

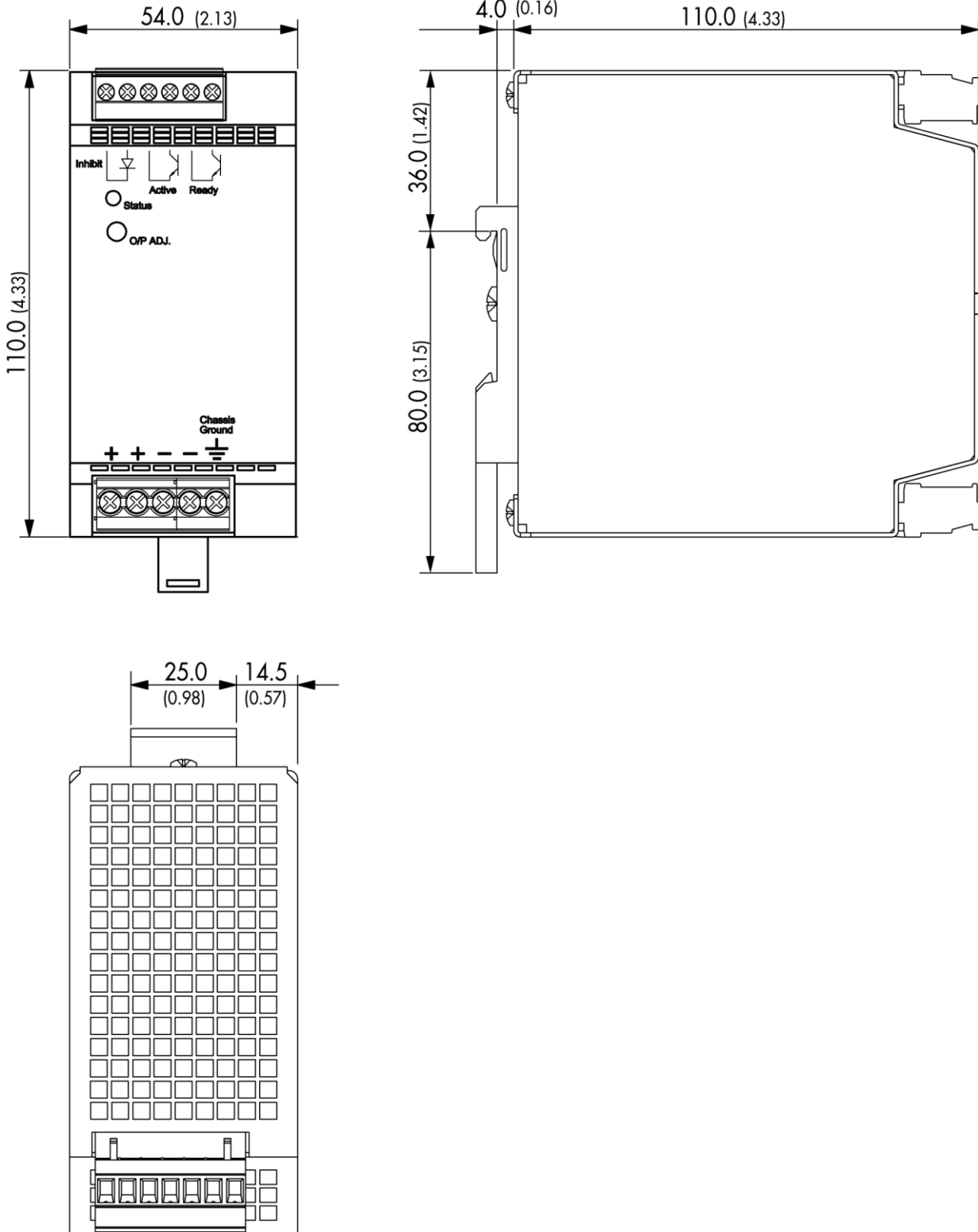
BUFFER MODULE TSP-BFM24

Operating Instructions



Dimensions drawings:

TSP-BFM24



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-BFM24 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-BFM24 is constructed in accordance with the safety requirements of IEC 60950, EN60950, UL60950 and UL508.

The TSP-BFM24 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-BFM24 can result in death, severe personal injury or substantial property damage. **The TSP-BFM24 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 TSP-BFM24 threshold level 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 installation has been carried out by a competent person and protection against electrical shock is guaranteed!
- That the input wiring is sufficiently dimensioned!
- That the output wiring is dimensioned according to the maximum output current or separately protected!
- That the protective earth is connected.
- 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. The TSP-BFM24 nor the 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-BFM24 or the 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-BFM24 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-BFM24 or power supply can result in death or fatal injury.



Danger: Never work on the TSP-BFM24 or power supplies if power is applied!

**1. Description and construction**

The TSP-BFM24 Buffer Module will hold the output voltage of a 24VDC power supply after brown outs or voltage dips of up to ten full 50Hz cycles. During this buffer period no deterioration of the 24VDC 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 a "POWER FAIL" signal. The hold up time is typically 200ms at 25A and 4 seconds typically at 1,2A. After 4 seconds the buffer device will switch off the output voltage. The operation modes of the module are indicated by a LED on the front panel also. The big 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.

The TSP power supply has to be connected to the load as well as to the TSP-BFM24 module (see Fig. 1.1). The device is in parallel to the output voltage of the TSP power supply, and charges its internal hold-up capacitors during normal operation. The charge current (<0.6A) is taken from the power supply output itself (charging time 30 sec max.). The output voltage is monitored, if it drops below an adjusted threshold the TSP-BFM 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 100mA typ. (typ. 2.5W). The output voltage of the TSP power supply has to be 1V higher as the threshold level adjusted by the potentiometer (see Fig. 3.1)

The threshold level can be adjusted on two different ways:

Option 1: In the factory the TSP-BFM24 is charged and then discharged with no load, this gives the operator 4s approx. to set the threshold level.

Option 2: Less accurate. Turn the TSP-BFM24 Potentiometer fully clockwise and connect the TSP-BFM24 to a DC supply or the TSP power supply unit set to 22.5V (for 24Vdc output voltage use) or to the level which the threshold level should be set. Turn the Buffer Pot anti-clockwise until the charging LED starts flashing Green/Red

The TSP-BFM24 is a built-in unit. 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-BFM24 is designed for mounting on a DIN rail TS35 (DIN EN 50022-35x15/7.5). The TSP-BFM24 is not protected against reverse input polarity.

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-BFM24 a minimum free space of 80mm [3.15in] is required and on each side of the TSP-BFM24 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 power derating above ambient temperatures of 40°C as specified for the TSP power supplies.

2.1 Assembly

To fix unit 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 unit, 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 unit off DIN-rail.

Wall mounting or chassis mounting can be achieved by use of optional mounting bracket TSP-WMK01 (1 bracket, see Fig. 3.1). 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-BFM24 (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 and COMBICON plug connectors (Signals). This reliable and easy-to-assemble connection method enables a fast connection of the device.

2.2.1 Input (Fig. 3.1 → Connector J1, pin 1, pin 2, pin 3, pin 4 & pin 5):

The connection is made by using the $-V_{in}$ and $+V_{in}$ connections (see Fig. 3.1 → Connector J1, pin 1, pin 2, pin 3 and pin 4) as well as protective earth (see Fig. 3.1 → Connector J1, pin 5) and has to be carried out in accordance with the local regulations. Sufficiently dimensioned wiring has to be ensured (see chapter 2.2.1.1) or has to be separately protected.

To achieve a reliable and shockproof connection strip the connecting ends according chapter 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

| Unit | Terminals | Function | Solid or stranded wires | | Torque | Stripping length |
|----------------------------|---|----------------------------------|-------------------------|-----------|-----------|------------------|
| | | | [mm ²] | [AWG] | [Nm] | [mm] |
| TSP 090-124 TSP 180-124 |  | Protective Earth Conductor | 0.5 ... 2.5 | 24 ... 12 | 0.5 – 0.6 | 7.0 |
| | + & - | Input Voltage (24VDC) | 0.5 ... 2.5 | 24 ... 12 | 0.5 – 0.6 | 7.0 |
| | Signal | Inhibit, active and ready signal | 0.2 ... 2.5 | 32 ... 12 | 0.5 – 0.6 | 7.0 |
| TSP 360-124 |  | Protective Earth Conductor | 0.5 ... 2.5 | 24 ... 12 | 0.5 – 0.6 | 7.0 |
| | + & - | Output Voltage (24VDC) | 1.0 ... 2.5 | 18 ... 12 | 0.5 – 0.6 | 7.0 |
| | Signal | Inhibit, active and ready signal | 0.2 ... 2.5 | 32 ... 12 | 0.5 – 0.6 | 7.0 |
| TSP 600-124 |  | Protective Earth Conductor | 1.0 ... 4.0 | 18 ... 10 | 0.5 – 0.6 | 7.0 |
| | + & - | Output Voltage (24VDC) | 2.0 ... 4.0 | 12 ... 10 | 0.5 – 0.6 | 8.0 |
| | Signal | Inhibit, active and ready signal | 0.2 ... 2.5 | 32 ... 12 | 0.5 – 0.6 | 7.0 |

2.2.2 Signalling (Fig. 3.1 → Connector J2, pin 3, pin 4, pin 5 & pin 6):

The output “Active” is for enabling monitoring of the functions if the TSP-BFM24 is in operation. This signal is detected by measuring the input voltage direct at the input pins and is provided by an open collector opto coupler which can handle 10mA in maximum (see also Fig 1.1 and Fig. 3.1 → connector J2, pin 3 & pin 4). The output “Ready” is providing the signal if the TSP-BFM24 is ready to provide the current (see Fig. 3.1 → Connector J2, pin 5 & pin 6). The “Ready” signal is provided by an open collector opto coupler which can handle 28Vdc/10mA. It is detected by measuring the TSP-BFM24 voltage level direct at the capacitors (see Fig. 1.1).

2.2.2.1 Status LED:

The Status LED is a two colour LED which indicates the status of the TSP-BFM24 module and enables visual evaluation of the function locally in the control cabinet. Status LED green – normal operation, TSP-BFM24 is ready to provide a current of 25A max.. Status LED red – input voltage on the TSP-BFM24 is lower as the adjusted threshold level. Status LED is changing from green to red – TSP power supply is charging the TSP-BFM24 module. Status LED green pulsing – TSP-BFM is providing output current, discharging of TSP-BFM24.

3. Function

3.1 Inhibit:

The TSP-BFM24 unit provides an Inhibit function by use of pin 1 & pin 2 at connector J2 (see Fig. 3.1) to control the TSP-BFM24 module. To switch off the TSP-BFM24 a voltage level between 5Vdc and 28Vdc has to be applied on Connector J2 pin 1 (Inhibit GND) and Connector J2, pin 2 (Inhibit +). At open connection or a voltage level between 0Vdc and 1Vdc between J2 pin 1 (Inhibit GND) and pin 2 (Inhibit +) the device is ready to provide the output current for the requested buffer time.

4. Compliance to UL508C

The TSP-BFM24 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 connected to the TSP-BFM24. Please see operating temperature range and load derating at the TSP power supply datasheet or TSP operating instructions.

5. Technical Specifications

4.1 Input Specifications

| Order code Model | Input | Buffer Time | * Operating Voltage Range | max. Output Current |
|------------------|--------|--|---------------------------|---------------------|
| TSP-BFM24 | 24 Vdc | Depending on load (see Fig. 2.1) 200 msec @ 25A load 4 sec @ 1.2A load | 22 - 28 Vdc | 25.0 A (600W) |

* Output voltage adjustable

** Maximum current at Vout nom.

5.2 Output Specifications

| | | |
|---|-------------------------------------|--------------------|
| Threshold adjustable Range with Potentiometer | | 22 - 28 Vdc |
| Ripple and Noise (20MHz Bandwidth) | at $V_{in\ nom}$ und $I_{out\ max}$ | 200mV pk-pk max |
| Parallel operation | | 2 devices possible |

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 |
| Buffer voltage | | Adjustable, >1Vdc below input voltage, min. 22Vdc |
| Charging | | 0.6A max. / 30s max. |
| Status signal | | Buffer active, Buffer ready (optocoupler output) And dual colour LED for status indication |
| 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 |
| Inhibit | see Fig. 3.1 | see Fig. 3.1; J2 pin 1 (GND) & pin 2 (+) optocoupler input voltage level of 5Vdc to 35Vdc / 5mA max is applied → Device off if a voltage level of 0Vdc to 1Vdc is applied → Device on |
| Alarm Outputs | | 28Vdc / 10mA |
| 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 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 for TSP-BFM24 (see datasheet page 7) |
| Connection | | Screw terminal and pluggable screw terminal (plug included) |

Block diagram TSP-BFM24

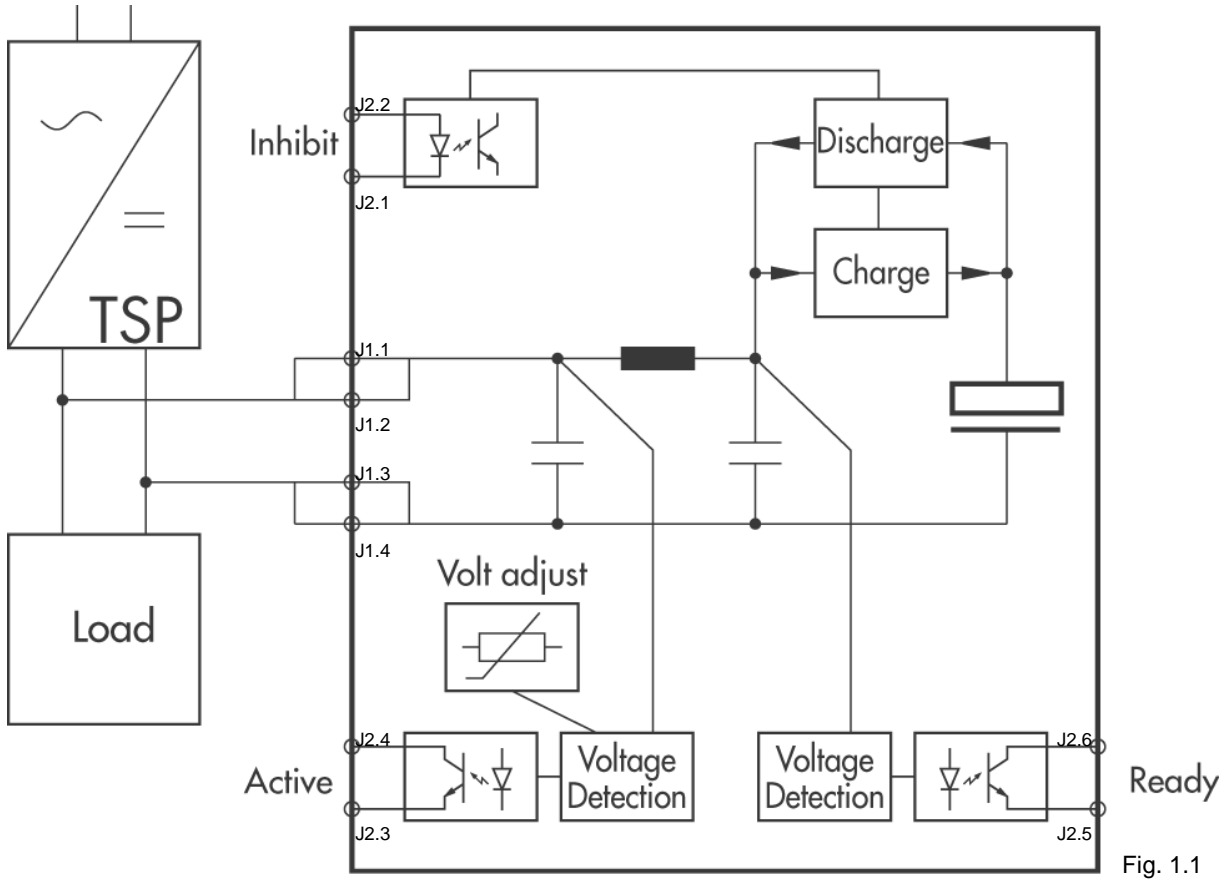


Fig. 1.1

TSP-BFM24 – Buffer Time vs. Load Power

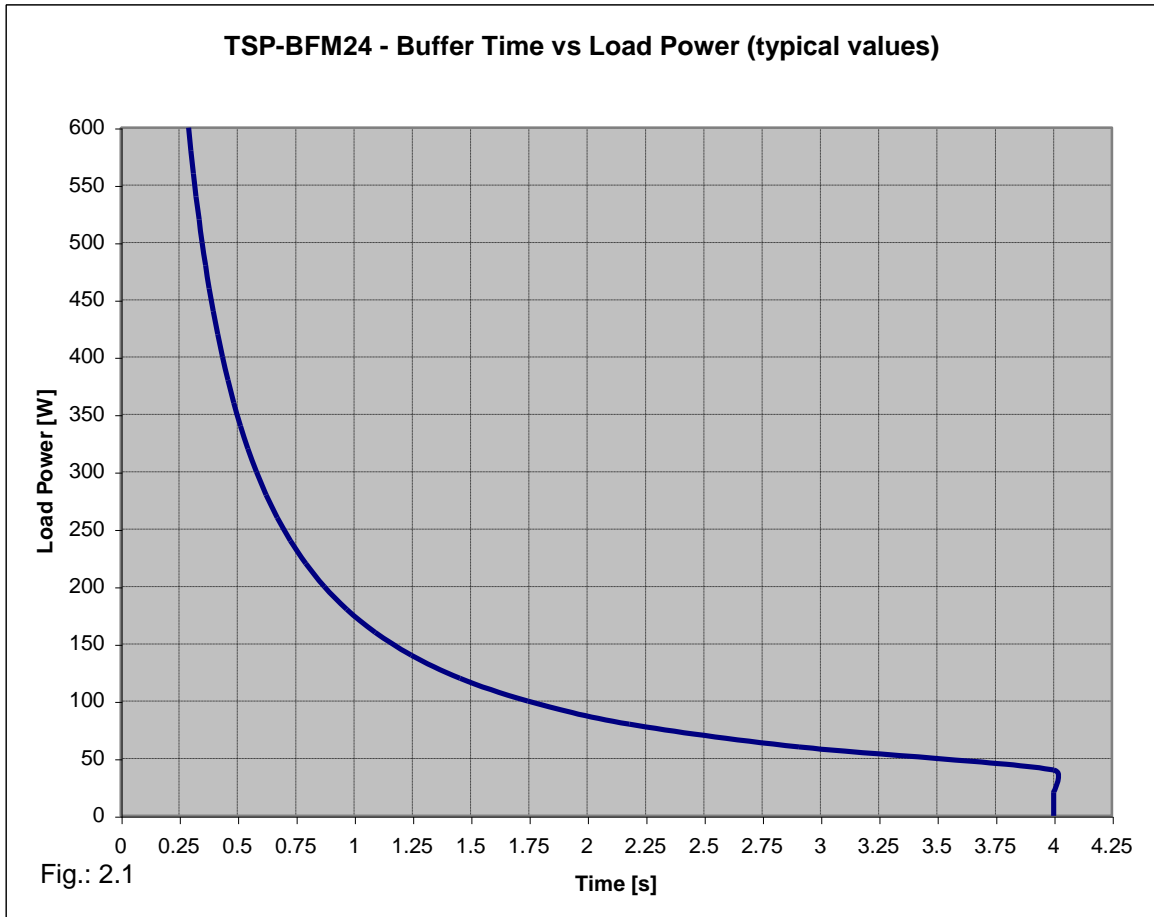
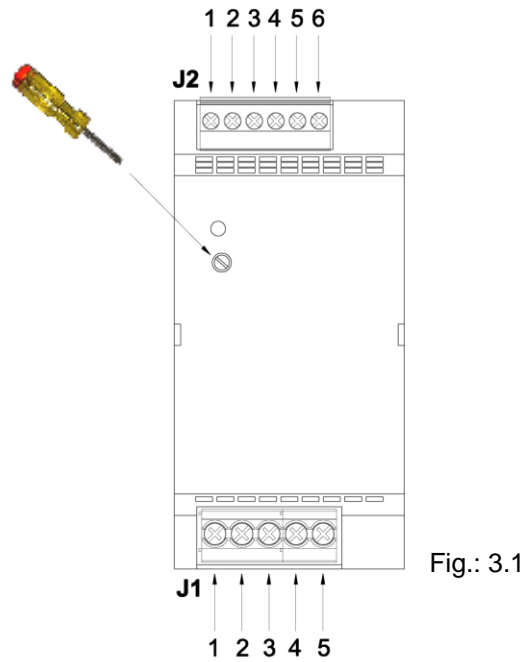


Fig.: 2.1

Connectors of TSP-BFM24



| | J1 | J2 |
|-------|------|---------------|
| Pin 1 | +Vin | Inhibit GND |
| Pin 2 | +Vin | Inhibit + |
| Pin 3 | -Vin | Active GND |
| Pin 4 | -Vin | Active Signal |
| Pin 5 | FG | Ready GND |
| Pin 6 | - | Ready Signal |

Wall mounting brackets (TSP-WMK01) for TSP-BFM24

