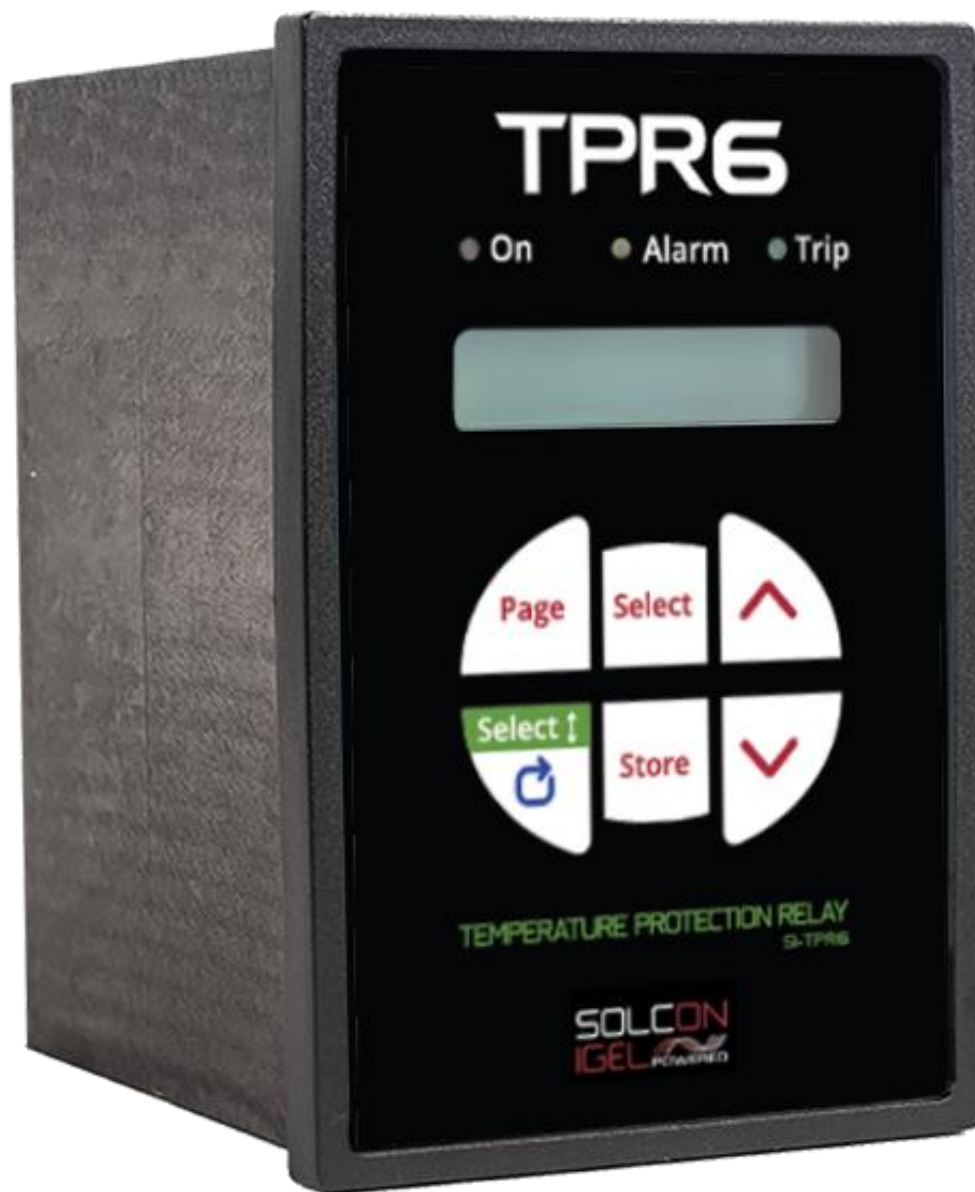


# TPR6

## Temperature Protection Relay



Instruction Manual

Ver.03.25

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	<p><b>Safety notes</b></p> <ul style="list-style-type: none"> <li>• Read this manual carefully before operating the equipment and follow its instructions.</li> <li>• Installation, operation and maintenance should be in strict accordance with this manual, national codes and good practice. Installation or operation not performed in strict accordance with these instructions will void manufacturer’s warranty.</li> <li>• Disconnect all power inputs before servicing the relay.</li> <li>• For use in a pollution degree 2 environment or equivalent.</li> <li>• This device is not intended to provide motor overload protection, and suitable protection should be provided in the end product.</li> <li>• <b><u>DANGER</u></b> - Electrocution Hazard - RTDs or other sensors connected to this device must be provided with electrical isolation sufficient for the voltage present on the motor windings (or other equipment being monitored). Sensors must also be provided with shielded cables, and all shields must be reliably grounded.</li> </ul>
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*The company reserves the right to make any improvements or modifications to its products without prior notice.*

## 1. INTRODUCTION

The TPR6, **Temperature Protection Relay**, is a new generation of micro-processor-based relay, designed to protect electric motors, transformers and other systems from over temperature.

The TPR6 has 6 or 14 temperature inputs that can be programmed to measure Thermistors (PTC or NTC) and RTDs (Pt100).

Each temperature input can be Disabled or Enabled, designated as Thermistor-PTC or Thermistor-NTC or RTD (Pt100). Protection levels and time delay are programmable as well as grouping for combining the data in the analog output.

Additionally, a Fan control function allows to set a temperature and time delay to start a fan and a time delay to stop the fan.

### Temperature sensor types & mode of operation.

- **Number of sensors** - can be set from 1-6 (TPR6-6) or 1-14 (TPR6-14)
- **Sensor type** – Each sensor can be set as RTD, Thermistor-PTC, Thermistor-NTC or Not Used (requires changing sensor type from RTD to Thermistor and Vice Versa and includes internal dip switches modification – refer to section 7 page 21 for dip switches settings).
- **Level 1** (for example Alarm) – Different levels can be set for each sensor. Levels are set in degrees C for RTD type sensors or KOHMS for Thermistor type sensors.
- **Level 2** (for example Trip) - Different levels can be set for each sensor. Levels are set in degrees C for RTD type sensors or KOHMS for Thermistor type sensors.
- **Time delay level 1** – A time delay can be set for level 1.
- **Time delay level 2** - A time delay can be set for level 2.
- **Group of sensors** – Used for analog output.
- **Fan Turn On Temp.** - Each sensor can be set to control a fan via Relay C (terminals 7, 8 & 9). Different levels can be set for each sensor (a constant time delay of 2 seconds applies).
- **Fan Turn Off Delay** – After turning on, and if temperature is below set value, Fan control relay C will be de-energized after the set delay.

### Input / Output configuration

Unique Tripping / Alarm options makes it possible to designate any fault as an Alarm, Trip, both or none. This unique facility also enables controlled fault Reset possibilities.

- **Alarm relay** as Alarm, Alarm-fail safe or Tripping / Alarm
- **Trip relay** as Trip, Trip-fail safe or Tripping / Alarm
- **Input 1** (discrete) – As Remote Reset, External Fault 1 – N.O. or N.C. contact
- **Input 2** (discrete) – As Remote Reset, External Fault 2 – N.O. or N.C. contact
- **Analog output** – As 0-20mA Normal or 4-20mA Normal or Inverted
- **Analog output group** – Group Minimum, Average, Maximum
- **Communication RS485** – can be locked or unlocked, address numbers for each sensor and baud rate.
- **Fan relay** as Fan, or Tripping / Alarm.

### Trip / Alarm configuration

Each sensor as well as two discrete inputs, communication fault and internal fault can be configured, separately for level 1 and 2, as follows:

- **Trip function** – Enabled or Disabled
- **Alarm function** – Enabled or Disabled
- **Auto Reset function** – Enabled or Disabled
- **Operating Relay A** – Enabled or Disabled
- **Operating Relay B** – Enabled or Disabled
- **Operating Relay C** – Enabled or Disabled (Only when NOT set to FAN)
- **Operating Relay D** – Enabled or Disabled

### Displaying Actual data

- Temperature (RTD) or resistance (Thermistors) of each sensor, Failure of sensor connecting wires.

Statistical data

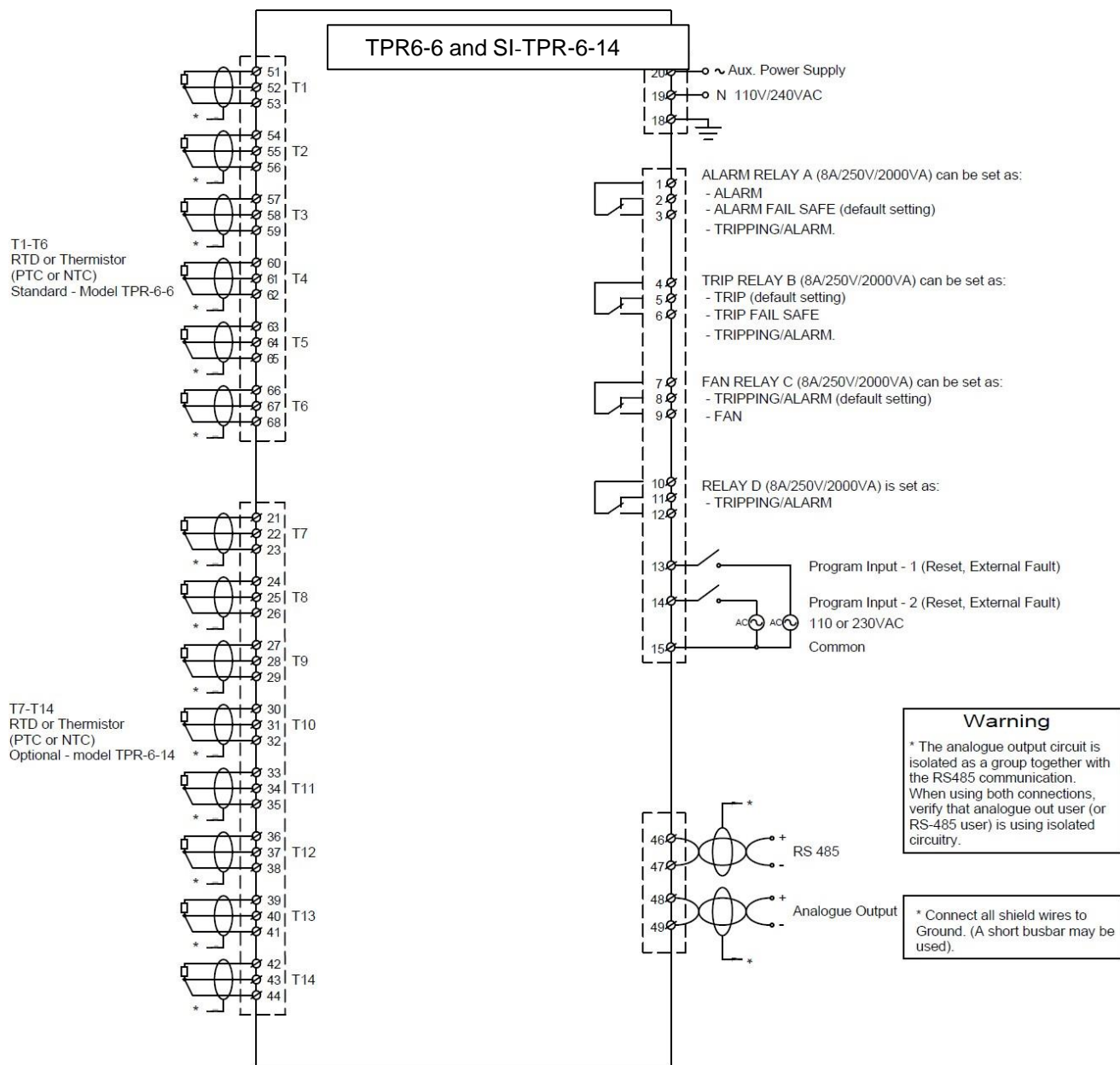
- **Max. value of each sensor**
- **Last trip**
- **Last alarm**
- **Total number of trips**
- **Temperature / Resistance of each sensor at time of trip**

All above parameters can be individually configured through a keypad on the front panel or through communication.

The Liquid Crystal Display (LCD), together with a Keypad and LEDs enables user friendly interface, accurate digital parameters setting, actual parameters readings, and detailed trip and alarm message displays. Changes can easily be prevented by the usage of the parameter lock feature.

RS485 serial link (with MODBUS communication protocols), operating at baud rate of 1200 to 19200 bits/sec. enables monitoring of both the set points and actual parameters. Changes of the set points parameters through the serial link makes it very easy to enter customer set points in place of the factory default parameters. Parameter setting through the serial link may be easily disabled through manual keypad setting. Up to 32 TPR6 units can be connected on the same link to the host computer.

## 2. WIRING DIAGRAM

**Notes:**

1. Refer to section 5.2 Parameter Setting – I/O Settings page 12 for more information.
2. **Warning:** The analog output circuit is isolated as a group together with the RS-485 communication. When using both connections, verify that analog out user (or RS-485 user) is using an isolated circuitry.  
Connect all shield wires to ground (a short busbar may be used)
3. **Relays Contacts:**  
Rated load: 8A/250 VAC (VDE, UL, cUL); 8A/24VDC (UL, cUL).  
Maximum breaking capacity AC: 2000 VA  
Max. DC Load Breaking Capacity: 8A at 30VDC.
4. **DANGER** - Electrocution Hazard - RTDs or other sensors connected to this device must be provided with electrical isolation sufficient for the voltage present on the motor windings (or other equipment being monitored). Sensors must also be provided with shielded cables, and all shields must be reliably grounded.

### 3. TERMINALS REVIEW

**General Notes:**

Use 75°C copper wires only

**Control Supply**

110-240V 50/60Hz or DC (+10% / -15%)

Phase/Positive Lead .....	20
Neutral/Negative Lead .....	19
Ground .....	18

The TPR6 incorporates four relays, each with 1-C/O contact, rated 8A/250 VAC, 2000VA resistive. See I/O SETTINGS (page 2).

**Note:**

Tighten terminals 18, 19, 20 to 7 in-lbs

**Output Relay A - Alarm**

Relay contacts can be configured as one of:

- ALARM RELAY – contact changes upon fault and returns after reset (after fault has been removed).
- ALARM FAIL-SAFE logic – contact changes when control voltage is connected and returns upon fault. Relay is energized when control voltage is connected. Upon fault, which is designated as Alarm, the relay de-energizes. This relay can be used to sense control supply outage.
- TRIPPING / ALARM - Relay can be assigned to specific faults that are enabled as alarm or trip.

Common.....	1
N.C.....	2
N.O.....	3

**Output Relay B - Trip**

Relay contacts can be configured as one of:

- TRIP Relay – contact changes upon fault and returns after reset (after fault has been removed).
- TRIP FAIL-SAFE logic – contact changes when control voltage is connected and returns upon fault.
- TRIPPING / ALARM - Relay can be assigned to specific faults that are enabled as alarm or trip.

Common .....	4
N.C.....	5
N.O.....	6

**Output Relay C – Fan Programmable**

Relay contacts can be configured as one of:

- FAN
- TRIPPING / ALARM - Relay can be assigned to specific faults that are enabled as alarm or trip.

Common .....	7
N.C.....	8
N.O.....	9

**Output Relay D – Programmable as TRIPPING/ALARM**

Relay can be assigned to specific faults that are enabled such as alarm or

trip. Common.....	10
N.C.....	11
N.O.....	12

**Discrete Logic Inputs**

Programmable inputs from N.O or N.C. contacts (See I/O Settings)

Input voltages are 110-240V 50/60Hz or DC (+10% / -15%)

Input 1 .....	13
Input 2 .....	14
Common.....	15

---

## Thermal Inputs

The TPR6 can accept inputs from the following types of thermal sensors:

- RTD - Platinum 100 Ohm (Pt100) - Three-wire measurement system to be used to compensate for cable resistance.
- Thermistors - field Programmable as PTC or NTC (Two wire)

### Notes:

1. Shielded cables must be used. Connect shield to external ground.
2. For RTD maximum cable resistance allowed is 25 Ohm.
3. LCD display in Celsius degrees for RTD and in KOHMS for Thermistors
4. If a sensor is not used, leave relevant terminals open, and set in TEMPERATURE SETTING, Tx SENSPR TYPE – NOT USED. This will prevent the display of the non-used sensors and to disable the relevant Trip and Alarms.

### For 6 thermal inputs

Thermistor 1 .....	51+52	RTD 1 .....	51+52, 53
Thermistor 2 .....	54+55	RTD 2 .....	54+55, 56
Thermistor 5 .....	57+58	RTD 3 .....	57+58, 59
Thermistor 4 .....	60+61	RTD 4 .....	60+61, 62
Thermistor 5 .....	63+64	RTD 5 .....	63+64, 65
Thermistor 6 .....	66+67	RTD 6 .....	66+67, 68

### For a 14 thermal inputs

Thermistor 7 .....	21+22	RTD 7 .....	21+22, 23
Thermistor 8 .....	24+25	RTD 8 .....	24+25, 26
Thermistor 9 .....	27+28	RTD 9 .....	27+28, 29
Thermistor 10.....	30+31	RTD 10 .....	30+31, 32
Thermistor 11.....	33+34	RTD 11 .....	33+34, 35
Thermistor 12.....	36+37	RTD 12 .....	36+37, 38
Thermistor 13.....	39+40	RTD 13 .....	39+40, 41
Thermistor 14.....	42+43	RTD 14 .....	42+43, 44

**Note:** Disconnected sensors do not trip the unit!

### Serial Link

Standard RS485 Half Duplex, with MODBUS protocol.

Twisted & shielded pair should be used for wiring.

Acceptable baud rates: 1200, 2400, 4800, 9600 and 19200 BPS.

Serial Port (+) ..... 46

Serial Port (-) ..... 47

### Warning

The analog output circuit is isolated as a group together with the RS485 communication. When using both connections, verify that analog out user (or RS-485 user) is using isolated circuitry.

### Notes:

1. Auxiliary Power Supply must be turned Off after changing baud rate value.
2. In order to match the line, connect 120 Ohm resistors between + and - at the end and the beginning of the line.

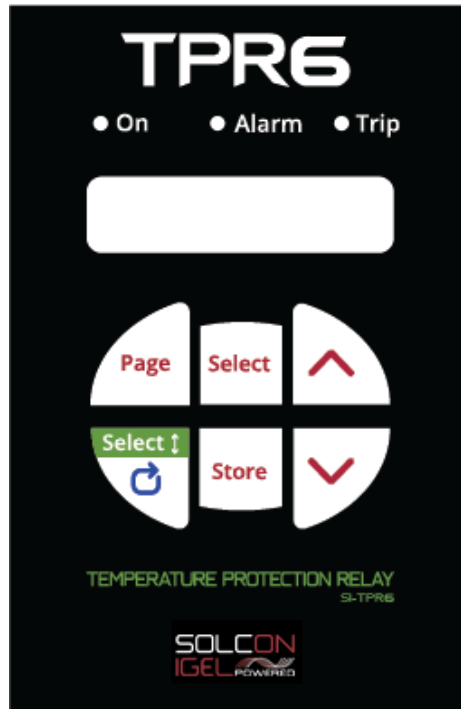
### Analog Output

See isolation Warning (this page) . The output is programmable to 0-20mA, 4-20mA, Normal or Inverted designated to any single sensor, minimum, average or maximum of a group of sensors.

Serial Port (+) ..... 48

Serial Port (-) ..... 49

## 4. FRONT PANEL DESCRIPTION

**LEDs**

**On** - Illuminates when auxiliary power supply voltage is connected.

**Alarm** - Illuminates in Alarm condition. Stays lit even if alarm condition disappears, turns off after resetting.

**Trip** - Illuminates in Trip condition. Stays lit even if trip condition disappears, turns off after resetting.

**Keys Overview**

**PAGE** - Press to change set point pages in positive cyclical order.

**SELECT** - Press to scroll parameters within page in forward cyclic order. Short press on the Reset key will reverse scrolling direction. A small line will appear under the first letter of the lower line (for example RTD).

▲ - Press once to increase parameter value. Press and hold to increase value at a fast rate.

▼ - Press once to decrease parameter value. Press and hold to decrease value at a fast rate.

**STORE** - Press to store displayed parameter value in the non-volatile memory.

**RESET/SELECT** – This key has two functions:

Press for more than 1 second to cancel displayed Alarm or Trip (after fault has been removed).

This key can also be used to change direction of **Select** operation. See above **Select** key.

**Notes:**

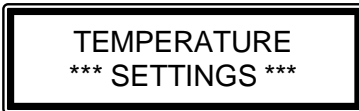
1. Changing and storing new parameters is possible only if PARAMETER LOCK is set to NO.
2. If PARAMETER LOCK is set to LOCKED, parameters can only be viewed.

**LCD**

Illuminated, two lines of 16 characters each, presenting, Top line, parameter name. Bottom Line, parameter value, or all other data, statistics and messages.

## 5. MODE PAGES DISPLAY

Upon initiation the LCD will display:



By pressing **PAGE** key the following pages can be reviewed



In order to review details of the above page settings, press **SELECT** key.

Messages are displayed on the LCD in two lines.

- \* The upper line describes the parameter's name.
- \* Lower line shows its value.

To change settings, when PARAMETER LOCK is NOT LOCKED, press **▲ or ▼** keys and save the new value by pressing **STORE** key. Once data was properly stored in the non-volatile memory the LCD displays the 2 sec. flash message:



### Notes:

1. Pressing **STORE** key while the LCD displays an ACTUAL DATA parameter will store this parameter as default display. If no key is pressed for more than five minutes, this parameter will be constantly displayed.
2. A new parameter setting becomes effective upon setting, even before storing it in the non-volatile memory. However, setting a parameter without storing and moving to another page will return the parameter to its previously stored value.
3. Any set parameter can be viewed, altered and stored at any time (provided that PARAMETER LOCK is set NOT LOCKED). However, it is not recommended to change and store parameters while motor is running.
4. Any stored parameter is kept indefinitely in the non-volatile memory.

### Returning to Factory Default Values:

Press **PAGE** and **▼** keys simultaneously, the LCD displays: SERVICE OPTIONS

Press **SELECT** key three times, the LCD will display: STORE NOW DEFAULT PARAMETERS?

Press **STORE** and **PAGE** keys simultaneously, the LCD will display: DATA SAVED OK

**Note:** Storing Default parameters erases all previously updated parameters

## 5.1 Parameter Setting – Temperature Settings

TEMPERATURE  
\*\*\* SETTINGS \*\*\*

NO. OF SENSORS  
3

Press **▲** or **▼** keys to set actual number of connected sensors  
Range: 1-6 in TPR6-6 and 1-14 in TPR6-14.

Press **SELECT**

Tx SENSOR TYPE  
RTD

Type of temperature sensor in temperature input x.

x represents any number between 1-6 in TPR6-6-6 and any number between 1-14 in TPR6-14. Press **▲** or **▼** keys to set actual type of sensors.

Sensor type must be modified via internal dip switches (Refer to section 7 page 21.) as well as via the software.

Range: NOT USED, RTD, PTC THERMISTOR, NTC THERMISTOR

If more than one sensor is used (as set in parameter NO. OF SENSORS above) it will show T2 SENSOR

**Important Note: - In order to set the sensor type connected to the TPR6 the Tx SENSOR TYPE parameter must be set accordingly, and dip switch setting must be done as well. Refer to section 7 page 21 for dip switch settings.**

Press **SELECT**

Tx LEVEL 1  
120 deg. C

Tx LEVEL 1 (represents T1 LEVEL 1, T2 LEVEL 1 etc...) is normally used to set an Alarm Level

- If Tx SENSOR TYPE is set to RTD this display is in deg. C (Celsius degrees).
- If Tx SENSOR TYPE is set to PTC-THERMISTOR or NTC-THERMISTOR this display is in KOHM.

Press **▲** or **▼** keys to set Tx LEVEL 1 value

Range for RTDs: 5 – 250 deg. C.

Range for Thermistors: 0.5 – 25.0 KOHM

Press **SELECT**

Tx LEVEL 2  
140 deg. C

Tx LEVEL 2 (represents T1 LEVEL 2, T2 LEVEL 2 etc...) is normally used to set a Trip Level

- If Tx SENSOR TYPE is set to RTD this display is in deg. C (Celsius degrees).
- If Tx SENSOR TYPE is set to PTC-THERMISTOR or NTC-THERMISTOR this display is in KOHM.

Press **▲** or **▼** keys to set Tx LEVEL 2 value

Range: 5 – 250 deg C

Press **SELECT**

TEMP. LEVEL 1 DELY  
2.0 SEC.

Time delay for Level 1 (for all sensor channels)

Press **▲** or **▼** keys to set time delay

Range: 0.1 – 20 Sec.

Press **SELECT**

TEMP. LEVEL 2 DELY  
 2.0 SEC.

Time delay for Level 2 (for all sensor channels)

Press **▲** or **▼** keys to set time delay

Range: 0.1 – 20 Sec.

Press **SELECT**

Tx IN GROUP ?  
 YES

Any sensor 1-14 can be grouped for group measurement and analog output.

Press **▲** or **▼** keys to set whether the temperature input Tx is in the analog out group.

Range: YES, NO

Press **PAGE**. The display will change to the next page: I/O SETTINGS.

Tx – TURN FAN ON  
 NOT USED

Any of the temperature sensors can be set to operate Fan relay C at a set temperature level.

Note that in order to operate - parameter CONFIG.FAN RELAY (see I/O Parameters settings below) must be set to FAN.

- If Sensor Type is set to RTD this display is in deg. C
- If Sensor Type is set to Thermistor this display is in KOHM.

Press Up / Down keys to set Fan Turn On value

Range: 5 – 250 deg C

Repeat for all sensors.

Press **SELECT**

FAN OFF DLY TIME  
 10 Min.

Off delay Time for Fan

Press Up / Down keys to set time delay. The off delay time is after the temperature is below the temperature set on Tx – TURN FAN ON parameter (see above).

Range: 1 – 50 Min.

Press **PAGE**

## 5.2 Parameter Setting – I/O Settings



Press **SELECT**



Configure Alarm Relay function

Press **▲** or **▼** keys to set required operation mode

Range: ALARM, ALARM FAIL SAFE, TRIPPING/ALARM

**ALARM** - the relay changes position upon trip and returns to original position upon reset, after fault has been removed.

**ALARM FAIL SAFE** - the relay changes position upon voltage connection and returns to original position upon fault.

**TRIPPING / ALARM** - Relay can be assigned to specific faults that are enabled as alarm or trip.

Press **SELECT**



Configure Trip Relay function

Press **▲** or **▼** keys to set required operation mode

Range: TRIP, TRIP FAIL SAFE, TRIPPING/ALARM

**TRIP** - the relay changes position upon trip and returns to original position upon reset, after fault has been removed.

**TRIP FAIL SAFE** - the relay changes position upon voltage connection and return to original position upon fault.

**TRIPPING / ALARM** - Relay can be assigned to specific faults that are enabled as alarm or trip.

Press **SELECT**



Configure input 1 function

Press **▲** or **▼** keys to set required input function for INPUT 1.

Range: REMOTE RESET, EXTERNAL FAULT 1 N.O., EXTERNAL FAULT 1 N.C.

Press **SELECT**



Configure Trip Relay function

Press **▲** or **▼** keys to set the required input function for INPUT 2.

Range: REMOTE RESET, EXTERNAL FAULT 2 N.O., EXTERNAL FAULT 2 N.C.

Press **SELECT**



Configure Analog Output

Press **▲** or **▼** keys to configure the analog output.

Range: 0-20mA NORMAL, 4-20mA NORMAL, 0-20mA INVERTED and 4-20mA INVERTED

---

Press **SELECT**

AN. OUT PARAMETER  
GROUP MAXIMUM

Configure Analog Output – related to the minimum, average or maximum of the selected group  
Range: GROUP MINIMUM, GROUP AVERAGE, GROUP MAXIMUM, T1, T2, T3.....R1, R2....

Press **SELECT**

AN. OUT FUL RANGE  
200 deg C

Analog Output Full Range

Press **▲ or ▼** keys to set the full range (or full scale) upon which the analog output is referred to.  
Range: For Thermistor 0-25 KOHM, For RTD 0-250 deg C.

Press **SELECT**

PARAMETERS LOCK  
NOT LOCKED

When locked – parameters can be reviewed but not modified

When unlocked – parameter settings can be modified

Press **▲ or ▼** keys to lock/unlock parameters settings.

Range: NOT LOCKED, LOCKED

Press **SELECT**

S. LINK SAVE LOCK  
LOCKED

When locked – parameters can be reviewed but not modified via the communication link.

When unlocked – parameter settings can be modified

Press **▲ or ▼** keys to lock/unlock parameters settings via communication.

Range: NOT LOCKED, LOCKED

Press **SELECT**

ADDRESS NUMBER  
248

Address number of the communication link.

Press **▲ or ▼** keys to set communication link address.

Range: 1-248 (note that 248=off)

Press **SELECT**

BAUD RATE  
19200

Press **▲ or ▼** keys to set the baud rate of communication link. Range:

1200, 2400, 4800, 9600, 19200

Press **SELECT**

COM. PARITY  
EVEN

Press **▲ or ▼** keys to set the communication link parity.

Range: ODD, EVEN, NONE

Press **SELECT**

CONFIG. FAN RELAY  
TRIPPING / ALARM

Configure Fan Relay C function

Press Up / Down keys to set required operation mode.

Range: FAN, TRIPPING / ALARM

- **FAN** - The relay changes position when the fan must be turned on.  
When the temperature of the sensor/s that are set to operate a fan (see parameter Tx – TURN FAN ON above) exceeds the set level for 2 seconds, relay C will be energized to operate a fan.  
The relay will be de-energized after a set delay time has elapsed (see parameter FAN OFF DLY TIME above)
- **TRIPPING / ALARM** - Relay can be assigned to specific faults that are enabled as alarm or trip.

Press **PAGE**. The display will change to the next page: TRIPPING/ALARM OPTIONS.

### 5.3 Parameter Setting – Tripping and Alarm Options

TRIPPING / ALARM  
\*\*\* OPTIONS \*\*\*

Refer to section 8 - Tripping / Alarm Default Settings on page 23 for the default settings of all the parameters in the TRIPPING/ALARM OPTIONS mode page.

#### Protection function

Each of the TPR6 Protection functions can be assigned to each of the following functions:

1. TRIP function – ENABLED or DISABLED, if ENABLED can be programmed to TRIP or TRIP-FAIL SAFE function (see I/O SETTINGS page)
2. ALARM function – ENABLED or DISABLED
3. AUTO RESET – Enabled or Disabled
4. Operate RELAY A – ENABLED or DISABLED
5. Operate RELAY B – ENABLED or DISABLED
6. Operate RELAY C – ENABLED or DISABLED
7. Operate RELAY D – ENABLED or DISABLED

RELAY A, RELAY B, RELAY C must be configured as TRIPPING/ALARM in the I/O SETTING PAGE in order to operate in the TRIPPING/ALARM mode. (RELAY D is set to TRIPPING / ALARM and cannot be modified to a different setting)

Each of the TPR6 Protection functions has two levels – LEVEL 1 and LEVEL 2

The following represents the displays shown for level 1 of the first temperature sensor. Similar displays are shown for all sensors with LEVEL 1 faults then for all sensors with LEVEL 2 sensors.

**Note:** If a sensor is set as NOT USED (in TEMPERATURE SETTINGS mode page), then only one screen (per Level) for this sensor will be displayed, showing NOT USED.

Press **SELECT**

Tx LEVEL 1  
TRIP: DISABLE

Enabling, Disabling trip function for Tx LEVEL 1.

Press **▲** or **▼** keys to set if TRIP is after T1 LEVEL 1.

Range: DISABLE, ENABLE

Press **SELECT**

Tx LEVEL 1  
ALARM: ENABLE

Enabling, Disabling Alarm function for Tx LEVEL 1.

Press **▲** or **▼** keys to set if ALARM is after Tx LEVEL 1.

Range: DISABLE, ENABLE

Press **SELECT**

Tx LEVEL 1  
AUTO RST: DSABL

Enabling, Disabling auto-reset function for Tx LEVEL 1

Press **▲** or **▼** keys to set if Tx LEVEL 1 is AUTO RESET or not AUTO RESET.

Range: DISABLE, ENABLE

Press **SELECT**

Tx LEVEL 1  
RELAY C: DISABLE

Enabling, Disabling operation of RELAY A for Tx LEVEL 1.

Press **▲** or **▼** keys to set if RELAY A will follow Tx LEVEL 1 settings.

**Note:** Relay operates upon Tx LEVEL 1 fault which is enabled if RELAY C is set to TRIPPING/ALARM in the I/O SETTING PAGE.

Range: DISABLE, ENABLE

**Note:**

The settings of RELAY C are only possible when parameter CONFIG.FAN RELAY is set to TRIPPING / ALARM (see I/O SETTINGS menu above).  
 When CONFIG.FAN RELAY is set to FAN the operation of this relay is controlled by the parameters Tx TURN FAN ON and FAN OFF DLY TIME (see TEMPERATURE SETTINGS menu above). In this case RELAY C settings will not be displayed in the TRIPPING / ALARM parameters list.

Press **SELECT**

Tx LEVEL 1  
RELAY D: DISABLE

Enabling, Disabling operation of RELAY D for Tx LEVEL 1.  
 Press **▲ or ▼** keys to set if RELAY D will follow Tx LEVEL 1 settings.  
 Range: DISABLE, ENABLE

Press **SELECT** to see next Tx LEVEL 1, then all sensors with Tx LEVEL 2.

Press **SELECT**

EXTERNAL FAULT 1  
TRIP: DISABLE

Enabling, Disabling trip function upon closure of EXTERNAL FAULT INPUT 1.  
 Press **▲ or ▼** keys to set if EXTERNAL FAULT 1 is set to TRIP the unit.  
 Range DISABLE, ENABLE

Press **SELECT** to see ALARM, AUTO RST, RELAY A..RELAY D settings for EXTERNAL FAULT 1

**EXTERNAL FAULT 1**  
 EXTERNAL FAULT 1 occurs when terminal 13 – CONFIG. INPUT 1 is set as EXTERNAL FAULT 1 NO and the TPR detects a closed circuit between terminal 13 terminal 15 (common) input terminals.  
 EXTERNAL FAULT 1 occurs when terminal 13 - CONFIG. INPUT 1 is set as EXTERNAL FAULT 1 NC and the TPR6 detects open circuit between terminal 13 terminal 15 (common) input terminals.

EXTERNAL FAULT 1  
ALARM : DISABLE

EXTERNAL FAULT 1  
AUTO RST: DISABLE

EXTERNAL FAULT 1  
RELAY C: DISABLE

EXTERNAL FAULT 1  
RELAY D : DISABLE

Press **SELECT**

EXTERNAL FAULT 2  
TRIP: DISABLE

Enabling, Disabling trip function upon closure of EXTERNAL FAULT INPUT 1.  
 Press **▲ or ▼** keys to set if EXTERNAL FAULT 1 is set to TRIP the unit.  
 Range DISABLE, ENABLE

Press **SELECT** to see ALARM, AUTO RST, RELAY A..RELAY D settings for EXTERNAL FAULT 1

**EXTERNAL FAULT 2**  
 EXTERNAL FAULT 2 occurs when terminal 14 – CONFIG. INPUT 2 is set as EXTERNAL FAULT 2 NO and the TPR detects a closed circuit between terminal 14 terminal 15 (common) input terminals.  
 EXTERNAL FAULT 2 occurs when terminal 14 - CONFIG. INPUT 2 is set as EXTERNAL FAULT 2 NC and the TPR6 detects open circuit between terminal 14 terminal 15 (common) input terminals.

EXTERNAL FAULT 2  
ALARM: DISABLE

EXTERNAL FAULT 2  
AUTO RST: DISABLE

EXTERNAL FAULT 2  
RELAY C: DISABLE

EXTERNAL FAULT 2  
RELAY D: DISABLE

Press **SELECT**

COMM PORT FAILED TRIP: DISABLE
-----------------------------------

Fault occurs when the TPR6 detects three consecutive transmissions from the host computer, in which a parity bit, and/or the CRC word are wrong. Enabling, Disabling trip function upon communication failure. Press **▲ or ▼** keys to set this function.

Range: DISABLE, ENABLE

Press Select to see Alarm, AUTO RST, RELAY A..RELAY D settings for COMM PORT FAILED.

COMM PORT FAILED ALARM: DISABLE
------------------------------------

COMM PORT FAILED AUTO RST: DISABLE
---------------------------------------

COMM PORT FAILED RELAY C: DISABLE
--------------------------------------

COMM PORT FAILED RELAY D: DISABLE
--------------------------------------

Press **SELECT**

INTERNAL FAILURE TRIP: DISABLE
-----------------------------------

Enabling, Disabling trip function upon INTERNAL FAILURE in the TPR

Press **▲ or ▼** keys to set this function.

Range: DISABLE, ENABLE

Press Select to see Alarm, AUTO RST, RELAY A..RELAY D settings for COMM PORT FAILED.

Press **PAGE**. The display will change to the next page: ACTUAL DATA.

INTERNAL FAILURE ALARM: DISABLE
------------------------------------

INTERNAL FAILURE AUTO RST: DISABLE
---------------------------------------

INTERNAL FAILURE RELAY C: DISABLE
--------------------------------------

INTERNAL FAILURE RELAY D: DISABLE
--------------------------------------

5.4 **Actual Data**



The following demonstrates the readings with the following settings in TEMPERATURE SETTINGS:

T1 SENSOR TYPE is set to RTD - the display is in deg. C (Celsius degrees)

T2 SENSOR TYPE is set to PTC THERMISTOR – the display is in KOHM

T3 SENSOR TYPE is set to PTC THERMISTOR – the display is in KOHM

**Note:** If a sensor is set as NOT USED (in TEMPERATURE SETTINGS mode page), then the screen for this sensor will be displayed, showing NOT USED.

Press **SELECT**



In case sensors are not connected the LCD will show FAILED SENSOR ??

Press **SELECT**



In case sensors are not connected the LCD will show FAILED SENSOR ??

Press **SELECT**



In case sensors are not connected the LCD will show FAILED SENSOR ??

Press **PAGE**. The display will change to the next page: STATISTICAL DATA.

- If Tx SENSOR TYPE is set to RTD this display is in deg. C (Celsius degrees).
- If Tx SENSOR TYPE is set to PTC-THERMISTOR or NTC-THERMISTOR this display is in KOHM.

## 5.5 Statistical Data

The following demonstrates the readings with the following settings in TEMPERATURE SETTINGS:

T1 SENSOR TYPE is set to RTD - the display is in deg. C (Celsius degrees)

T2 SENSOR TYPE is set to PTC THERMISTOR – the display is in KOHM

T3 SENSOR TYPE is set to PTC THERMISTOR – the display is in KOHM

**Note:** If a sensor is set as NOT USED (in TEMPERATURE SETTINGS mode page), then the screen for this sensor will be displayed, showing NOT USED.

STATISTICAL DATA  
\_\*\*\*\*\_

Press **SELECT**

T1 – MAX. VALUE  
255 deg C

When sensor type is set as Thermistor display will show:

Press **SELECT**

R2 – MAX. VALUE  
5 KOHM

Press **SELECT**

R3 – MAX. VALUE  
6 KOHM

Press **SELECT**

LAST TRIP  
NO DATA

Press **SELECT**

LAST ALARM  
NO DATA

Press **SELECT**

TOTAL # OF TRIPS  
0

Press **SELECT**

T1 AT TRIP TIME  
255 deg. C

Press **SELECT**

R2 AT TRIP TIME  
5 KOHM

Press **SELECT**

R3 AT TRIP TIME  
15.9 KOHM

**Note:** When in the STATISTICAL DATA displays, pressing **RESET** for more than 1 second, will zero the display screen.

### Attention!

Resetting Statistical Data resets all previous statistical data values!!!

The last two actions (store DEFAULT SETTINGS and clearing STATISTICAL DATA in SERVICE MODE page) should be done with care, since it is not possible to retrieve the previous set point parameters or statistical data.

### More than One Alarm or Trip.

The TPR6 is designed to accept and store the first alarm it detects. If this alarm has not been reset and an additional alarm occurs, the TPR6 will not display the second alarm on the LCD nor assign it to the STATISTICAL DATA.

In case a trip occurs after an alarm, the trip message will override the alarm message.

This is to assist the user in establishing the cause of the alarm.

### Open RTD Circuit.

In case of open RTD circuit, the TPR6 will display ????. In order to have remote indication for this case, enable the LEVEL 1 ALARAM for all connected sensors.

In such case open RTD circuit will energize the alarm relay.

## 5.6 Service Mode

Press **PAGE** and **▼** simultaneously, the following will display:

```
*** SERVICE ***  
*** OPTIONS ***
```

Press **SELECT**

```
RUN SELF TEST ?  
PRESS "VALUE-UP"
```

If the test was OK the display will show for a short time

```
SELF TEST PASSED
```

If test failed, the display will show

```
SELF TEST FAILED  
ERROR CODE = 32
```

Press **SELECT**

```
PROGRAM VERSION  
TPR0270812-MB-ENG
```

Displaying the software date (04.03.04) and version.

Press **SELECT**

```
STORE NOW ?  
DEFAULT SETTINGS
```

If it is required to return to default setting (original factory setting) press **STORE & PAGE** keys simultaneously (**Note:** All values set by you will be erased).

Display will show:

```
DATA SAVED OK
```

Press **SELECT**

```
CLEAR  
STATISTICAL DATA
```

If it is required to reset all STATISTICAL DATA press **STORE & RESET** keys simultaneously. (**Note:** All data in STATISTICAL DATA will be erased).

**Attention !**

The last two actions (store DEFAULT SETTINGS and clearing STATISTICAL DATA in SERVICE MODE page) should be done with care, since it is not possible to retrieve the previous set point parameters or statistical data.

6. RESISTANCE/TEMPERATURE CONVERSION TABLE PT. 100 AS PER DIN 43760

Temperature Units =Deg C	Pt.100 (DIN 43760) Units = Ohms
0	100.00
10	103.90
20	107.79
30	111.67
40	115.54
50	119.40
60	123.24
70	127.07
80	130.89
90	134.70
100	138.50

Temperature Units =Deg C	Pt.100 (DIN 43760) Units = Ohms
110	142.29
120	146.06
130	149.82
140	153.58
150	157.32
160	161.04
170	164.76
180	168.46
190	172.16
200	175.84

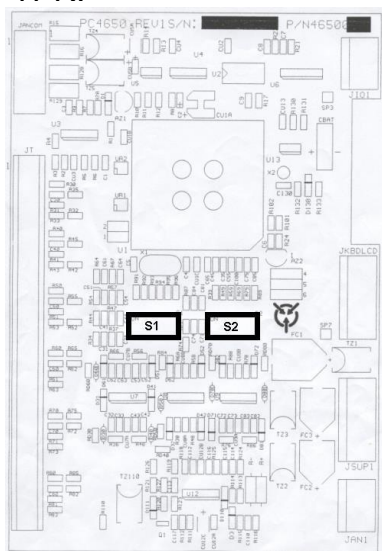
7. DIP SWITCHES SETTINGS FOR PT100/THERMISTOR INPUTS DESIGNATION

The following must be done to set the right sensors connected to the TPR6:

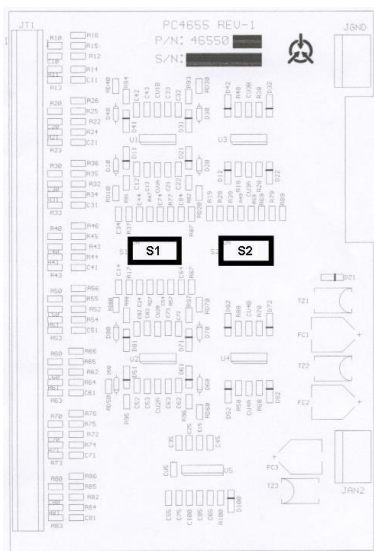
1. Set the sensor type in the TEMPERATURE SETTINGS page. Refer to section 5.1 page 10.
2. Set the dip switches as shown here after.

In order to change the position of the dip switches the main PCB (In all models) and the input PCB (In TPR6/14 only) should be dismantled.

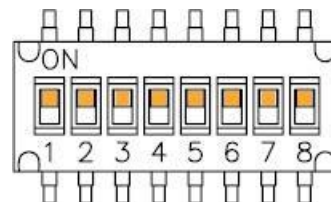
**Note:** Take all safety precautions to prevent electrical shock or damage to the TPR6 before dismantling the SI-TPR.



Main PCB (All models)



Input PCB (TPR6/14 only)



Close look on dip switches S1&S2

PT100/Thermistor inputs T1-T6 (All models) are designated via dip switches 1-6 on the main PCB. PT100/Thermistor inputs T7-T14 (TPR6/14 only) are designated via dip switches 1-8 on the input PCB. Two sets of dip switches are on each PCB – marked S1 and S2. Each PT100/Thermistor input is designated by the position of two dip switches – one in S1 and the second in S2. Both dip switches must be in the same position.

When dip switches are in ON position, the input is designated as a Thermistor input (PTC type or NTC type should be programmed via the keypad).

When dip switches are in Off position the input is designated as PT100.

For example, in order to designate PT100/Thermistor input T6 to Thermistor PTC put dip switch no. 6 in S1 and dip switch no. 6 in S2 on the main PCB to its ON position. After doing so program this input as a PTC input via the keypad.

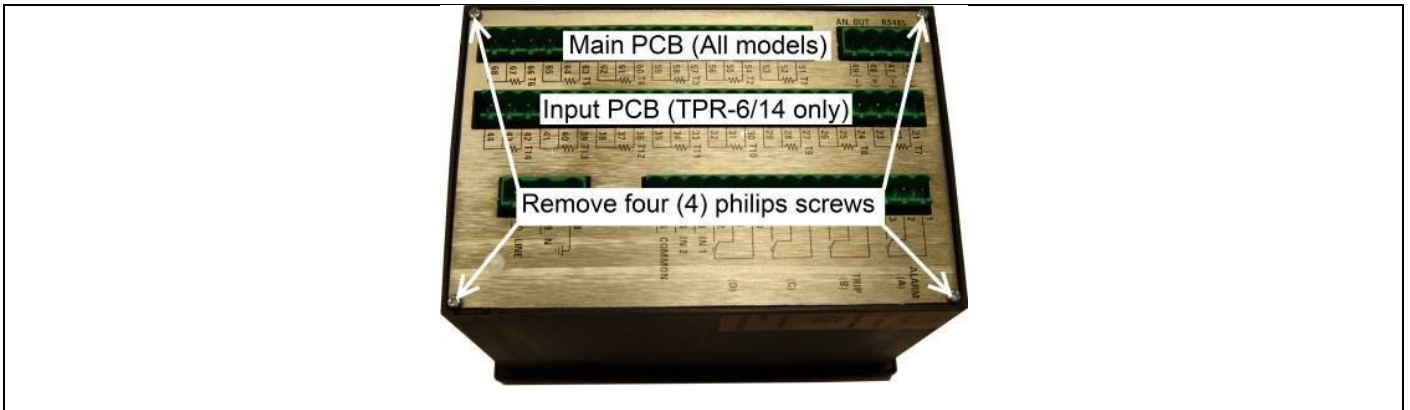
In order to designate PT100/Thermistor input T8 to PT100 put dip switch no. 2 in S1 and dip switch no. 2 in S2 on the input PCB to its OFF position. (Note that dip switches no. 1 in S1 & S2 are for PT100/Thermistor input T7).

### 7.1 Dismantling the Main PCB and the Input PCB

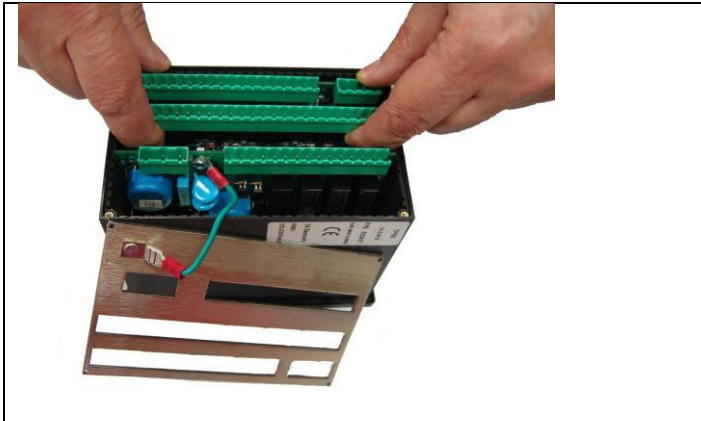
**Note:**

This procedure must be done by a qualified personnel.

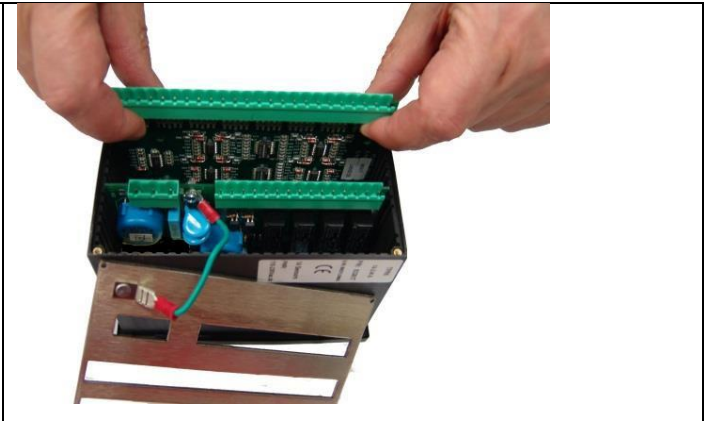
Verify that the TPR6 is completely disconnected from any power source before this procedure is done.



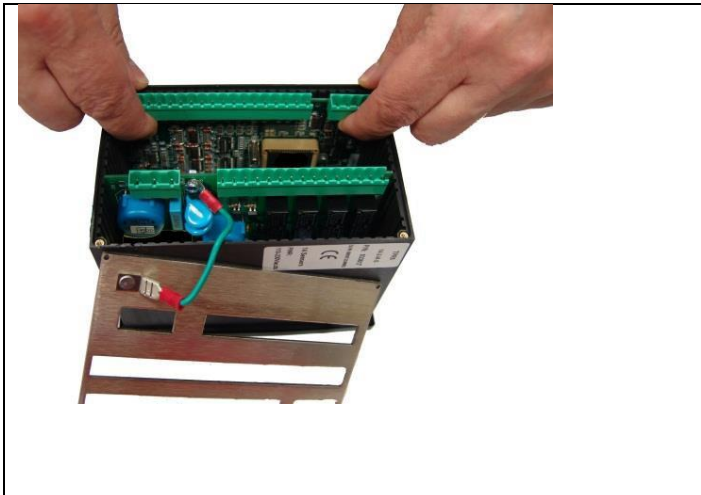
1. Identify the Main PCB (in All models) and Input PCB (TPR6/14 only).
2. Remove four screws holding the back cover of the TPR6 and remove the cover.



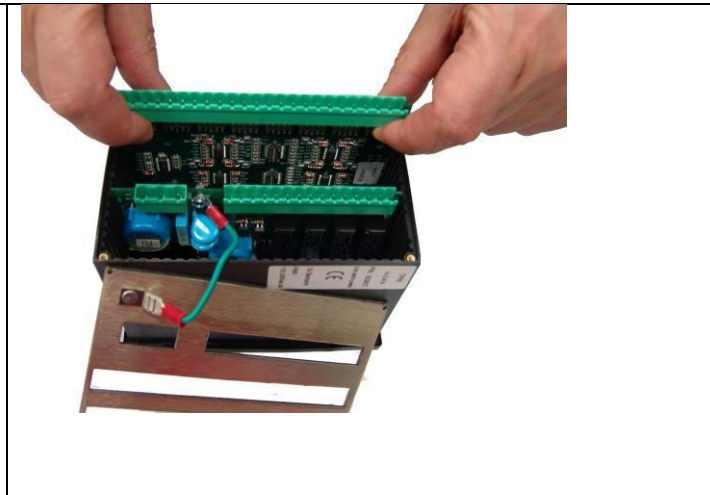
3. Hold the Input PCB by the two sides of the connector with four fingers as shown in the picture.



4. Pull upwards to remove the Input PCB as shown in the picture.



5. Hold the Main PCB by the two sides of the connector with four fingers as shown in the picture.



6. Pull upwards to remove the Main PCB as shown in the picture.

**Note:**

Upon completion of dip switch settings re-install both PCBs gently and close the back cover.

## 8. TRIPPING / ALARM DEFAULT SETTINGS

In this table, (+) stands for ENABLED, (-) for DISABLED.

Print this page for every installed unit, mark its serial number, installation number, drawing number and General notes for future reference concerning this installation.

Mark the newly programmed values into the parenthesis ( ) of each item for future reference.

Installation Number : \_\_\_\_\_, TPR6 Serial Number : \_\_\_\_\_

Drawing Number : \_\_\_\_\_, Project Name/Number : \_\_\_\_\_

	Protection	Trip	Alarm	Auto Reset	Relay C (SEE NOTE BELOW)	Relay D	Active During	ANSI Code
1	T1 LEVEL 1	(-) ( )	(+) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
2	T2 LEVEL 1	(-) ( )	(+) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
3	T3 LEVEL 1	(-) ( )	(+) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
4	T4 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
5	T5 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
6	T6 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
7	T7 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
8	T8 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
9	T9 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
10	T10 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
11	T11 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
12	T12 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
13	T13 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
14	T14 LEVEL 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
15	T1 LEVEL 2	(+) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
16	T2 LEVEL 2	(+) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
17	T3 LEVEL 2	(+) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
18	T4 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
19	T5 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
20	T6 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
21	T7 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
22	T8 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
23	T9 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
24	T10 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
25	T11 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
26	T12 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
27	T13 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
28	T14 LEVEL 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	49R
29	EXTERNAL FAULT 1	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	86 / 94
30	EXTERNAL FAULT 2	(-) ( )	(-) ( )	(-) ( )	(-) ( )	(-) ( )	Always	86 / 94
31	COMM. PORT FAILED	(-) ( )	(-) ( )	(+) ( )	(-) ( )	(-) ( )	Always	3
32	INTERNAL FAILURE	(-) ( )	(+) ( )	(-) ( )	(-) ( )	(-) ( )	Always	3

### Notes:

- A) The settings of RELAY C are only possible when parameter CONFIG.FAN RELAY is set to TRIPPING / ALARM (see I/O SETTINGS menu above).  
When CONFIG.FAN RELAY is set to FAN the operation of this relay is controlled by the parameters Tx TURN FAN ON and FAN OFF DLY TIME (see TEMPERATURE SETTINGS menu above). In this case RELAY C settings will not be displayed in the TRIPPING / ALARM parameters list.
- B) Open RTD Circuit - In the case of open RTD circuit, the TPR6 will display ????. To have remote indication for this case, enable the LEVEL 1 ALARAM for all connected sensors.  
In such cases open RTD circuit will energize the alarm relay.

## 9. FLASH MESSAGES

The message is displayed for a short while only. Display then returns to the previous message. Flash messages are usually displayed as a response to an operator's action.

It is used either to confirm the activation of the requested operation, or to indicate reason for not doing

so. Flash messages are:

<b>Display</b>	<b>Description</b>
DATA SAVED OK	Displayed after pressing <b>Store</b> key. If an error is found during the store process, then next message is shown.
STORAGE ERROR	Displayed when an error is found in the store process.
WRONG PARAMETERS	Displayed after power-up, if the non-volatile parameter check sum is found to be wrong.
UNAUTHORIZED ACCESS	When Authorized Key is open (locked), and a parameter change is attempted. Also displayed after Unauthorized Store and Reset action.
SELF TEST PASSED	Displayed as a response to running the built-in test procedure, provided that all tests were "O.K.".
SELF TEST FAILED ERROR CODE = 32	Displayed as a response to finding an error during the operation of Test procedure. Error code should be reported to the Authorized Factory representative.

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## 10. TPR6 COMMUNICATION

The TPR6 is equipped with a powerful data communication system, operating beyond a motor protection controller into the realm of a complete motor management system. This communication system is unmatched in its reliability, flexibility and ease of use, providing the ideal basis for the design of a modern motor management system.

The TPR6 incorporates RS485 serial link and uses a MODBUS RTU protocol (The protocol is not included in this document) to provide high speed data acquisition to supervisory computers. Data formats have been carefully structured to provide fast notification of alarms and continuous updates of performance parameters. Load control can be performed from host computers or by PLCs.

The following information and control can be accessed through communication.

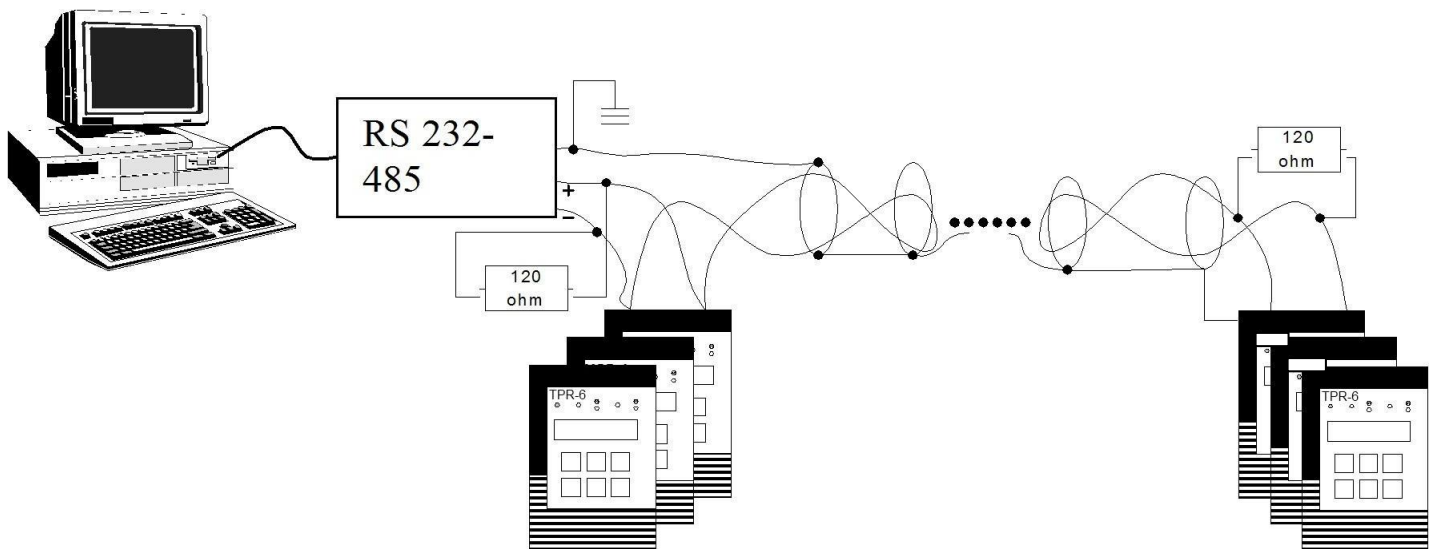
- \* All Actual data parameters
- \* All TPR6 Settings (Read & Write)
- \* Reset

The TPR6 system is user expandable. No special engineering skills or tools are required. For small systems, the Host computer can communicate directly with the TPR6 via a twisted shielded pair.

For larger systems a Data Highway enables multiple TPR6 connections. Up to 32 TPR's can be added on each twisted pair of the Host serial link with full access to all TPR's.

The system also performs high speed data acquisition. Users therefore have a simple and friendly means of building fully integrated monitoring and control systems.

System reliability is exceptionally high, meeting the highest standards of protected communication in industry. Included in each message is a 16-bit CRC.



**TECHNICAL SPECIFICATIONS****Auxiliary Power Supply  
(terminals 19-20)**

Ac Power Supply: 110-240V 50/60Hz or DC (+10% / -15%)  
Power consumption: 12 VA or 10W. Recommended fuse rating: 0.5A.

**Temperature Inputs**

Types: TPR6-6 with 6 temp. inputs and TPR6-14 with 14 temp. inputs  
Temp. Inputs: Field adjustable (dip switches) as RTD (Pt100) or Thermistors (software programmable as PTC or NTC).  
Temp. Range: For RTD: 5-250 deg C. For Thermistors: 0.5 – 30 K $\Omega$   
Time delay: 2 Sec.  
Accuracy:  $\pm$  3% of full-scale resistance.  
Max wire resistance: 25% of Sensor resistance at 10 deg C.

**Fault Time Delays**

Accuracy:  $\pm$ 0.5 Sec. or  $\pm$ 2% of time, whichever is greater, for all but the above-mentioned faults and the following exceptions:

**Relays Contacts  
(terminals 1-12)**

Rated load: 8A/250 VAC (VDE, UL, cUL); 8A/24VDC (UL, cUL).  
Maximum breaking capacity AC: 2000 VA  
Max. DC Load Breaking Capacity: 8A at 30VDC.

**Dielectric Strength**

1500 VAC, for 1 minute, Between Ground (terminal 18) and:  
\* Auxiliary power supply inputs  
\* Control Terminal

**Discrete Inputs  
(terminals 13-15)**

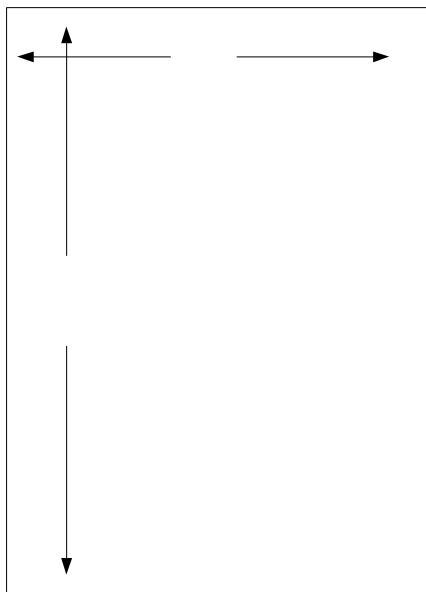
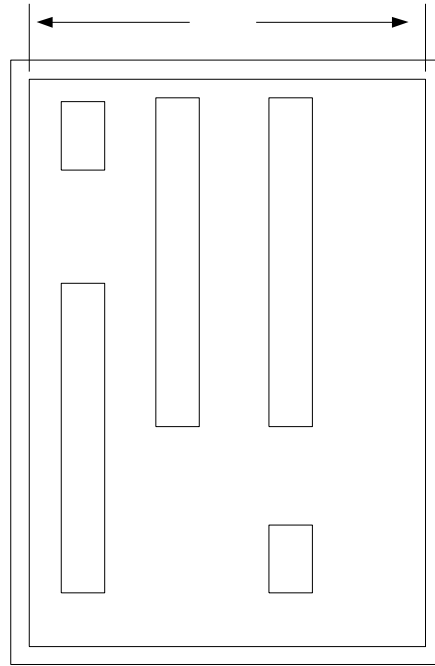
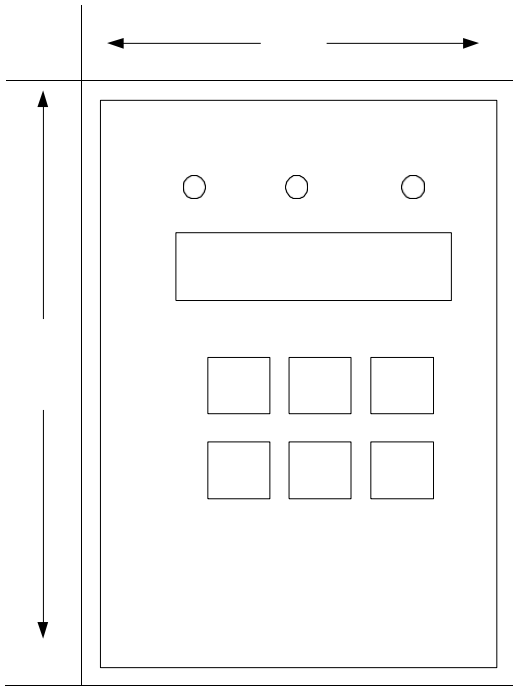
Two Discrete (digital) inputs. The inputs are optically Isolated.  
Input voltage to 110 -240V 50/60Hz or DC (+10% / -15%).

**Ambient and  
Storage temperatures**

Operation temperature: 50°C  
Storage: 70°C

---

11. DIMENSIONS AND CUT-OUT DIMENSIONS



## 12. ORDERING INFORMATION

<b>TPR6</b>	<b><u>14-</u></b> No. of Temp. Inputs	<b><u>2-</u></b> Supply Voltage	<b><u>M-</u></b> Comm.	<b><u>0-</u></b> Required Options	<b><u>S</u></b> Front Panel
-------------	------------------------------------------------	---------------------------------------	---------------------------	-----------------------------------------	-----------------------------------

**No. Of Temperature Inputs**

Specify	Description
6	6 Temperature Inputs
14	14 Temperature Inputs

**Supply Voltage**

Specify	Description
2	110-240V 50/60Hz or DC (+10% / -15%)

**Communication**

Specify	Description
M	RS485 with MODBUS protocol

**Required Options**

Specify	Description
0	No Option
8	Conformal coating
H	Special character set LCD display (Must be factory supplied).
M	Marine approval (Consult factory)

**Front Panel**

Specify	Description
S	Standard