

TPR-6

Temperature Protection Relay



Instruction Manual

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Safety notes

- Read this manual carefully before operating the equipment and follow its instructions.
- 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.
- Disconnect all power inputs before servicing the relay.
- For use in a pollution degree 2 environment or equivalent.
- This device is not intended to provide motor overload protection, and suitable protection should be provided in the end product.
- **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.

The company reserves the right to make any improvements or modifications to its products without prior notice.

2. INTRODUCTION

The TPR-6, 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 TPR-6 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 analogue output.

Temperature sensors types & mode of operation.

- **Number of sensors - can be set from 1-6 or 1-14**
- **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 page 18 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 K Ω 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 K Ω 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 analogue output.

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
- **Analogue output** – As 0-20mA Normal or 4-20mA Normal or Inverted
- **Analogue output group** – Group Minimum, Average, Maximum
- **Communication RS485** – can be locked or unlocked, address numbers for each sensor and baud rate.

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
- **Operating Relay D** – Enabled or Disabled

Displaying Actual data

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

Statistical data

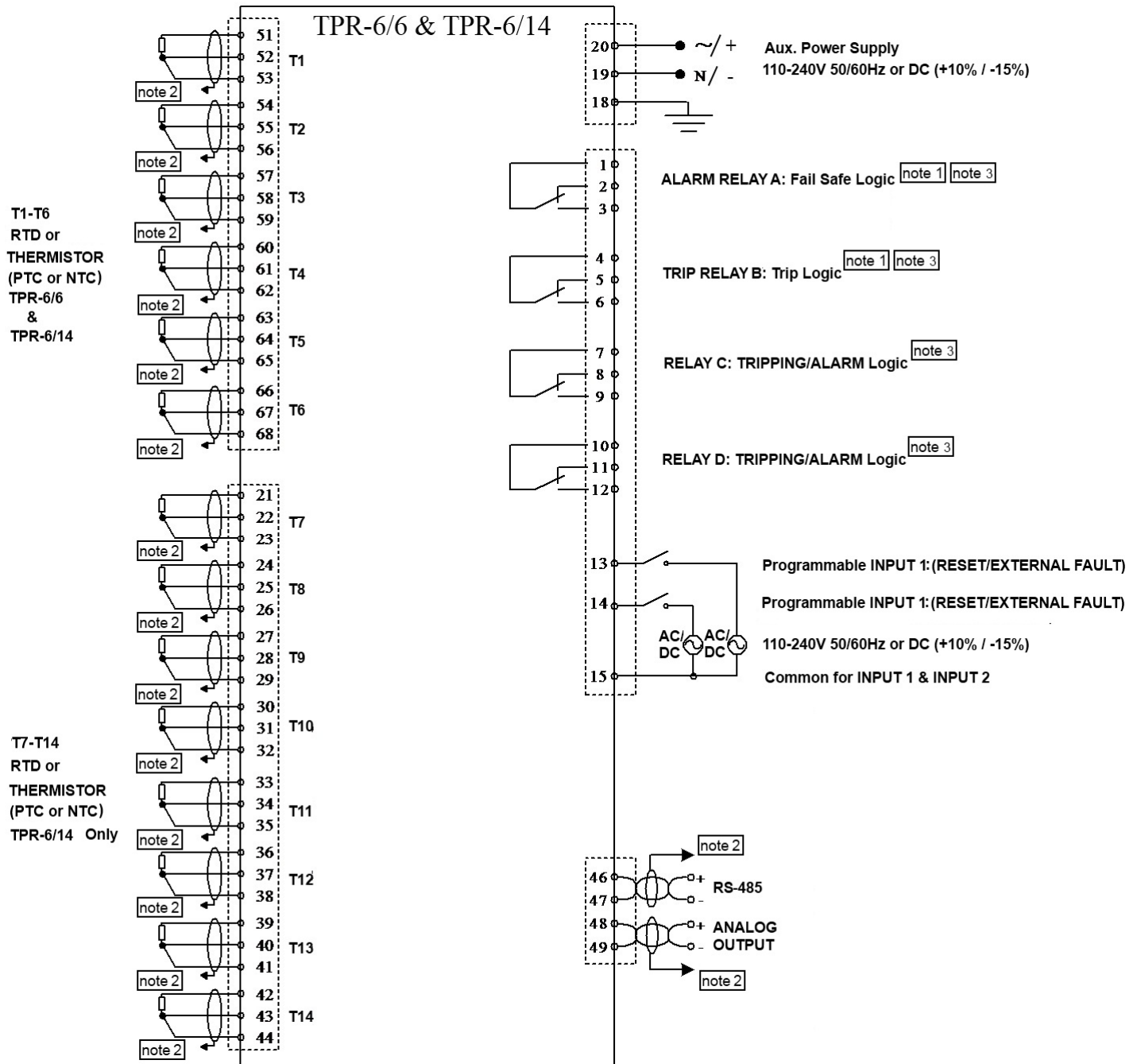
- **Max. value** of each sensor
- **Last trip**
- **Last alarm**
- **Total number of trips**
- **Temperature / Resistance of each sensor** at time of trip

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 TPR-6 units can be connected on the same link to the host computer.

3. WIRING DIAGRAM

**Notes:**

- ALARM RELAY A can be programmed as ALARM or ALARM FAIL SAFE (default setting) or TRIPPING/ALARM.
TRIP RELAY B can be programmed as TRIP (default setting) or TRIP FAIL SAFE or TRIPPING/ALARM.
Refer to section 6.2 Parameter Setting – I/O Settings page 12 for more information.
- 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)
- 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.
- 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.

4. 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 TPR-6 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 - Programmable

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

Relay can be assigned to specific faults that are enabled 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 TPR-6 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 analogue output circuit is isolated as a group together with the RS485 communication. When using both connections, verify that analogue 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.

Analogue 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

5. 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.



6. 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 above page settings, press **SELECT** key.

Messages are displayed on the LCD in two lines.

* Upper line describes the parameter's name.

* Lower line shows its value.

To change settings, when PARAMETER LOCK is set 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 displays: 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

6.1 Parameter Setting – Temperature Settings

TEMPERATURE
*** SETTINGS ***

NO. OF SENSORS
3

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

Press **SELECT**

Tx SENSOR TYPE
RTD

Type of temperature sensor in temperature input x.

x represents any number between 1-6 in TPR-6/6 and any number between 1-14 in TPR-6/14.

Press ▲ or ▼ keys to set actual type of sensors.

Sensor type must be modified via internal dip switches (Refer to section 8 page 20.) 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 TPR-6 the Tx SENSOR TYPE parameter must be set accordingly and dip switch setting must be done as well. Refer to section 8 page 20 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 analogue 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.

6.2 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**

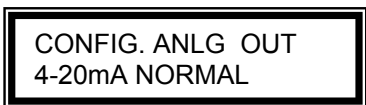


Configure Trip Relay function

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

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

Press **SELECT**



Configure Analogue 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 Analogue 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

Analogue 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 the communication link.

Range: 1200, 2400, 4800, 9600, 19200

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

6.3 Parameter Setting – Tripping and Alarm Options

TRIPPING / ALARM
 *** OPTIONS ***

Refer to section 9 - Tripping / Alarm Default Settings on page 22 for the default settings of all the parameters in the TRIPPING/ALARM OPTIONS mode page.

Protection function

Each of the TPR-6 Protections 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 and RELAY D must be configured as TRIPPING/ALARM in the I/O SETTING PAGE in order to operate in the TRIPPING/ALARM mode.

Each of the TPR-6 Protections 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, then only one screen (per Level) for this sensor will be displayed, showing NOT USED.

Press **SELECT**

T1 LEVEL 1
 TRIP: DISABLE

Enabling, Disabling trip function for T1 LEVEL 1.

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

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
 ALARM: ENABLE

Enabling, Disabling Alarm function for T1 LEVEL 1.

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

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
 AUTO RST: DSABL

Enabling, Disabling auto-reset function for T1 LEVEL 1

Press **▲** or **▼** keys to set if T1 LEVEL 1 is AUTO RESET or not AUTO RESET.

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
 RELAY A: DISABLE

Enabling, Disabling operation of RELAY A for T1 LEVEL 1.

Press **▲** or **▼** keys to set if RELAY A will follow T1 LEVEL 1 settings.

Note: Relay operates upon T1 LEVEL 1 fault which is enabled if RELAY A is set to TRIPPING/ALARM in the I/O SETTING PAGE.

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
RELAY B: DISABLED

Enabling, Disabling operation of RELAY B for T1 LEVEL 1.

Press **▲ or ▼** keys to set if RELAY B will follow T1 LEVEL 1 settings.

Note: Relay operates upon T1 LEVEL 1 fault which is enabled if RELAY B is set to TRIPPING/ALARM in the I/O SETTING PAGE.

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
RELAY C: DISABLED

Enabling, Disabling operation of RELAY C for T1 LEVEL 1.

Press **▲ or ▼** keys to set if RELAY C will follow T1 LEVEL 1 settings.

Note: Relay operates upon T1 LEVEL 1 fault which is enabled if RELAY C is set to TRIPPING/ALARM in the I/O SETTING PAGE.

Range: DISABLE, ENABLE

Press **SELECT**

T1 LEVEL 1
RELAY D: DISABLED

Enabling, Disabling operation of RELAY D for T1 LEVEL 1.

Press **▲ or ▼** keys to set if RELAY D will follow T1 LEVEL 1 settings.

Note: Relay operates upon T1 LEVEL 1 fault which is enabled if RELAY D is set to TRIPPING/ALARM in the I/O SETTING PAGE.

Range: DISABLE, ENABLE

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

Press **SELECT**

EXTERNAL FAULT 1
TRIP: DISABLED

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 TPR-6 detects open circuit between terminal 13 terminal 15 (common) input terminals.

Press **SELECT**

EXTERNAL FAULT 2
TRIP: DISABLED

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 TPR-6 detects open circuit between terminal 14 terminal 15 (common) input terminals.

Press **SELECT**

COMM PORT FAILED
TRIP: DISABLED

Fault occurs when the TPR-6 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.

Press **SELECT**

INTERNAL FAILURE
TRIP: DISABLED

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.

6.4 Actual Data



ACTUAL DATA
- **** -

The following demonstrates the readings with the following settings in TEMPERATURE SETTINGS:
T1 SENSOR TYPE is set to RTD
T2 SENSOR TYPE is set to PTC THERMISTOR
T3 SENSOR TYPE is set to PTC THERMISTOR

Press **SELECT**



T1 TEMPERATURE
110 deg. C

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

Press **SELECT**



T2 RESISTANCE
3.8 KOHM

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

Press **SELECT**



T3 RESISTANCE
3.9 KOHM

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

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

6.5 Statistical Data

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

T1 SENSOR TYPE is set to RTD

T2 SENSOR TYPE is set to PTC THERMISTOR

T3 SENSOR TYPE is set to PTC THERMISTOR

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
25.5 KOHM

Press **SELECT**

R3 – MAX. VALUE
25.5 KOHM

Press **SELECT**

LAST TRIP
T1 LEVEL 1

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
0 KOHM

Press **SELECT**

R3 AT TRIP TIME
0 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 TPR-6 is designed to accept and store the first alarm it detects. If this alarm has not been reset and an additional alarm occurs, the TPR-6 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.

6.6 Service Mode

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

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

Press **SELECT**

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

If 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  
TPR040304-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.

7. 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

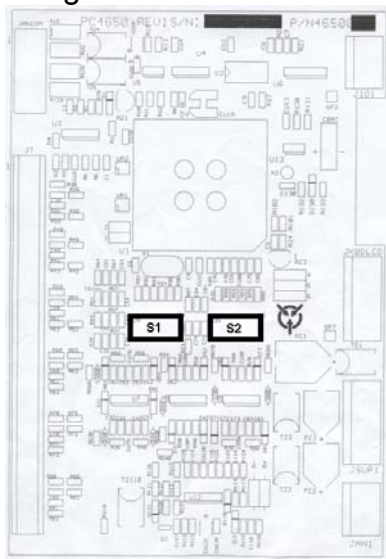
8. DIP SWITCHES SETTINGS FOR PT100/THERMISTOR INPUTS DESIGNATION

The following must be done in order to set the right sensors connected to the TPR-6:

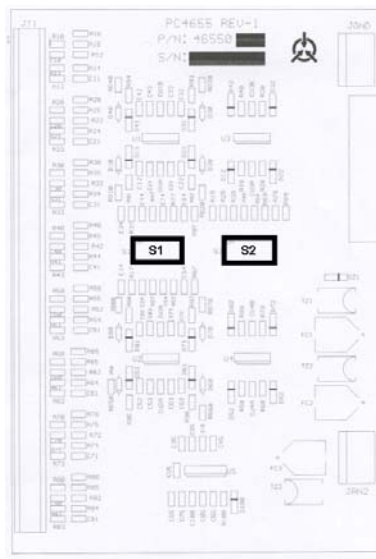
1. Set the sensor type in the TEMPERATURE SETTINGS page. Refer to section 6.1 page 10.
2. Set the dipswitches as shown here after.

In order to change the position of the dip switches the main PCB (In all models) and the input PCB (In TPR-6/14 only) should be dismantled.

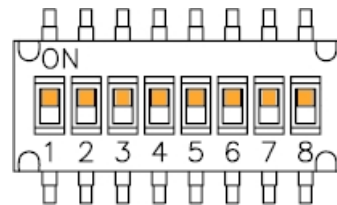
Note: Take all safety precautions to prevent electrical shock or damage to the TPR-6 before dismantling the TPR.



Main PCB (All models)



Input PCB (TPR-6/14 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 (TPR-6/14 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 key pad).

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 key pad.

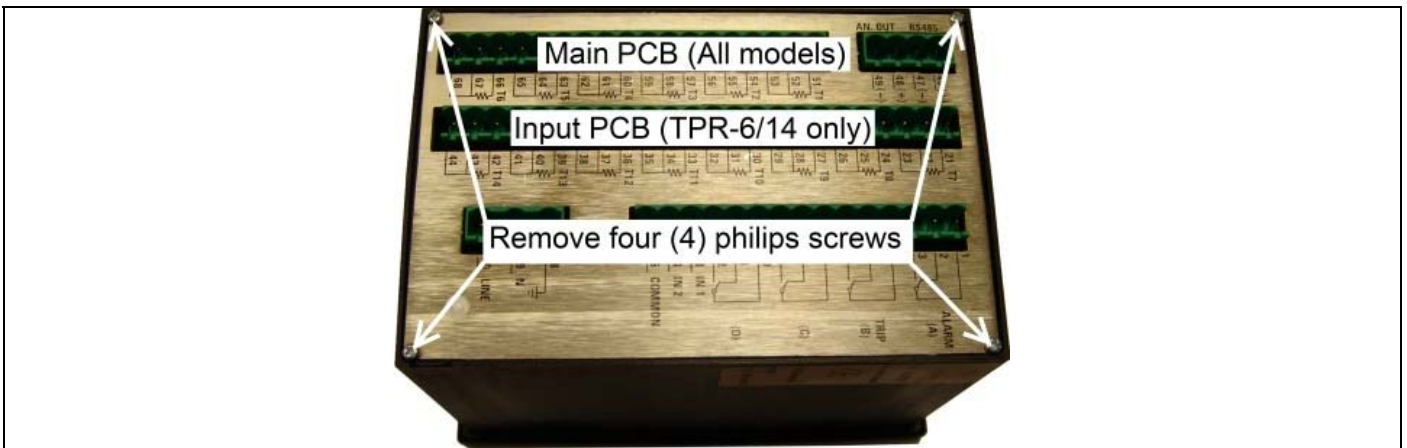
In order to designate PT100/Thermistor input T8 to PT100 put dip switch no. 2 in S1 and dip switch no. 2 in S2 on the input PCB to its OFF position. (Note that dip switches no. 1 in S1 & S2 are for PT100/Thermistor input T7).

8.1 Dismantling the Main PCB and the Input PCB

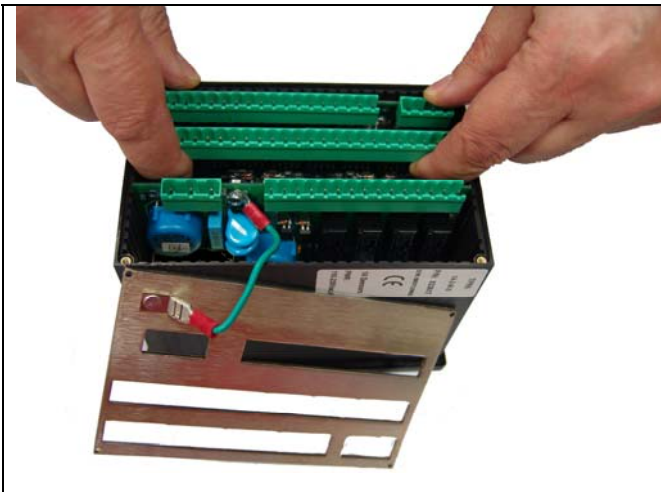
Note:

This procedure must be done by a qualified personnel.

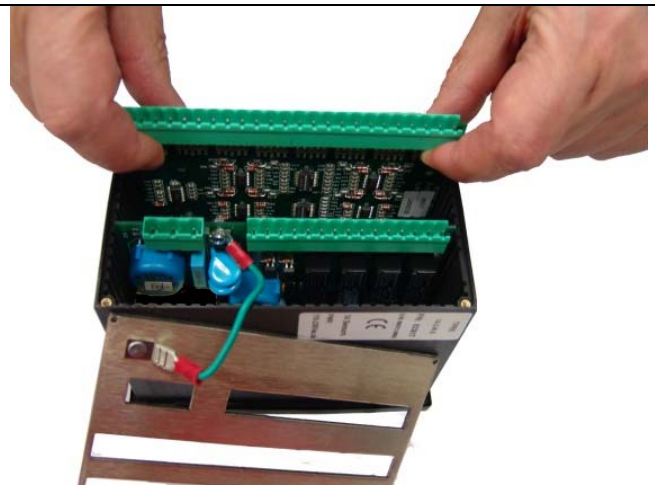
Verify that the TPR-6 is completely disconnected from any power source before this procedure is done.



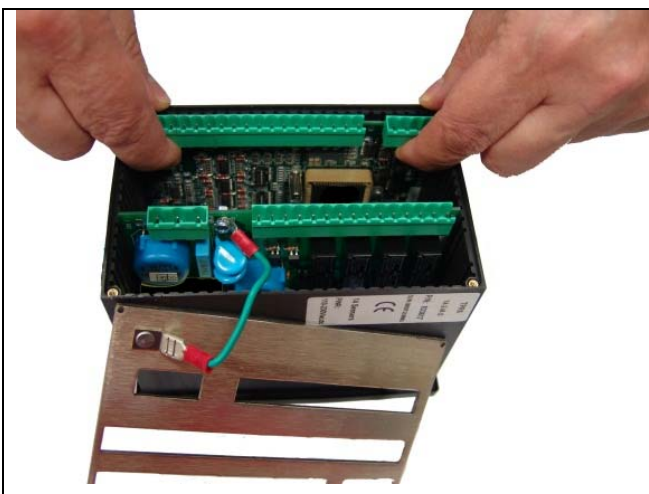
1. Identify the Main PCB (in All models) and Input PCB (TPR-6/14 only).
2. Remove four screws holding the back cover of the TPR-6 and remove the cover.



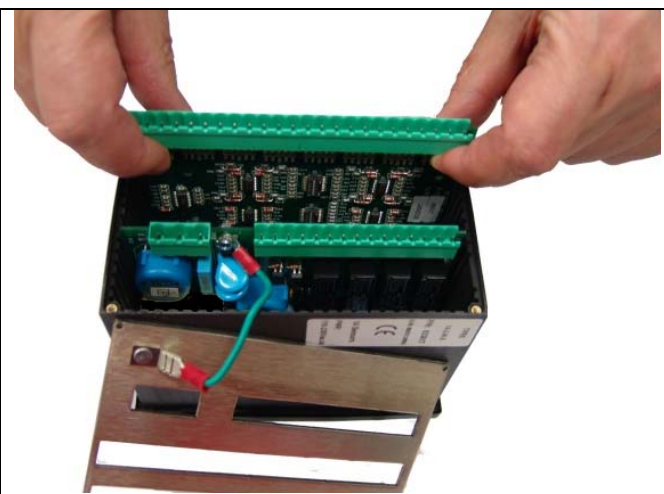
3. Hold the Input PCB by the two sides of the connector with four fingers as shown in the picture.



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.

9. **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 : _____, TPR-6 Serial Number : _____

Drawing Number : _____, Project Name/Number : _____

	Protection	Trip	Alarm	Auto Reset	Relay C	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 INPUT 1	(-)()	(-)()	(-)()	(-)()	(-)()	Always	86 / 94
30	EXTERNAL INPUT 2	(-)()	(-)()	(-)()	(-)()	(-)()	Always	86 / 94
31	COMM. PORT FAILED	(-)()	(-)()	(+)()	(-)()	(-)()	Always	3
32	INTERNAL FAULT	(-)()	(+)()	(-)()	(-)()	(-)()	Always	3

General Notes : _____

10. 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 action.

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

Flash messages are :

Display	Description
DATA SAVED OK	Displayed after pressing Store key. If an error is found during 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 Authorized Factory representative.

11. TPR-6 COMMUNICATION

The TPR-6 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 TPR-6 incorporates RS485 serial link and uses a MODBUS RTU protocol (The protocol is not included in this document) to provides 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 the communication.

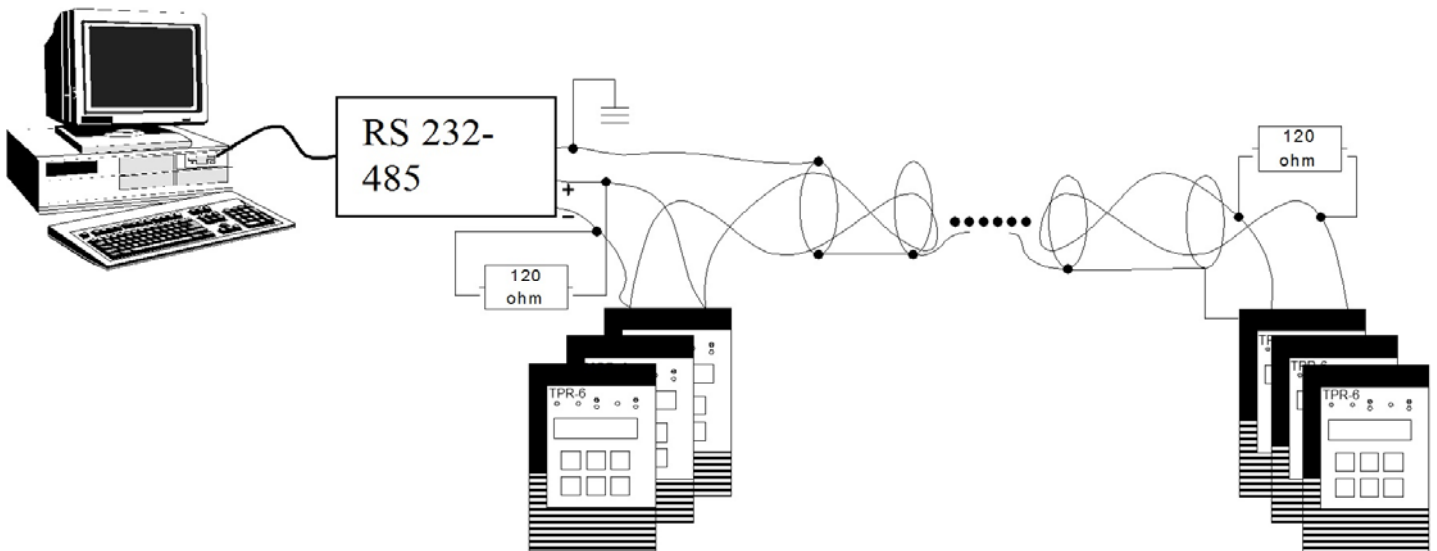
- * All Actual data parameters
- * All TPR-6 Settings (Read & Write)
- * Reset

The TPR-6 system is user expandable. No special engineering skills or tools are required. For small systems, the Host computer can communicate directly with the TPR-6 via a twisted shielded pair.

For larger systems a Data Highway enables multiple TPR-6 connection. 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 a fully integrated monitoring and control systems.

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



12. 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: TPR-6/6 with 6 temp. inputs and TPR-6/14 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 Ω
 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, which ever 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

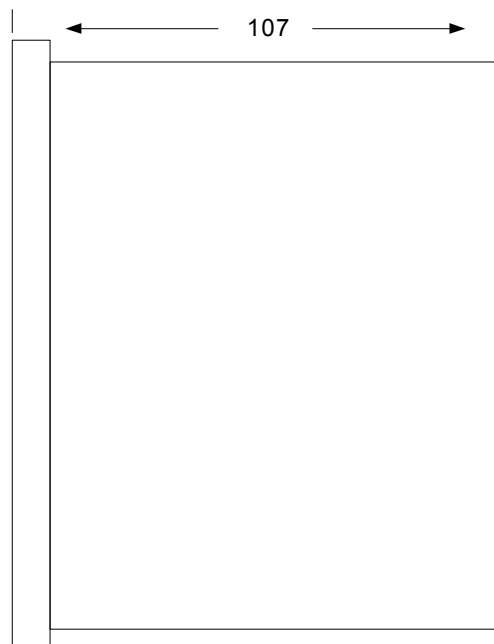
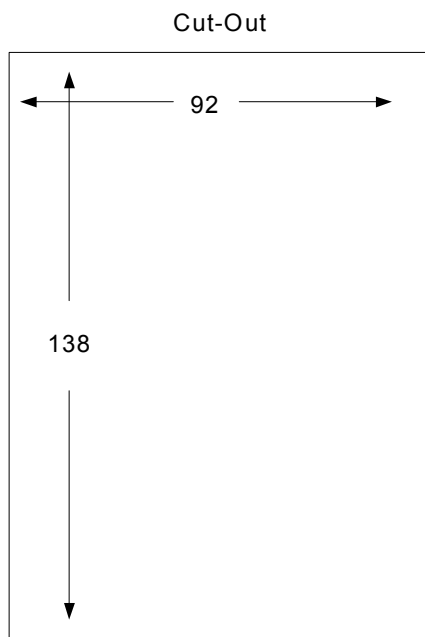
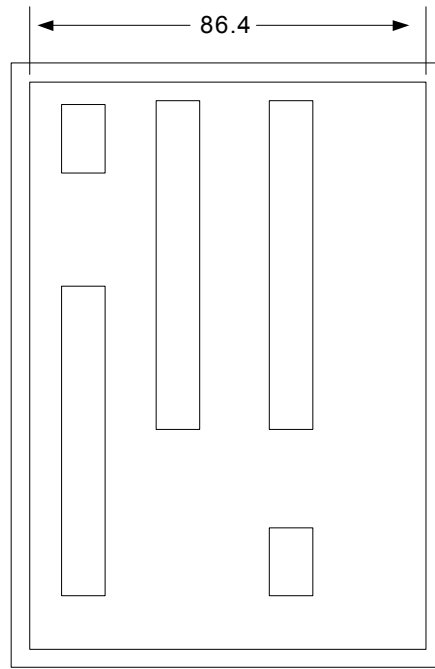
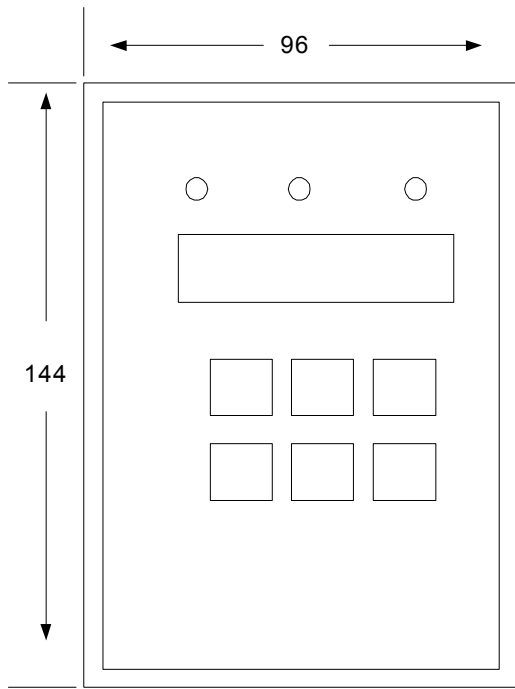
Discrete Inputs (terminals 13-15)

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

13. DIMENSIONS AND CUT-OUT DIMENSIONS



14. ORDERING INFORMATION

TPR-6	<u>14-</u> No. of Temp. Inputs	<u>2-</u> Supply Voltage	<u>M-</u> Comm.	<u>0-</u> Required Options	<u>S</u> Front Panel
-------	---	--------------------------------	--------------------	----------------------------------	----------------------------

No. Of Temp. 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
M	Marine approval (Consult factory)

Front Panel

Specify	Description
S	Standard

