

Maintainability  
Availability  
Reliability  
Safety

## Monitoring and Protection Relays

# MPS3

## Motor Protection Relay



**The TiC-MPS3 is the ideal protection for high voltage and low voltage motors in applications requiring comprehensive protection with advanced warning - especially in the process, chemical, marine and offshore industries. Monitoring three phase currents, voltages and up to 10 temperature inputs, it provides a most complete motor protection package. Thermal capacity and overload calculations methods are built - in and also possibility exists to introduce bias into the overload curve from current imbalance (positive/negative sequence) and temperature sensor, ensuring accurate modelling of the motor condition.**

### Protection Features

- Max. Start Time
- Too many starts Pre-Alarm
- Too many starts
- Undercurrent level 1
- Undercurrent level 2
- Load increase - Alarm
- Over current Level 1 - Jam
- Over current Level 2 - Short
- Thermal Overload Level 1
- Thermal Overload Level 2
- Current Imbalance Level 1
- Current Imbalance Level 2 (Positive/ Negative sequence)
- Undervoltage
- Overvoltage Level 1
- Overvoltage Level 2
- Phase Loss
- Phase sequence
- Ground Fault Level during starting
- Ground Fault Level 1
- Ground Fault Level 2
- Communication Failure
- Internal Failure
- External Fault 1 - interlock
- External Fault 2 - interlock
- External Fault 3 - interlock
- High Temp. Level 1, sensors 1-10
- High Temp. Level 2, sensors 1-10
- Under Power Level 1
- Under Power Level 2
- Low Power Factor
- Auxiliary relay closes upon detection of welded contractor status (programmable)

Level 1 & 2 can be used for Alarm & Trip or both for trip, each with individual time delays.

### Protection function

Each protection can be designated as:

- Alarm Fail-safe
- Trip (or Trip Fail-Safe)
- Auto Reset
- Panel Reset
- Remote Reset

### Inputs

- Control supply 120-230V, AC/CD  
Optional 19-60VDC
- 3 phase voltage, directly up to 690V,  
Above 690V through PT
- Three phase currents (1 or 5A)
- 10 temperature sensors, with two types:  
\* 10 RTD-Pt100 (or CU)  
\* 6RTD-Pt100 (or CU) and 4  
Thermistors (Programmable as NTC  
or PTC)
- 4 Programmable discrete inputs
- 4 Programmable Analogue Inputs  
0/4-20mA.  
Selection between 20 parameters.

### Outputs

- 4 Programmable Relays 8A, 250VAC.
- Four Programmable Analogue Outputs:
  - I1, I2, I3, T1, T2 or T3 measured values
  - Motor Load Current
  - Maximum of I1, I2 and I3 values
  - Ground Current
  - Minimum of T1, T2 and T3 values
  - Thermal Capacity
- Programming allow selection between:  
0-20mA or 4-20 mA

### Emergency Start (key activated)

Cancelling the thermal capacity and too many starts limits to allow emergency restart after fault.

### Settings

With LCD and keypad on the front panel or through the communication port.

### Simulation

Simulation of voltage, current and temperature inputs enables testing a relay as well as understanding its functions.

### Measured Values

(True R.M.S. at sampling rate of 0.5msec).

- Three phase voltage (phase to phase)
- Three phase voltage (phase to neutral)
- Current, each phase
- Ground current
- Temperature / Resistance, each sensor
- Energy with programmable pulse output
- Power, Reactive power, Power factor
- Minimum & Maximum RMS Average value (three phases) for voltage, Current and Frequency

### Statistical data

- Total run time
- Total number of starts
- Total number of trips
- Last start time period
- Last start current peak

### Calculated Data

- Motor current (% of FLC)
- Current Imbalance
- Thermal Capacity
- Time to trip
- Time to start (after fault)
- Energy

### Fault Data

- Last trip
- Last alarm
- Trip current each phase
- Trip earth fault current
- Trip voltage (each phase)
- History of last 10 trips with time stamp (date, hours, minutes)

### Communication

RS-485, half duplex, MODBUS protocol at rates of 1200-19200 bits/sec. Enables parameter change, supervision and remote resetting. 20 user-selectable parameters grouping of actual data.

### LCD display

Large 150mm x 30mm (6"x1") display area

### LED Indication

- On
- Stopped
- Starting
- Running
- Alarm
- Trip
- Relay A (controller)
- Relay B (controller)
- Internal failure

### Real Time Clock

Each fault is date, hour and minute stamped.

### Dimensions & Weight

Vertical (WxHxD mm): 135x310x161, 3.3Kg

# MPR-6

## Motor Protection Relay



The MPR-6 monitors three phase currents, ground current, motor temperature (three RTDs/Thermistors) and creates an accurate "Thermal Model" of the motor to protect it from abnormal conditions due to power supply, motor and cabling faults, as well as operator malfunction.

- Advanced microprocessor based circuitry
- True RMS measurement at a sampling rate of 0.5 mSec
- Display of motor's operating data, fault and statistical data
- Early warning "time to trip" indication
- Programmable inputs and outputs
- RS-485 communication for remote programming, monitoring and supervision
- Compact design and simple installation

### Protection Features

The MPR-6 provides the following programmable protection with separate settings for alarm and trip levels (\*) and adjustable time delays:

- Maximum start time (stall)
- Too many starts
- Under current (\*)
- Load increase
- Over-current (Jam)
- Over-current (Short circuit) (\*)
- Thermal capacity level (\*)
- Current unbalance (\*)
- Ground fault current (\*)
- Current instability (Broken Bar Detection)
- Over temperature -RTD or PTC/NTC Thermistor (\*)
- Disconnected temperature sensor
- Directional ground fault (option)
- External fault 1 - NO / NC contacts
- External fault 2 - NO / NC contacts (\*) with two individual levels

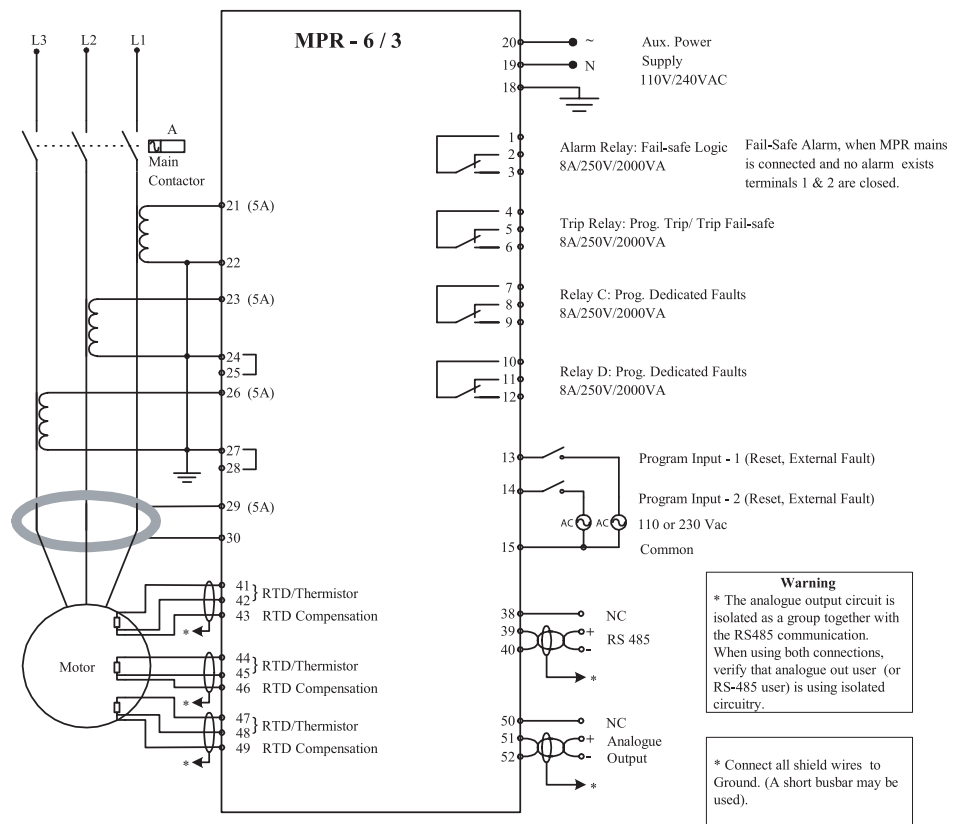
### Production Functions

Each protection can be assigned one of the following functions:

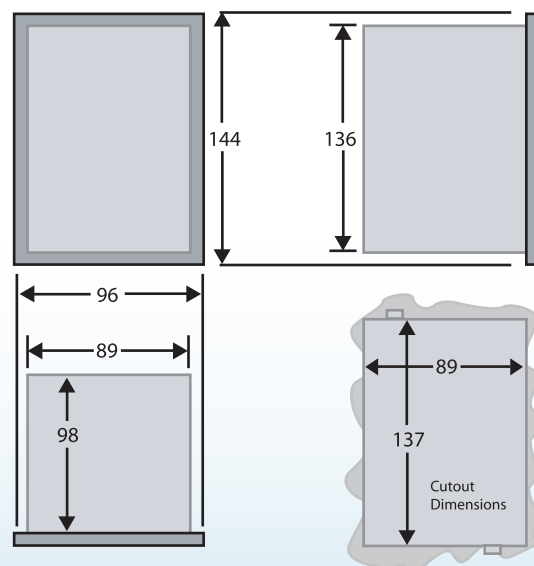
- Trip only - Relay B
- Alarm only - Relay A
- Alarm and trip
- Disabled
- Enabling Auto Resetting
- Operating Aux - Relay C
- Operating Aux - Relay D
- Time to Trip

### "Time to Trip" and "Time to Start"

When current exceeds the overload setting, a unique algorithm calculates the "Time to Trip", enabling the operator or host computer to take corrective actions before tripping. After the motor trips, a "Time to Start" counter displays the time delay before the motor can be restarted.



### Dimensions - (mm)



# TPR-6

## Temperature Protection Relay



**The TiC-TPR-6 monitors 6-14 RTD/Thermistor temperature inputs. It accurately measures the temperature increase to protect the motor/transformer from damage due to heat build-up in the winding and/or bearings. The built-in self-test protects against disconnected sensors and operator faults.**

- Advanced microprocessor based circuitry
- Display of operating RTD or Thermistor Data, Fault and Statistics
- Programmable inputs and outputs
- RS 485 communication, MODBUS protocol, for remote setting and supervision
- Easy installation & friendly operation
- Two level protection for Alarm and Trip
- Selection between Trip and Trip Fail Safe
- Analogue Output related to any input or inputs combination
- RTD/Thermistor selection via Dip Switches
- Disconnected sensor protection.

### Protection Features

- RTD / Thermistor Selection (Any Input)
- Thermistor PTC/NTC selection (Any Thermistor Input)
- Over temperature Alarm Input number 1..14
- Over temperature Trip Input number 1..14
- Continuous analog output signal
- External fault 1 (from NO/NC contact)
- External fault 2 (from NO/NC contact)

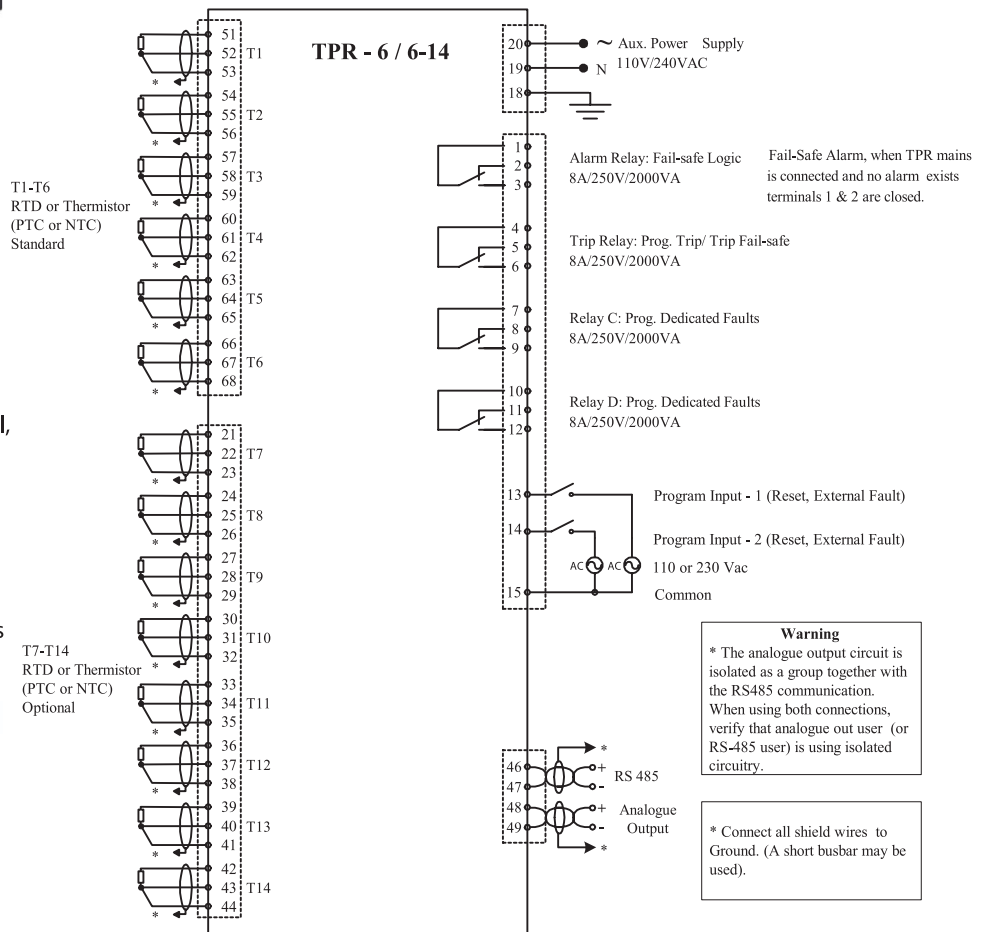
### Protection Functions

Each protection can be assigned to any of the following functions:

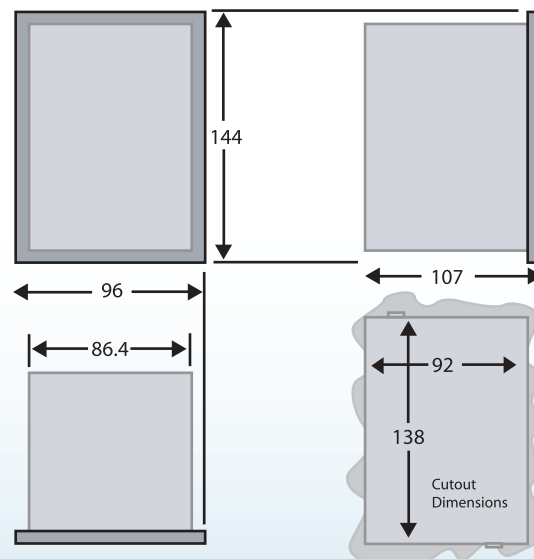
- Alarm only - Relay A
- Trip only - Relay B
- Alarm & Trip
- Disabled
- Enabling Auto Reset
- Programmable Relay C

### Programmable Relay Applications

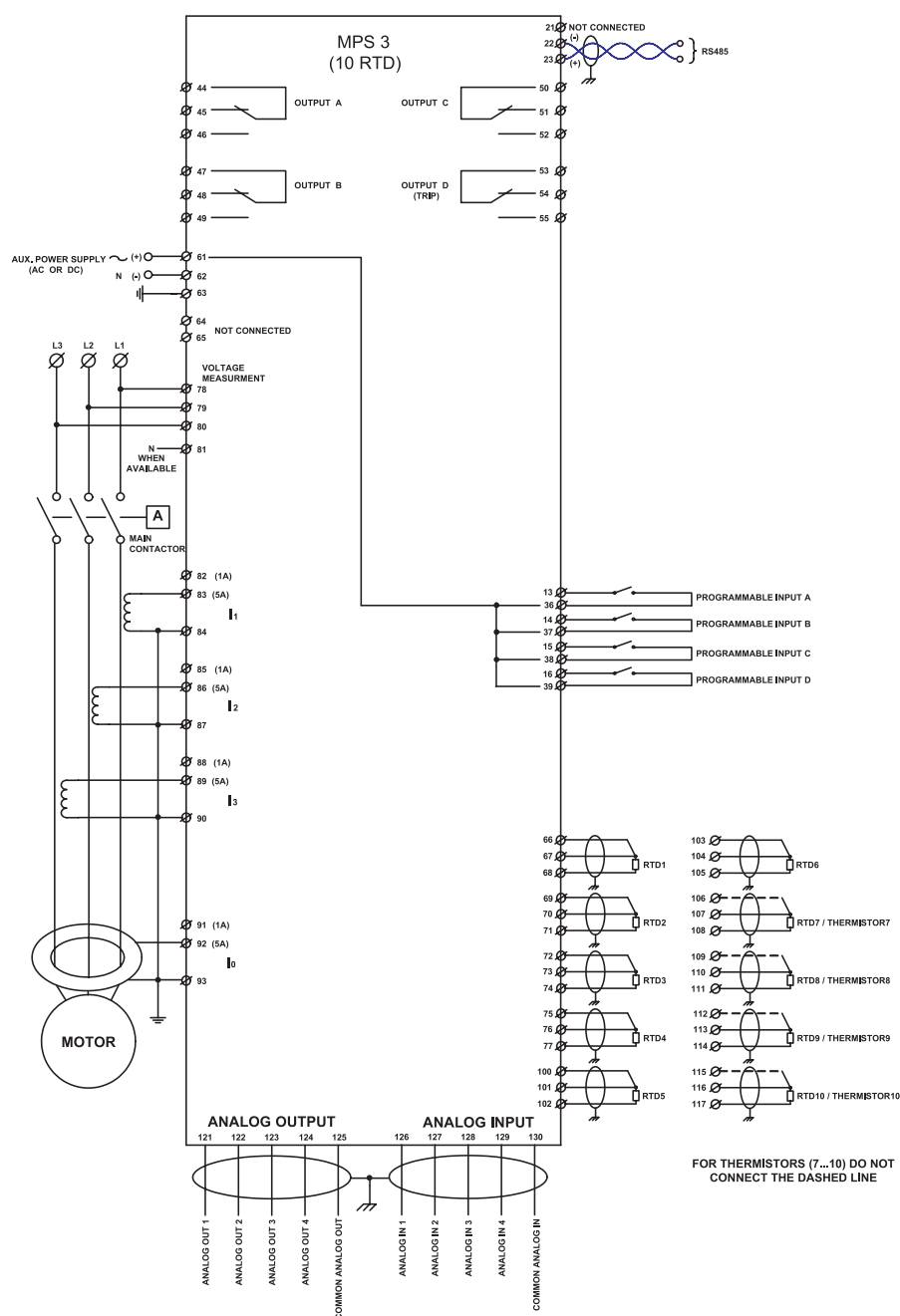
- LV and MV motors (Winding & Bearings)
- Motors driven by Variable Frequency Drives
- Transformers
- Multi RTD and bearing devices such as turbines



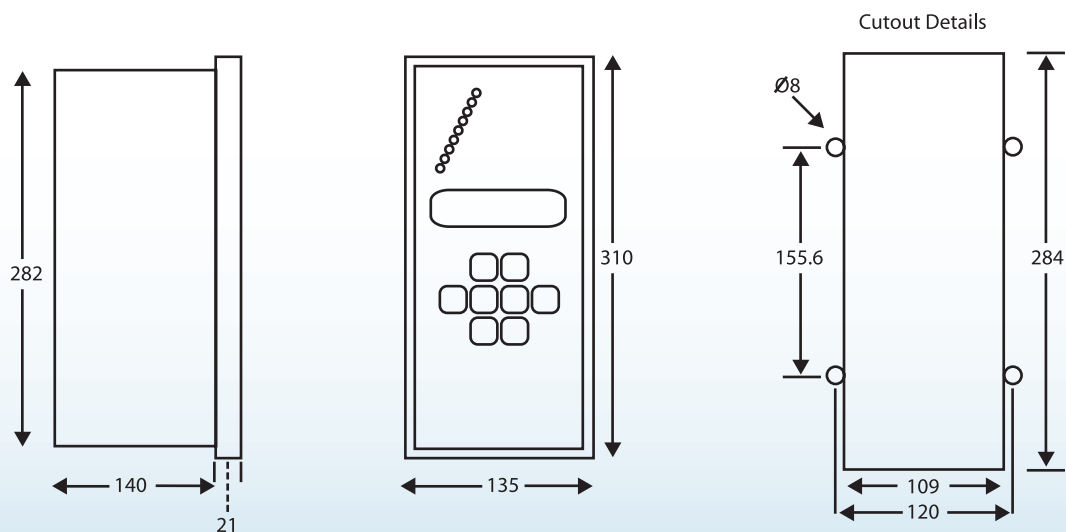
## Dimensions - (mm)



# TiC-MPS3 : Wiring Diagram



## Dimensions - (mm)





## Additional Products

(Detailed catalogues Available)



**VF-S11 Series**  
Variable Speed Drive



**VF-A7 Series**  
High Performance  
Variable Speed Drive



**VF-P7 TIL Series**  
General Purpose  
Variable Speed Drive



**PLC**

**24 Hr After Sales Service**  
**Plant Maintenance & Monitoring**  
**Asset Management**  
**Plant Alliance Management**



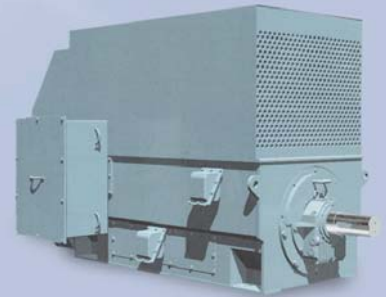
**Density (Consistency) Meter**



**HI - Efficiency**  
AC Motor



**Flame Proof**  
AC Motor



**TOSMIGHTY**  
High Voltage AC Motor

Information provided in this brochure is subject to change without notice.

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