



These relays are useful for protection of 3-phase AC induction motors against various hazards. With their unique advantages they eliminate use of a thermal/bimetal relay for motor protection. Being current sensing, they are to be selected according to motor rating and are available for practically all ranges of motors. These relays are ideally suitable for Air-conditioning Compressor motor protection, as also for motors in machines, conveyors, cranes/hoists and lifts, and for pumps.

MODELS

**MPR D2, SPG D2, F3 DRC1,
D2 MPR1, D2MPR2, S2 CMR1
S2 CTS1, F3 MPR1
MBMPR, M-Commander,
WTR D1, S2 WTR1**

FEATURES

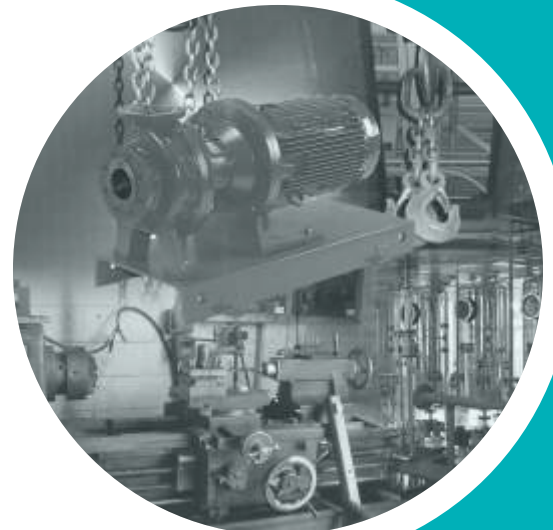
- Fixed/adjustable unbalance settings
- Fixed/adjustable settings for under/over voltage, current, load
- Fixed/adjustable trip delays
- Resetting Auto or Manual
- Output contacts : 1 CO or 2 CO
- Choice of enclosures (DIN-Rail, Flush)
- Models with Micro-Controller based design
- Serial Communication (RS485) port
- 2 line alpha-numeric LCD display
- Use of SMD Technology
- User-friendly LED indications

PROTECTIONS / FUNCTIONS

- Phase Failure (Phase Loss/Single Phasing),
- Phase sequence reversal,
- Voltage Unbalance,
- Under Voltage, Over Voltage
- Overload protection as per motor IDMTL characteristics
- No-load/dry running
- Motor Winding overheating
- Over-current/Short circuit/locked rotor
- Earth Fault

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage & frequency
- ✓ Aux. Supply/Control supply voltage
- ✓ Motor/Pump rating (HP/KW) & duty
- ✓ Overload characteristics required
- ✓ No. of PTCs & Temp. graph



MOTOR / PUMP PROTECTION RELAYS



MPR D2 Overload Protection Relay with Phase Failure



Phase Failure, Unbalance, Phase sequence and overloading
Auto / Manual Reset,
Adjustable current trip settings,
selectable characteristics,
1CO/2CO output relay

SPG D2 Dry Run & Overload Protection Relay with Phase Failure



Phase Failure, Unbalance,
Phase sequence,
Overloading & Dry running
Auto/Manual Reset,
Adjustable current trip settings,
selectable overload characteristics,
1CO/2CO output relay

F3 DRC1 Dry Run & Overload Protection Relay with Phase Failure

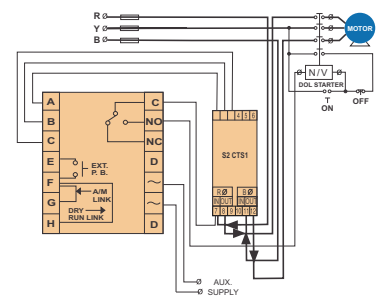
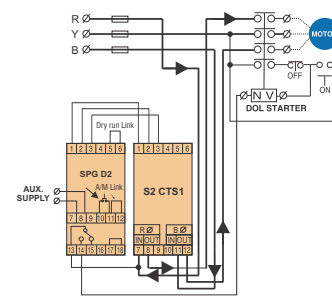
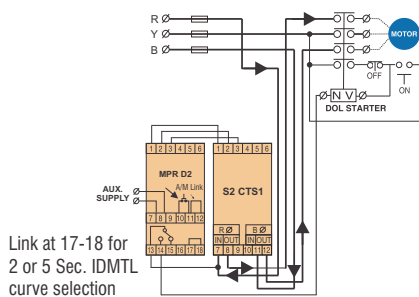
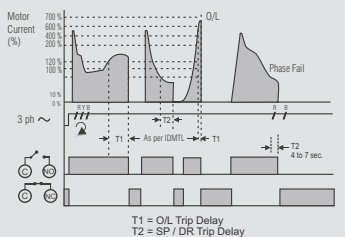
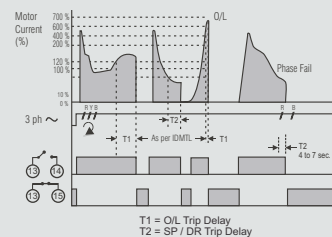
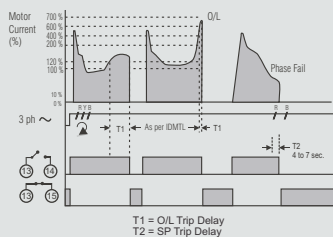


Discontinued

Phase Failure, Unbalance, Phase sequence, overloading and dry running
Auto/Manual Reset,
Adjustable current trip settings,
Adjustable overload characteristics,
1CO output relay

| | | | |
|-----------------------------|---|--|--|
| Supply Voltage | | | |
| System | 100-120 / 220-240 / 380-440 V AC $\pm 20\%$ | 100-120/220-240/380-440V AC $\pm 20\%$ | 220-240/380-440 V AC $\pm 20\%$ 50/60 Hz $\pm 3\%$ |
| Auxiliary | 110/240/380/415VAC/DC/24VAC/DC $\pm 20\%$, 50/60Hz | 110/240/380/415/440 V AC/DC/24 V AC/DC $\pm 20\%$, 50/60 Hz | 110 / 240 / 380/ 415 V AC $\pm 20\%$ 50 / 60 Hz |
| Output Relay Contact | 1 CO (2 CO) | 1 CO (2 CO) | 1 CO |
| Input | From CTS | From CTS | From CTS |
| Trip Setting | | | |
| Phase to phase unbalance | 50% of motor Current $\pm 10\%$ | 50% of motor Current | 50% of I FLC |
| Under current (Dry running) | N.A. | 50%/75% of set current | 50% or 75% of I SET |
| Overload | Above 120% of set Current (IDMTL) | Above 120% of set current (IDMTL) | Above 120% of set current (IDMTL) |
| UV/OV | N.A. | N.A. | N.A. |
| Trip Time delay | | | |
| On phase failure | 5.5 secs. ± 1.5 secs. | 5.5 secs. ± 1.5 secs. | 5.5 secs. ± 1.5 secs. |
| For overloading | As per selectable inverse time Characteristics (2 secs. / 5 secs.) or 10 secs. or 15 secs. or 20 secs. (optional) | As per selectable inverse time Characteristics 2 / 5 secs (10 secs.) | As per selectable inverse time Characteristics 2 - 10 secs. (variable) |
| UV/OV RP | N.A. | N.A. | N.A. |
| Resetting | Auto / Manual / Remote | Auto / Manual / Remote | Auto / Manual / Remote |
| Dimensions (mm) | | | |
| Overall (L x W x D) | 76 x 56.5 x 117.5 | 76 x 56.5 x 117.5 | 96 x 96 x 76 |
| Panel mounting (L x W) | 67 x 46 / 35 mm Rail Mounting | 67 x 46 / 35 mm Rail Mounting | 92 x 92 |
| Approx Weight | 425 gms. | 425 gms. | 425 gms. |

Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)



Relay contact position shown in 'Power off' condition

MOTOR / PUMP PROTECTION RELAYS

minilec®

D2 MPR1

Dry Run & Overload Protection
Relay with Phase Failure



Phase Failure, Unbalance, Phase sequence and overloading, Under Current, Auto/Manual Reset, Adjustable current trip settings, Test Facility, UC bypass facility, selectable overload characteristics, 2CO output relay

D2 MPR2

Dry Run & Overload Protection
with Phase Failure & UV+OV



Sensing both voltage and current signals, Phase Failure, Unbalance, Phase sequence, under over voltage, overloading and dry running. Manual Reset, Delayed auto reset, fixed trip settings, fixed overload characteristics, 2CO output relay

S2 CMR1

Dry Run & Overload Protection
Relay with Phase Failure



Phase Failure, Unbalance, Phase sequence, overloading and dry running (Under current) Microcontroller based design, SMD technology, Auto/Manual Reset, Adjustable current trip settings, selectable overload characteristics, 2CO output relay

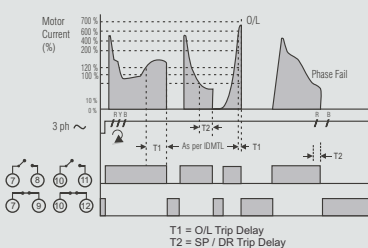
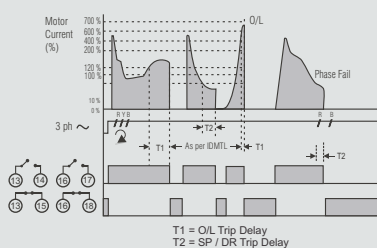
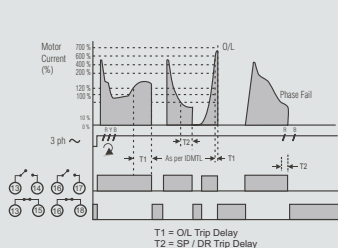
S2 CTS1

Current Sensor



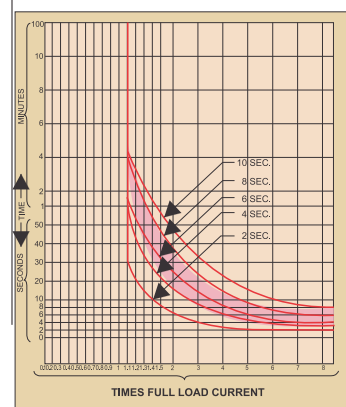
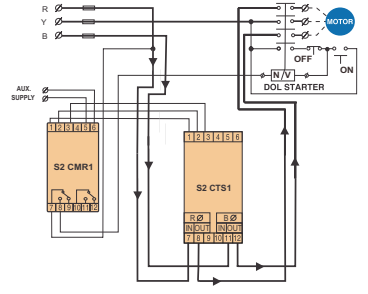
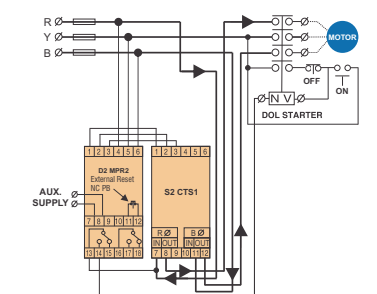
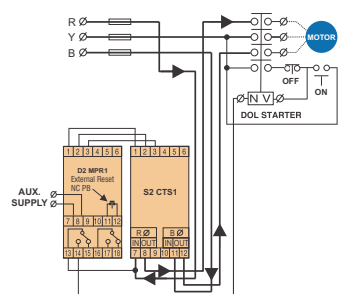
Current sensor suitable for full load motor current of 1.25A, 2.5A, 5A, 10A, 20A, 40A & 80A To be used with Minilec relays only.

| | | | |
|--|--|--|-------------------------------------|
| 380-440 V AC \pm 20%, 48-63 Hz 220-240 / 380-440V AC 2 CO - | 380-440V AC \pm 20%, 48-63 Hz 220-240 \pm 20% VAC 2 CO - | 100-120/220-240/380-440V AC \pm 20%, 48-63 Hz 100-120/220-240VAC \pm 20%, 24V DC \pm 10%-15% 2 CO - | N.A. N.A. 3-wire Output |
| 50% of Motor Current (Fixed) 40% to 80% of set current (Adj. with Bypass facility) As per inverse time characteristics N.A. | 50% of Motor Current (Fixed) 50% of set current (Fixed) As per inverse time characteristics UV = -20% (Fixed) OV = +20% (Fixed) | 50% of Motor Current (Fixed) 40% to 80% of set current As per inverse time characteristics N.A. | N.A. N.A. N.A. N.A. |
| 4 Sec \pm 1 Sec As per Inverse Time Characteristics 2/5/10 Sec. (Selectable) N.A. | 4 Sec \pm 1% As per Inverse Time Characteristics 2 Sec. (Fixed) For UV/OV - 4 Sec \pm 1 Sec for RP - Instant | 4 Sec \pm 1 Sec (Fixed) As per Inverse Time Characteristics 2/5/10 Sec. (Selectable) N.A. | N.A. N.A. N.A. |
| Auto/ Manual (Remote with NC Push Button) | Delayed Auto | Auto / Manual | |
| 76 x 56.5 x 117.5 67 x 46 / 35 mm Rail Mounting | 76 x 56.5 x 117.5 67 x 46 / 35 mm Rail Mounting | 90 x 35 x 60 35 mm Rail Mounting | 90 x 35 x 60 35 mm Rail Mounting |
| 400 gms | 400 gms | 140 gms | 140 gms. |



Selection Chart for S2 CTS1

| HP | KW | Amp | S2 CTS1 Model |
|-------|-------|----------|---------------|
| <0.75 | <0.5 | 0.5-1.25 | S2 CTS1/1.25 |
| <1.75 | <1.30 | 1-2.5 | S2 CTS1/2.5 |
| <3 | <2.25 | 2-5 | S2 CTS1/5 |
| <6 | <4.5 | 4-10 | S2 CTS1/10 |
| <12.5 | <9.4 | 8-20 | S2 CTS1/20 |
| <30 | <22.5 | 16-20 | S2 CTS1/40 |
| <60 | <45 | 32-80 | S2 CTS1/80 |



Relay contact position shown in 'Power off' condition

Note: S2 Series - RoHS Product available on request.

MICROPROCESSOR BASED MOTOR PROTECTION RELAY

F3 MPR1

Motor Protection Relay



MBMPR

Comprehensive Motor Protection Relay



CT Module

(CT 20 / CT 50)



CT Module is specially designed for use with Minitec relays only like F3 MPRI, MBMPR and M-Commander Available in 2 modules, CT20 and CT50. Interconnecting cable (2.5mtrs) is provided with this module.

Microcontroller based. Sensing voltage, current and temperature. Protecting against Phase Failure, Unbalance, Phase sequence, Under/over voltage, overloading, winding over temperature, Over current/Short circuit, locked rotor, Auto/Manual resetting, Adjustable trip settings for UV/OV, UC/OC, O/L, Locked rotor & earth fault. On delay & start-up delay adjustable, 2x1C0 output relays and serial communication port.

F3 MPR 1

| | |
|-----------------------------|--|
| Supply Voltage | |
| System | 220-440 V AC $\pm 20\%$, 45-65Hz |
| Auxiliary | 90-270 V AC/DC |
| Output Relay Contact | 2 CO |
| Serial Communication | Provision of RS485 Output |
| Input | Current Sensor - External CTS (CT1/CT5/CT 20/CT50) |

| Trip Setting | Protection Parameter | Setting Range | Trip Delay | LCD Display | Resetting Mode |
|--------------|--|------------------|--------------|-------------------------------|-----------------|
| | Over load Trip Setting As per IDMTL Char | 2/5/10/15/20 Sec | N.A | Over Load | Manual |
| | Unbalance Trip Setting | 20% 60% | 1-10 Sec | Current Unbalanced | Multi Attempt |
| | Phase Failure | N.A | 1-10 Sec | Current S.P | Manual |
| | Reverse Phasing | N.A | Instant | Phase Reversal | Manual |
| | Under Current | 30%-90% | 1-60 Sec | Under Current | } Multi Attempt |
| | Over Current | 300%-800% | 2-25 Sec | Over Current | |
| | Lock Rotor | 200%-500% | 1-10 Sec | Rotor Lock | Manual |
| | Earth Fault Setting | 30%-80% | 0.5 - 10 Sec | Earth Fault | Manual |
| | Over Temp. | 70° to 180° | 1-20 Sec | Sensor Fail, Motor Temp. High | Auto/Manual |

| | |
|----------------|-----------------------------|
| Display | 16x2 (Back lit LCD Display) |
|----------------|-----------------------------|

| Dimensions (mm.) | |
|---------------------|--------------------------|
| Overall (L x W x D) | 96 x 96 x 80 |
| Mounting (L x W) | Panel Mounting - 92 x 92 |

| | |
|--------------------|---------|
| Approx Weight Unit | 400 gms |
|--------------------|---------|

MBMPR

| | |
|--------------------------|---|
| Supply Voltage | |
| System | 415V AC ± 20%, -25% 3Ø, 3 Wire, 50 / (60)Hz ± 3% |
| Auxiliary | 90-270V AC / DC |
| Output | 1 CO for Trip & 1 CO for Alarm/RS 232 Port (Optional) |
| Input | Current Sensor - External CTS (CT1/CT5/CT 20/CT50) |
| Power Consumption | 8 VA |

| Settings | Trip Level | Trip Delay | LED | Reset Mode |
|--|------------------------------------|--------------------|-----|---------------|
| Power ON | — | — | ✱ | — |
| Unbal/Ph.Rev | 1% - 20% | 1-10 Secs. | ✱ | Auto / Manual |
| Under Voltage | 75% - 95% | 1-10 Secs. | ✱ | Auto / Manual |
| Over Voltage | 105% - 120% | 1-10 Secs. | ✱ | Auto / Manual |
| Current unbalance | 20-60% of I _{max} | 1-10 Secs. | ✱ | Multi Attempt |
| Current phase Loss | — | 1-10 Secs. | ✱ | Multi Attempt |
| Under Current (dry run) I_{CDR-M} for | 30-90% of I _{max} | 1-10 Secs. | ✱ | Multi Attempt |
| Over Current/ Short Circuit | 300% - 800% of I _{max} | 2-25 Secs. | ✱ | Multi Attempt |
| Overload | 2/5/10/15/20 Sec. | As per IDMTL char. | ✱ | Manual |
| Lock Rotor | 200%-500% of I _{max} | 1-10 Secs. | ✱ | Manual |
| Earth Fault | 30% - 80% | 0.5 - 10 Secs. | ✱ | Manual |
| Winding Overheat | 4K1 - 5K6 | 1-20 Secs. | ✱ | Auto / Manual |

| | |
|----------------|---------------------------------|
| Display | 16x2 Ch. (Back lit LCD Display) |
|----------------|---------------------------------|

| Dimensions (mm) | |
|------------------------|----------------|
| Overall (L x W x D) | 166 x 216 x 80 |
| Panel mounting (L x W) | 153 x 203 |

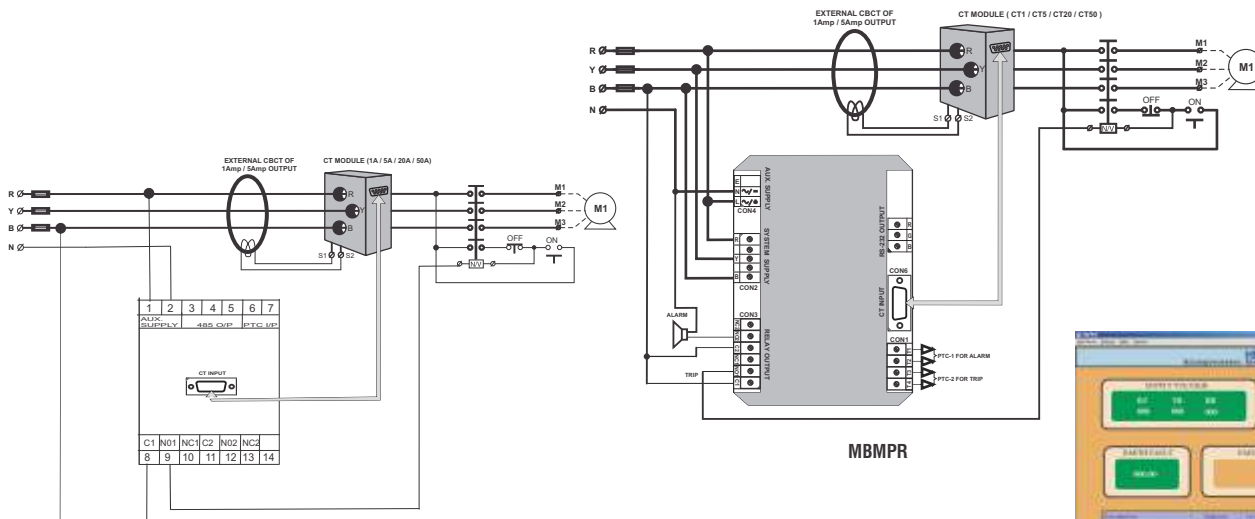
| | |
|---------------|---------|
| Approx Weight | 600 gms |
|---------------|---------|

- Interconnection cable

- Input from R.Y.B. phases and CBCT

CT Module Selection Chart

| CT | Range |
|------|--------------------------------------|
| CT20 | For motor currents (FLA) upto 20 Amp |
| CT50 | For motor currents (FLA) upto 50 Amp |



F3 MPR1

Relay contact position
shown in 'Power off' condition



PC Side Software

CT Module

(CT1 / CT 5)



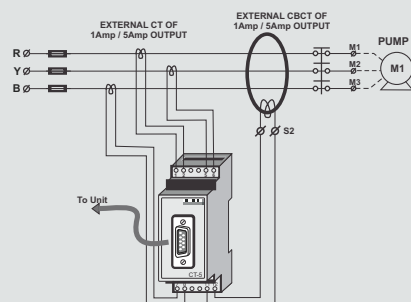
For motor current above 50 Amp. customer to use suitable external CT of 1 Amp/5 Amp Secondary and CT Module CT 1/CT 5 for Minilec relay only like F3 MPR1, MBMPR & M-COMMANDER

M-COMMANDER

Pump Management & Protection System



M-Commander is a micro-processor based Motor protection and Pump management system, suitable for 2 pumps. Sensing voltage, current and temperature. Protecting against Phase Failure, Unbalance, Phase sequence, Under/over voltage, overloading, dry running, winding over temperature, Over current/Short circuit, locked rotor, earth fault. Auto/Manual resetting, Adjustable trip settings for UV/OV, UC/OC, O/L, Locked rotor & earth fault. On delay & start-up delay adjustable, 2x1CO output relays RTC based time settings Water level control.



90 x 35 x 60
35 mm Rail Mounting
400 gms

Motor protection Includes

- Under/Over voltage protection
- Single/Reverse phasing protection
- Voltage / Current unbalance
- Overload trip
- Over current protection
- Dry running protection
- Earth fault protection
- PTC based winding overheating protection

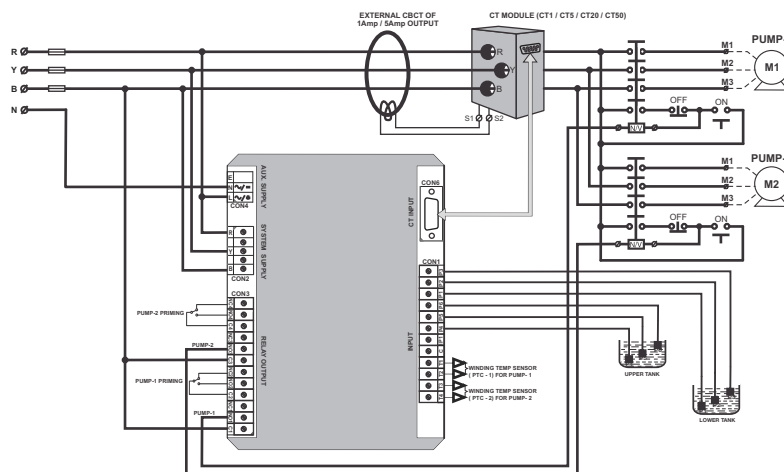
Pump Management System Features

- Auto Change over between two pumps
- Intelligent resetting facility
- On-site programming facility
- Password protection for programming
- Pump On-Off timer programmable for 10 times a day, with advance programming of 7 days
- Provision for water level control
- Run-time compensation
- Ideal for Pump Automation & Unmanned Pumping Stations.

| PARAMETERS | SPECIFICATIONS |
|-------------------------------------|---|
| Supply Voltage | |
| System | 415 V AC $\pm 20\%$, $\pm 25\%$ 50/60Hz $\pm 3\%$ |
| Auxiliary | 90-270 VAC/DC $\pm 20\%$, 50Hz |
| Output Contacts | 4 x 1 CO Relays (for 2 pumps) |
| Current sensor | External CT1 / CT5 / CT20 / CT50 |
| Reset | Auto/ Multi-Attempt / Manual |
| Unbalance | 1-20% $\pm 6V$ for Voltage Unbalance 20-60% $\pm 5\%$ of current unbalance |
| Overload | As per inverse time characteristics |
| Over Current / Short Circuit | 300% - 800% |
| Locked Rotor | 200% - 500% |
| Earth Fault | 30% - 80% |
| Winding Overheating | As per PTC temperature characteristics |
| Under Voltage | 75% - 95% of system supply (adjustable) |
| Over Voltage | 105%-120% of system supply (adjustable) |
| Dry Running | 30-90% of Imax |
| Display | 16x2 Ch. (Backlit LCD) |
| Level Control | Upper tank full Lower tank empty |
| Weight | 800gms |

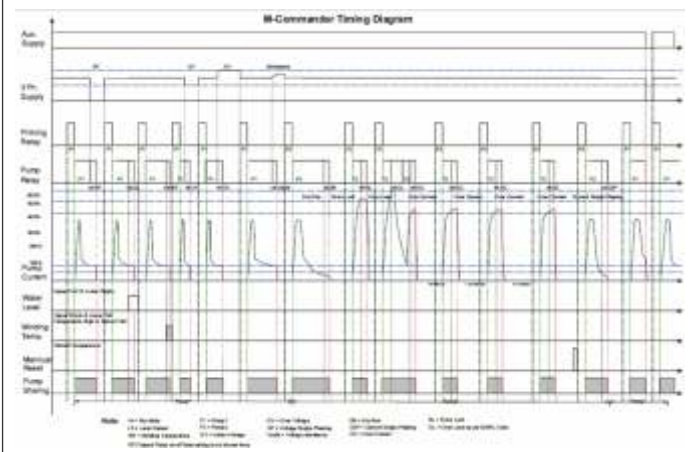
Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)

For more detailed specifications, refer table on page No. 26 (MBMPR)



M-COMMANDER

For Auto operation, Put link across 'ON' push button



Relay contact position shown in 'Power off' condition

WINDING OVER-TEMPERATURE PROTECTION RELAYS

WTR D1

Winding Protection Relay

ABS



Sensing motor winding temperature through PTC Thermistors. Winding overheating, sensor short, sensor open faults. Suitable for single, triple or 6/9/12 PTC's

S2 WTR1

PTC Thermistor Relay

ABS



Sensing motor winding temperature through PTC Thermistors. Winding overheating, sensor short, sensor open faults. Suitable for single, triple or 6/9/12 PTC's failsafe/Non fail safe

PTC

Thermistor



Supply Voltage

Auxiliary

110-120/220-240/380-440 V AC/24 V DC 50Hz(60 Hz) ±10%

Output Contacts

1 CO

Trip Setting

Thermistor Sensor Healthy

40 ohm - 4 K ohm

Thermistor Sensor Trip

4.1 K ohm - 5.5 K ohm

Thermistor Sensor Open

5.6 K ohm & above

Thermistor Sensor Short

39 ohms & below

Trip time delay

Less than 2 secs.

Resetting

Below 1.51 K

Dimensions (mm)

Overall (L x W x D)

76 x 30.5 x 117.5

Mounting (L x W)

68 mm centre to centre / 35 mm Rail Mounting

Weight

300 gms.

Resetting Mode

Auto / Manual (Optional)

12/24V DC/100-120/220-240V AC, 50Hz(60 Hz) ±10%

2 CO

40 Ω to 4K Ω

4.1K Ω 5.5K Ω

5.6K Ω & Above

0 - 39 Ω

Less than 1 Sec (Fixed)

Below 1.51 K

90 x 35 x 60

35 mm Rail Mounting

250 gms.

Auto / Manual

PTC Thermistors are semi conductor sensors. These have typical characteristics that change their resistance instantly at a specified pre-defined response temperature (NRT). As soon as the surrounding temperature of PTC reaches it's NRT value the body resistance of PTC Thermistor rises sharply from 200 / 250 Ohms to more than 5000 Ohms. The PTC Thermistors are embedded in the overhang location of the motor windings.

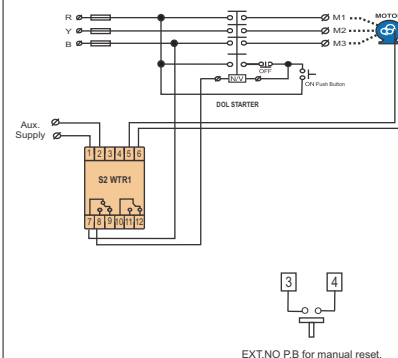
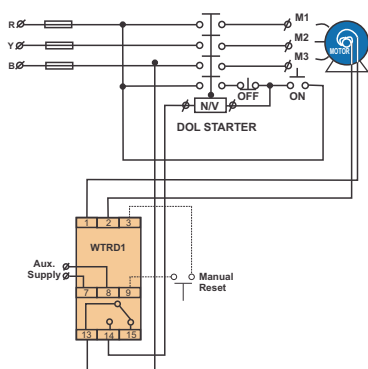
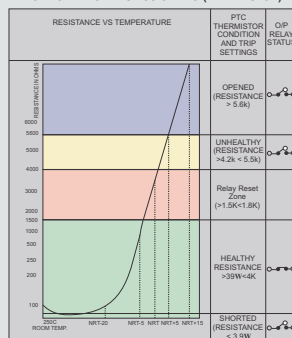
The NRT value of PTC is selected according to the Insulation Class of the copper windings of motor or transformers.

Selection Chart for NRT of PTC Thermistors.

| NRT °C | Class of Ins. | Cable Colour Code |
|--------|---------------|-------------------|
| 70 | — | White - Brown |
| 80 | — | White - White |
| 90 | — | Green - Green |
| 100 | A | Red - Red |
| 110 | — | Brown - Brown |
| 120 | E | Grey - Grey |
| 130 | B | Blue - Blue |
| 140 | — | White - Blue |
| 150 | F | Black - Black |
| 160 | — | Blue - Red |
| 170 | H | White - Green |
| 180 | C | White - Red |
| 190 | — | Orange - Black |

Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)

TYPICAL CHARACTERISTICS OF PTC (THERMISTOR)



Relay contact position shown in 'Power off' condition