

# MOTOR / PUMP PROTECTION RELAYS

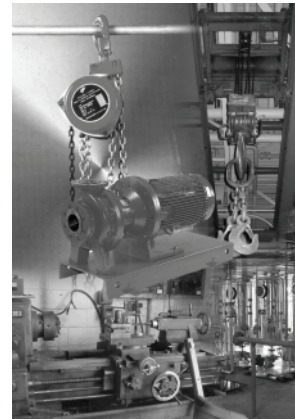
**minilec**<sup>®</sup>



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, and also for motors in machines, conveyors, cranes/hoists and lifts, and for pumps.

## MODELS

**MPR D2, SPG D2, PGS D2  
D2MPR2, D2MPR3, S2 CMR1  
S2 CTS1, F3 MPR1, S2 WTR1  
D3 MPR1, D5 MPR1, D2BTR1, D3 DMPR1, D3 MPR3**



## 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/Current 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/Stalling
- 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

## D2 MPR3

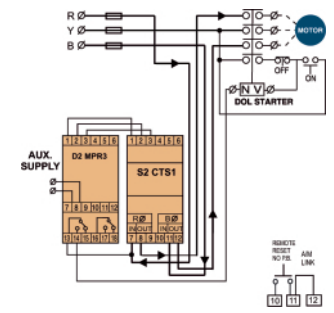
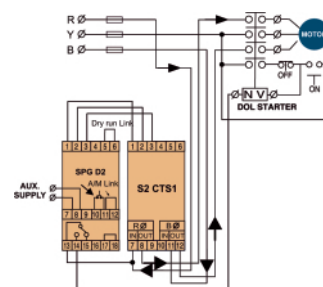
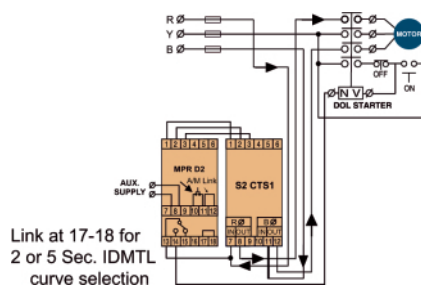
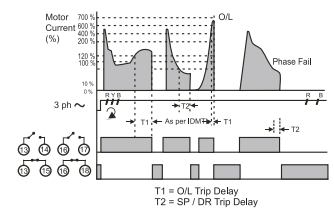
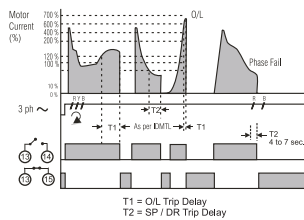
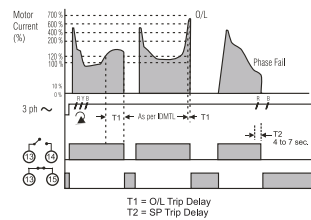
Dry Run & Overload Protection Relay with Phase Failure



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

Supply Voltage		110/240/380/415VAC/24VAC/DC±20%,50/60Hz	110/240/380/415/440 V AC 24 V AC/DC±20%, 50/60 Hz	100 - 120 / 220 - 240 / 380 - 440 VAC ± 20%
Note: Mention specific voltage (Fixed/wide range) in order	Auxiliary			
<b>Output Relay Contact</b>		1 CO (2 CO)	1 CO (2 CO)	2 CO
<b>Input</b>		From S2 CTS	From S2 CTS	From S2 CTS
<b>Trip Setting</b>				
Phase to phase unbalance		50% of motor Current ±10%	50% of motor Current	50% of motor current ± 10% (Fixed)
Under current (Dry running)		N.A.	50%/75% of set current	40% to 80% ± 5% of Set Current (Adj. with Bypass facility)
Overload		Above 120% of set Current (IDMTL)	Above 120% of set current (IDMTL)	As per Inverse Time Characteristics
UV/OV				N.A.
<b>Trip Time delay</b>				
On phase failure		5.5 secs. ± 1.5 secs.	5.5 secs. ± 1.5 secs.	4.0 ± 1.0 secs.
For overloading		As per selectable inverse time Characteristics 2/5 Sec. (selectable) 10/15/20 Sec. (Optional)	As per selectable inverse time Characteristics 2/5 Sec. (selectable) 10/15/20 Sec. (Optional)	As per Inverse Time Characteristics 2 / 5 / 10 / 15 / 20 sec. (Selectable)
UV/OV RP		N.A.	N.A.	N.A.
<b>Resetting</b>		Auto / Manual / Remote	Auto / Manual / Remote	Auto / Manual / Remote
<b>Dimensions (mm)</b>				
Overall (L x W x D)		76 x 56.5 x 117.5	76 x 56.5 x 117.5	76 X 56.5 X 117.5
Panel mounting (L x W)		67 x 46 / 35 mm Rail Mounting	67 x 46 / 35 mm Rail Mounting	67 x 46 / 35 mm Rail Mounting
<b>Approx Weight</b>		425 gms.	425 gms.	250 gms

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



Relay contact position shown in 'Power off' condition

# MOTOR / PUMP PROTECTION RELAYS



## 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

## PGS D2

Single Phase Over Load & Dry Run protection Relay



Single Phase Over Load & Dry Run protection Relay suitable up to 10 Amps. Relay Out put 1CO / 2 CO, Auto / Manual / Remote Reset.

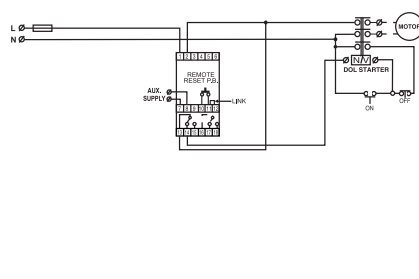
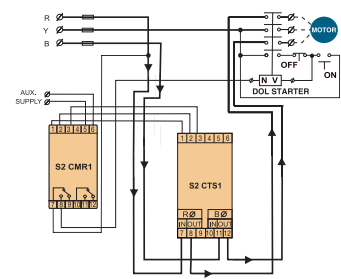
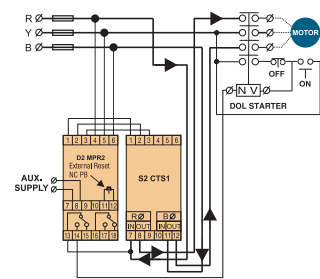
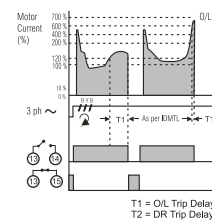
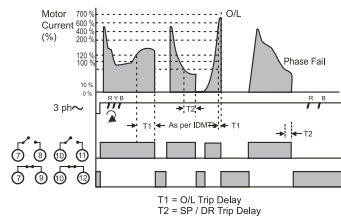
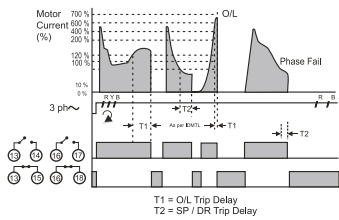
## S2 CTS1

Current Sensor



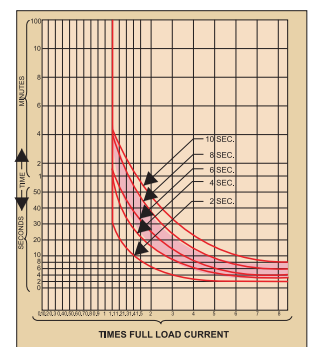
Current sensor suitable for full load motor current of 1.25A, 2.5A, 5A, 10A, 20A, 40A & 80A To be used with Minilec relays only.

220-240 / 380 - 415 V AC ± 20%	100-120/220-240/415 VAC±20%, 24V DC+10%-15%	220-240 VAC ± 20 %, 50/60 Hz ± 3%	N.A.
2 CO	2 CO	1CO / 2CO	3-wire terminal Output
From S2 CTS	From S2 CTS	Build in CT 10A /5A (SELECTABLE)	
50% of Motor Current (Fixed)	50% of Motor Current (Fixed)	N.A.	N.A.
50% of set current (Fixed)	40% to 80% of set current (Adj. with bypass facility)	75% of set current ± 10% (fixed)	N.A.
As per inverse time characteristics	As per inverse time characteristics	Above 120% of set Current (fixed)	N.A.
UV = -20% (Fixed) OV = +20% (Fixed)	N.A.	N.A.	N.A.
4 Sec ± 1%	4 Sec ± 1 Sec (Fixed)	Less than 2 sec	N.A.
As per Inverse Time Characteristics	As per Inverse Time Characteristics	As per 2 sec. Inverse Time current characteristics	N.A.
2 Sec. (Fixed)	2/5/10 Sec. (Selectable)		
For UV/OV - 4 Sec ± 1 Sec for RP - Instant	N.A.	N.A.	N.A.
Delayed Auto	Auto / Manual	Auto / Manual / Remote	
76 x 56.5 x 117.5	90 x 35 x 60	76 x 56.5 x 117.5	90 x 35 x 60
67 x 46 [ ] /35 mm Rail Mounting	35 mm Rail Mounting	67 x 46 [ ] /35 mm Rail Mounting	35 mm Rail Mounting
400 gms	140 gms	600 gms	140 gms.



### Selection Chart for S2 CTS1

HP	KW	Amp	S2 CTS1
<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	16-40	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



Microcontroller based. Sensing current and temperature. Protecting against Phase Failure, Unbalance, Phase sequence, overloading, winding over temperature, Over current/Short circuit, locked rotor, Auto/Manual resetting, Adjustable trip settings for UC/OC, O/L, Locked rotor & earth fault. On delay & start-up delay adjustable, 2x1CO output relays and serial communication port.



### F3 MPR 1

<b>Supply Voltage</b>	
System	220-440 V AC $\pm$ 20%
Auxiliary	90-270 V AC/DC (45-65Hz), 24 VDC
<b>Output Relay Contact</b>	2 CO (5 Amp, 230 V AC Resistive)
<b>Serial Communication</b>	Provision of RS 485 Output (Optional)
<b>Input</b>	External CTS (CT 1/ CT 2.5/ CT5/ CT20/ 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 Unbalance	Manual/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	Manual/Multi Attempt
	Over Current	300%-800%	2-25 Sec	Over Current	Manual/Multi Attempt
	Lock Rotor	200%-800%	1-10 Sec	Rotor Lock	Manual
	Earth Fault Setting	10%-100%	0.5 - 10 Sec	Earth Fault	Manual
	Over Temp.	70°C to 180°C	1-20 Sec	Sensor Fail, Motor Temp. High	Auto/Manual

<b>Display</b>	16x2 (Back lit LCD Display)
<b>Operating Temperature</b>	0°C to 60°C
<b>Humidity</b>	Upto 95% Rh
<b>Enclosure</b>	F3 Series ABS
<b>Dimensions (mm.)</b>	
Overall (L x W x D)	96 x 96 x 80
Mounting (L x W)	Panel Mounting - 92 x 92
<b>Approx Weight Unit</b>	400 gms

## 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 and current. Protecting against Phase Failure, Unbalance, Phase sequence, Under/over voltage, overloading, dry running, Over current/Short circuit. Auto/Manual resetting, Adjustable trip settings for UV/OV, UC/OC, O/L. On delay & startup delay adjustable, Start inhibition time adjustable, 2x1CO output relays RTC based time settings.

### Motor protection Includes

- Under/Over voltage protection • Single/Reverse phasing protection
- Voltage / Current unbalance • Overload trip • Over current protection • Dry running 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 • Run-time compensation • Ideal for Pump Automation & Unmanned Pumping Stations. • Start Inhibition Facility

PARAMETERS	SPECIFICATIONS
<b>Supply Voltage</b>	
Auxiliary	90-270 VAC/DC $\pm$ 20%, 50Hz
<b>Output Contacts</b>	4 x 1 CO Relays (for 2 pumps)
<b>Current sensor</b>	External CT1 / CT5 / CT20 / CT50
<b>Reset</b>	Auto/ Multi-Attempt / Manual
<b>Unbalance</b>	4-20% for Voltage Unbalance 40-60% $\pm$ 10% for current unbalance
<b>Overload</b>	As per Inverse Time Characteristics
<b>Over Current / Short Circuit</b>	300% - 800% $\pm$ 50% of Imax.
<b>Under Voltage</b>	75% - 95% of system supply (adjustable)
<b>Over Voltage</b>	105%-120% of system supply (adjustable)
<b>Dry Running</b>	30-90% $\pm$ 10% of Imax
<b>Display</b>	16x2 Ch. (Backlit LCD)
<b>Weight</b>	800gms
Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)	

## CT Module

(CT 20 / CT 50)

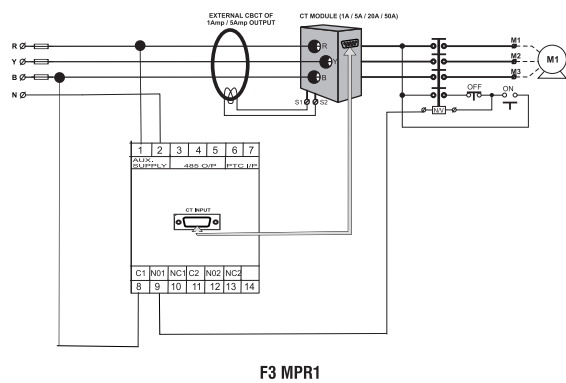


CT Module is specially designed for use with Minitec relays only like F3 MPR1. M-Commander Available in 2 modules, CT20 and CT50. Interconnecting cable (2.5mtrs) is provided with this module.

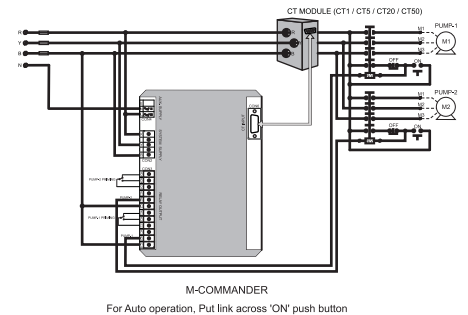
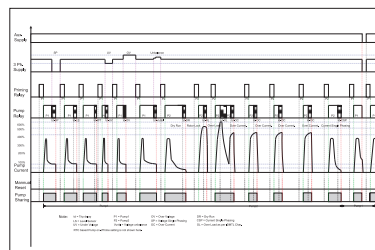
- Interconnection cable
- Input from R.Y.B. phases and CBCT

### CT Module Selection Chart

CT	Range
CT20	For motor currents (FLA) upto 20 Amp
CT50	For motor currents (FLA) upto 50 Amp
102 x 35 x 81	
90mm Panel Mounting centre to centre	
600 gms	



### M-Commander Timing Diagram



Relay contact position shown in 'Power off' condition

Relay contact position shown in 'Power off' condition



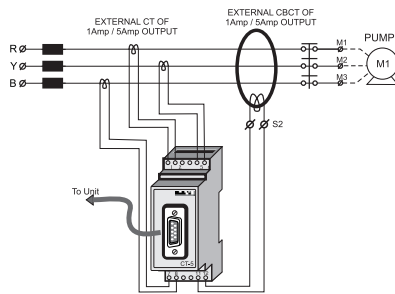
# MICROPROCESSOR BASED PUMP AUTOMATION RELAY



## 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, M- COMMANDER



90 x 35 x 60  
35 mm Rail Mounting  
400 gms

## D5 MPR1

Micro controller based motor protection relay



Microcontroller based. Sensing current. Protecting against Phase Failure, Unbalance, Phase sequence, overloading, Over current/Short circuit, locked rotor, Auto/Manual resetting, Adjustable trip settings for UC/OC, O/L, Locked rotor & earth fault. Start-up delay adjustable, 2x1CO output relays and last ten faults logging.

### Supply Voltage

System Supply: 380 - 440 V AC  $\pm$  20%, 45 - 55 Hz.

Auxiliary Supply: 90 - 270 V AC / DC, 415 V AC

Internal CT - up to 175 Amps.

Output Contacts : 2 CO

### Trip Settings

Sr. No.	Parameters	Range	Resolution	Fact Setting	Trip Delay Range	Fact Setting	Bypass Facility	Reset Type
1	CT Range	35 - 175 Amp	1 Amp	100 Amp	NA	NA	NA	NA
2	Over Load	Above 115% of Set Value	NA	NA	IDMTL class 2, 5, 10, 15, 20, 30 sec	2 sec	Yes	Auto / Manual
3	Start up delay	0 - 60 sec	1 sec	10 sec	NA	NA	NA	NA
4	Under Current	30 - 174 Amp	2 Amp	50 Amp	1 - 60 sec	5 sec	Yes	Auto / Manual
5	Over Current	110 - 350%	5%	200%	1 - 10 sec	2 sec	Yes	Auto / Manual
6	Current Unbalance	20 - 60%	5%	50%	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
7	Current Single Phasing	Yes	NA	NA	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
8	Reverse Phase	Yes	NA	NA	Instant (< 2 sec)	NA	Yes (Password Protected)	Auto / Manual
9	Rotor Lock	200 - 800%	50%	700%	Instant (< 2 sec)	NA	Yes	Auto / Manual
10	Earth Fault (Optional)	10 - 100%	10%	30%	0.5 - 10 sec	0.5 sec	Yes	Auto / Manual

Fault Memory: Last 10 faults

Resetting Mode: Auto / Manual

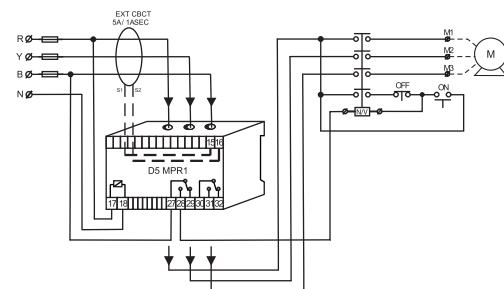
Display: 8 X 2 AN LCD

Weight: 400 gms (Approx.)

Dimensions (mm)

Over All: (L X W X D)150 x 73 x 113

Mounting : (L X W)35 mm DIN Rail



# MICROPROCESSOR BASED PUMP AUTOMATION RELAY

## D3 MPR1

Micro controller based motor protection relay

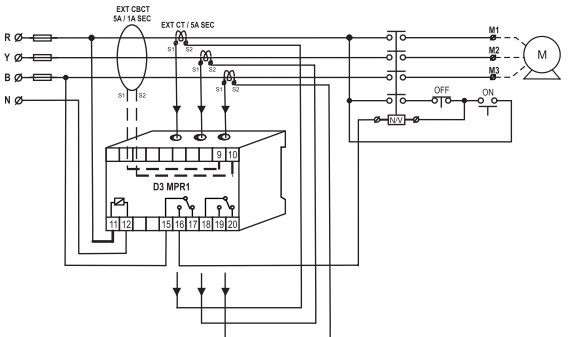


Microcontroller based. Sensing current. Protecting against Phase Failure, Unbalance, Phase sequence, overloading, Over current/Short circuit, locked rotor, Auto/Manual resetting, Adjustable trip settings for UC/OC, O/L, Locked rotor & earth fault. Start-up delay adjustable, 2x1CO output relays and last ten faults logging.

Supply Voltage  
 System Supply : 380 - 440 V AC ± 20%, 45 - 55 Hz.  
 Auxiliary Supply: 90 - 270 V AC / DC, 415 V AC  
 Internal CT For D3 MPR1 - 5 Amp or 20 Amp. or 50 Amp.  
 Output Contacts: 2 CO

Trip Settings								
Sr. No.	Parameters	Range	Resolution	Fact Setting	Trip Delay Range	Fact Setting	Bypass Facility	Reset Type
1	* Ext. CT	50 - 600	5 Amp	100 Amp	NA	NA	NA	NA
2	Set current (FLC)	30 to 100% of FLA	1 Amp	20 / 50 / 100 Amp	NA	NA	NA	NA
3	Over Load	Above 115% of Set Value	NA	NA	IDMTL class 2, 5, 10, 15, 20, 30 sec	2 sec	Yes	Auto / Manual
4	Start up delay	0 - 60 sec	1 sec	10 sec	NA	NA	NA	NA
5	Under Current	30 - 90%	5%	50%	1 - 60 sec	5 sec	Yes	Auto / Manual
6	Over Current	110 - 350%	5%	200%	1 - 10 sec	2 sec	Yes	Auto / Manual
7	Current Unbalance	20 - 60%	5%	50%	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
8	Current Single Phasing	Yes	NA	NA	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
9	Reverse Phase	Yes	NA	NA	Instant (< 2 sec)	NA	Yes (Password Protected)	Auto / Manual
10	Rotor Lock	200 - 800%	50%	700%	Instant (< 2 sec)	NA	Yes	Auto / Manual
11	Earth Fault (Optional)	10 - 100%	10%	30%	0.5 - 10 sec	0.5 sec	Yes	Auto / Manual

Fault Memory: Last 10 faults  
 Resetting Mode: Auto / Manual  
 Display : 8 X 2 AN LCD  
 Weight : 400 gms (Approx.)  
 Dimensions (mm)  
 Over All : (L X W X D) 100 x 73 x 113  
 Mounting : (L X W) 35 mm DIN Rail



## D3 DMPR1

Micro controller based motor protection relay

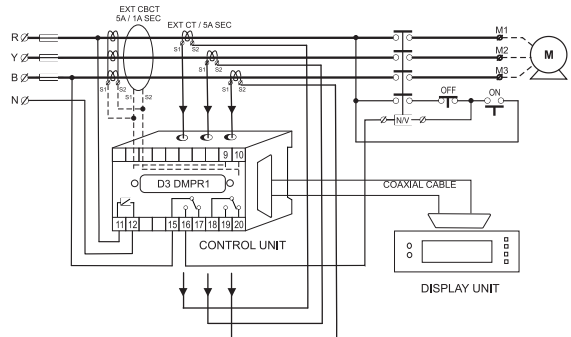


Microcontroller based. Sensing current. Protecting against Phase Failure, Unbalance, Phase sequence, overloading, Over current/Short circuit, locked rotor, Auto/Manual resetting, Adjustable trip settings for UC/OC, O/L, Locked rotor & earth fault. Start-up delay adjustable, 2x1CO output relays and last ten faults logging.

Supply Voltage  
 System Supply : 380 - 440 V AC ± 20%, 45 - 55 Hz.  
 Auxiliary Supply: 90 - 270 V AC / DC, 415 V AC  
 Internal CT For D3 DMPR1 - 5 Amp or 20 Amp. or 50 Amp.  
 Output Contacts: 2 CO

Trip Settings								
Sr. No.	Parameters	Range	Resolution	Fact Setting	Trip Delay Range	Fact Setting	Bypass Facility	Reset Type
1	Ext. CT	50 - 600	5 Amp	100 Amp	NA	NA	NA	NA
2	Set current (FLC)	30 to 100% of FLA	1 Amp	5 Amp	NA	NA	NA	NA
3	Over Load	Above 110% of Set Value	NA	NA	IDMTL class 2, 5, 10, 15, 20, 30 sec	2 sec	Yes	Auto / Manual
4	Start up delay	0 - 60 sec	1 sec	10 sec	NA	NA	NA	NA
5	Under Current	30 - 90%	5%	50%	1 - 60 sec	5 sec	Yes	Auto / Manual
6	Over Current	110 - 350%	5%	200%	1 - 10 sec	2 sec	Yes	Auto / Manual
7	Current Unbalance	20 - 60%	5%	50%	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
8	Current Single Phasing	Yes	NA	NA	4 sec Fixed (+/- 1 sec)	4 sec	Yes	Auto / Manual
9	Reverse Phase	Yes	NA	NA	Instant (< 2 sec)	NA	Yes (Password Protected)	Auto / Manual
10	Stalling	200 - 800%	50%	700%	Instant (< 2 sec)	NA	Yes	Auto / Manual
11	Earth Fault (Optional)	10 - 100%	10%	30%	0.5 - 10 sec	0.5 sec	Yes	Auto / Manual
12	Short Circuit	600 - 999%	50%	800%	Instant (< 2 sec)	NA	Yes	Auto / Manual

Fault Memory: Last 10 faults  
 Resetting Mode: Auto / Manual  
 Display : 8 X 2 AN LCD  
 Weight : 400 + 150 GMS (Approx.)  
 Dimensions (mm)  
 Over All : D3 encl: 71 (H) X 100 (L) X 111 (D) (Overall)  
 Display unit : 48 (H) X 96 (L) X 55 (D) (Overall)  
 Mounting : (L X W) 35 mm DIN Rail



# MICROPROCESSOR BASED PUMP AUTOMATION RELAY



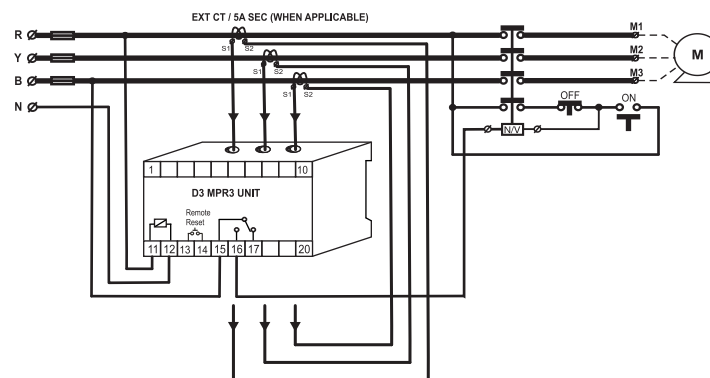
## D3 MPR3

(Microcontroller Based Motor Protection Relay)



Microcontroller based, Sensing current.  
Protection against Phase Failure, Unbalance  
and over loading. Manual / Remote resetting,  
1 CO output relays.

SR. NO.	PARAMETERS	D3 MPR3
1.	SYSTEM SUPPLY VOLTAGE	415 VAC $\pm$ 20%
2.	AUX. SUPPLY	110 / 240VAC $\pm$ 20%
3.	FREQUENCY	50 Hz / 60 Hz $\pm$ 3%
4.	OUTPUT RELAY CONTACTS	1CO
5.	OUTPUT CONTACT RATING	5 Amp, 240VAC [RESISTIVE]
6.	RATED I/P CURRENT	5A / 20A / 50A / 100A (OPTIONAL)
7.	FLC SETTING	20% TO 110% of Rated Current
8.	CURRENT UB TRIP SETTING	50% of FLC $\pm$ 10% (fixed)
9.	OVERLOAD TRIP SETTING	As per Inverse Time Charc' 10Sec fixed
10.	TRIP TIME DELAY PHASE LOSS (SP), UNBALANCE(UB) OVERLOAD	4 SEC $\pm$ 1 SEC. AS PER IDMTL CHARC' - 10SEC
11.	INDICATIONS 1) ON (RUN MODE) 2) SP / UB 3) OL	GREEN (STEADY ON) RED (STEADY ON / FLASHING) RED (STEADY ON)
12.	TEST / RESET	MANUAL (PUSH BUTTON ON UNIT), REMOTE RESET
13.	ENCLOSURE	D3 - ABS ENCLOSURE
14.	DIMENSIONS (L X W X D) ( mm )	71 x 100 x 111
15.	MOUNTING	35mm DIN RAIL MOUNTING
16.	WEIGHT (APPROX.)	350 gms.
17.	OPERATING CONDITIONS	TEMPERATURE = -5 °C TO +60 °C HUMIDITY = UPTO 95% Rh.



NOTE :- 1) EXTERNAL CT OF SEC 5A TO BE CONNECTED IN POWER WIRING WHEN RATED CURRENT > 100A  
2) RELAY CONTACTS SHOWN FOR UNIT IN POWER OFF / TRIP CONDITION.



# WINDING OVER-TEMPERATURE PROTECTION RELAYS



## D2 BTR1 Temperature Monitoring Relay



Temperature Monitoring Relay, Input through PT 100, Trip & Alarm Settings selectable, 1 CO + 1 CO Output Relay Contact

## S2 WTR1 PTC Thermistor Relay



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



Note: Mention specific voltage (Fixed/wide range) in order

<b>Supply Voltage</b>	Auxiliary	85 - 265 VAC, 50 / 60 Hz. ± 3%	12/24V DC/100-120/220-240V AC, 50Hz(60 Hz) ± 10%
<b>Output Contacts</b>		1 CO ( Trip) + 1 CO (Pre Heat Alarm)	2 CO
<b>Trip Setting</b>			
Trip Range		0 - 300 °C	-
Alarm Range		0 - 299 °C	-
Thermistor Sensor Healthy		-	40 Ω - 4K Ω
Thermistor Sensor Trip		-	4.1K Ω - 5.5K Ω
Thermistor Sensor Open		-	5.6K Ω & Above
Thermistor Sensor Short		-	0 - 39 Ω
<b>Trip time delay</b>		Less than 1 Sec.	Less than 1 Sec (Fixed)
<b>Resetting</b>		-	Below 1.51 K
<b>Dimensions (mm)</b>			
Overall (L x W x D)		76 X 56.5 X 117.5	90 x 35 x 60
Mounting (L x W)		67 X 48 Center to Center / 35 mm DIN Rail	35 mm Rail Mounting
<b>Weight</b>		210 gms (Approx.)	150 gms.
<b>Resetting Mode</b>		Auto / Manual	Auto / Manual

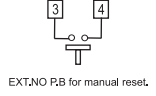
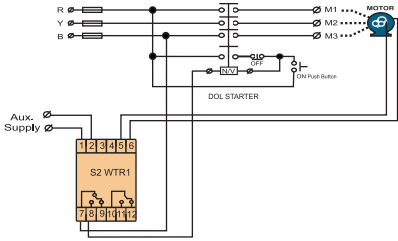
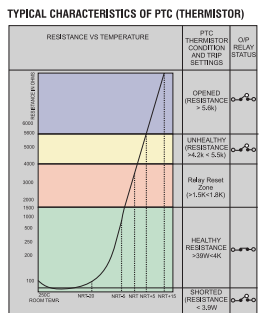
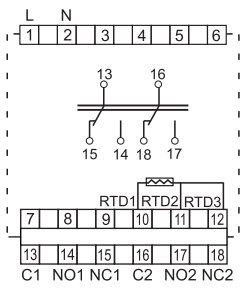
PTC Thermistors are semi conductor sensors. These have typical characteristics that change their resistance instantly at a specified pre-defined response temperature (NRT). As soon as the surrounding temperature of PTC reaches it's NRT value the body resistance of PTC Thermistor rises sharply from 200 / 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)



Relay contact position shown in 'Power off' condition