

INSTALLATION INSTRUCTION MANUAL

MOTOR / SUBMERSIBLE PUMP PROTECTION RELAY



D2 MPR1



D2 MPR1 is operating on negative sequence current component sensing principle for phase failure protection & sensing motor current for overload protection & dry run protection.

It offers protection against :

- Overloading condition.
- Unbalanced current condition/Phase reversal condition
- Dry running condition(with Bypass facility).

Being current operated it is to be used with minilec make current sensor CTS only. Refer Table1 for CTS selection chart & table 2 for current rating selected as per front scale printed on the unit. D2 MPR1 is an auxiliary relay & is to be used along with the motor starter only. The effective working of D2 MPR1 will depend on efficient working of the electromagnetic motor starter.

Before installing D2 MPR1 check whether the motor starter is operating perfectly by starting the motor with the "START" push button and switching it off by "STOP" push button. If the motor does not "START" or "STOP" on respective operations the starter needs to be serviced.

Do not install D2 MPR1 with faulty motor starter.

TRIP SETTING, TRIP DELAY & RESETTING

D2 MPR1 is factory set to trip the starter for unbalanced currents between any two phases exceeding 50% of full load currents (F.L.C). The trip time delay is between 4.0 ± 1.0 sec. In D2 MPR1, the inverse time characteristic (IDMTL) is given selectable type by front O/L TIME SET knob (i.e. Keep O/L time set knob at 2 or 5 or 10 sec char.) For other characteristic user has to specify while ordering & unit will follow inverse time current characteristic as per front O/L TIME SET knob setting on front plate. Depending upon the percentage of excess load on the motor above 100% rated load, the D2 MPR1 decides the trip time delay as per inverse time current characteristics. (Ref. Fig 4 for typical inverse time current characteristic chart). In D2 MPR1, site selectable dry run setting facility is given by front knob (i.e. Keep% UC knob at bypass position to disable dry run setting & keep% UC knob at other position for 40% to 80% dry run setting). The Dry Run Trip Time Delay is between 4.0 ± 1.0 sec. Unit can be set on Auto Reset mode & Remote Manual Reset mode by removing or putting an external 'NC' type push button at terminals 11 & 12 respectively in power off condition.

MOUNTING

D2 MPR1 unit & CTS are RAIL mounted or PANEL mounted. They are suitable for 35 mm RAIL (For Panel mounting & Drilling details see Fig.2.)

CAUTION

1. Ensure that D2 MPR1 is

- Not installed near any heat sources like Burner, Sunlight, Electric Arc etc.
- Not subjected to Abnormal Vibrations.
- Not subjected to direct Rains, Stormy wind & Dust
- Installed as near to the starter as possible.

2. D2 MPR1 with AUTO RESET mode should not be used with

- Fully automatic reset starter.
- When any other auto resetting type control switches are used in series with no volt coil of the starter.

For using with fully automatic reset starter if D2 MPR1 is to be set in Auto Rest mode a reset time delay should be induced externally preferably with Minilec Electronic Time Delay Relay.

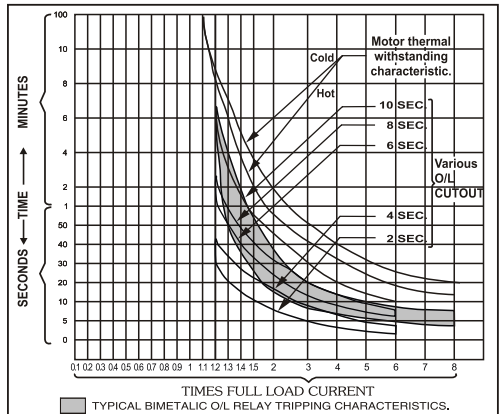
ELECTRICAL CONNECTIONS OF D2 MPR1

See Fig.3 for Terminal details of D2 MPR1 **Do all connections in power off condition.** Connect Auxiliary Supply Voltage at terminals 7 & 8 as marked on front cover plate of the unit. Connect the output of CTS at A,B,C to terminals 1,2,3 of D2 MPR1 respectively. The output relay contacts 13 & 14 are to be connected in series with the no volt coil of the starter. Refer Tabel 1 & 2 for CTS selection. **NOTE:** For motors above this range (above 75 H.P.) D2 MPR1 can be used with CTS5 along with external 5amp. Secondary CT (Ref.Fig.1C). CTS 20/CTS 40/ CTS 80/CTS120 Pair has feed through type construction. Power cables for two phases R&B are to be passed through it for CTS 20/CTS 40 / CTS 80 (Fer. Fig.1B). But for CTS5 / CTS 10, the incoming/outgoing power cables (secondary of 5 A CT) for A & B phases are to be terminated on the CTS (Ref. Fig. 1A). For CTS are to be terminated on the CTS (Ref. Fig. 1A). For CTS 120, R & B phase CTS are enclosed in two different enclosures. Power cables for two phases R & B are to be passed through respective CTS separately (Ref. Fig. 1D).

TECHNICAL SPECIFICATIONS OF D2 MPR1	
1. System Supply :	220-240 / 380-440 VAC $\pm 20\%$
2. Aux. Supply :	100 - 120 / 220 - 240 / 380 - 440 VAC $\pm 20\%$
3. Frequency :	48 Hz - 63 Hz.
4. Output Relay Contacts :	2 CO
5. Output Contact Rating :	5A, 240 VAC [Resistive]
6. Power Consumption :	22 VA (max.)
7. Test Facility :	With front knob
8. Phase to Phase Unbalance :	50% $\pm 10\%$ of motorcurrent [Fixed]
9. Under Current (Dry run) :	40% to 80% $\pm 5\%$ of setcurrent [Variable] (with bypass facility)
10. Overloading :	2 / 5 / 10 sec. IDMTL [Selectable]Or any other IDMTL Curve (factory set type)
11. Trip Time Delay :	Phase Failure : 4.0 ± 1.0 sec [Fixed] Dry Running : 4.0 ± 1.0 sec [Fixed] Overloading : As per IDMTL characteristics
12. Set Accuracy :	$\pm 5\%$ of set value
13. Resetting :	Auto / Manual [Remotely wired] With ext. 'NC' Push Button
14. Indications :	ON: Steady On : Power On SP/UB : Steady On : Phase Failure /Unbalance OL: Steady On : Overload DR: Steady On : Dry Running
15. Enclosure :	ABS
16. Dimensions (mm) :	Overall: 76 X 56.5 X 117.5 Mounting: 67 X 46
17. Mounting :	35mm Rail Mounting & Panel Mounting
18. Unit Weight (Approx.) :	250 gms.
19. Sensor Weight (Approx.) :	320 gms (For CTS 5 / CTS 10 / CTS 20 / CTS 40) 330 gms (For CTS 80) 380 gms (For CTS 120 pair)
20. Operating Condition :	Temperature : -5°C to $+60^{\circ}\text{C}$ Humidity : Up to 95% Rh
21. Life Expectancy :	0.5×10^8 operations at 100% rating

INVERSE TIME CHAR. (IDMTL) GRAPH

Fig. 4



COMPLIANCE TO STANDARDS

TEST	IEC STD.
1. EFT Test of Auxiliary Supply	61000-4-4
2. Surge Test of Auxiliary Supply	61000-4-5
3. Voltage Interruption, Variation & Dip Test	61000-4-11
4. ESD Test (Contact Discharge)	61000-4-2
ESD Teast (Air Discharge)	61000-4-2
5. H.V. Test (Dielectric Test)	60255-5
H.V. Test (Dielectric Test)	60255-5
6. Insulation Resistance Test	60255-5
7. Dry Heat Test	60068-2-2
8. Damp Heat test (Steady State)	60068-2-30
9. Damp Heat test (cyclic test)	60068-2-78

ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

Fig. 1A : FOR CTS 5 / 10

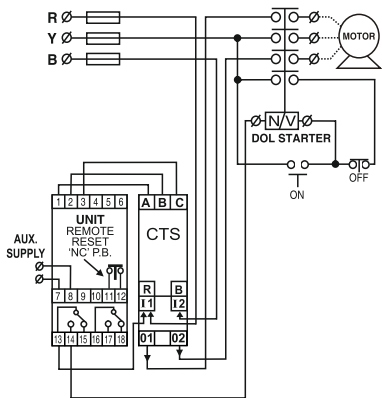


Fig. 1B : FOR CTS 20 / 40 / 80

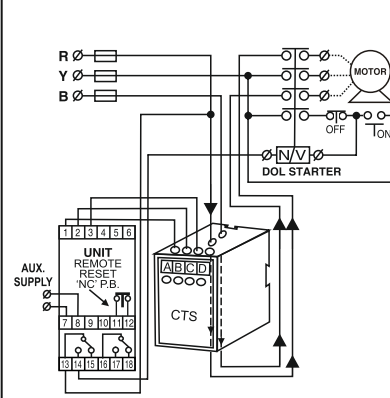


Fig. 1C : FOR CTS 5 WITH EXTERNAL CT OF SECONDARY 5 AMP.

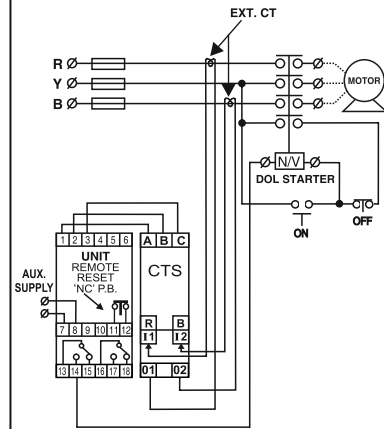
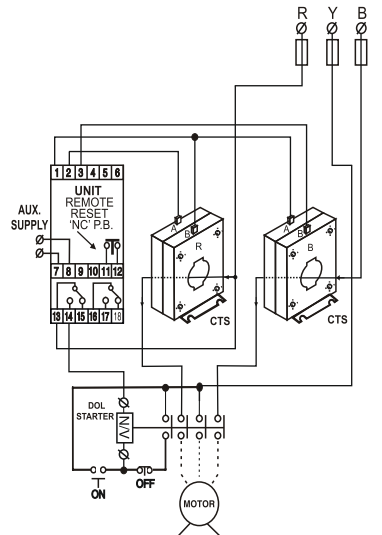


Fig. 1D : FOR CTS 120



MOUNTING DIMENSIONS

Fig. 2A : D2-03 TYPE BOX

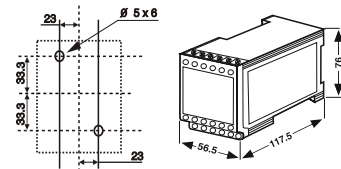


Fig. 2D : CTS 120

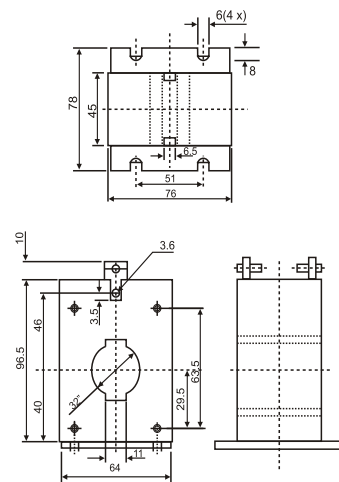


Fig. 2B : CTS 5 / 10

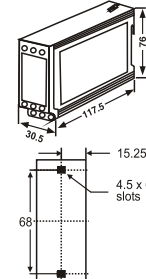
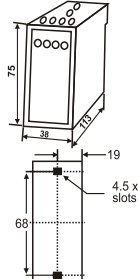
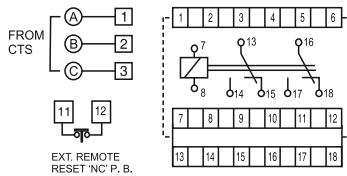


Fig. 2C : CTS 20 / 40 / 80



TERMINAL DETAILS

Fig. 3



- INDICATIONS**
- 'ON' : Steady on : Power On
 - 'SP/UB' : Steady on : Unbalance / Phase Failure
 - 'OL' : Steady on : Over Load
 - 'DR' : Steady on : Dry Run

TERMINAL DETAILS

TERMINAL NO.	D2 MPR1
1-2-3	CURRENT INPUT FROM CTS (A - B - C)
4, 5, 6	DUMMY
7-8	AUX. SUPPLY AS MARKED ON THE UNIT
9-10	DUMMY
11-12	EXT. REMOTE RESET 'NC' PUSH BUTTON
13-14-15	C1 - NO1 - NC1
16-17-18	C2 - NO2 - NC2

■ NOTE : RELAY CONTACTS SHOWN FOR UNIT IN POWER OFF CONDITION

CTS SELECTION CHART

Table 1

CURRENT RANGE			MODEL
HP From - To	KW From - To	FULL LOAD AMPS RANGES	CURRENT SENSORS
1.75 - 3.00	1.30 - 2.25	2 to 5 AMPS	CTS 05
3.00 - 6.00	2.20 - 4.50	4 to 10 AMPS	CTS 10
6.00 - 12.50	4.50 - 9.40	8 to 20 AMPS	CTS 20
12.50 - 30.0	9.40 - 22.50	16 to 40 AMPS	CTS 40
30.0 - 60.0	22.5 - 45.0	32 to 80 AMPS	CTS 80
40.0 - 75.0	30.0 - 56.25	48 to 120 AMPS	CTS 120

CURRENT RATING SELECTED AS PER FRONT SCALE PRINTED ON THE UNIT

Table 2

SCALE AS PRINTED ON UNIT	CTS 5 (Amp.)	CTS 10 (Amp.)	CTS 20 (Amp.)	CTS 40 (Amp.)	CTS 80 (Amp.)
0.4	2.0	4.0	8.0	16.0	32.0
0.5	2.5	5.0	10.0	20.0	40.0
0.6	3.0	6.0	12.0	24.0	48.0
0.7	3.5	7.0	14.0	28.0	56.0
0.8	4.0	8.0	16.0	32.0	64.0
0.9	4.5	9.0	18.0	36.0	72.0
1.0	5.0	10.0	20.0	40.0	80.0

WARRANTY - AGAINST ALL MANUFACTURING DEFECTS FOR 18 MONTHS FROM DATE OF SUPPLY OR 12 MONTHS FROM INSTALLATION WHICHEVER IS EARLIER