INSTALLATION INSTRUCTION MANUAL
MOTOR / SUBMERSIBLE PUMP PROTECTION RELAY

minilec®

D2 MPR3

D2 MPR3 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 failure condition/Phase reversal condition.

Dry running condition(with Bypass facility). Being current operated it is to be used with minilec make current sensors S2 CTS1 only. Refer TABLE 1 for S2 CTS1 selection chart & Table 2 for current rating selected as per front scale printed on the unit. D2 MPR3 is an auxilliary relay & is to be used along with the motor starter only. The effective working of D2 MPR3 will depend on efficient working of the electromagnetic motor starter. Before installing D2 MPR3 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 need to be serviced. Do not install D2 MPR3 with faulty motor starter.

TRIP SETTING, TRIP DELAY & RESETTING

D2 MPR3 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 secs. In D2 MPR3, the inverse time characteristic (IDMTI) is given selectable type by front O/L TIME SET knob (i.e Keep O/L TIME SET knob at 2/5/10/15/20 sec char.). Depending upon the percentage of excess load on the motor above 100% rated load, the D2 MPR3 decides the trip time delay as per inverse time current characteristics.(Ref. Fig. 4 for typical inverse time current characteristic chart). In D2 MPR3, site selectable dry run setting facility is given by front knob (i.e. Keep 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.o ± 1.0 secs. Unit can be set in Auto Reset mode & Remote/Manual Reset Mode by removing or putting an external link at terminals 11 & 12 respectively in power off condition.

MOUNTING

D2 MPR3 unit & S2 CTS1 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 MPR3 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 MPR2 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 MPR3 is to be set in Auto Reset mode a reset time delay should be induced externally preferably with Minilec Electronic. Time Delay Relay.

ELECTRICAL CONNECTIONS OF D2 MPR3

See Fig3 for electrical connection details of D2 MPR3.
Do all connections in power off condition. Connect Auxiliary Supply Voltage at terminal 7 & 8 as marked on front cover plate of the unit. Connect the output of S2 CTS1 at 1,2,3 to terminals 1,2,3 of D2 MPR3 respectively. The output relay contacts 13 & 14 are to be connected in series with the no volt coil of the contactor Refer table 1 & 2 for S2 CTS1 selection.

NOTE:
For motors above this range (above 75 H.P.) D2 MPR3 can be used with S2 CTS 1/5 along with external 5 amp. Secondary CT (Ref.Fig.1C). S2 CTS1/20,S2 CTS 1/40, S2 CTS1/80, CTS 120 pair has feed through it for S2 CTS1/20,S2 CTS 1/40, S2 CTS1/80, (Ref Fig. 1B) but for S2 CTS1/5, S2 CTS1/10 the incoming or out going power cables (Secondary of 5A CT) for R&B phases are to be terminated on the S2 CTS1 (Ref Fig 1A) For CTS 120, R & B phase S2 CTS1 are enclosed in two different enclosures. Power cables for two phases R & B are to be passed through respective CTS separately (Ref. Fig.1D).

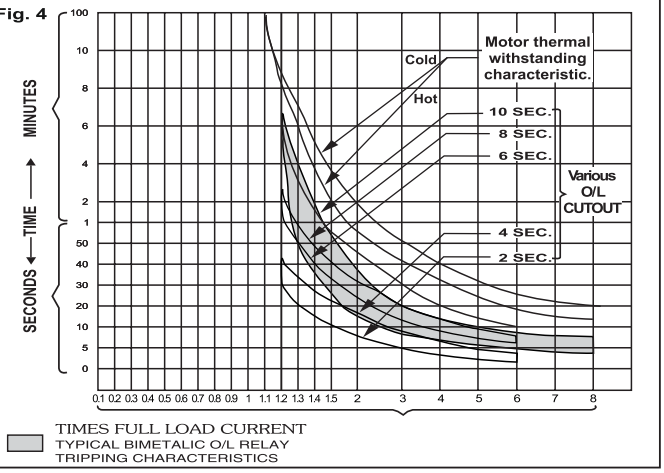
TECHNICAL SPECIFICATION OF D2 MPR3

1.	**System Supply :**	220-240 / 380-440 VAC ± 20%
2.	**Aux. Supply :**	100-120/220-240 / 380-440 VAC ± 20%
3.	**Frequency**	48Hz - 63Hz.
4.	**Power Consumption :**	22 VA max.
5.	**Output Relay Contacts :**	2 CO
6.	**Output Contact Rating :**[Resistive]	5A, 240 VAC
7.	**Life Expectancy :**	0.5 x10^6 operations at 100% rating
8.	**Operating Condition :**	Temperature : -5℃ to 60℃ Humidity : Up to 95% R. H.
9.	**Test Facility :**	With front push button.
10.	**Phase to Phase Unbalance :**	50% ±10% of motor current. (Fixed.)
11.	**Under Current (Dry run) :**	40% to 80% ± 5% of set current (Site selectable type by Front Knob with bypass facility.)
12.	**Overloading :**	2 / 5 / 10 /15 /20 sec. IDMT Curve
13.	**Trip Time Delay :**	Phase Failure : 4.0 ± 1.0 secs. Dry Running : 4.0 ± 1.0 secs. Over loading : As per IDMTL char.
14.	**Set Accuracy :**	±5% of set value .
15.	**Resetting :**	Auto / Manual /remote
16.	**Indications :**	ON : Green : Power On PF : Red : Phase Failure / Unbalance OL : Red : Overload UC : Red : Dry Running
17.	**Enclosure :**	ABS
18.	**Dimension(mm) : Over all : mounting :**	76 X 56.5 X117.5 67 X 46
19.	**Mounting :**	35 mm rail mounting & panel mounting
20.	**Unit Weight :**	250 gms (approx)
21.	**Sensor Weight :** (gms)	140 (for S2 CTS 1/5,S2 CTS1/10,S2 CTS1/20, S2 CTS 1/40, S2 CTS1/80) 320 (For CTS 120 pair)

* NOTE :- CE cULus WILL BE AVAILABLE ON REQUEST

INVERSE TIME CHARACTERISTICS (IDMTL) GRAPH

Fig. 4



ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

Fig. 1A FOR S2 CTS 1 - 5 /10

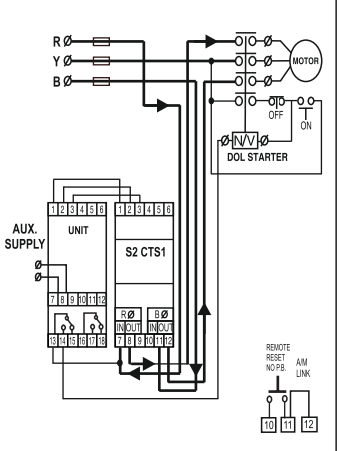
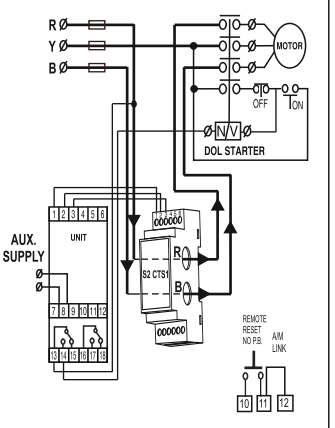


Fig. 1B FOR S2 CTS 1-20 /40 /80.



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.	Surge Test of System Supply	61000-4-5
4.	ESD Test (Contact Discharge)	61000-4-2
	ESD Teast (Air Discharge)	61000-4-2
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. 1C FOR S2 CTS 1/5 WITH EXTERNAL CT OF SECONDARY 5 AMP

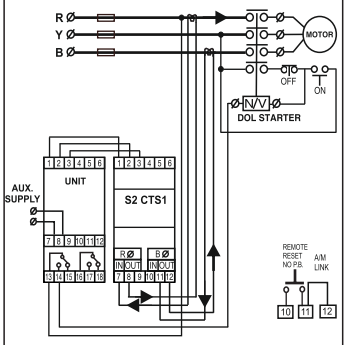
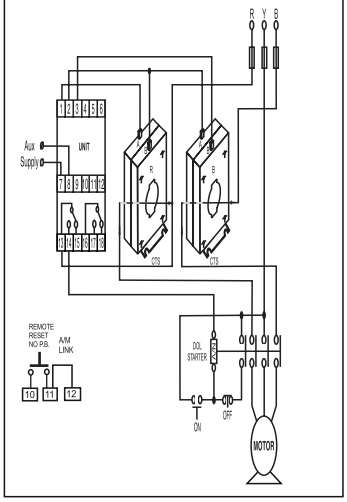
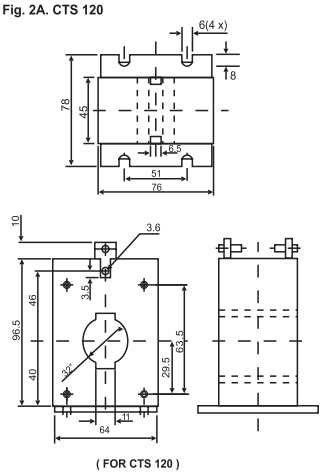


FIG 1D : FOR CTS 120



MOUNTING DIMENSIONS

Fig. 2A. CTS 120



(FOR CTS 120)

MOUNTING DIMENSIONS

Fig. 2B D2-03 TYPE BOX

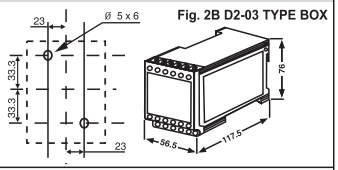
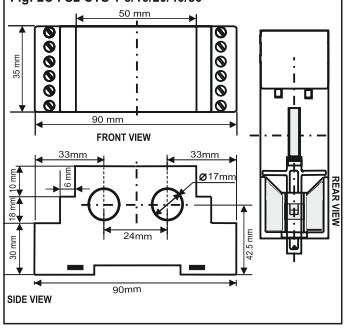
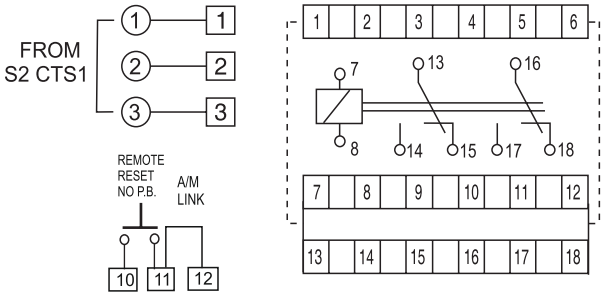


Fig: 2C : S2 CTS 1-5/10/20/40/80



CONNECTION DIAGRAM

Fig. 3



INDICATIONS

'ON' : POWER ON
'PF' : PHASE FAILURE TRIP / UNBALANCE TRIP
'OL' : OVER LOAD TRIP
'UC' : UNDER CURRENT

Terminal Details
D2 MPR3

TERMINAL NO	
1 - 2 - 3	CURRENT INPUT FROM S2 CTS 1 (1 - 2 - 3)
4, 5, 6,9	ALL DUMMY
7 - 8	AUX. SUPPLY AS MARKED ON THE UNIT
10 - 11	EXT. REMOTE RESET PUSH BUTTON (NO TYPE)
11 - 12	MANUAL & REMOTE RESET -WITH LINK AUTO RESET - NO LINK
13 - 14 -15	C1 - NO1 - NC1
16 - 17 -18	C2 - NO2 - NC2

NOTE : RELAY CONTACTS SHOWN FOR UNIT IN POWER OFF CONDITION

TABLE : 1

S2 CTS1 SELECTION CHART			
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	S2 CTS 1/5
3.00 - 6.00	2.20 - 4.50	4 to 10 AMPS	S2 CTS 1/10
6.00 12.50	4.50 9.40	8 to 20 AMPS	S2 CTS 1/ 20
12.50 - 30.0	9.40 - 22.50	16 to 40 AMPS	S2 CTS 1/ 40
30.0 - 60.0	22.5 - 45.0	32 to 80 AMPS	S2 CTS 1/ 80
40.0 - 75.0	30.0 - 56.25	48 to 120 AMPS	CTS 120

TABLE : 2

CURRENT RATING SELECTED AS PER FRONT SCALE PRINTED ON THE UNIT

SCALE AS PRINTED ON UNIT	S2 CTS 1/5 (AMP.)	S2 CTS 1/10 (AMP.)	S2 CTS 1/20 (AMP.)	S2 CTS 1/40 (AMP.)	S2 CTS 1/80 (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