INSTALLATION INSTRUCTION MANUAL
MOTOR / SUBMERSIBLE PUMP PROTECTION RELAY

minilec®

MPR D2 / SPG D2

MPR D2/SPG D2 is operating on negative sequence current component sensing principle for phase failure protection & sensing motor current or overload protection & dry run protection submersible pumps in SPG D2 only).

It offers protection against:
- Overloading condition.
- Unbalanced current condition.
- Phase failure condition./ Phase reversal condition.
- Dry running condition (in SPG D2 only)

Being current operated it is to be used with Minilec Make current sensors CTS only. Refer selection chart for CTS. MPR D2/ SPG D2 is an auxillary relay & is to be used along with the motor starter only. The effective working of MPR D2/SPG D2 will depend on efficient working of the electromagnetic motor starter.

Before installing MPR D2/SPG D2 check whether the motor starter is operating perfectly by starting the motor with the "START" push button and switching it by "STOP" push button. If the motor does not " Start" or Stop" on respective operations the starter needs to be serviced Do not install MPR D2 / SPG D2 with faulty motor starter.

TRIP SETTING , TRIP DELAY & RESETTING

MPR D2/SPG D2 is factory set to trip the starter for unbalanced current between any two phases exceeding 50% of full load current (F.L.C). The time delay is between 5.5 ± 1.5 secs. In MPR D2 & SPG D2, the inverse time characteristic (IDML) is given selectable type by link (i.e. PUT LINK for 2 SEC CHA. REMOVE LINK for 5 SEC CHA. at terminal No. 17 & 18). For other characteristics user has to specify while ordering & unit will follow inverse time current characteristic as specified on front plate. For 2 change over,Fix overload characteristics is applicable. Depending upon the percentage of excess load on the motor above 100% rated load, the MPR D2 /SPG D2 decides the trip time delay as per inverse time current characteristics. (Ref. Fig 8 for typical inverse time current characteristic chart). In SPG D2, site selectable dry run setting facility is given by link (i.e. PUT LINK 75% dry run setting & REMOVE LINK for 50 % dry run setting at terminal No. 5&6). The Dry Run Trip Time Delay is between 3.5 ± 1.5 secs for SPG D2 Only Unit can be set in Auto Reset mode or Manual Reset & Remote Reset Mode by removing or putting an external short link at terminals 11 & 12 respectively.

MOUNTING

MPRD2/SPGD2 units & CTS are RAIL mounted or PANEL mounted. They are suitable for 35 mm RAIL (For Panel mounting & Drilling details see Fig. 3 & 4).

CAUTION

1. Ensure that MPR D2/SPG D2 is
- Not installed near any heat sources like burner, Sunlight, electric arc etc.
- Not subjected to abnormal vibration.
- Not subjected to direct rains, stormy wind & dust
- Installed as near to the starter as possible.

2. MPR D2 / SPG D2 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 MPR D2/SPG D2 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 MPR D2/ SPG D2

See Fig.6 for electrical connection details of MPR D2/SPG D2. Connect Auxilliry Supply Voltage at terminal 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 of MPR D2 /SPG D2 respectively. The output relay contacts 13 & 14 are to be connected in series with the no volt coil of the contactor. SELECTION CHART FOR CTS FOR USE WITH MPR D2 / SPG D2 (fOR 415 VAC, 50Hz 3 PHASE)

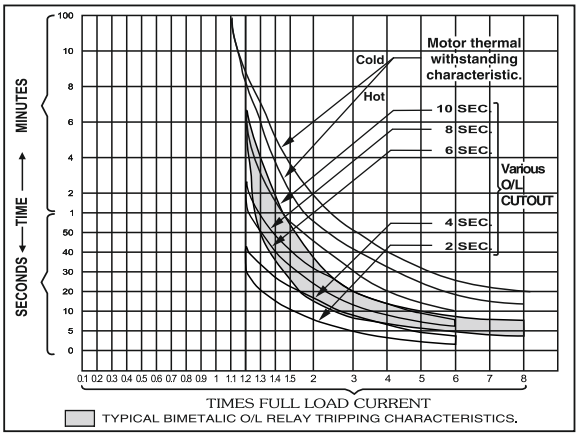
CURRENT RANGE			MODEL
HP From - To	KW From - To	FULL LOAD AMPS RANGES	CURRENT SENSORS
0.30 - 0.75	0.22 - 0.56	0.5 to 1.25 AMPS	CTS 1.25
0.75 - 1.75	0.56 - 1.31	1to 2.5 AMPS	CTS 2.5
1.75 - 3.00	1.30 - 2.25	2 to 5 AMPS	CTS 05
3.00 - 6.00	2.20 - 4.50	4 to 10 AMPS	CTS 10
6.00 -12.50	4.50 -9.40	8 to 20 AMPS	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

NOTE: For motors above this range (above 75 H.P.) MPR D2/SPG D2 can be used with CTS 5, CTS 1.25 along with external 5 amp. Secondary CT (Ref. Fig. 5). CTS 20/CTS 40 /CTS 80(Ref. Flg.2). But for CTS 1.25 /CTS 2.5/CTS 5/CTS 10 the incomming / outgoing power cables (Seconary of 5 A ro 1A CTS (Ref. Fig.1). 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.7).

TECHNICAL SPECIFICATION OF MPR D2 / SPG D2		
1.	**Voltage :**	
	System Supply	220 / 230 / 240 / 380 / 400/ 415 / 440 VAC ± 20 %
	Aux. Supply	24 / 110 / 220 / 230 / 240 / 380 / 400 / 415 /440 VAC ± 20 %. 24VDC ± 10%.
2.	**Frequency :**	50 Hz / 60 Hz ± 3%
3.	**Power Consumption :**	30 VA max.
4.	**Output Relay Contacts :**	1CO / (2CO)
5.	**Output Contact Rating** [Resistive] :	5A, 240 VAC
6.	**Life Expectancy :**	0.5 x10^6 operations at 100% rating
7.	**Operating Condition :**	Temperature : -5°C to 60°C Humidity : Upto 95% R.H.
8.	**Test Push Button Delay :**	Less than 2 sec.
9.	**Trip Settings (current) :**	Phase to Phase Unbalance : 50% ±10% of motor current. Under Current (Dry run) : 50% or 75% ± 5% of set current (site selectable type by link at terminal 5 & 6 - SPG D2 only) Overloading : 2sec.or 5 sec. IDMTL Curve (site selectable type by link at terminal 17 & 18)OR any other IDMTL Curve (factory set type) For 2CO unit fixed overload characteristics is applicable
10.	**Set Accuracy :**	±10% of set value
11.	**Trip Time Delay :**	Phase Failure : 5.5 ± 1.5 secs Dry Running (in SPG D2 only) : 3.5 ± 1.5 secs. Overloading : As per inverse time characteristics (IDMTL)
12.	**Resetting :**	Auto / Manual / Remote
13.	**Indications :**	ON : Green : Power On SP : Red : Phase Failure OL : Red : Overload DR : Red : Dry Running (In SPG D2 only).
14.	**Enclosure :**	**ABS**
15.	**Unit Weight :**	250 gms (approx)
16.	**Sensor Weight :** [gms]	225 (For CTS 1.25 / CTS 2.5) 320(For CTS 5 / CTS 10 / CTS 20 / CTS 40) 330 (For CTS 80) & 380 (For CTS 120 pair)

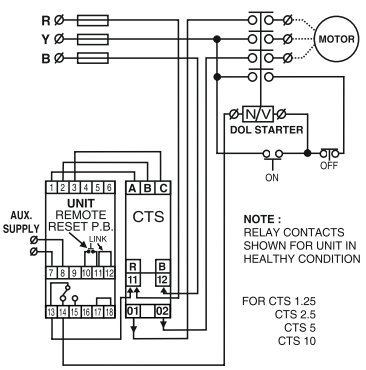
INVERSE TIME CHARACTERISTICS (IDMTL) GRAPH

Fig.8



ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

Fig. 1

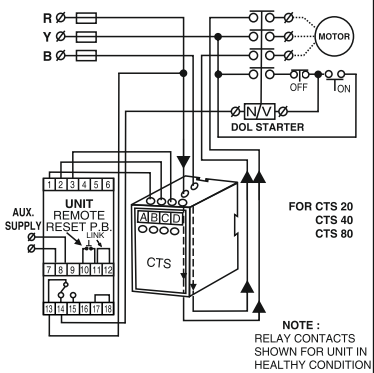


FOR UNITS WITH 2CO, RELAY CONTACT PRESENT BETWEEN 13,14,15 & 16,17,18 IN THAT CASE LINK AT 17& 18 IS ABSENT & FIXED OVERLOAD CHARACTERISTICS IS APPLICABLE.

Refer Fig. 6 (CONNECTION DIAGRAM) for TERMINAL DETAILS of respective unit. Link connections & other details are also given in the same.

ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

Fig. 2



FOR UNITS WITH 2CO, RELAY CONTACT PRESENT BETWEEN 13,14,15 & 16,17,18 IN THAT CASE LINK AT 17& 18 IS ABSENT & FIXED OVERLOAD CHARACTERISTICS IS APPLICABLE.

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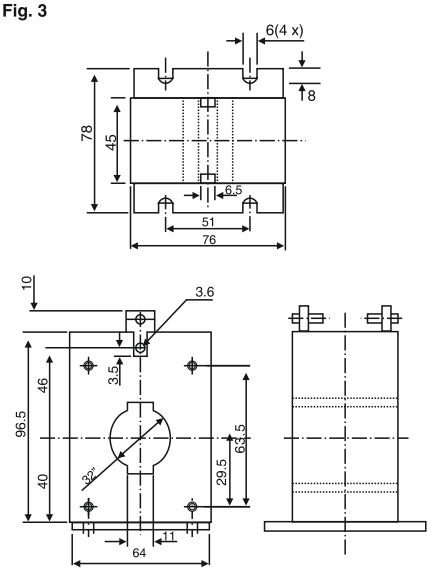
COMPLIANCE TO STANDARDS

	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
5.	ESD Teast (Air Discharge)	61000-4-2
6.	H.V. Test (Dielectric Test)	60255-5
7.	Insulation Resistance Test	60255-5
8.	Dry Heat Test	60068-2-2
9.	Damp Heat test (Steady State)	60068-2-30
10.	Damp Heat test (cyclic test)	60068-2-78

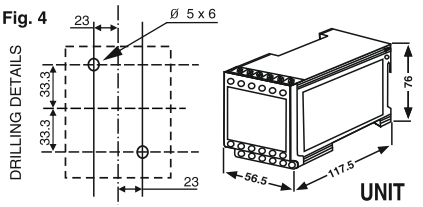
MOUNTING DIMENSIONS

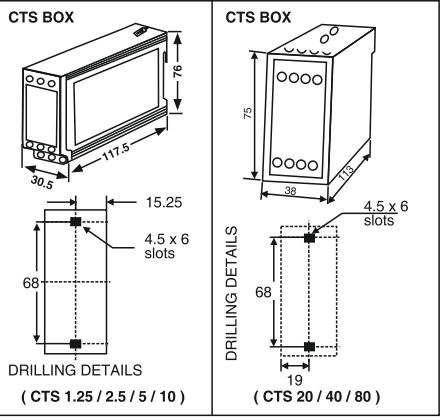
Fig. 3



MOUNTING DIMENSIONS

Fig. 4



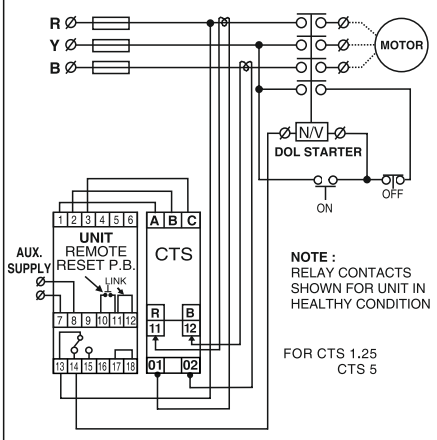


(CTS 1.25 / 2.5 / 5 / 10)

(CTS 20 / 40 / 80)

ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

Fig. 5



NOTE :
RELAY CONTACTS SHOWN FOR UNIT IN HEALTHY CONDITION

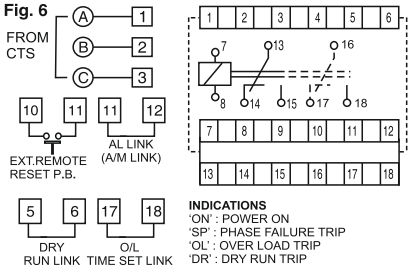
FOR CTS 1.25
CTS 5

FOR UNITS WITH 2CO, RELAY CONTACT PRESENT BETWEEN 13,14,15 & 16,17,18 IN THAT CASE LINK AT 17& 18 IS ABSENT & FIXED OVERLOAD CHARACTERISTICS IS APPLICABLE.

Refer Fig. 6 (CONNECTION DIAGRAM) for TERMINAL DETAILS of respective unit. Link connections & other details are also given in the same.

CONNECTION DIAGRAM

Fig. 6



INDICATIONS
'ON' : POWER ON
'SP' : PHASE FAILURE TRIP
'OL' : OVER LOAD TRIP
'DR' : DRY RUN TRIP

FOR UNITS WITH 2CO, RELAY CONTACT PRESENT BETWEEN 13,14,15 & 16,17,18 IN THAT CASE LINK AT 17& 18 IS ABSENT & FIXED OVERLOAD CHARACTERISTICS IS APPLICABLE.

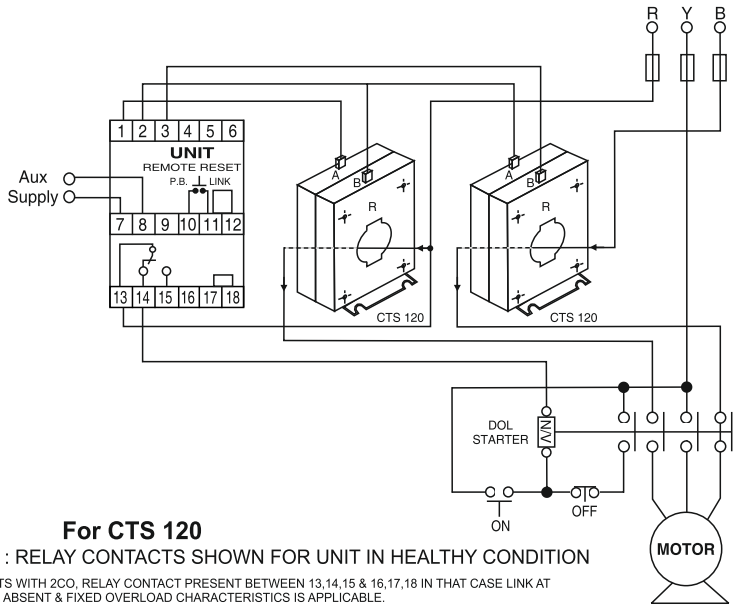
Terminal Details

TERMINAL NO.	MPR D2	SPG D2
1-2-3	CURRENT INPUT FROM CTS(A-B-C)	
4	ALL DUMMY	DUMMY
5		DRY RUN LINK
6		75 % WITH LINK 50 % NO LINK
7-8	AUX. SUPPLY AS MARKED ON THE UNIT	
9	DUMMY	
10-11	EXT. REMOTE RESET PUSH BUTTON	
11-12	MANUAL & REMOTE RESET- WITH LINK AUTO RESET- NO LINK	
13 -14-15	1 CHANGEOVER OUTPUT RELAY CONTACT (C-NO-NC)	
16	DUMMY for 1CO	
17-18	LINK FOR IDMTL CURVE 2 SEC. WITH LINK 5 SEC - NO LINK FOR OTHER IDMTL CURVE DUMMY (For 1CO)	
16 -17-18	RELAY CONTACT FOR 2CO	

NOTE : RELAY CONTACTS SHOWN FOR UNIT IN HEALTHY CONDITION

ELECTRICAL CONNECTIONS IN POWER & CONTROL WIRING

Fig. 7



For CTS 120

NOTE : RELAY CONTACTS SHOWN FOR UNIT IN HEALTHY CONDITION

FOR UNITS WITH 2CO, RELAY CONTACT PRESENT BETWEEN 13,14,15 & 16,17,18 IN THAT CASE LINK AT 17& 18 IS ABSENT & FIXED OVERLOAD CHARACTERISTICS IS APPLICABLE.

Refer Fig. 6 (CONNECTION DIAGRAM) for TERMINAL DETAILS of respective unit. Link connections & other details are also given in the same.