Data Sheet

Electronic motor protection relay with integral CTs

RS stock number 185-3243 and 198-4993

Introduction

The overload relay is primarily intended for protection of three-phase loads, e.g. cage induction motors. It monitors current flowing in two of the three lines and in the event of an overload condition the output relay will de-energise after a time delay inversely proportional to the overcurrent.

The unit will tolerate a wide (>2:1) variation in supply voltage without loss of performance.

It is self-contained with two integral current transformers; one unit caters for full load currents from 0.2A up to 32A. A slide switch selects the appropriate current band, with a screwdriver adjustment for final setting. This is best achieved by reducing current setting, with load connected, until the amber 'SET' LED illuminates, then increasing setting until LED is just extinguished. Three current range labels are supplied with each unit, one for each range selected.

A selectable start delay increases the 6 × FLC trip time from approximately 5s to 15s. After a short period (e.g. 2m at FLC) the starting characteristic converges toward the normal inverse time characteristic.

This is useful for loads such as fans which have a long run-up time.

Nuisance tripping during the starting sequence can thus be avoided, while still maintaining maximum protection during normal running.

Other features include hand/auto reset selection, delayed or instantaneous, with a manual reset button for local operation and terminals for connecting a remote reset contact. A test button injects a current equivalent to 6 × FLC into the monitoring input to confirm operation of the internal circuits.

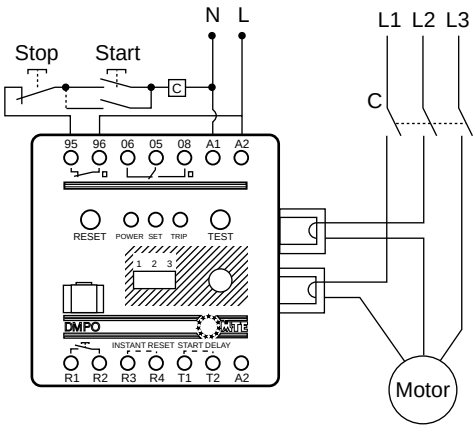
If required, the full load current range can be extended beyond 32A by using two additional current transformers of suitable rating.

Latching versions of the DMPO contain a retentive circuit which is not affected by loss of supply; if the supply is removed following a trip condition, the trip status (in the manual reset mode) is remembered when the supply is restored. The unit can be reset in the manual mode only by momentarily linking terminals R1 and R2 - or operating the RESET button - with supply connected.

Features

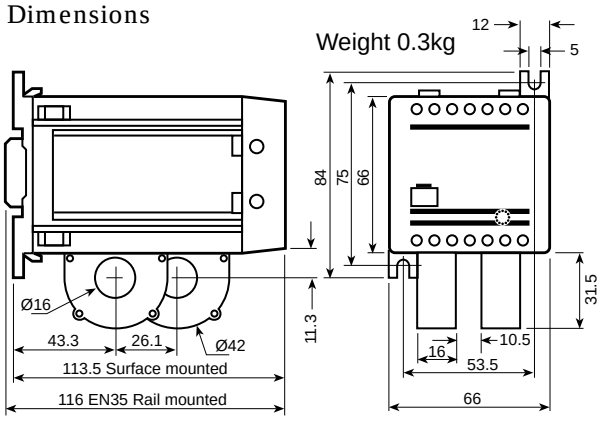
- Suitable for most single or three-phase motors
- Inverse time-delay tripping for optimum match to motor thermal characteristics
- 0.2-32A FLC
- Integral current transformers
- Selectable starting delay gives enhanced protection for motors with prolonged acceleration times such as ventilation fans
- Volt-free trip and alarm contacts
- Advance warning of trip condition
- Auto/Manual reset, instant or delayed
- Remote reset capability
- Test facility
- Supply and trip indicators
- Unaffected by waveform distortion under normal conditions.

Basic wiring diagram
DOL starter, 240V coil, 3-phase 3-wire supply



WARNING: Remote reset terminals R1 and R2 are not isolated from the supply. The remote reset contact, if used, and its associated cabling, must withstand supply voltage. The contact loading is 2mA at 20Vdc. Output terminals 05, 06, 08 - 95, 96 are for control circuit use in accordance with IEC 947 Parts 4 and 5. They should not be used for isolation purposes.

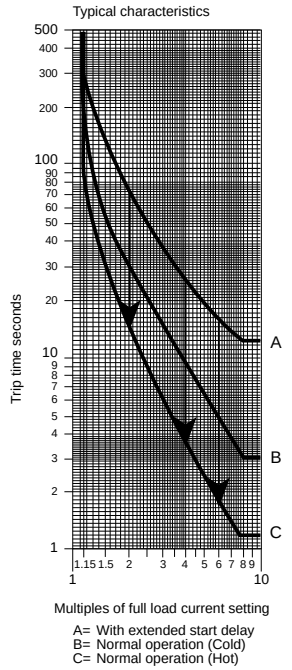
Dimensions



Technical specification

Supply voltage: 90-264V: 50Hz 80-220V 60Hz			
Load current range: (Switch selectable)	1 0.2-1.2A	2 1.0-6.5A	3 6.0-32.0A
	Calibration accuracy ±10% approx		
Auxiliary contact ratings (ac):	Resistive load: 5A at 240V Inductive load: 120-415V	2A at 415V Make: 3600VA Break: 360VA	
Ambient temperature range	-10°C to +60°C		
Operations/h:	60 max.		
Indicators:	Green - Power on Amber - Trip level exceeded/Timing in progress Amber - Overload tripped		
Phase loss:	Normal time-delayed tripping if any line current exceeds set trip level		
Start delay T1:	As supplied, the extended start delay, for motors with long run-up times, is enabled. The trip delay at 6 × FLC is in the range 8 to 24s. Normal trip response applies after 2m operation at FLC. Standard starting response, 2-8s is achieved by linking terminals T1 and T2.		
Reset:	Hand/Auto selection by terminal link. Button for local reset, terminals for remote - link to reset. Relay delay (hand or auto) is 10m approx. With terminals R2 and R3 linked instant reset delay is 100-200ms.		
Caution: If supply is removed for a period greater than 10m after a trip condition, non-latching versions reset automatically when supply is restored. Manual reset should be used for latching versions.			
Test:	Test button simulates 600% FLC overload to check operation		

Time/Current graph



Terminal functions

A1. } Supply: 90-264V
A2. }

95. } Trip contact (closed
96. } when relay is energised)

05. Common
06. n.o. (closed when relay is energised)
08. n.c. (open when relay is energised)

Alarm contacts

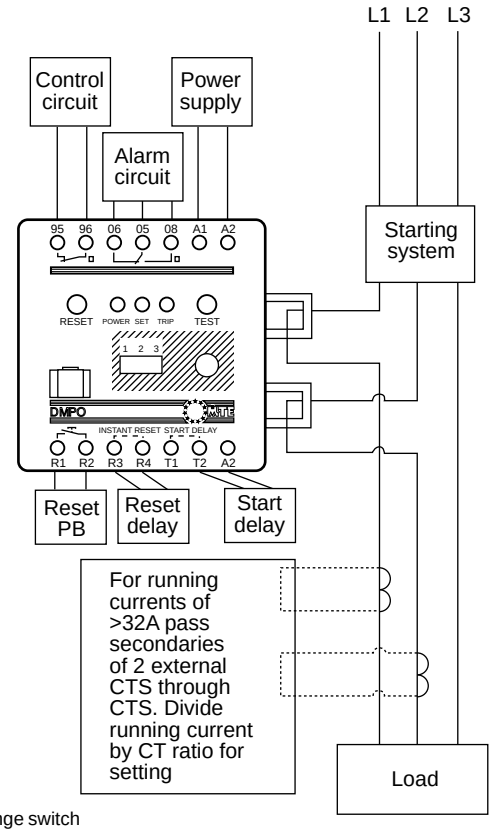
R1. } Remote reset
R2. } (volt-free n.o. contact required)

R2. Reset delay
R3. (link to disable)

T1. } Start delay T1
T2. } (link to disable)

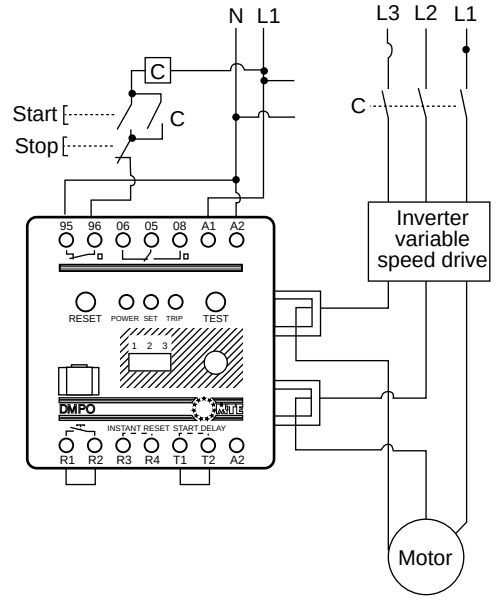
Wiring diagrams

General scheme



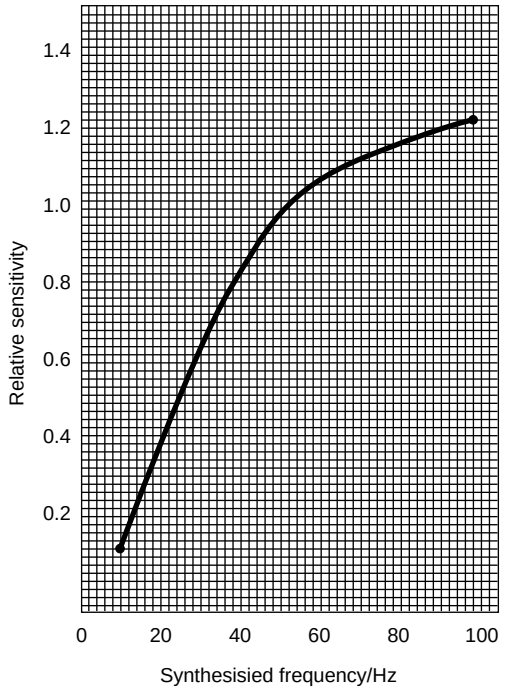
Range switch
1. 0.2-1.2A
2. 1.0-6.5A
3. 6.0-32.0A
(Running current)

Inverter

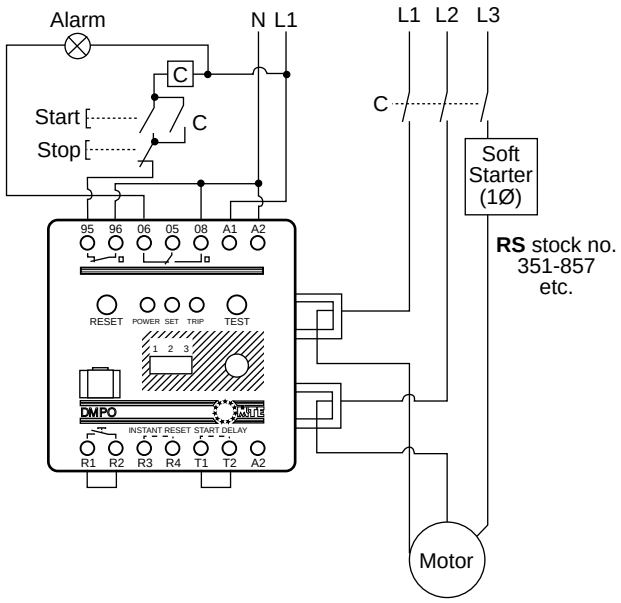


T1 disabled Delayed auto reset
Example: Variable speed drive inverter controlling motor
Note: Relative sensitivity of relay is dependent upon synthesised output frequency of V.S.D. – see graph on next page
On load current: 25A
Synthesised frequency: 40Hz
(From graph relative sensitivity: 0-86)
∴Relay set to 25 × 0.86 = 21.5A
Range 3 (6-32A)

Frequency dependent response



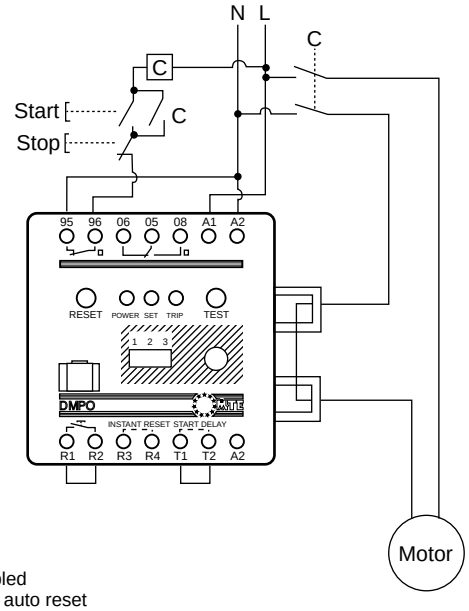
Single phase control soft starter circuit



RS stock no. 351-857 etc.

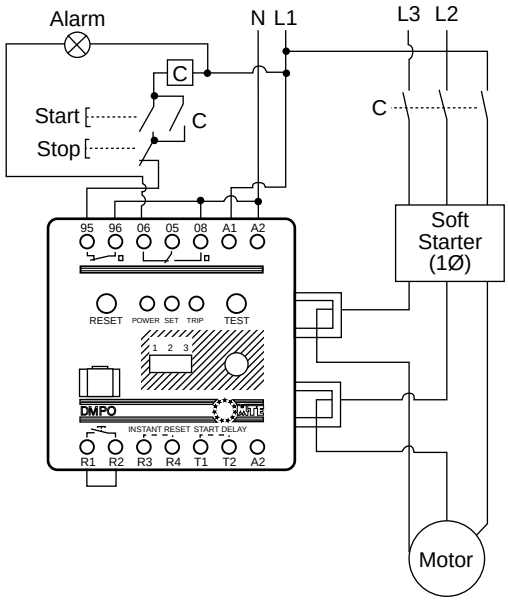
T1 enabled
Disabled auto reset
Alarm indicator
Example: Low cost single phase controlled soft starter connected in L3 phase (L1 and L2 phases DOL)
Pass L1 and L2 through relay CTs
On load current 1.4 Amps
∴ Set to range 1 (0.2→1.2A)

Single phase use



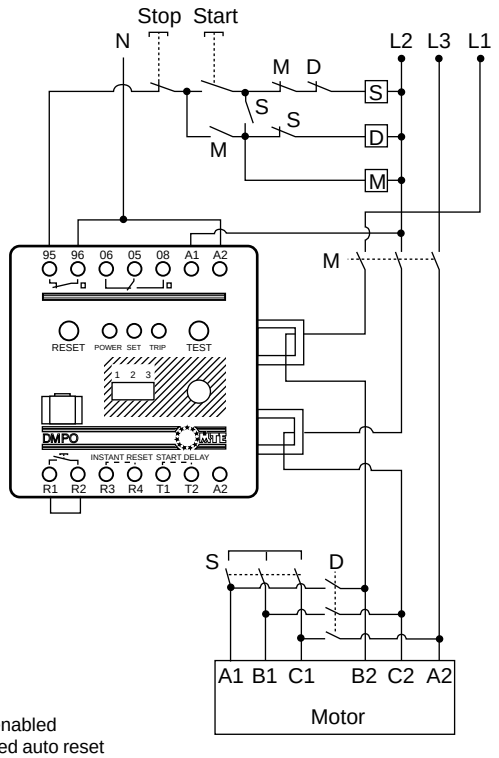
T1 disabled
Delayed auto reset
Example: Single phase (L-N) motor. Pass one conductor through both CTs in opposite directions (top to bottom through one CT and bottom to top through the other)
On load current: 2.9A
∴ Set to range 2 (1.0→6.5A)

Three phase soft starter – low current



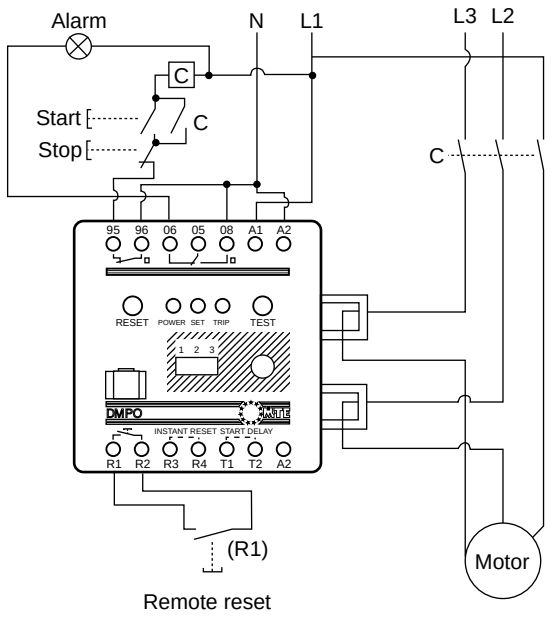
T1 – enabled (extended starting time)
Delayed auto reset
Alarm indicator connected
Example: Motor on line – 6A
Set relay to range 2 (1.0→6.5A)

Star/Delta connection – less than 32A



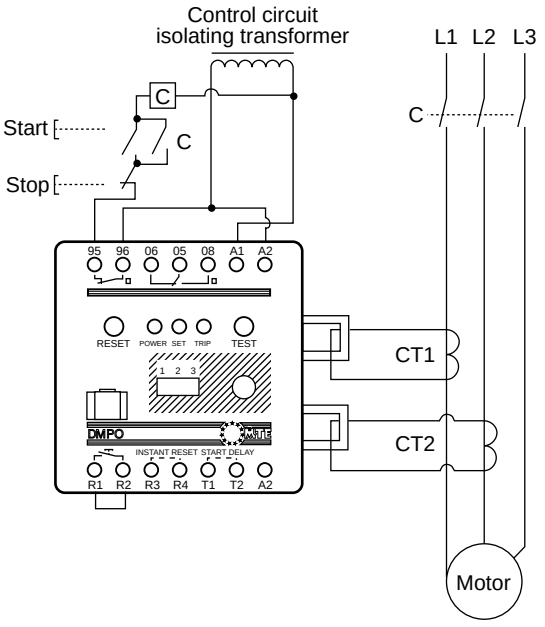
T1 – enabled
Delayed auto reset
Example: Motor on line 24A
Set relay to range 3 (6→32A)
Supply L1-L2 (415V)

DOL 3Ø motor



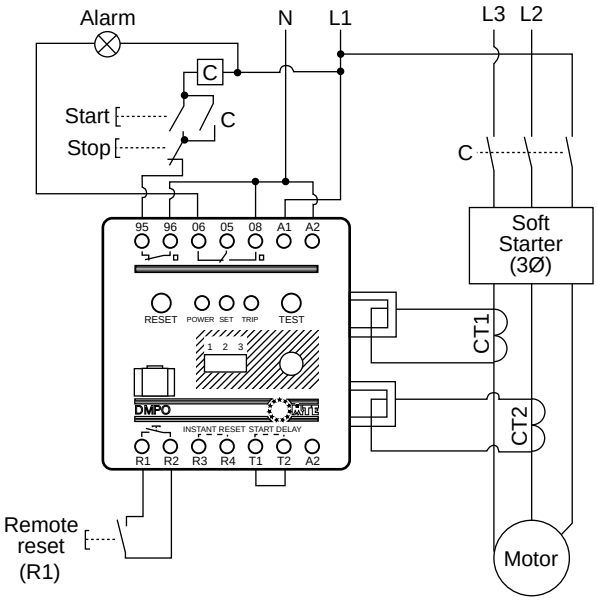
T1 – enabled (extended starting time)
Manual reset, remote via reset pushbutton R1
Alarm indicator
Example: Motor on line: 1.5A
Set relay to range 1 (0.2→1.2A)

DOL 3Ø high current (>32A)



T1 – enabled (extended startup time)
Auto reset
Supply – via isolated control circuit
Example: Motor on line: 45A
Current transformer ratio: 10:1
$\therefore$ Secondary current = $\frac{45}{10}$ = 4.5A
Set relay to range 2 (1.0→6.5A)

Soft starter 3Ø high current



T1 – disabled (no extended startup delay)
Manual reset, remote via reset pushbutton R1
Alarm indicator connected
Example: Motor on line = 100A
Current transformer ratio 10:1
$\therefore$ Secondary current = $\frac{100}{10}$ = 10
Set relay to range 3 (6→32A)