

MP-820

Motor System Protection Relay Underload Restart Timer Single Phase

PROTECTOR

MOTOR PROTECTION RELAYS



ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
MP	820	230	A	S

SEE PAGE 104 FOR ORDERING OPTIONS

Application Examples

- Comprehensive Motor System Protection against conditions of underload, overload and supply fluctuations.
- Detection of conveyor belt breaks.
- Detection of clogged fan filters in spray paint installations.
- Protection of pumps against running dry, closed outlet valve or no-flow (centrifugal pumps).

Features

- Underload sensing by measuring the phase angle.
- Adjustable restart time after detection of underload conditions.
- Overload sensing by measuring the current amplitude.
- Microprocessor-based technology.
- Direct in-line current sensing of motors up to loads above 1.1kW.
- Direct interface with a conventional current transformer.
- Auto-calibration of overload and underload limits.
- Auto-calibration of overvoltage and undervoltage limits.
- Liquid level control (programmable for charge or discharge).
- External control (programmable for normally open/closed contacts).
- Start-up delay (fixed, 3 seconds standard).
- Latching on overload conditions.
- Fail-to-safe design.
- Din-rail mount.
- 5A SPDT relay output.

Description of Operation

The ProteCTOR **MP-820** is a multi-featured relay providing comprehensive protection for single phase AC induction motor systems such as submersible pumps. The unit is a phase angle, current sensing and voltage sensing relay, that can automatically set up trip points within specified limits around the normal operating conditions of a particular motor system. An adjustable restart timer, triggered by an underload fault can be used to restart the motor system after a pre-set time. Motor systems up to 1.1kW can be protected without the use of an external current transformer. An external current transformer must be used for motors higher than 1.1kW.

Calibration

Auto Calibration: If the unit is not in Uncalibrated Mode, with all LED's flashing simultaneously, see Calibration Reset below. To start auto calibration, power the unit up in Uncalibrated Mode. Press the **Calibration Set/Reset** pushbutton and hold it until only the green Relay ON LED starts flashing (approx. 5 seconds). The unit will now monitor the load of the motor and set up the overload, underload and voltage limits (this will take approx. 10 seconds). If calibration is successful the green Relay ON LED will stop flashing and stay on. If calibration is unsuccessful, the unit will return to the uncalibrated mode with all LED's flashing simultaneously. This means that the motor's load is outside the unit's specified calibration range (see Technical Specifications).

Note: If calibration is unsuccessful, check the current direction (reverse if necessary), or the current magnitude (use an external CT if above 10Amps).

Calibration Reset: The calibration limits can be reset when required by the user. Remove power from the unit. Press the Calibration Set/Reset pushbutton and apply power to the unit. The green Relay ON LED will illuminate. Hold the pushbutton down until all the LED's start flashing (approx. 3 seconds). This will reset the calibrated limits and return the unit to uncalibrated mode.

Uncalibrated Mode: The unit is supplied uncalibrated from the factory. When power is applied to the unit all LED's will flash simultaneously and the relay energises to supply power to the motor.

Note: The motor is unprotected in this mode and care should be taken before applying power.

Normal Operation

Start-up Delay: When power is applied to the unit, the relay energises immediately, ignoring abnormal load conditions experienced during initiation. This time is fixed at 3 seconds.

Latching Faults

Overload Sensing: If the current exceeds the set limit stored during calibration the relay will de-energise after a 3 second response time. The unit will latch in this condition (see Faults Reset).

Faults Reset: If the unit latches in a fault condition, the relay will remain de-energised until reset. A reset can be performed by either connecting the reset

input (R) to Earth (E) via an external switch or cycling the power supply to the unit.

Reset Lockout: If the system is reset more than 3 times in a 15 min period the reset lockout is enabled, prohibiting continuous resetting when a fault condition exists. Cycling the power supply to the unit will override the reset lockout and reset the unit.

Caution: When using the reset input or cycling the power supply to the unit, the relay will be forced to energise even though a fault may exist. This could cause damage to equipment, therefore the fault must first be repaired before attempting to run the motor.

Non-latching Faults

Voltage Sensing: If the supply voltage increases or decreases by more than 10% of nominal, the relay will de-energise and the motor will be switched off.

When the voltage has stabilised within safe limits, the relay automatically energises and the motor will start again.

Underload Sensing: In an induction motor, the current always lags the voltage. By measuring this angular lag, an underload fault can be sensed. Loss of load will cause the angular lag to increase. When it exceeds the set limit stored during calibration, the relay will de-energise after a 1 sec response time. The restart timer will now start timing (see Restart Timer).

Control Functions

Level Control: The unit can monitor the level of conductive liquids. By using three probes, the unit controls the level of the liquid in a reservoir between a low and a high level. The unit normally operates in the Charging (Filling) mode, but can be programmed to the Discharging (Draining) mode by means of an external wire link.

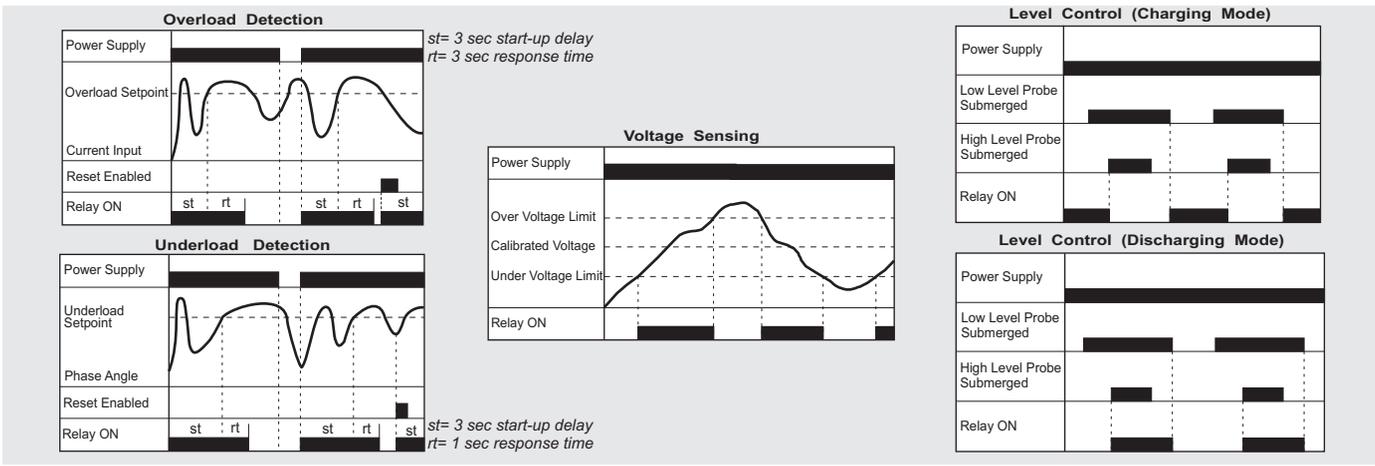
Charging (Filling): [No external wire link.] The relay will energise when the liquid level drops below the low level probe. The relay will remain energised until the level reaches the high level probe. When the high level probe becomes submerged, the relay de-energises and remains off until the liquid level has dropped sufficiently to clear the low level probe.

Discharging (Draining): Link terminals Dis (discharging) and E (Earth). The relay will energise when the liquid level rises above the high level probe. The relay will remain energised until the level drops to below the low level probe. The relay then de-energises and remains off until the liquid level has risen sufficiently to submerge the high level probe.

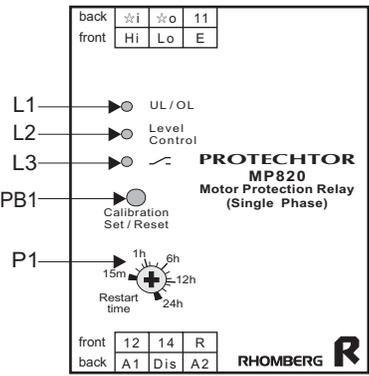
External Control: The liquid level inputs can be used as a general-purpose external control to switch the relay on and off. If both high (Hi) and low (Lo) level inputs are connected to Earth (E), the relay will de-energise and similarly, if both Hi and Lo are disconnected, the relay will energise. (With terminals Dis and E linked, the relay will operate in the opposite sense.)

Restart Timer: The restart timer is triggered by an underload condition. The unit will attempt to restart the motor when the set time elapses to check if the fault still exists. If an underload fault still exists after a restart attempt, the relay will de-energise, re-triggering the restart timer. The above procedure will be repeated.

Operational Diagrams



Description of Controls

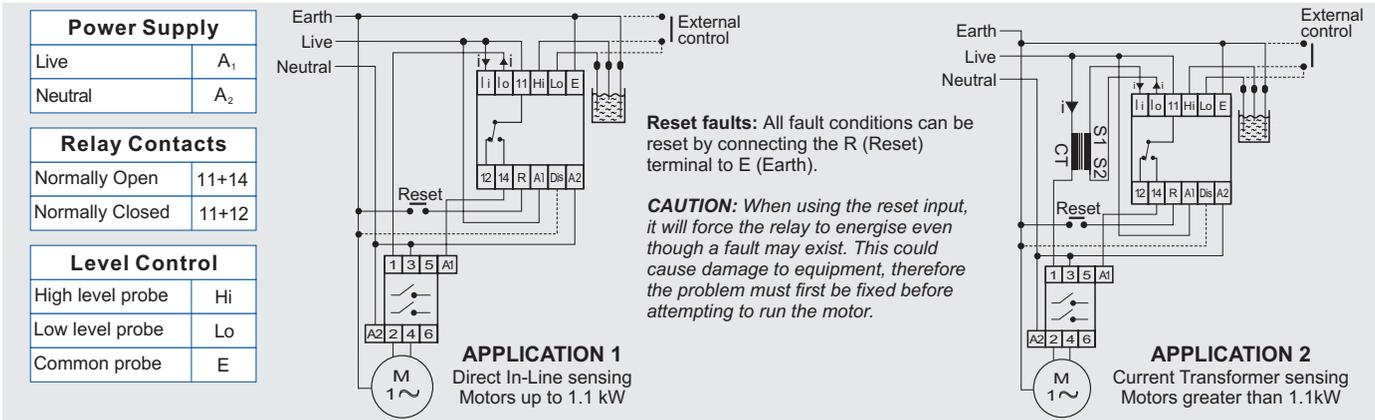


- L1: The red “UL / OL” LED.
 - L2: The yellow “Level Control” LED.
 - L3: The green “Relay ON” LED.
- Note:** Collectively the 3 LED's indicate the status of unit, see Table 1.
- P1: **Restart Time** is set on P1. This time Period is adjustable from 15 min to 24 hrs.
- PB1: **Calibration Set / Reset** is initiated with PB1.
 Calibration Set: Refer to Calibration under Description of Operation above.
 Calibration Reset: Refer to Calibration Reset under Description of Operation above.

TABLE 1:

GREEN	YELLOW	RED	UNIT STATUS
ON	OFF	OFF	Normal Operation
OFF	ON	OFF	Liquid Level High (Low)
OFF	OFF	ON	Overload
OFF	Flash	ON	Underload/Dry-Timing
OFF	OFF	Flash	Low voltage(uncal mode)
OFF	ON	Flash	Under/Over Voltage
Flash	Flash	Flash	Unit Uncalibrated
Flash	OFF	OFF	Unit Calibrating
OFF	ON	ON	Unit Faulty

Wiring and Connection



Technical Specifications

POWER SUPPLY		CURRENT INPUT		RELAY	
Nominal Supply Voltage	100 - 120V AC / 220 - 240V AC	Motors <1.1kW:		250V, 5A	SPDT
Supply Voltage Tolerance	80 - 144V AC / 176 - 288V AC	Current limits to ensure calibration	0,5 to 10A	LEVEL CONTROL	
Supply frequency	50/60Hz	Repetitive accuracy	1%	Sensitivity	50 kΩ
Isolation (current input to power supply)	2kV	Maximum input current (continuous)	15A		
Power Consumption	4VA (approx.)	Motors >1.1kW: (use external CT)			
RESPONSE		CT Example: 220/230/240V			
Start-up Delay	3 seconds fixed, standard (extended times available on request)	Motor	1.5kW / 2.2kW		
Response Delay	Overload 3 seconds / On all other faults 1 second	Current Transformer	20/5 / 30/5		
RESTART		CALIBRATION			
Restart Timer (underload)	15 min - 24 hrs (adjustable)	Phase Angle Limits:	Underload: 90° or 125% of calibration value		
Reset lockout	Max. 3 resets per 15 minutes	Current Limits:	Overload: 13A or 125% of calibration value		
		Voltage Limits:	±10% of calibration value		

Additional information in Section J, page 131.