



3 Phase Motor / Pump Protection Relay

MP 830



ORDERING CODE

TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS
MP830	415	A	S

Refer to MP820 for Single Phase Motors

Application Examples

- Borehole pump protection
- Protection of 3 Phase AC Induction Motors
- **Protection against:** Running dry, jamming of motor, closed valve or no-flow (centrifugal pumps), overcurrent, phase sequence/failure, over- & under-voltage.

Features

- Underload sensing by measuring phase angle (Auto-calibration)
- Overload sensing by measuring current amplitude (Auto-calibration)
- Calibration reset for easy setting up of motor changeover
- Direct in-line current sensing for motors up to 3.75kW
- Direct interface with conventional current transformer for motors > 3.75kW
- Phase Sequence and phase failure detection
- Liquid Level Control
- Adjustable restart timer on underload (ie running dry)
- Fixed start-up delay (3 seconds standard)
- Unit latches in de-energised state on overload fault only
- LED indication of all fault conditions and all modes of operation (Chart supplied)



Technical Specification

POWER SUPPLY	
Nominal Supply Voltage	415V
Supply Voltage Tolerance	± 20%
Supply frequency	50/60Hz
Isolation (current input to power supply)	2kV
Power Consumption	4VA (approx.)

RESPONSE	
Start-up Delay	3 seconds fixed, standard (extended times available on request)
Response Delay	Overload 3 seconds Phase sequence/failure instantaneous On all other faults 1 second

RESTART	
Restart Timer (underload)	15 min - 24 hrs (adjustable)
Rapid cycle starting	Max. 3 starts per 15 minutes

RELAY	
250V, 5A	SPDT

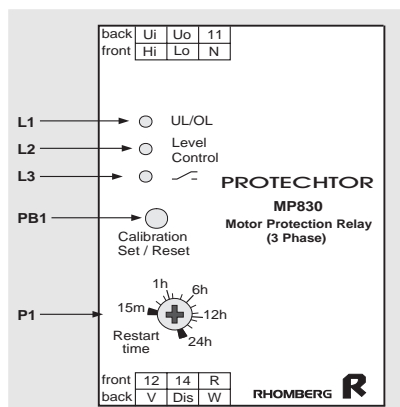
VOLTAGE SENSING	
Over and under voltage trip points	415V ±15% fixed

LEVEL CONTROL	
Sensitivity	50 kΩ

CURRENT INPUT	
Motors < 3.75 kW:	
Current limits to ensure calibration	0,5 to 8A
Repetitive accuracy	1%
Maximum input current (continuous)	12A
Motors > 3.75 kW: (use external CT)	
CT Example: 415V	
Motor	5.5kW 7.5kW 11kW 15kW 18.5kW 22kW 30kW 37kW 45kW
CT	15/5 20/5 30/5 40/5 50/5 50/5 75/5 100/5 100/5

CALIBRATION	
Phase Shift Limits: Underload	90° or 125% of calibration value
Current Limits: Overload	10A or 125% of calibration value

Description of Controls



L1: The red "UL / OL" LED

L2: The yellow "Level Control" LED

L3: The green "Relay ON" LED

Collectively the 3 LED's indicate the status of the unit - see Table 1. This table (with the wiring diagram) is supplied as an adhesive laminated chart for mounting on inside of cabinet door).

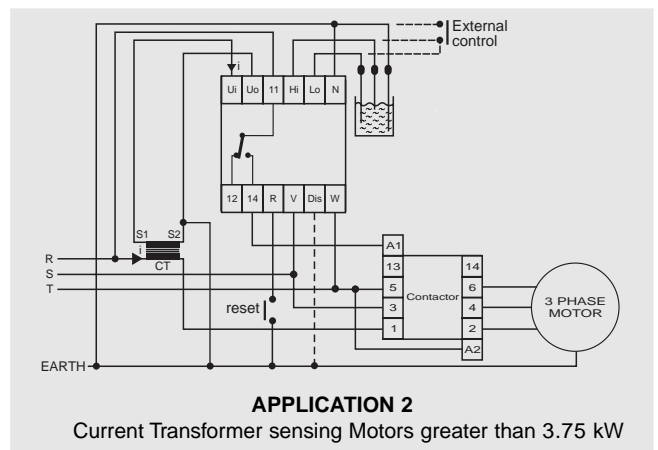
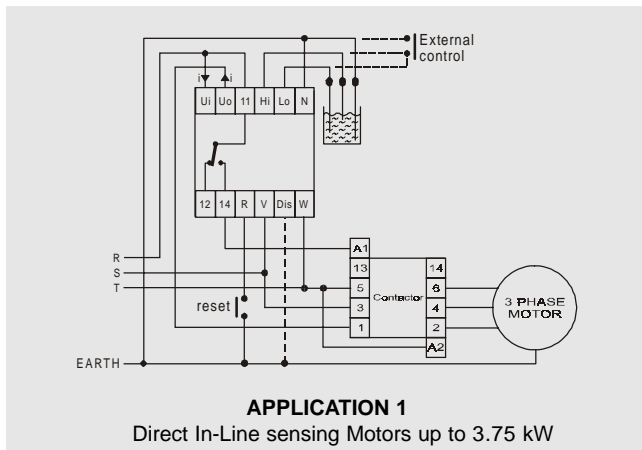
PB1: Calibration Set / Reset is initiated with PB1.
Calibration Set & Reset:
Refer to Calibration under Description of Operation on next page.

P1: Restart Time is set on P1. This time period is adjustable from 15 min to 24 hrs.

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	Flash	Flash	Phase Sequence
OFF	OFF	Flash	Phase Failure
OFF	ON	Flash	Under/Over Voltage
Flash	Flash	Flash	Unit Uncalibrated
Flash	OFF	OFF	Unit Calibrating
OFF	ON	ON	Unit Faulty

Wiring and Connection



Description of Operations

CALIBRATION: The unit will automatically set up the overload and underload setpoints. To put the unit into Calibration Mode, power it up in Uncalibrated Mode with all LED's flashing simultaneously. Press the Calibration Set / Reset pushbutton and hold it until only the green Relay ON LED starts flashing (approximately 5 seconds). The unit will now monitor the load of the motor and set up the overload and underload limits if calibration is successful. The green Relay ON LED will stop flashing and stay on. This will take approximately 10 seconds.

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. This will reset the calibrated limits and takes approximately 3 seconds. The unit will now be in uncalibrated mode.

UNCALIBRATED MODE: The unit is supplied uncalibrated from the factory. When power is applied to the unit all the 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. The unit will only respond to phase sequence or phase failure faults.

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. The unit can be reset by either connecting the reset input (R) to Earth (N) via an external switch or removing the power supply to the unit.

LEVEL/EXTERNAL 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.

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 N (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 by bridging the level inputs in the correct sequence.

NON-LATCHING FAULTS:
PHASE SEQUENCE: If any two phases to the motor are reversed, the relay will de-energise immediately. When the phase sequence has been restored, the relay automatically energises and the motor will start again.

PHASE FAILURE: The unit will monitor the loss of any phase in the 3 phase supply to the motor, causing the relay to de-energise immediately, in conditions of up to 80% voltage regeneration. When the voltage has stabilised within safe limits, the relay automatically energises and the motor will start again.

VOLTAGE SENSING: If the supply voltage increases or decreases by more than 15% of nominal, the relay will de-energise and the motor will switch off. When the voltage has stabilised within safe limits, the relay automatically energises and the motor will be started 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).

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 the fault exists on a restart attempt, the relay will de-energise and will trigger the timer again. The above procedure will be repeated.

Operational Diagrams

