RACO

Power Monitoring Relay PMR 480V

- Industrial Design
- Width 22.5 mm
- True Power Monitoring
- Fault Latch
- Form C Output Contact
- 1 & 3 Phase
- 0 to 480V AC
- VFD (10 to 100 Hz)
- Selectable Range 0.75, 1.5, 3, 6 kW

Thrust Overload Protection via Power Monitoring

Introduction

The thrust level that the electro-mechanical actuator is developing has a direct relationship with the electrical power consumption of the actuator motor. By monitoring and comparing the power consumption to a preset threshold value, a precise maximum thrust value can be defined.

Function

The actuator motor true power monitoring relay (PMR 480V) operates in the fail safe mode for single and three phase power systems. When the actuator motor power is initially applied, a time delay begins to suppress the power spike due to the additional acceleration and inertia power requirements. The delay time is factory set and slightly longer than the inrush time.

After the delay time has expired, the relay de-energizes when the actuator motor power rises above the preset trip point (this represents an over-thrust condition). The PMR 480V unit remains locked-out, if terminal Y1 and Y2 is connected, with the dry relay contacts open until the control voltage is interrupted and re-applied. An external CT may be used to extend the power range of the PMR 480V unit.

Coal Unloading Facility

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Operational Function
Minimum & Maximum Monitoring

The PMR 480V power monitoring unit is equipped with multiple functions for a wide range of power monitoring capabilities. The function which is utilized for the thrust overload protection of your actuator is the "Over O+I< Function" selected via the bottom rotary switch on the unit.

The next rotary switch up "Range" matches the connected motor power consumption at the rated actuator thrust value with the unit measurement range. Four settings are available: 0.75, 1.5, 3, 6 kW.

The next rotary potentiometer "Delay" determines the time after which the unit should shut off after the thrust limit is reached. This time should be as short as possible to protect the actuator and the attached equipment from thrust overloading. The value is typically factory selected for 0.1 seconds.

The potentiometer "Power" is used to adjust the thrust shut off point of the actuator. At the nominal rated thrust value of the actuator, the actuator motor will draw a precise electrical supply power value. The motor power consumption value will be calculated as a percentage of the selected power range (second rotary switch from the bottom).

Example:
RACO Actuator T1A5 with a nominal thrust rating of 1100 lbf and a rated speed of 4.2"/sec.
Supply Voltage: 480VAC, 3 Phase
At rated thrust of 1100 lbf the motor will draw 1,831 W electrical power.
Selected power range setting at the PMR 480V unit is 3kW.
P1 should be set at:

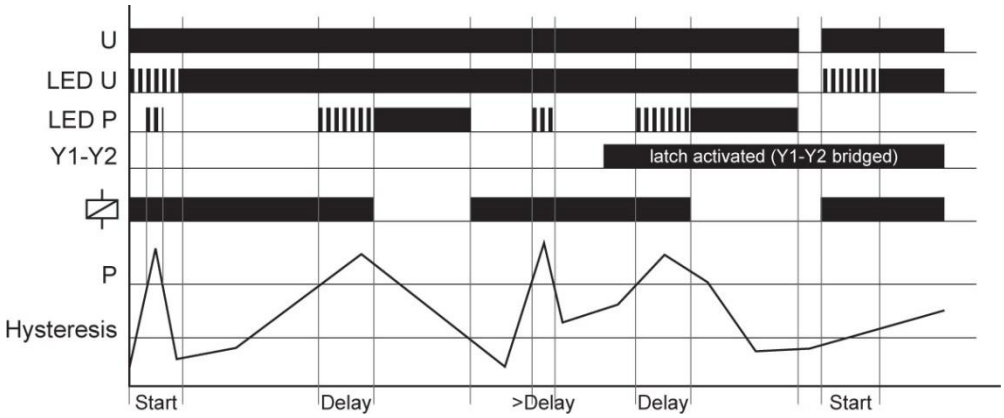
$$P1 = \frac{1831 * 100}{3000}\ \% = 61.0\ \%$$

To block out the power consumption readings during start-up in retract or extend direction, a start-up delay time can be selected. The potentiometer start is typically factory set at 1 sec. In rare cases where huge masses are connected to the actuator which need to be accelerated or decelerated, a slightly higher start-up time may be required. Settings above 2 to 3 sec indicate dynamic overloading of the actuator. Please consult factory.

The below diagram illustrates the behavior of the thrust overload protection unit PMR 480V.

Terminal Layout

Looking at the front plate, the A1 terminal is located on the left site of the bottom terminal strip. The L1 terminal is located on the left site of the upper terminal strip.



Read and understand these instructions before installing, operating or maintaining the equipment.

Danger!
Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

Technical data

1. Functions
True power monitoring of 1- or 3-phase loads with adjustable threshold, fixeded hysteresis, timing for start-up suppression and tripping delay separately adjustable, fault latch and the following functions which are selectable by means of rotary switch:

OVER+$\overline{I=0}$	Overload monitoring with recognition of disconnected consumers (Rel.ON if I=0)
OVER+I=0	Overload monitoring with recognition of disconnected consumers (Rel.OFF if I=0)
UNDER	Underload monitoring
UNDER+I=0	Underload monitoring with recognition of disconnected consumers (Rel.ON if I=0)

2. Time ranges

	Adjustment range	
Start-up suppression time:	0.1s	2s
Tripping delay:	0.1s	2s

3. Indicators

Green LED ON:	indication of supply voltage
Green LED flashes:	indication of start-up supression time
Yellow LED R ON/OFF:	indication of relay output
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED ON/OFF:	indication of failure of the correspondi threshold
Red LED flashes:	indication of tripping delay of the corresponding threshold

4. Mechanical design
Self-extinguishing plastic housing, IP rating IP40
Mounted on DIN-Rail TS 35 according to EN 60715
Mounting position: any
Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
Tightening torque: max. 1Nm
Terminal capacity:
- 1 x 0.5 to 2.5mm² with/without multicore cable end
- 1 x 4mm² without multicore cable end
- 2 x 0.5 to 1.5mm² with/without multicore cable end
- 2 x 2.5mm² flexible without multicore cable end

5. Input circuit

Supply voltage:	
12 to 440V AC 24V DC	terminals A1-A2 (galvanically separate selectable via power modules TR2 or switching power supply SNT2
Tolerance:	according to specification of power module or switching power supply
Rated frequency:	according to specification of power module or switching power supply
Rated consumption:	2VA (1.5W)
Duration of operation:	100%
Reset time:	500ms
Residual ripple for DC:	-
Drop-out voltage:	>30% of the supply voltage
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	4kV

6. Output circuit
1 potential free change-over contact

Rated voltage:	250V AC
Switching capacity:	750VA (3A / 250V AC)
If the distance between the devices is less than 5mm!	
Switching capacity:	1250VA (5A / 250V AC)
If the distance between the devices is greater than 5mm!	
Fusing:	5A fast acting
Mechanical life:	20 x 10^6 operations
Electrical life:	2 x 10^5 operations at 1000VA resistive load
Switching frequency:	max. 60/min at 100VA resistive load max. 6/min at 1000VA resistive load (in accordance with IEC 60947-5-1)
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	4kV

7. Measuring circuit

Measuring range PN:	0.75, 1.5, 3 and 6kW selectable
Wave form:	
AC Sinus:	10 to 400Hz
Sinus-weighted PWM:	10 to 100Hz
Measuring-input voltage:	terminals L1-L2-L3
1-phase mains	0 to 480V AC
3-phase mains	3~ 0 to 480/277V
Overload capacity:	
1-phase mains	550V AC
3-phase mains	3~ 550/318V
Input resistance:	2MΩ
Measuring-input current:	terminals i-k
Power range 0.75, 1.5kW:	0 to 6A
Power range 3, 6kW:	0 to 12A (for I>8A distance >5mm)
Overload capacity:	12A permanently
Input resistance:	<10mΩ
Switching threshold:	5% to 120% of P_N
Hysteresis:	fixed, approx. 3% of P_N
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	4kV

8. Control contact Y (equipotential with measuring circuit)

Function:	fault latch (Y1-Y2 bridged)
Loadable:	no
Line length Y1-Y2:	max. 10m (twisted pair)
Control pulse length:	-
Reset:	normally closed contact in the input circuit

9. Accuracy

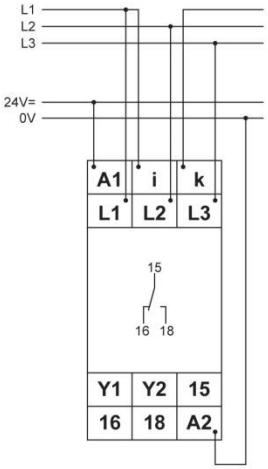
Base accuracy:	±2% (of maximum scale value)
Frequency response:	±0.025% / Hz
Adjustment accuracy:	≤5% (of maximum scale value)
Repetition accuracy:	±2%
Voltage influence:	-
Temperature influence:	≤0.2% / °C

10. Ambient conditions

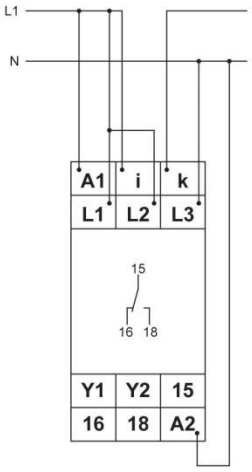
Ambient temperature:	-25 to +55°C (in accordance with IEC 60068-1) -25 to +40°C (in accordance with UL 508)
Storage temperature:	-25 to +70°C
Transport temperature:	-25 to +70°C
Relative humidity:	15% to 85% (in accordance with IEC 60721-3-3 class 3K3)
Pollution degree:	3 (in accordance with IEC 60664-1)
Vibration resistance:	10 to 55Hz 0.35mm (in accordance with IEC 60068-2-6)
Shock resistance:	15g 11ms (in accordance with IEC 60068-2-27)

Functions

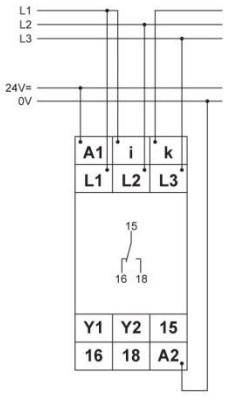
Connected to 3~ 480V mains with power module 24V AC without fault latch
I_N<12A



Connected to 1~ 230V mains with power module 230V AC without fault latch
I_N<12A

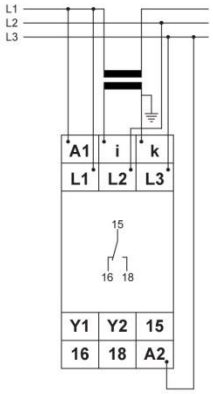


Connected to 3~ 480V mains with power module 480V AC without fault latch
I_N<12A

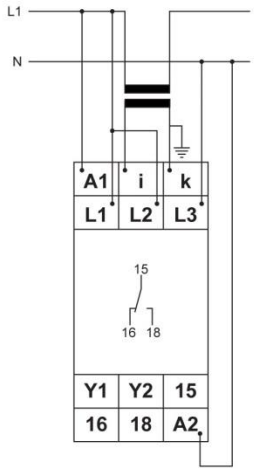


Connections

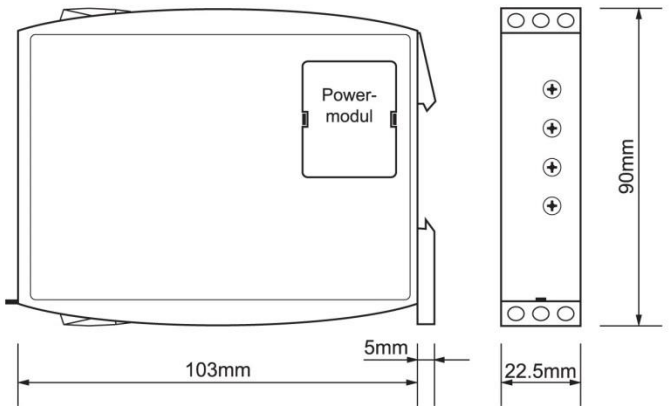
Connected to 1~ 230V mains with power module 230V AC without fault latch
I_N>12A



Connected to 1~ 230V mains with power module 230V AC without fault latch
I_N>12A



Dimensions



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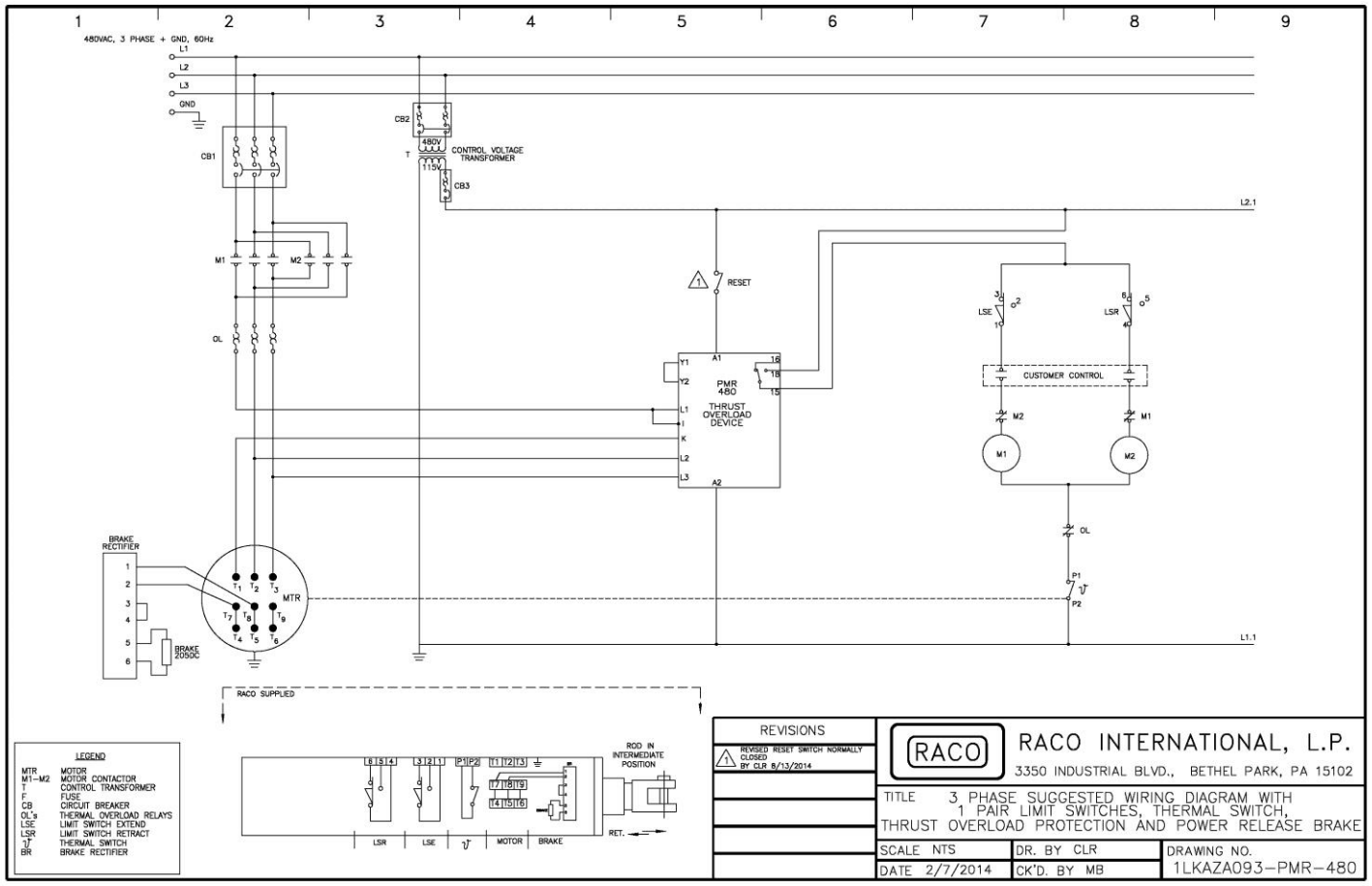
Wiring Diagram Example



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