RACO

Power Monitoring Relay PMR 575V

- Industrial Design
- Width 45 mm
- True Power Monitoring
- Fault Latch
- Form C Output Contact
- 1 & 3 Phase
- 42 to 690V AC
- VFD (10 to 100 Hz)
- Selectable Range 2, 4, 8, 16 kW

Thrust Overload Protection via Power Monitoring

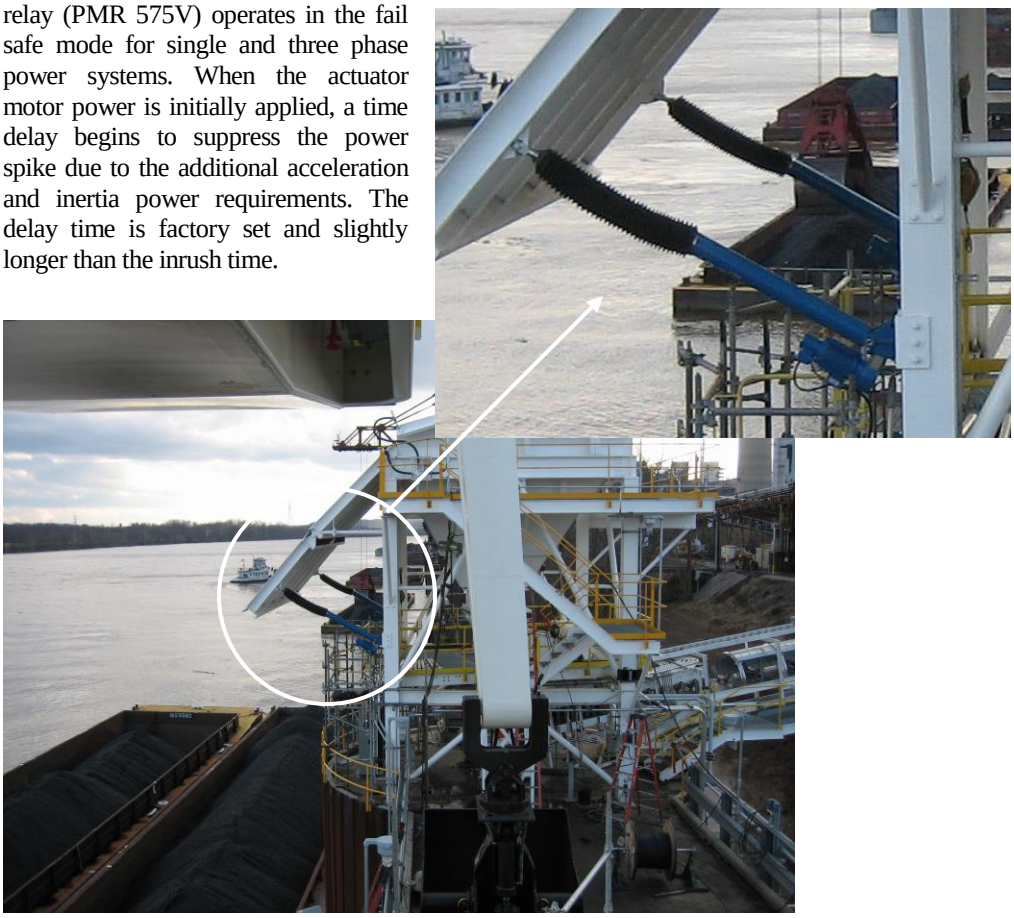
Introduction

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 575V) 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 575V unit remains locked-out, if terminal Y1 and Y2 is connected, with the dry relay contacts open until the reset button is pressed or the control voltage is interrupted and re-applied. An external CT may be used to extend the power range of the PMR 575V unit.



Coal Unloading Facility

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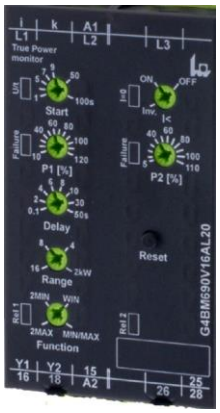
Operational Function
Minimum & Maximum Monitoring

The PMR 575V 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 minimum & maximum "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: 2, 4, 8, 16 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 "P1" 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).

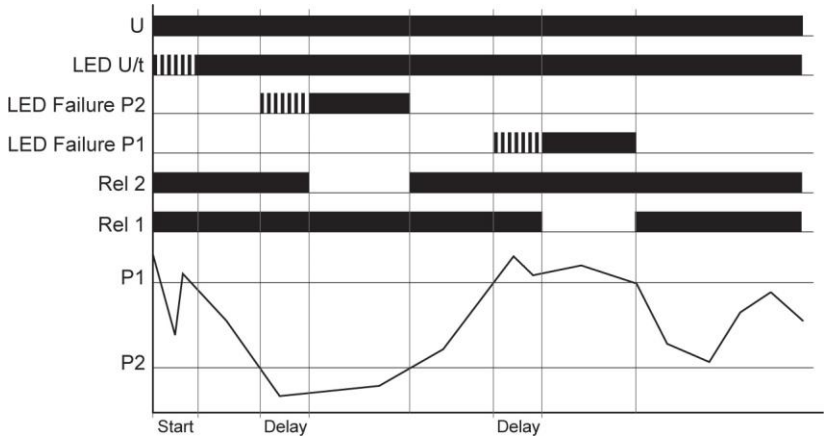
Example:
RACO Actuator T1A5 with a nominal thrust rating of 1100 lbf and a rated speed of 4.2"/sec.
Supply Voltage: 575VAC, 3 Phase
At rated thrust of 1100 lbf the motor will draw 1,831 W electrical power.
Selected power range setting at the PWR 575V unit is 2kW.
P1 should be set at:

$$P1 = \frac{1831 * 100}{2000}\ \% = 91.55\ \%$$

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 "P2" minimum power consumption setting is not relevant for the thrust overload protection monitoring of the actuator and should be set to its lowest level at 5%.

The below diagram illustrates the behavior of the thrust overload protection unit PMR 575V.



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 in 1- and 3-phase loads with adjustable thresholds (P1 and P2), timing for start-up suppression time and tripping delay separately adjustable, selectable fault latchand the following functions which are selected by means of rotary switch:

2MIN	Minimum monitoring
2MIN+I< ON	Minimum monitoring and recognition of disconnected consumers (relay ON if I<)
2MIN+I< Inv.	Minimum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
2MAX	Maximum monitoring
2MAX+I< ON	Maximum monitoring and recognition of disconnected consumers (relay OFF if I<)
2MAX+I< Inv.	Maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
WIN	Monitoring the window between MIN and MAX
WIN+I< ON	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay ON if I<)
WIN+I< Inv.	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay OFF if I< Inv.)
MIN/MAX	Minimum- and maximum monitoring
MIN/MAX+I< ON	Minimum- and maximum monitoring and recognition of disconnected consumers (relay ON if I<)
MIN/MAX+I< Inv.	Minimum- and maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)

2. Time ranges

	Adjustment range	
Start-up suppression time:	1s	100s
Tripping delay:	0.1s	50s

3. Indicators

Green LED U/t ON:	indication of supply voltage
Green LED U/t flashes:	indication of start-up suppression time
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED Failure ON:	indication of failure of the corresponding threshold P1 or P2
Red LED Failure flashes:	indication of tripping delay of the corresponding threshold P1 or P2
Yellow LED Rel 1 ON/OFF:	indication of relay output Rel 1
Yellow LED Rel 2 ON/OFF:	indication of relay output Rel 2

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 500V a.c.	terminals A1-A2 (galvanically seperated) selectable via power module type TR3
Tolerance:	according to specification of power module
Rated frequency:	according to specification of power module
Rated consumption:	3.5VA (3W)
Duration of operation:	100%
Reset time:	500ms
Ripple and noise:	-
Drop-out voltage:	>30% of the supply voltage
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	6kV

6. Output circuit
2 potential free change over contacts

Rated voltage:	250V a.c.
Switching capacity:	750VA (3A / 250V a.c.)
If the distance between the devices is less than 5mm!	
Rated voltage:	1250VA (5A / 250V a.c.)
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 capacity:	max. 60/min at 100VA resistive load max. 6/min at 1000VA resistive load (in accordance with IEC 60947-5-1)
Withstand voltage across open contacts:	1000Veff a.c.
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	6kV

7. Measuring circuit

Measuring range P_N:	reversible between 2kW, 4kW, 8kW and 16kW
Wave form:	
AC Sinus:	10 to 400Hz
Sinus weighted PWM:	10 to 100Hz
Measuring input voltage:	terminals L1-L2-L3
1-phase load:	42 to 690V a.c.
3-phase load:	3~ 42 to 690/400V
Overload capacity:	
1-phase load:	796V a.c.
3-phase load:	3~ 796/460V
Input resistance:	1.25MΩ
Measuring input current:	terminals i-k
Measuring range 2kW, 4kW:	0.2 to 8A
Measuring range 8kW, 16kW:	0.4 to 16A (for I>16A distance >5mm)
Overlaod capacity:	18A permanent
Input resistance:	<10mΩ
I< - recognition:	
Power interruption:	
Measuring range 2kW, 4kW:	200mA
Measuring range 8kW, 16kW:	400mA
Current flow recognition:	
Measuring range 2kW, 4kW:	240mA
Measuring range 8kW, 16kW:	480mA
Switching threshold P:	
Switching threshold P1:	10% to 120% of P_N
Switching threshold P2:	5% to 110% of P_N
Hysteresis:	1% of maximum value of the measuring range
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	6kV

8. Control contact Y (equipotential with measuring circuit)

Function:	latch (terminal Y1-Y2 bridged)
Loadable:	no
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:	≤0.02% / °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:	2 (in accordance with EN 60255-27)
Vibration resistance:	class 1 (in accordance with EN 60255-22-1)
Shock resistance:	class 1 (in accordance with EN 60255-22-2)

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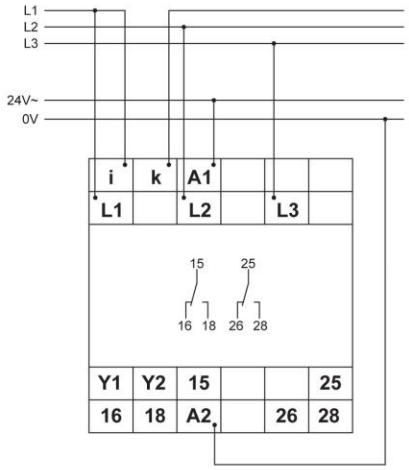
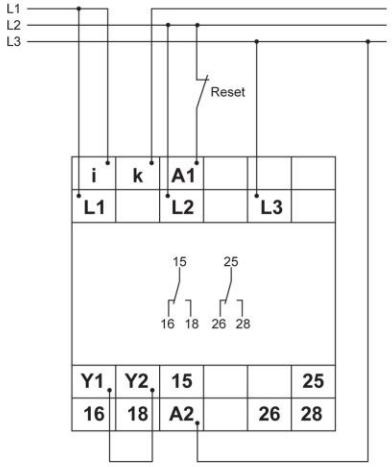
Connections

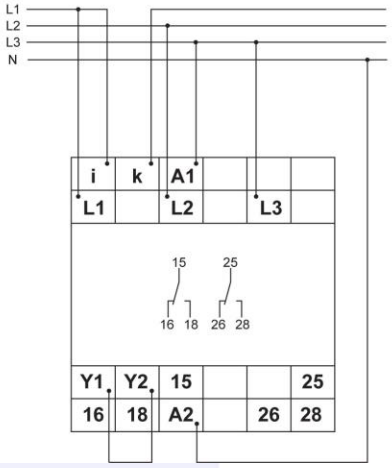
Connected 3~ 400/690V with power module 24V a.c. without fault latch I_N<16A



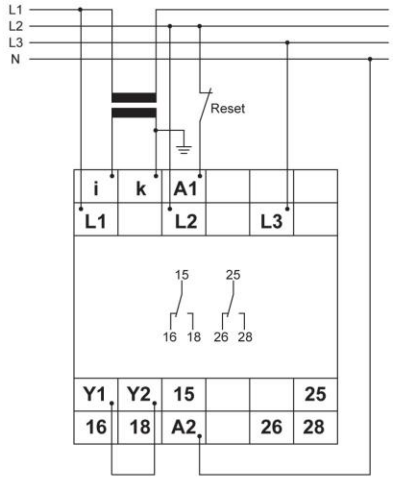
Connected 3~ 500V with power module 500V a.c. with fault latch I_N<16A



Connected 3~ 230/400V with power module 230V a.c. with fault latch I_N<16A

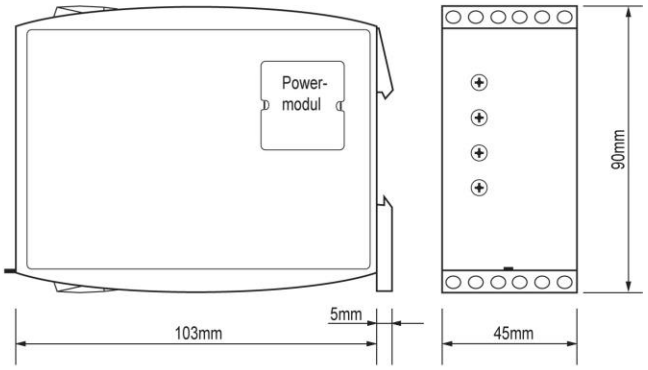


Connected 3~ 400/690V with power module 400V a.c. with fault latch and current transformer I_N>16A



Note:
Before working on current transformer circuits, these shall be short-circuited.

Dimensions



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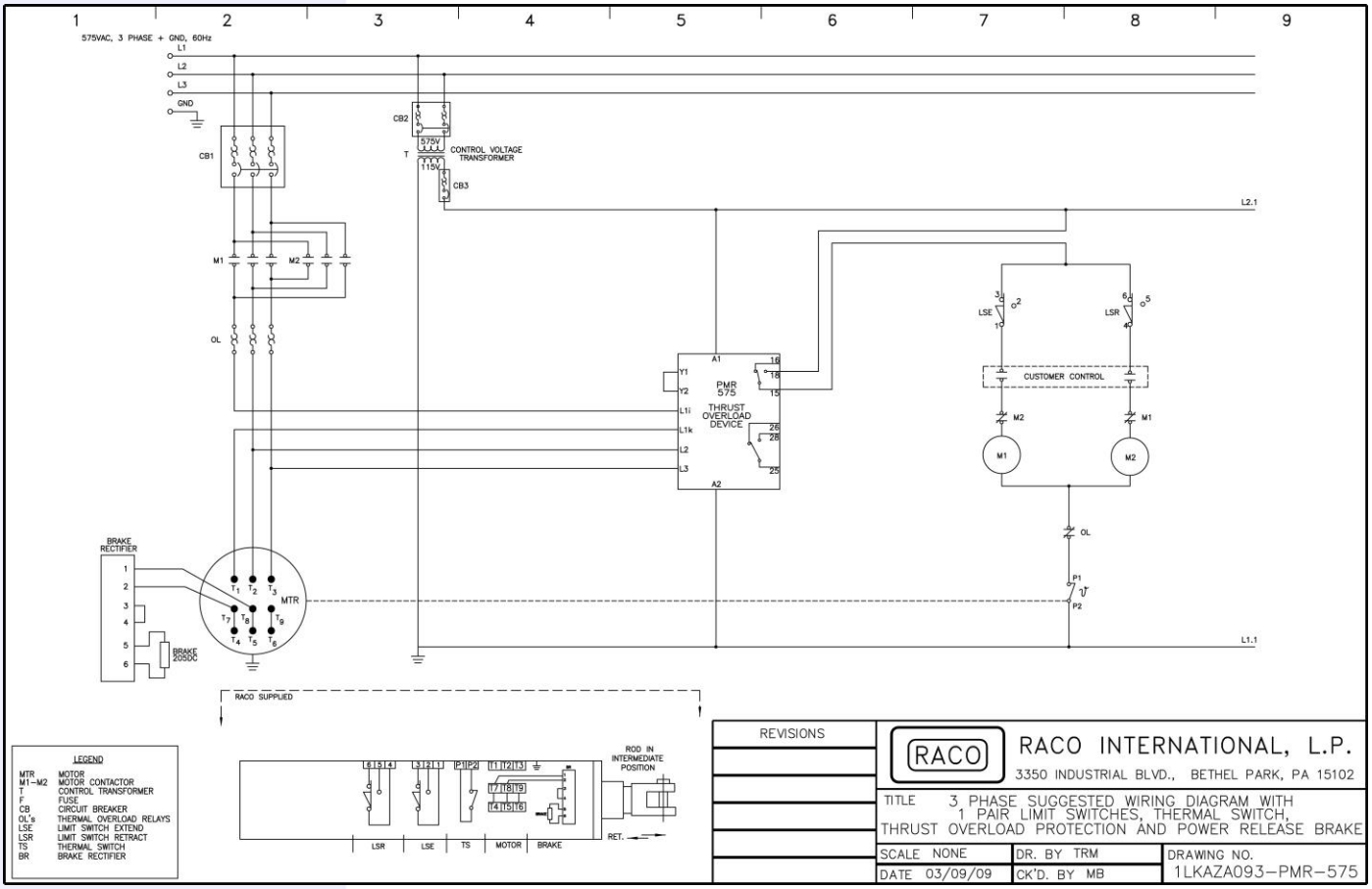
Wiring Diagram Example



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