

## Overload Relays

Monitoring, control, and protection are critical and necessary functions in motor and pumping applications. SymCom's single-phase and three-phase UL listed enhanced overload relays monitor for both line-side voltage problems and load-side current faults, providing an added layer of protection over voltage monitors and other basic overload relays. All SymCom overload relays are user configurable and cover a wide range of voltages and currents, making them the most versatile in the industry. A standard feature of the entire family of SymCom overload relays is a communications port which provides easy connectivity to a SCADA system, PLC, or virtually any network through the use of a communications module. The communications port allows remote monitoring of motor operations and fault conditions through easy connectivity to SymCom's Remote Monitors, aiding compliance with arc flash safety regulations.

### Product Selection Matrix

MODEL	High Voltage	Low Voltage	Phase Loss	Phase Reversal	Voltage Unbalance	Contact Failure	Low Current Trip	Low Power Trip	High Power Trip	Overcurrent Trip	Linear Overcurrent Trip (Trip Class)	Current Unbalance	Subtrol High Temp. Trip*	10-800A with CTs	1-9 Amps without external CTs	2-90 Amps without external CTs	2-800 Amps without external CTs	100-240 VAC	200-480 VAC	340-480 VAC	500-600 VAC	277V Relay	600V Relay	Use with rotary phase converter
777-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777 (replaced by 777-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-P (replaced by 777-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-P1 (replaced by 777-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-LR-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-LR-P (replaced by 777-LR-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-LR (replaced by 777-LR-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HVR-LR-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HVR-LR (replaced by 777-HVR-LR-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HVR-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HVR (replaced by 777-HVR-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-MV-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-MV (replaced by 777-MV-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575 (replaced by 777-575-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-P (replaced by 777-575-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-P1 (replaced by 777-575-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-FT (replaced by 777-575-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-LR-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-LR (replaced by 777-575-LR-P2)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HRG-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-LR-HRG-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-HRG-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-LR-HRG-P2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-FT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-FT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-TS	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-LR-TS	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-575-TS	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777VA-02	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777VA-03	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
77C	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
77C-LR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
777-HVR-SP	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

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 \*\* Network programmable ONLY

# Overload Relay

## Model 777 Product Line *single-phase and 3-phase current & voltage monitor, on-board display, optional communications to PLC/SCADA/monitoring systems*



### The Model 777 / 77C

is a fully programmable electronic overload relay designed to protect any motor drawing 2-800 full load amps (external CTs are required above 90 amps). The 77C (family of products) is for single-phase 100-240VAC applications and the 777 (family of products) is for 3-phase 200-480VAC applications, with several specialized units for other voltage ranges and unique applications. Common applications include conveyor systems, HVAC equipment, saws and grinders, fan motors, and almost any pumping application. Some unique applications include use with a Subtrol® equipped Franklin submersible motor to detect high motor temperatures and applications where a fast linear trip is required.

All of the overload relays provide unsurpassed protection by combining overload, underload, voltage and power monitoring functions in one package. The overload relays have a 3-digit display for viewing real-time voltage and current and for displaying the last or active fault code (to simplify diagnostics) when tripped for a fault condition. The units can be used as a stand-alone product or the communications port can be used to form a Modbus, DeviceNet™, Profibus, or Ethernet network to monitor up to 99 units from a PC, PLC, or SCADA system, and for data logging through a PC with SymCom's Solutions software (see page 15).




The communications port can also be used for remote monitoring (see SymCom's remote monitors on page 13) to improve safety for personnel by allowing them to monitor and control motor operation without opening the electrical cabinet. This capability allows for a simple, cost-effective way to meet new requirements for arc-flash safety.

For more information see:

See Appendix A, page 66, Figure 1 for dimensional drawing.

See Appendix B, page 71, Figures 1-4 for typical wiring diagrams.

### Features:

- Built-in 3-digit display for programming, real-time info, and diagnostics
- Programmable voltage and current settings/parameters
- Programmable restart control (automatic, semi-automatic, or manual)
- 3 separate programmable restart delay timers (rapid-cycle protection, motor cool down and dry-well recovery)
- Run-hour meter (available via network or remote displays)
- Reset pushbutton (and optional remote reset pushbutton)
- Current/last fault indication on 3-digit display
- Last four faults (with characteristics) available via network or remote displays
- Network communications (Modbus, DeviceNet™, Profibus, or Ethernet)
- Optional remote displays aid compliance with arc-flash safety regulations
- Approvals:   

### Auxiliary Products:

- Communication Modules (see pgs. 10-12)
- RM-1000/RM-2000 (remote displays) (see pgs. 13-14)
- Solutions Software (see pg. 15)
- Manual Remote Reset Kit (see pg. 65)

### Available Models:

77C  
77C-LR  
777-HVR-SP  
777-P2  
777-LR-P2  
777-HVR-P2  
777-HVR-LR-P2  
777-575-P2  
777-MV-P2  
777-575-LR-P2  
777-HRG-P2  
777-LR-HRG-P2  
777-575-HRG-P2  
777-575-LR-HRG-P2  
777-FT  
777-575-FT  
777-TS  
777-LR-TS  
777-575-TS  
777VA-02  
777VA-03

#### DEMOS:

777-P2-DEMO (777-P2 Demo only)  
777-P2-DEMO-1 (777-P2 demo with CIO-EN Ethernet Module)  
777-P2-DEMO-2 (777-P2 demo, CIO-EN and RM-1000 Remote Monitor)  
777-P2-DEMO-3 (777-P2 demo, CIO-EN, RM-1000 and RM-2000 Remote Monitors)

# Overload Relay

# Model 777 Product Line

*single-phase and 3-phase current & voltage monitor, on-board display, optional communications to PLC/SCADA/monitoring systems*

## Specifications

### Input Characteristics

#### Line Voltage

777-P2, 777-LR-P2, 777-HRG-P2 .....	200-480VAC
777-TS, 777-LR-TS, 777-LR-HRG-P2 .....	200-480VAC
777VA-02, 777VA-03 .....	200-480VAC
77C, 77C-LR, 777-MV-P2 .....	100-240VAC
777-HVR-P2, 777-HVR-LR-P2, 777-HVR-SP .....	340-480VAC
777-575-P2, 777-575-LR-P2, 777-575-HRG-P2 .....	500-600VAC
777-575-TS, 777-575-LR-HRG-P2 .....	500-600VAC

Frequency ..... 50/60Hz

#### Motor Full Load Amp Range

77C-LR, 777-LR-TS .....	1-9A
777-LR-P2, 777-575-LR-P2, 777-HVR-LR-P2 .....	1-9A & 10-800A with external CTs
777-LR-HRG-P2, 777-575-LR-HRG-P2 .....	10-800A (external CTs required, external zero-seq. CT required)
777-HRG-P2, 777-575-HRG-P2 .....	2-90A only
777-MV-P2 .....	10-800A with CTs
77C, 777-P2, 777-575-P2 .....	2-800A (external CTs required above 90A)
777-HVR-P2 .....	2-800A (external CTs required above 90A)
777-TS, 777-575-TS, 777VA-02 .....	2-800A (external CTs required above 90A)
777VA-03, 777-HVR-SP .....	2-800A (external CTs required above 90A)

### Functional Characteristics

TC- Overcurrent Trip Class (777 Plus Series units) ..... 02-60, J02-J60, L00-L60 or Off

TC- Overcurrent Trip Class (77C, 777 non-Plus Series units) ..... 5, 10, 15, 20, 30 (J prefix enables jam protection feature)

### Output Characteristics

#### Output Contact Rating (SPDT - Form C)

Pilot duty rating .....	480VA @ 240VAC, B300
General purpose .....	10A @ 240VAC
Pilot duty rating for HVR models .....	470VA @ 600VAC, B600

### General Characteristics

#### Ambient Temperature Range

Operating .....	-20° to 70°C (-4° to 158°F)
Storage .....	-40° to 80°C (-40° to 176°F)

#### Accuracy

Voltage .....	±1%
Current .....	±3% (<100 amps direct)
GF Current .....	±15%
Timing (777 Plus Series units) .....	±0.5 second
Timing (77C, 777 non-Plus Series units) .....	5% ±1 second

#### Repeatability

Voltage .....	±0.5% of nominal voltage
Current .....	±1% (<100 amps direct)

Maximum Input Power ..... 10 W

Pollution Degree ..... 3

Class of Protection ..... IP20

Relative Humidity ..... 10-95%, non-condensing per IEC 68-2-3

Terminal Torque ..... 7 in.lbs.

#### Standards Passed

Electrostatic Discharge (ESD) .....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity (RFI), Conducted .....	IEC 61000-4-6, Level 3 10V/m
Radio Frequency Immunity (RFI), Radiated .....	IEC 61000-4-3, Level 3 10V/m
Fast Transient Burst .....	IEC 61000-4-4, Level 3, 3.5kV input power

Short Circuit ..... 100kA

#### Surge

IEC .....	61000-4-5, Level 3, 2kV line-to-line; Level 4, 4kV line-to-ground
ANSI/IEEE .....	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line

Hi-potential Test ..... Meets UL508 (2 x rated V +1000V for 1 minute)

Vibration ..... IEC 68-2-6, 10-55Hz, 1mm peak-to-peak, 2 hours, 3 axis

Shock ..... IEC 68-2-27, 30g, 3 axis, 11ms duration, half-sine pulse

#### Safety Marks

UL .....	UL508, UL1053 (File #E68520)
CE .....	IEC 60947-1, IEC 60947-5-1
CSA .....	C22.2

Maximum Conductor Size (with insulation) through 777/77C .... 0.65"

Dimensions ..... 3.05 H x 3.85 W x 5.05 D in. (77.47 x 97.79 x 128.27 mm)

Weight ..... 1.56 lbs. (24.96 oz., 707.6 g)

Mounting Method ..... Surface mount (4 - #8 screws) or DIN rail mount

# Overload Relay

## Model 777 Product Line

*single-phase and 3-phase current & voltage monitor, on-board display, optional communications to PLC/SCADA/monitoring systems*

**-P2** The 777-P2 protects 200-480VAC, 2-800 full load amp (FLA) motors and provides protection from overvoltage and undervoltage, overcurrent and undercurrent and unbalanced voltage or unbalanced current through adjustable setpoints. Provides adjustable Trip Class (TC) settings that include settings from 2-60, with or without "jam" protection, and linear TC from <1 second to 60 seconds. The fast linear TC is ideal for applications where very short trip delays are needed to prevent chain drives and other drive linkages from breaking in an overload or jam situation (ex. sewage clarifiers, mixers, augers, conveyors). This family of products also includes network programmable alarm setpoints and high and low power trip points (programmable through a network or SymCom's Solutions Software).

**-LR (Low Range)** The 777-LR-P2 is specifically designed for use with 1-9 FLA motors to ease installation when wired directly, or for 10-800 FLA motors with use of external CTs.

**-HVR** The 777-HVR-P2 or 777-HVR-LR-P2 is required when a CPT (control power transformer) is not used on a 480V system. They have a 340-480VAC range, a relay rated at 470VA @ 600VAC pilot duty, and is commonly used in pumping applications to save the cost and extra wiring associated with a CPT.

**-HRG** The 777-HRG-P2 / 777-LR-HRG-P2 are overload relays, designed for a high resistance ground system, that incorporates an internal zero-sequence CT (HRG) or an external zero-sequence CT (LR-HRG) to detect ground faults. The HRG is only for 2-90 FLA and is wired directly. The LR-HRG is only for 10-800 FLA and requires the use of external CTs that correspond with the built-in multipliers.

**-MV** The 777-MV-P2 is specifically designed for medium voltage applications where both PTs (potential transformers) and CTs (current transformers) are used. It has a 115-230VAC nominal voltage range and built-in multipliers for 25:5, 50:5, 100:5, ...CTs. The voltage unbalance, single-phase and reverse-phase protection can be disabled to accommodate applications where only one PT is used.

**-575** The 777-575-P2 has a nominal 500-600VAC range and 240V relay. They are commonly used in Canada and the Northeast US where 575V utility power services are common.

**-VA-02** The 777VA-02 has RD1 setpoints of 2-500 minutes and UCTD setpoints of 2-60 minutes. (Replaced 777-RD1M-UCTDM).

**-VA-03** The 777VA-03 is specifically designed for use with static and rotary single to 3-phase converters. Voltage unbalance protection is disabled and the high and low voltage trip features apply only to the utility supplied power. This allows the 777 to ignore the severely unbalanced voltages that are inherent to unloaded phase converters. (Replaced 777-PH.)

**-SP** The 777-HVR-SP is specifically designed for single-phase, 480VAC applications. It has a high voltage relay rated at 480VA @ 600VAC pilot duty to handle systems with no control power transformer.

**-FT** The 777-FT is intended for applications where a fast linear trip is required. It has an overcurrent trip delay that can be set to less than 500ms, to be used in applications where very short trip delays are needed to prevent chain drives and other drive linkages from breaking in an overload or jam situation. Often times these are referred to as shock relays. Some applications include sewage clarifiers, mixers, augers and conveyors. The trip delay can be set to as long as 70 seconds, so the 777-FT can also be used in certain applications when a slower than normal trip is desired, such as motor test panels in a rewind shop. The 777-FT also features an adjustable motor acceleration time and overcurrent trip delay time when using the fast linear trip mode.

**-TS** The 777-TS is specifically designed for use with a Subtrol®-equipped Franklin submersible motor to detect high motor temperatures.

**-DEMO** SymCom offers demo packages for the Model 777 family and remote monitors. These demos are powered via one power adapter (included) and are very easy to set up for use as sales tools or for training purposes. Four packages of the MotorSaver® and four of the PumpSaver® versions are available ranging from the basic model 777 up to a complete package including the Ethernet module and both remote monitors. Which package to choose will depend on your markets and/or product focus.)

# Power Monitors

Many pumping applications require advanced power monitoring and control. SymCom enhanced power monitors provide all of the protections and features included with an enhanced overload relay, but are designed specifically for applications where there is not much change in current between a load and no load condition. This family of enhanced power monitors provides optimum protection in these adverse situations by monitoring for subtle changes in voltage, current and power factor to distinguish between changing load conditions.

## Product Selection Matrix

MODEL	High Voltage	Low Voltage	Phase Loss	Phase Reversal	Voltage Unbalance	Contactors Failure	Low Current Trip	Low Power Trip	High Power Trip	Overcurrent Trip	Linear Overcurrent Trip (Trip Class)	Current Unbalance	10-800 A with CTs	1-9 Amps	0.5-21 and 40-740 Amps w/ CTs	2-800 Amps	200-480VAC	340-480VAC	500-600VAC	277V Relay	600V Relay	Displays Output Shaft Power
777-KW/HP-P2	•	•	•	•	•	•	**	•	**	•	•	•	•	•	•	•	•	•	•	•	•	•
777-KW/HP (replaced by 777-KW/HP-P2)																						
777-KW/HP-P (replaced by 777-KW/HP-P2)																						
777-LR-KW/HP-P2	•	•	•	•	•	•	**	•	**	•	•	•	•	•	•	•	•	•	•	•	•	•
777-LR-KW/HP (replaced by 777-LR-KW/HP-P2)																						
777-LR-KW/HP-P (replaced by 777-LR-KW/HP-P2)																						
777-MLR-KW/HP-P2	•	•	•	•	•	•	**	•	**	•	•	•	•	•	•	•	•	•	•	•	•	•
777-MLR-KW/HP (replaced by 777-MLR-KW/HP-P2)																						
777-HVR-KW/HP-P2	•	•	•	•	•	•	**	•	**	•	•	•	•	•	•	•	•	•	•	•	•	•
777-HVR-KW/HP (replaced by 777-HVR-KW/HP-P2)																						
777-S75-KW/HP-P2	•	•	•	•	•	•	**	•	**	•	•	•	•	•	•	•	•	•	•	•	•	•
777-S75-KW/HP (replaced by 777-S75-KW/HP-P2)																						
777-AccuPower	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

\*\* Network programmable ONLY.

# Power Monitors

## Model 777-KW/HP-P2 Product Line

3-phase current & voltage monitor, on-board display, optional communications, **underpower trip for more accurate/faster motor protection versus undercurrent trip**



### The Model 777-KW/HP-P2 Series

has the underload trip, adjustable on the face of the unit, based on power, while all the other products in the 777 family provide an undercurrent trip.

The underpower trip feature is desirable anytime the current vs. load characteristic is non-linear or has little change. In general terms, smaller motors and slow speed motors have little change in current over the normal load range. Larger motors that are running light loads will also show small current changes over the operating load range.

KW/HP products should be used with all small centrifugal motors and fractional horsepower motors when underload protection is needed and with most motors under 3hp. Also use KW/HP products when the motor is derated (Ex: Coal bed methane well with a 7.5hp submersible pump on a

10hp motor.) Other typical applications are mixer motors up to 50hp and beyond that run at less than 1800 rpm, magdrive pumps and can pumps. If in doubt, underpower can be used anytime in place of undercurrent protection.

The 777-KW/HP-P2 can display kilowatts and horsepower and a high power trip feature that can be enabled over a network. The high power trip is useful added protection for positive displacement pumps in a restricted flow (dead-head) condition.

**-LR (Low Range)** The 777-LR-KW/HP-P2 is specifically designed for use with 1-9 FLA motors to ease installation when wired directly, or for 10-800 FLA motors with use of external CTs.

**-HVR** The 777-HVR-KW/HP-P2 is required when a CPT (control power transformer) is not used on a 480V system. It has a 340-480VAC range, a relay rated at 470VA @ 600VAC pilot duty, and is commonly used in pumping applications to save the cost and extra wiring associated with a CPT.

**-575** The 777-575-KW/HP-P2 has a nominal 500-600VAC range and 240V relay. They are commonly used in Canada and the Northeast US where 575V utility power services are common.

**-MLR** The 777-MLR-KW/HP-P2 is used in applications that have a 0.5-21 and 40-740 full load amp range. It is wired directly without the need to loop conductors for 5-21 amps (under 5 amps requires looping of conductors), and can be used with external CTs for 40-740 amps.

For more information see:

See Appendix A, page 66, Figure 1 for dimensional drawing.

See Appendix B, page 71, Figures 1 & 2 for typical wiring diagrams.

### Features:

- Low power protection
- High power protection
- Overcurrent (overload)
- High voltage
- Low voltage
- Current unbalance
- Voltage unbalance
- Ground fault detection
- Modbus communication
- Built-in 3-digit display for setup and diagnostics
- Network communications

Approvals:   

### Auxiliary Products:

- Communication Modules (see pgs. 10-12)
- RM-1000/RM-2000 (remote displays) (see pgs. 13-14)
- Solutions Software (see pg. 15)
- Manual Remote Reset Kit (see pg. 65)

### Available Models:

777-KW/HP-P2

777-LR-KW/HP-P2

777-HVR-KW/HP-P2

777-575-KW/HP-P2

777-MLR-KW/HP-P2

#### DEMOS:

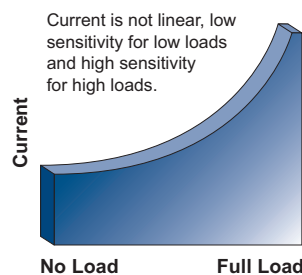
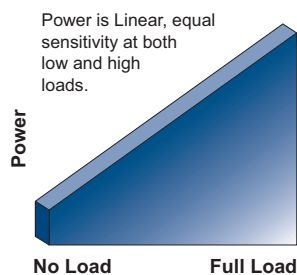
777-KW/HP-P2-DEMO (777-KW/HP-P2 Demo only)

777-KWHP-P2-DEMO1 (777-KW/HP-P2 demo with

CIO-EN Ethernet Module)

777-KWHP-P2-DEMO2 (777-KW/HP-P2 demo, CIO-EN and RM-1000 Remote Monitor)

777-KWHP-P2-DEMO3 (777-KW/HP-P2 demo, CIO-EN, RM-1000 and RM-2000 Remote Monitor)





# Power Monitors

## Model 777-KW/HP-P2 Product Line

*3-phase current & voltage monitor, on-board display, optional communications, underpower trip for more accurate/faster motor protection versus undercurrent trip*

### Specifications

#### Input Characteristics

Line Voltage	
777-KW/HP-P2 .....	200-480VAC (3-phase)
777-LR-KW/HP-P2, 777-MLR-KW/HP-P2 .....	200-480VAC (3-phase)
777-HVR-KW/HP-P2 .....	340-480VAC (3-phase)
777-575-KW/HP-P2 .....	500-600VAC (3-phase)
Current	
777-KW/HP-P2 .....	2-800A (external CTs required above 90A)
777-HVR-KW/HP-P2, 777-575-KW/HP-P2 .....	2-800A (external CTs required above 90A)
777-LR-KW/HP-P2 .....	1-9A & 10-800A with external CTs
777-MLR-KW/HP-P2 .....	0.5-21A and 40-740A with external CTs
Frequency .....	50/60Hz

#### Functional Characteristics

TC-Overcurrent Trip Class .....	02-60, J02-J60, L00-L60 or OFF
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#### Output Characteristics

Output Contact Rating (SPDT - Form C)	
Pilot duty rating .....	480VA @ 240VAC, B300
General purpose .....	10A @ 240VAC
Pilot duty rating for HVR model .....	470VA @ 600VAC, B600

#### General Characteristics

Ambient Temperature Range	
Operating .....	-20° to 70°C (-4° to 158°F)
Storage .....	-40° to 80°C (-40° to 176°F)
Accuracy	
Voltage .....	±1%
Current .....	±3% (<100 amps direct)
Power .....	±4% (<100 amps direct)
GF Current .....	±15%
Timing .....	±0.5 second
Repeatability	
Voltage .....	±0.5% of nominal voltage
Current .....	±1% (<100 amps direct)
Power .....	±2%
Maximum Input Power .....	10 W
Pollution Degree .....	3
Class of Protection .....	IP20
Relative Humidity .....	10-95%, non-condensing per IEC 68-2-3
Terminal Torque .....	7 in.-lbs.
Standards Passed	
Electrostatic Discharge (ESD) .....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity (RFI), Conducted .....	IEC 61000-4-6, Level 3 10V/m
Radio Frequency Immunity (RFI), Radiated .....	IEC 61000-4-3, Level 3 10V/m
Fast Transient Burst .....	IEC 61000-4-4, Level 3, 3.5 kV input power
Short Circuit Rating .....	100kA
Surge	
IEC .....	61000-4-5, Level 3, 2kV line-to-line; Level 4, 4kV line-to-ground
ANSI/IEEE .....	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line
Hi-potential Test .....	Meets UL508 (2 x rated V +1000V for 1 minute)
Vibration .....	IEC 68-2-6, 10-55Hz, 1mm peak-to-peak, 2 hours, 3 axis
Shock .....	IEC 68-2-27, 30g, 3 axis, 11ms duration, half-sine pulse
Safety Marks	
UL .....	UL508, UL1053 (File #E68520)
CE .....	IEC 60947-1, IEC 60947-5-1
CSA .....	C22.2
Maximum Conductor Size (with insulation) through 777 .....	0.65"
Dimensions .....	3.05 H x 3.85 W x 5.05 D in. (77.47 x 97.79 x 128.27 mm)
Weight .....	1.56 lbs. (24.96 oz., 707.6 g)
Mounting Method .....	Surface mount (4 - #8 screws) or DIN rail mount

# Power Monitors

*3-phase current & voltage monitor, on-board display, calculates motor output power with optional 4-20mA communications*

## Model 777-AccuPower



### The Model 777-AccuPower

is a fully-programmable 3-phase motor and pump protection relay. It allows motor hp rating, full load amps, efficiency and power factor to be entered and will accurately calculate motor output power. This is most useful with mag-drive pumps or process applications where the process power is desired over the utility power. Voltage, current and power measurements can be displayed as well as fault information and setpoints. The built-in display simplifies troubleshooting and allows the user to easily and precisely configure setpoints. The 777-AccuPower can be used with SymCom's 4-20mA output module to give an analog signal proportional to output shaft power.

For more information see:

See Appendix A, page 66, Figure 1 for dimensional drawing.

See Appendix B, page 71, Figures 1 & 2 for typical wiring diagrams.

### Features:

- Motor output power measurement
- 3 separate restart timers for rapid-cycle protection, motor cool down and dry-well recovery
- Built-in 3-digit display for setup and diagnostics
- Last fault indication on display
- Last 4 faults available on network or remote displays
- Optional remote displays (RM-1000 or RM-2000) via Modbus communications
- Limited Modbus capabilities
- Adjustable underload trip delay (network only)
- Power factor measurement (network readable)
- Run-hour meter (network readable)
- 4-20mA scalable output signal

Approvals:   

### Auxiliary Products:

- Com 4-20mA (for 4-20mA output)
- RS485MS-2W (for limited Modbus capabilities)
- RM-1000/RM-2000 (remote displays)

### Available Models:

777-AccuPower

## Specifications

<b>Input Characteristics</b>	
Line Voltage .....	200-480VAC
Frequency .....	50/60Hz
Motor Full Load Amp Range.....	2-800A (external CTs required over 90A)
<b>Functional Characteristics</b>	
TC- Overcurrent Trip Class .....	.5, 10, 15, 20, 30 (J prefix enables jam protection feature)
<b>Output Characteristics</b>	
Output Contact Rating (SPDT - Form C)	
Pilot duty.....	480VA @ 240VAC
General purpose.....	10A @ 240VAC
<b>General Characteristics</b>	
Ambient Temperature Range	
Operating .....	-40° to 70°C (-40° to 158°F)
Storage .....	-40° to 80°C (-40° to 176°F)
Accuracy	
Measured Horsepower/Kilowatt	
Typical .....	±3%**
Voltage .....	±1%
Current .....	±3% (<100 amps direct)
GF Current.....	±15%
Timing .....	.5% ±1 second
Repeatability	
Voltage .....	±0.5% of nominal voltage
Current .....	±1% (<100 amps direct)
Maximum Input Power.....	10 W
Pollution Degree: .....	3
Class of Protection: .....	IP20, NEMA 1 (finger safe)
Relative Humidity: .....	10-95%, non-condensing per IEC 68-2-3
Terminal Torque.....	.7 in.-lbs.

<b>Standards Passed</b>	
Electrostatic Discharge (ESD).....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity (RFI), Conducted .....	IEC 61000-4-6, Level 3 10V/m
Radio Frequency Immunity (RFI), Radiated .....	IEC 61000-4-3, Level 3 10V/m
Fast Transient Burst .....	IEC 61000-4-4, Level 3, 3.5 kV input power
Short Circuit Rating.....	100kA
Surge	
IEC .....	61000-4-5 Level 3, 2kV line-to-line; Level 4, 4kV line-to-ground
ANSI/IEEE .....	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line
Hi-Potential Test .....	Meets UL508 (2 x rated V + 1000V for 1 min.)
Vibration .....	IEC 68-2-6, 10-55Hz, 1mm peak-to-peak, 2 hrs, 3 axis
Shock .....	IEC 68-2-27, 30g, 3 axis, 11ms duration, half-sine pulse
Safety Marks	
UL .....	UL508, UL1053
CE .....	IEC 60947-1, IEC 60947-5-1
CSA .....	C22.2
Max. conductor size thru 777.....	.065" with insulation
Dimensions .....	3.05 H x 3.85 W x 5.05 D in. (77.47 x 97.79 x 128.27 mm)
Weight .....	1.3 lbs. (20.8 oz., 589.67 g)
Mounting Method .....	Surface mount (4 - #8 screws) or DIN rail mount

\*\*On a well balanced system within recommended current range.



# Communication Modules

## Models RS485MS-2W / CIO-MB *communication link to PLC/SCADA/monitoring systems*



### The RS485MS-2W

is required to enable the Modbus communications function on Model 77x-type products. This module is required when the RM-1000, RM-2000 or other Modbus capable device is used with 77x-type products.

For more information see:  
See Appendix A, page 66, Figure 2 for dimensional drawing.

### Features:

- Optical isolation from line potentials
- Powered by the 77x product
- RS-485 compliant bus drive capability
- Remote reset input connection
- Power connection for the Model RM-1000

Approvals:

### Available Models:

RS485MS-2W

## Specifications

### Functional Specifications

Remote Reset (for use with optional 777 Series) . . . Normally open pushbutton rated 24VDC, 10mA (min.)

### General Characteristics

Ambient Operating Temperature . . . -20° to 50°C (-4° to 122°F)

Terminal (depluggable terminal block)

Torque . . . 3 in.-lbs. (max.)

Wire AWG . . . 12-20 AWG

Class of Protection . . . IP20

Relative Humidity . . . 10-95%, non-condensing per IEC 68-2-3

Standards Passed

Electrostatic Discharge (ESD) . . . IEC 61000-4-2, Level 3, 6kV contact, 8kV air

Radio Frequency Immunity, Radiated . . . 150 MHz, 10V/m

Fast Transient Burst . . . IEC 61000-4-4, Level 3, 4kV input power

Hi-Potential Test . . . Meets UL508 (2 x rated V + 1000V for 1 min)

Surge

Input Power . . . IEC 61000-4-5, Level 1

Inputs/Data Lines . . . IEC 61000-4-5, Level 2

Safety Marks

UL . . . UL508 (File #E68520)

CE . . . IEC 60947

Enclosure . . . Polycarbonate

Dimensions . . . 2.08"H x 2.776"W x 0.77"D

Weight . . . 0.26 lb. (4.16oz., 117.93 g)

Mounting Method . . . 9-pin D-Sub connector on the side of a 777-Series



### The CIO-MB / CIO-120-MB Modules

are convenient and cost-effective Modbus-RTU interfaces capable of providing discrete control and monitoring of an overload relay over a Modbus network.

For more information see:  
See Appendix A, page 66, Figure 3 for dimensional drawing.

### Features:

- Can be used in both new and existing installations
- Can be used as stand-alone or with a 777 Plus series unit
- Can be re-configured to work with standard 777 units
- Reduced field wiring. Unpluggable terminal block connection for network.
- Ease in system startup and commissioning
- Compact size
- DIN rail or surface mountable
- Additional remote reset input to reset 777 Plus series
- Flexible addressing standard

Approvals:

### Available Models:

CIO-MB

CIO-120-MB

## Specifications

### Functional Specifications

Remote Reset (for use with optional 777 Series) . . . Normally open pushbutton rated 24VDC, 10mA (min.)

### Power Requirements

Voltage . . . 24VDC ±10%

Current . . . 95mA (max.) 70mA (typical)

Power . . . 2.28 W (max.) 1.7 W (typical)

Ethernet Controller . . . IEEE 802.3

Capability . . . 10Base-T

### Input Characteristics

#### General Purpose (4)

Voltage Range

CIO-MB . . . 12-24VDC

CIO-120-MB . . . 90-130VAC

Current . . . 2mA (typical)

### Output Characteristics

SPDT (1), SPST (1)

Pilot Duty . . . 480VA & 240VAC, B300

General Purpose . . . 5A @ 240VAC

### General Characteristics

Ambient Operating Temperature . . . -20° to 70°C (-4° to 158°F)

Terminal (depluggable terminal block)

Torque . . . 3 in.-lbs. (max.)

Wire AWG . . . 12-20 AWG

Class of Protection . . . IP20, NEMA 1 (finger safe)

Relative Humidity . . . 10-95%, non-condensing per IEC 68-2-3

Standards Passed

Electrostatic Discharge (ESD) . . . IEC 61000-4-2, Level 3, 6kV contact, 8kV air

Radio Frequency Immunity, Radiated . . . 150 MHz, 10V/m

Fast Transient Burst . . . IEC 61000-4-4, Level 3, 4kV input power

Hi-Potential Test . . . Meets UL508 (2 x rated V + 1000V for 1 min)

Surge

Input Power . . . IEC 61000-4-5, Level 1

Inputs/Data Lines . . . IEC 61000-4-5, Level 2

Safety Marks

UL . . . UL508 (File #E68520)

CSA . . . C22.2 (File #46510)

CE . . . IEC 60947-6-2

Enclosure . . . Polycarbonate

Dimensions . . . 2.08"H x 2.776"W x 0.77"D

Weight . . . 0.25 lb. (4 oz., 113.4 g)

Mounting Methods . . . DIN Rail or surface mount (w/ two #8 screws)



### Communication Adapters

- RS485-RS232 converter with cable & plug
- RS485-USB converter with cable & plug/RS232:USB converter

Specifications match industry standard.

# Communication Modules

## Models CIO-DN-P / CIO-777-PR *communication link to PLC/SCADA/monitoring systems*



### The CIO-DN-P / CIO-120-DN-P

are convenient and cost-effective Devicenet™ interfaces capable of providing discrete control and monitoring of motor starters, drives and other devices over a Devicenet™ network.

For more information see:  
See Appendix A, page 66, Figure 3 for dimensional drawing.

### Features:

- Can be used in both new and existing installations
- Can be used as stand-alone or with a 777 Plus series unit
- Reduced field wiring. Unpluggable terminal block connection for network.
- Ease in system startup and commissioning
- Compact size
- DIN rail or surface mountable
- Additional remote reset input to reset 777 Plus series
- Flexible addressing standard

Approvals:

### Available Models:

CIO-DN-P  
CIO-120-DN-P

### Specifications

<b>Input Characteristics</b>	
<b>Power Requirements</b>	
Voltage (nominal).....	24VDC
Current.....	137mA (max.)
Power.....	3.28 W (max.)
<b>Digital Inputs</b>	
Voltage Range.....	12-24 VAC
CIO-DN-P.....	90-130VAC
CIO-120-DN-P.....	50/60Hz
Frequency.....	2mA (typical)
Maximum Current.....	24VDC, 10mA (min.), NO pushbutton
Remote Reset.....	
<b>Output Characteristics</b>	
<b>Form A &amp; Form C Contactors</b>	
Pilot Duty.....	480VA @ 240VAC, B300
General Purpose.....	5A @ 240VAC
<b>General Characteristics</b>	
Temperature Range.....	-20° to 70°C (-4° to 158°F)

Relative Humidity.....	10-95%, non-condensing
Wire Gauge.....	Solid or stranded, 12-20 AWG
Terminal Torque.....	3 in.-lbs.
Hi-Potential Test (relays to other circuits).....	(2 x rated V + 1000V for 1 minute)
<b>EMC Standards</b>	
Electrostatic Discharge (ESD).....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity, Radiated.....	150 MHz, 10V/m
Fast Transient Burst.....	IEC 61000-4-4, Level 3, 4kV input power
<b>Safety Marks</b>	
UL, ULC Listed.....	UL508 (File #E68520)
CSA.....	C22.2 (File #46510)
Enclosure.....	Polycarbonate
Dimensions.....	3.4" H x 1" W x 5" D (w/ depluggable connectors)
Weight.....	0.25 lb. (4 oz., 113.4 g) (w/ depluggable connectors)
Mounting Methods.....	DIN Rail or surface mount (w/ two #8 screws)



### The CIO-777-PR Module

is a convenient and cost-effective Profibus interface capable of providing discrete control and monitoring of motor starters, drives and other devices over a Profibus network.

For more information see:  
See Appendix A, page 66, Figure 3 for dimensional drawing.

### Features:

- Can be used in both new and existing installations
- Can be used as stand-alone or with a 777 Plus series unit
- Reduced field wiring. Simple 9-Pin sub-D connection for network
- Ease in system startup and commissioning
- Compact size
- DIN rail or surface mountable
- Additional remote reset input to reset 777 Plus series
- Flexible addressing standard

Approvals:

### Available Models:

CIO-777-PR

### Specifications

<b>Input Characteristics</b>	
<b>Power Requirements</b>	
Voltage (nominal).....	12-24VDC
Current.....	150mA (max.)
Power.....	3.6 W (max.)
<b>Digital Inputs</b>	
Voltage Range.....	12-24VAC
Maximum Current.....	2mA (typical)
Remote Reset.....	24VDC, 10mA, (min.), NO pushbutton
<b>Output Characteristics</b>	
<b>Form A &amp; Form C Contactors</b>	
Pilot Duty.....	480VA @ 240VAC, B300
General Purpose.....	5A @ 240VAC
<b>General Characteristics</b>	
Ambient Temperature Range.....	-20° to 70°C (-4° to 158°F)
Operating.....	-40° to 80°C (-40° to 176°F)
Storage.....	

Relative Humidity.....	10-95%, non-condensing per IEC 68-2-3
Wire Gauge.....	Solid or stranded, 12-20 AWG
Terminal Torque.....	3 in.-lbs.
Hi-Potential Test (relays to other circuits).....	Meets UL508 (2 x rated V + 1000V for 1 min.)
<b>EMC Standards</b>	
Electrostatic Discharge (ESD).....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity, Radiated.....	150 MHz, 10V/m
Fast Transient Burst.....	IEC 61000-4-4, Level 3, 4kV input power
<b>Safety Marks</b>	
UL, ULC Listed.....	UL508 (File #E68520)
CSA.....	C22.2 (File #46510)
Enclosure.....	Polycarbonate
Dimensions.....	3.4" H x 1" W x 5" D (w/ depluggable connectors)
Weight.....	0.25 lb. (4 oz., 113.4 g) (w/ depluggable connectors)
Mounting Methods.....	DIN Rail or surface mount (w/ two #8 screws)

# Communication Modules

## Models CIO-EN / COM 4-20mA *communication link to PLC/SCADA/monitoring systems*






### The CIO-EN Module (non-POE)

is a convenient and cost-effective Modbus-TCP and Modbus-RTU interface capable of providing discrete control and monitoring of an overload relay over a Modbus network.

For more information see:  
See Appendix A, page 66, Figure 3 for dimensional drawing.

### Features:

- Can be used in both new and existing installations
- Can be used as stand-alone or with a 777 Plus series unit
- Can be re-configured to work with standard 777 units
- Reduced field wiring. Simple Ethernet™ jack connection for network
- 10 Base-T Ethernet™ compatible
- Additional Modbus port and Modbus message assembly feature for block reads
- Ease in system startup and commissioning
- Additional remote reset input to reset 777 Plus series

Approvals:   

### Available Models:

CIO-EN

## Specifications

<b>Input Characteristics</b>	
<b>Power Requirements</b>	
Voltage.....	24VDC ±10%
Current.....	95mA (max.) 70mA (typical)
Power.....	2.28 W (max.) 1.7 W (typical)
<b>Digital Inputs</b>	
<b>General Purpose (4)</b>	
Voltage Range.....	12-24VDC
Current.....	2mA (typical)
<b>Functional Specifications</b>	
Remote Reset (for use with optional 777 Series).....	Normally open pushbutton rated 24VDC, 10mA (min.)
Ethernet Controller.....	IEEE 802.3
Capability.....	10Base-T
<b>Output Characteristics</b>	
<b>SPDT (1), SPST (1)</b>	
Pilot Duty.....	480VA & 240VAC, B300
General Purpose.....	5A @ 240VAC
<b>General Characteristics</b>	
Ambient Operating Temperature.....	-20° to 70°C (-4° to 158°F)

<b>Terminal (depluggable terminal block)</b>	
Torque.....	3 in.-lbs. (max.)
Wire AWG.....	12-20 AWG
Class of Protection.....	IP20, NEMA 1 (finger safe)
Relative Humidity.....	10-95%, non-condensing per IEC 68-2-3
<b>Standards Passed</b>	
Electrostatic Discharge (ESD).....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity, Radiated.....	150 MHz, 10V/m
Fast Transient Burst.....	IEC 61000-4-4, Level 3, 4kV input power
Hi-Potential Test.....	Meets UL508 (2 x rated V + 1000V for 1 min)
<b>Surge</b>	
Input Power.....	IEC 61000-4-5, Level 1
Inputs/Data Lines.....	IEC 61000-4-5, Level 2
<b>Safety Marks</b>	
UL.....	UL508 (File #E68520)
CSA.....	C22.2 (File #46510)
CE.....	IEC 60947-6-2
Enclosure.....	Polycarbonate
Dimensions.....	2.08"H x 2.776"W x 0.77"D
Weight.....	0.25 lb. (4 oz., 113.4 g)
Mounting Methods.....	DIN Rail or surface mount (w/ two #8 screws)



### The Com 4-20mA Output Module

is intended for use with ONLY the Model 777-AccuPower output power monitor. The module will send a 4-20mA signal proportional to the output power. It can also be used to send the input power by setting the efficiency setting on the 777-AccuPower monitor to one. This module allows communication to a PLC with an analog input and no Modbus input.

For more information see:  
See Appendix A, page 66, Figure 2 for dimensional drawing.

### Features:

- Powered by the 777-AccuPower
- Scalable 4-20mA output proportional to Hp or kW
- Signal can be used for displays, controllers, or PLCs

Approvals:  

### Available Models:

COM 4-20

## Specifications

<b>Output Characteristics</b>	
Current.....	4-20mA
<b>General Characteristics</b>	
Temperature Range.....	-20° to 50°C (-4° to 122°F)
<b>Terminal (depluggable terminal block)</b>	
Torque.....	3 in.-lbs. (max.)
Wire AWG.....	12-20 AWG
Class of Protection.....	IP20
Relative Humidity.....	10-95%, non-condensing per IEC 68-2-3
<b>Standards Passed</b>	
Electrostatic Discharge.....	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
Radio Frequency Immunity, Radiated.....	150 MHz, 10V/m
Fast Transient Burst.....	IEC 61000-4-4, Level 3, 4kV input power

Hi-Potential Test.....	Meets UL508 (2 x rated V + 1000V for 1 min)
<b>Surge</b>	
Input Power.....	IEC 61000-4-5, Level 1
Inputs/Data Lines.....	IEC 61000-4-5, Level 2
<b>Safety Marks</b>	
UL.....	UL508 (File #E68520)
CE.....	IEC 60947
Enclosure.....	Polycarbonate
Dimensions.....	2.08"H x 2.776"W x 0.77"D
Weight.....	0.25 lb. (4 oz., 113.4 g)
Mounting Method.....	#8 screws; mount to side of 777-AccuPower unit

# Remote Monitor

# Model RM-1000

*remote monitoring, fault history, can read up to sixteen 777 models*



## The RM-1000

is a motor-monitoring device to be used in conjunction with SymCom's Model 777 family of products (excluding the P1 Series), 77C family of products and the Model 601 voltage monitors, via Modbus protocol with a communications module. The RM-1000/777 motor management system combines unsurpassed electronic motor protection and critical, user-friendly, motor monitoring.

The RM-1000 can monitor up to 16 MotorSaver® and/or PumpSaver® units through an RS-485 network using Modbus RTU protocol. A second communication port allows monitoring and control of up to 99 MotorSaver® and/or PumpSaver® units from a computer, PLC, DCS or SCADA system and can be accessed from the host computer or PLC

with the RM-1000 acting as a repeater for any of its motor protectors. In addition to the monitoring functions, the RM-1000 can be used to reset a tripped MotorSaver® or PumpSaver®.

The RM-1000 is easily mounted remotely and improves safety for service and operations personnel by allowing them to control and monitor the device without opening the electrical cabinet. Using the RM-1000 is a simple, cost-effective method for aiding compliance with arc flash safety regulations. The enclosure and keypad assembly is water and ultraviolet light resistant. The enclosure is NEMA 3R or NEMA 4X (optional) rated. The RM-1000 and RM-1000 NEMA 4 also carry a UL Type 12 rating, whereas the RM-1000-3R does not carry the UL Type 12 rating due to added weep holes. The added weep holes in the RM-1000-3R make it suitable for applications subjected to condensing moisture/humidity.




For more information see:

See Appendix A, page 67, Figure 4 for dimensional drawing.

See Appendix B, page 72, Figure 5 for typical wiring diagrams.

## Features:

- Displays:
  - Individual line currents and average current
  - Current unbalance
  - Individual phase voltages and average voltage
  - Voltage unbalance
  - Present fault trip reason and restart timer status
  - Last four faults
  - MotorSaver® and/or PumpSaver® setpoints
  - Run-hours on each motor
  - Warning of pending (imminent) faults
- Controls:
  - Reset run-hour meter
  - Reset MotorSaver® or PumpSaver®
  - Clear last fault in MotorSaver® or PumpSaver®
  - Change setpoints from the RM-1000
- Convenience:
  - Power from RS485MS-2W communications module
  - Monitor up to 16 777s with one display
  - NEMA 3R outdoor rated
  - Secondary steel enclosure available (see pg 65 for details)

Approvals:   

## Auxiliary Products:

- 777-P2 / 777-KW/HP-P2 Series units
- Communication modules
- RM-1000-ENCL
- Solutions Software

## Available Models:

RM-1000  
RM-1000-3R  
RM-1000 NEMA 4

## Specifications

<b>Input Characteristics</b>		<b>Safety Marks</b>	
Control Power .....	12-24VDC (Supplied by RS485MS-2W)	UL .....	UL508 (File #E68520)
<b>Functional Characteristics</b>		CSA .....	22.2 No. 14 (File #46510)
Communication .....	Port #1 for 777(s) Port #2 for PC, PLC, etc.	CE .....	IEC 60947-6-2
Baud Rate .....	1200-28800	Enclosure	
Setup .....	None, Odd, or Even Parity	Material .....	Black polycarbonate
.....	1 or 2 Stop Bits	Display .....	Liquid Crystal with extended temp. range
Protocol .....	Modbus RTU	Size .....	2 rows x 16 characters
Serial Interface .....	RS-485	Keypad .....	Six 0.5" stainless steel dome buttons for tactile feedback
Available Addresses .....	1-99 (max 16 per RM-1000)	Dimensions .....	3.619"H x 4.544"W x 0.9"D (91.92 x 115.42 x 22.86mm)
Mechanical Life .....	100,000 actuations	Weight .....	1.5 lbs. (24 oz., 680.39 g)
Overlay Material .....	Polyester	Mounting Method .....	Surface mountable on backplane using 4 screws
UV Exposure			
w/o degradation .....	2000 hrs		
Terminal Torque (depluggable terminal block) .....	3 in.-lbs.		
Panel Thickness .....	0.030" min, 0.120" max		
<b>General Characteristics</b>			
Ambient Temperature Range			
Operating .....	-40° to 70°C (-40° to 158°F)		
Storage .....	-40° to 80°C (-40° to 176°F)		
Maximum Input Power .....	100mA		
Class of Protection			
RM-1000, RM-1000 NEMA 4 .....	NEMA 3R and/or UL Type12, NEMA 4X (optional)		
RM-1000-3R .....	NEMA 3R only		
Relative Humidity .....	Up to 85%, non-condensing		





## The RM-2000

is a motor-monitoring device to be used in conjunction with SymCom's Model 777 family of products (excluding the P1 Series), 77C family of products and the Model 601 voltage monitors, via Modbus protocol with a communications module. The RM-2000/777 motor management system combines unsurpassed electronic motor protection and critical, user-friendly, motor monitoring.

The RM-2000 has membrane keypad controls which allow both monitoring and control of a 777 MotorSaver<sup>®</sup> through an RS-485 network using Modbus RTU protocol. A second communication port allows monitoring and control of up to 99 RM-2000 devices from a PLC, DCS, or SCADA system or a PC with Solutions software installed.

The RM-2000 will act as a repeater for its motor protector when accessed from the host computer or PLC. In addition to the monitoring functions, the RM-2000 can be used to reset a tripped MotorSaver<sup>®</sup> or PumpSaver<sup>®</sup>.

The RM-2000 is easily mounted remotely and improves safety for service and operations personnel by allowing them to control and monitor the device without opening the electrical cabinet. Using the RM-2000 is a simple, cost-effective method for aiding compliance with arc flash safety regulations. The enclosure and keypad assembly is water and ultraviolet light resistant.

For more information see:

See Appendix A, page 67, Figure 5 for dimensional drawing.

See Appendix B, page 72, Figure 6 for typical wiring diagrams.

## Features:

- Displays:
  - Average current, individual line currents and current unbalance
  - Current to ground
  - Average voltage, line-line voltages and voltage unbalance
  - Instantaneous power
  - Power factor
  - Last four faults
  - All parameters programmed into 777 MotorSaver<sup>®</sup>
  - Remaining restart delay times
- Controls:
  - Start and stop buttons
  - Key lock input to prevent setpoint changes
  - Change 777 setpoints from keypad
- The RM-2000 is also equipped with a real-time clock, which allows access to the following motor management information (most readings can be reset):
  - Total motor run-time
  - Time and date of last four faults, along with voltage and current at time of trip
  - Time and date of last 10 motor starts
  - Total number of motor restarts
  - Minimum time between any two starts with time and date
  - Run-time since last start
  - kWh consumed
  - kVARs consumed

Approvals:

## Auxiliary Products:

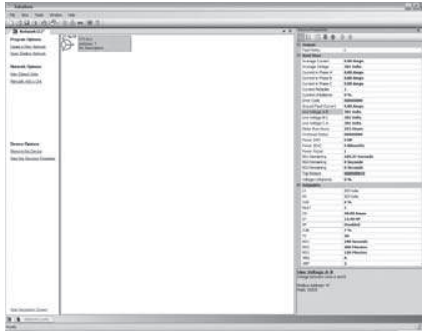
- 777-P2 / 777-KW / HP-P2 Series units
- Communication modules
- Solutions Software

## Available Models:

RM-2000  
RM-2000-CBM+  
RM-2000-RTDW

## Specifications

<b>Input Characteristics</b>			
Control Voltage	115VAC ±10%; 50/60Hz		
Transient Protection (Internal)	2500V for 10ms		
<b>Functional Characteristics</b>			
Communication	Port #1 for 777	Port #2 for PC, PLC, etc.	
Baud Rate	1200-28800	1200-28800	
Setup	Even Parity	None, Odd, or Even	
	1 Stop Bit	Parity 1 or 2 Stop Bits	
Protocol	Modbus RTU	Modbus RTU	
Serial Interface	RS-485	RS-485	
Available Addresses	01	A01-A99	
Real-time Clock			
Battery Back-up Life	10 years @ 25°C without external power		
Last fault memory	Stores up to 4 faults with time and date stamp, includes voltages and currents at time of trip		
Configuration	Two independent electro-mechanical Form C (SPDT)		
Contact Material	Silver/Tin Oxide		
<b>Output Characteristics</b> (RM-2000-RTDW version only)			
Pilot Duty Rating	240VA @ 120VAC		
General Purpose Rating	5A @ 120VAC		
<b>General Characteristics</b>			
<b>Ambient Temperature Range</b>			
Operating	-20° to 70°C (-4° to 158°F)		
Storage	-30° to 70°C (-22° to 158°F)		
		Maximum Input Power	3 W
		Class of Protection	NEMA 3R and/or UL Type 12
		Relative Humidity	Up to 85%, non-condensing
		Safety Marks	
		UL	UL508 (File #E68520)
		CSA	C22.2 No. 14 (File #46510)
		CE	IEC 60947-6-2
		Enclosure	
		Material	Black polycarbonate
		Display	Liquid crystal with extended temp. range
		Size	2 rows x 20 characters
		Lighting	LED Backlight
		Keypad	Eight 0.5" stainless steel dome buttons for tactile feedback
		Mechanical Life	100,000 actuations
		Overlay Material	Polyester
		UV Exposure w/o degradation	2000 hrs.
		Terminal Torque (depluggable terminal block)	3 in.-lbs.
		Dimensions	6.4" H x 6.1" W x 1.1" D (162.56 x 154.94 x 27.94mm)
		Weight	1.2 lbs. (19.2 oz., 544.31 g)
		Mounting Method	Surface mountable on backplane using 4 screws



## Solutions

is a software application that provides the ability to configure and monitor Modbus (Solutions-M) or DeviceNet™ (Solutions-D) networks. SymCom's Solutions Software features include data logging, real-time data monitoring and fault and event monitoring. Devices can be added and configured manually or the software can scan an existing network to identify devices which can be used as is or reconfigured by the user. Setpoints for each device can be uploaded and downloaded for easy monitoring and reconfiguration. Solutions-M supports both RS-485 and TCP/IP networks. Solutions-D provides support for all DeviceNet™ capable SymCom devices and most other DeviceNet™ devices, including DeviceNet™ scanners.

## Requirements:

- Microsoft Windows XP or higher
- Microsoft .net Framework 2.0 (provided with Solutions)
- 300 MB of hard drive space
- RS-485 to RS-232 converter (with 1 available serial port) for Solutions-M **OR**
- RS-485 to USB converter (with 1 available USB port) for Solutions-M
- USB to CAN converter (with 1 available USB port) for Solutions-D

## Auxiliary Products:

- 777-P2 / 777-KW/HP-P2 Series units
- Communication modules
- Remote Monitors

## Available Models:

Solutions-D  
Solutions-M