

# Protection Relays

## Motor and Pump Protection - 3-Phase Motor Protection



Expertise Applied | Answers Delivered

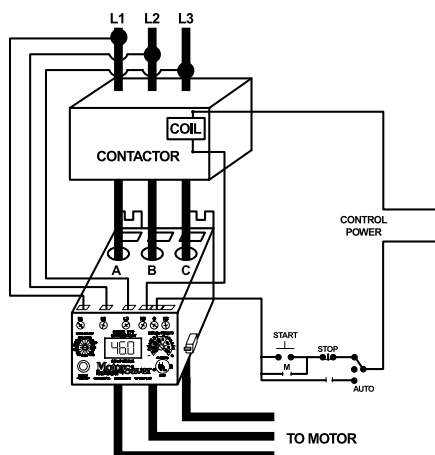
### 777 SERIES

#### 3-Phase Current & Voltage Monitor

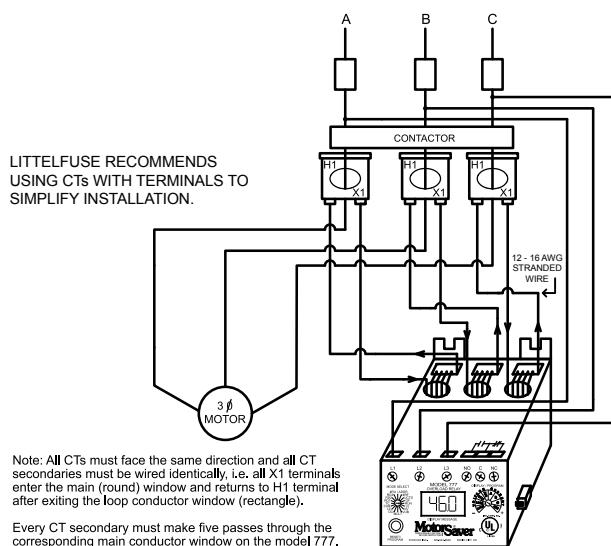


#### Wiring Diagram

TYPICAL WIRING DIAGRAM FOR MODEL 777 (2 to 90 amps)



CURRENT TRANSFORMER WIRING DIAGRAM FOR MODEL 777 (80 to 800 amps)



Note: All CTs must face the same direction and all CT secondaries must be wired identically, i.e. all X1 terminals enter the main (round) window and returns to H1 terminal after exiting the loop conductor window (rectangle).

Every CT secondary must make five passes through the corresponding main conductor window on the model 777.

Every CT secondary must make a single pass through the corresponding main conductor window on the LR versions of the 777 Plus Series.

#### Description

The 777 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 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, voltage, phase loss and reversal, voltage and current unbalance, power monitoring, and underload based on current in one package. For standalone applications, the units incorporate a 3-digit LED display that is used for programming, providing real-time operational information and displaying diagnostic codes to aid in troubleshooting a fault condition. The units also feature a communications port that can be used with communication modules listed in the 777 accessories section to form a Modbus, DeviceNet™, Profibus, or Ethernet network. Up to 99 units can be remotely monitored and controlled from a PC, PLC, or SCADA system, and data logging through a PC with the optional Solutions software. This capability allows for a simple, cost-effective way to meet new requirements for arc-flash safety.

#### Features & Benefits

FEATURES	BENEFITS
<b>Built-in display</b>	Visual indication for programming, viewing real-time voltage or current, and last fault code
<b>Programmable voltage and current settings</b>	Allows usage on wide range of systems
<b>3 selectable restart options</b>	Choose from automatic, semi-automatic, or manual to best meet individual application needs
<b>3 programmable restart delay timers</b>	Program separate restart delay time for rapid cycle protection, motor cool down, and dry-well recovery
<b>Remote display compatibility</b>	Increases safety through remote display of real-time data and fault history, without the need to open the cabinet. Aids with arc flash safety regulations
<b>Flexible reset</b>	Reset can be done through pushbutton on relay or remotely with optional 777-MRSW or OL-RESET remote reset kit
<b>Network communications capability</b>	Compatible with Modbus, DeviceNet™, Profibus, or Ethernet using optional communications module

#### Ordering Information

See next page.

**Protection Relays****Motor and Pump Protection - 3-Phase Motor Protection**

Expertise Applied | Answers Delivered

**777 SERIES****Ordering Information**

MODEL	LINE VOLTAGE	MOTOR FULL AMP RANGE	DESCRIPTION
777-P2	200-480VAC	2-800A (external CTs required above 90A)	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts
777-LR-P2	200-480VAC	1-800A (external CTs required above 9A)	Protects low range motors when wired directly or with 10-800 FLA with use of external CTs
777-HVR-P2	340-480VAC	2-800A (external CTs required above 90A)	Provides low and high power trip*, linear overcurrent trip, and 470VA @ 600VAC output SPDT relay contacts. Required when a control power transformer (CPT) is not used with a 480V system
777-HVR-LR-P2	340-480VAC	1-800A (external CTs required above 9A)	Provides low and high power trip*, linear overcurrent trip, and 470VA @ 600VAC output SPDT relay contacts. Required when a control power transformer (CPT) is not used with a 480V system
777-575-P2	500-600VAC	2-800A (external CTs required above 90A)	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Used in Canada and NE USA where 575V utility power services are common
777-575-LR-P2	500-600VAC	1-800A (external CTs required above 9A)	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Used in Canada and NE USA where 575V utility power services are common
777-MV-P2	100-240VAC	10-800A with external CTs	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Designed for Medium Voltage applications where both PTs and CTs are used. Has built in multipliers for 25.5, 50.5, 100.5 CTs. The voltage unbalance, single-phase and reverse phase protection can be disabled for applications where only the PTs are used
777-HRG-P2	200-480VAC	2-90A only	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Designed for high resistance grounding systems that incorporate an external zero-sequence CT that correspond with the built in multipliers to detect ground faults
777-LR-HRG-P2	200-480VAC	10-800A (external CTs required, external)	Overload relays designed for high resistance grounding systems that incorporate an external zero-sequence CTs that correspond with the built in multipliers to detect ground faults
777-575-HRG-P2	500-600VAC	2-90A only	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Used in Canada and NE USA where 575V utility power services are common. Designed for high resistance grounding systems that incorporate an external zero-sequence CT that correspond with the built in multipliers to detect ground faults
777-575-LR-HRG-P2	500-600VAC	10-800A with external CTs	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Used in Canada and NE USA where 575V utility power services are common. Designed for high resistance grounding systems that incorporate an external zero-sequence CT that correspond with the built in multipliers to detect ground faults
777-FT	200-480VAC	2-800A (external CTs required above 90A)	Provides linear overcurrent trip and 480VA @ 240VAC output SPDT relay contacts. Also known as shock relay, it is designed for fast linear trip applications. Overcurrent trip delay can be set ranging from less than 500ms - 70 seconds. Low trip delay is ideal in chain drive and drive linkage applications to prevent breaking in overload or jam situations. Other applications include sewage clarifiers, mixers, augers, and conveyors. Longer trip delay is ideal for motor test panels in rewind shops. Also includes adjustable motor acceleration time and overcurrent trip delay time when the faster linear trip mode is used
777-TS	200-480VAC	2-800A (external CTs required above 90A)	Provides 480VA @ 240VAC output SPDT relay contacts. For use with Subtrol® equipped Franklin submersible motors to detect high motor temperatures
777-LR-TS	200-480VAC	1-9A only	Provides 480VA @ 240VAC output SPDT relay contacts. For use with Subtrol® equipped Franklin submersible motors to detect high motor temperatures
777-575-TS	500-600VAC	2-800A (external CTs required above 90A)	Provides 480VA @ 240VAC output SPDT relay contacts. For use with Subtrol® equipped Franklin submersible motors with nominal 500-600VAC range to detect high motor temperatures
777VA-02	200-480VAC	2-800A (external CTs required above 90A)	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. Has restart delay 1 setpoints of 2-500 minutes and undercurrent trip delay setpoints of 2-60 minutes.
777VA-03	200-480VAC	2-800A (external CTs required above 90A)	Provides low and high power trip*, linear overcurrent trip, and 480VA @ 240VAC output SPDT relay contacts. For use with static and rotary single to 3-phase converters. High and low voltage trip feature only applies to the utility supplied power. Works well with unloaded phase converters because the relay ignores severely unbalanced voltages

\* Network programmable only

## Protection Relays

Motor and Pump Protection - 3-Phase Motor Protection



Expertise Applied | Answers Delivered

# 777 SERIES

## Accessories



**RS485MS-2W Communication Module**  
(for limited Modbus capabilities) Required to enable the Modbus communications function on Model 77X-type products.



**CIO-MB/CIO-120-MB Communication Module**  
Modbus-RTU interfaces capable of providing discrete control and monitoring of an overload relay over a Modbus network.



**CIO-DN-P/CIO-120-DN-P Communication Module**  
DeviceNet™ interfaces capable of providing discrete control and monitoring of motor starters, drives and other devices over a DeviceNet™ network.



**CIO-777-PR Communication Module**  
Profibus interface capable of providing discrete control and monitoring of motor starters, drives and other devices over a Profibus network.



**CIO-EN (non-POE) Communication Module**  
Modbus-TCP and Modbus-RTU interface capable of providing discrete control and monitoring of an overload relay over a Modbus network.



**Communication Adapters**  

- RS485-RS232-Converter with cable & plug
- RS485-USB-Converter with cable & plug
- RS232-USB-Converter

 Specifications match industry standard.



**RM1000 Remote Monitor**  
The RM1000/777 motor management system combines unsurpassed electronic motor protection and critical, user-friendly, motor monitoring for up to 16 devices.



**RM2000 Remote Monitor**  
The RM2000/777 motor management system combines unsurpassed electronic motor protection and critical, user-friendly, motor monitoring with event storage and real-time clock for date and time stamp.



**Solutions Software: Solutions-M**  
Software features include data logging, real-time data monitoring and fault and event monitoring.



**777-MRSW Manual Remote Reset Kit**  
Allows the 777 line of MotorSaver® and PumpSaver® products to be manually reset without opening the panel door.



**OL-RESET Manual Remote Reset Kit**  
Allows the 777 line of MotorSaver® and PumpSaver® products to be manually reset without opening the panel door.

## Specifications

### Functional Characteristics

<b>Frequency</b>	50/60Hz
<b>TC- Overcurrent Trip Class (777 Plus Series units)</b>	02-60, J02-J60, L00-L60 or Off
<b>TC- Overcurrent Trip Class (77C, 777 non-Plus Series units)</b>	5, 10, 15, 20, 30 (J prefix enables jam protection feature)

### Output Characteristics

<b>Output Contact Rating (SPDT - Form C)</b>	480VA @ 240VAC, B300
<b>Pilot duty rating</b>	10A @ 240VAC
<b>Pilot duty rating for HVR models</b>	470VA @ 600VAC, B600

### General Characteristics

<b>Ambient Temperature Range</b>	-20° to 70°C (-4° to 158°F)
<b>Operating Temperature</b>	-40° to 80°C (-40° to 176°F)
<b>Accuracy</b>	
<b>Voltage</b>	±1%
<b>Current</b>	±3% (<100 amps direct)
<b>GF Current</b>	±15%
<b>Timing (777 Plus Series units)</b>	±0.5 second
<b>Timing (77C, 777 non-Plus Series units)</b>	5% +1 second
<b>Repeatability</b>	
<b>Voltage</b>	±0.5% of nominal voltage
<b>Current</b>	±1% (<100 amps direct)
<b>Maximum Input Power</b>	10 W
<b>Pollution Degree</b>	3
<b>Class of Protection</b>	IP20
<b>Relative Humidity</b>	10-95%, non-condensing per IEC 68-2-3
<b>Terminal Torque</b>	7 in.-lbs.
<b>Standards Passed</b>	
<b>Electrostatic Discharge (ESD)</b>	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
<b>Radio Frequency Immunity (RFI), Conducted</b>	IEC 61000-4-6, Level 3 10V/m
<b>Radio Frequency Immunity (RFI), Radiated</b>	IEC 61000-4-3, Level 3 10V/m
<b>Fast Transient Burst</b>	IEC 61000-4-4, Level 3, 3.5kV input power
<b>Short Circuit</b>	100kA
<b>Surge</b>	
<b>IEC</b>	61000-4-5, Level 3, 2kV line-to-line; Level 4, 4kV line-to-ground
<b>ANSI/IEEE</b>	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line
<b>Hi-potential Test</b>	Meets UL508 (2 x rated V +1000V for 1 minute)
<b>Vibration</b>	IEC 68-2-6, 10-55Hz, 1mm peak-to-peak, 2 hours, 3 axis
<b>Shock</b>	IEC 68-2-27, 30g, 3 axis, 11ms duration, half-sine pulse
<b>Safety Marks</b>	
<b>UL</b>	UL508, UL1053 (File #E68520)
<b>CE</b>	IEC 60947-1, IEC 60947-5-1
<b>CSA</b>	C22.2
<b>Maximum Conductor Size (with insulation) through 777/77C</b>	0.65"
<b>Dimensions</b>	<b>H</b> 77.47 mm (3.05"); <b>W</b> 97.79 mm (3.85"); <b>D</b> 128.27 mm (5.05")
<b>Weight</b>	1.56 lbs. (24.96 oz., 707.6 g)
<b>Mounting Method</b>	Surface mount (4 - #8 screws) or DIN rail mount