

# MODEL 777-P2-DEMO AND OPTIONAL ACCESSORIES

## ELECTRONIC OVERLOAD RELAY



II\_777-P2-DEMO\_A

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## ATTENTION!

The optional demonstration accessories are not designed for use with a standard 777-P2. Do not connect the CIO-EN-DEMO, RM-1000-DEMO, and RM-2000-DEMO to any unit other than a 777-P2-DEMO or a 777-KW/HP-P2-DEMO.

The 777-P2-DEMO is a demonstration-only model of the 777-P2 electronic overload relay. The 777-P2-DEMO is designed to show the functions of a standard 777-P2.

The 777-P2-DEMO must be programmed in advance by supplying power with the 12VDC power assembly that comes with the demo unit.

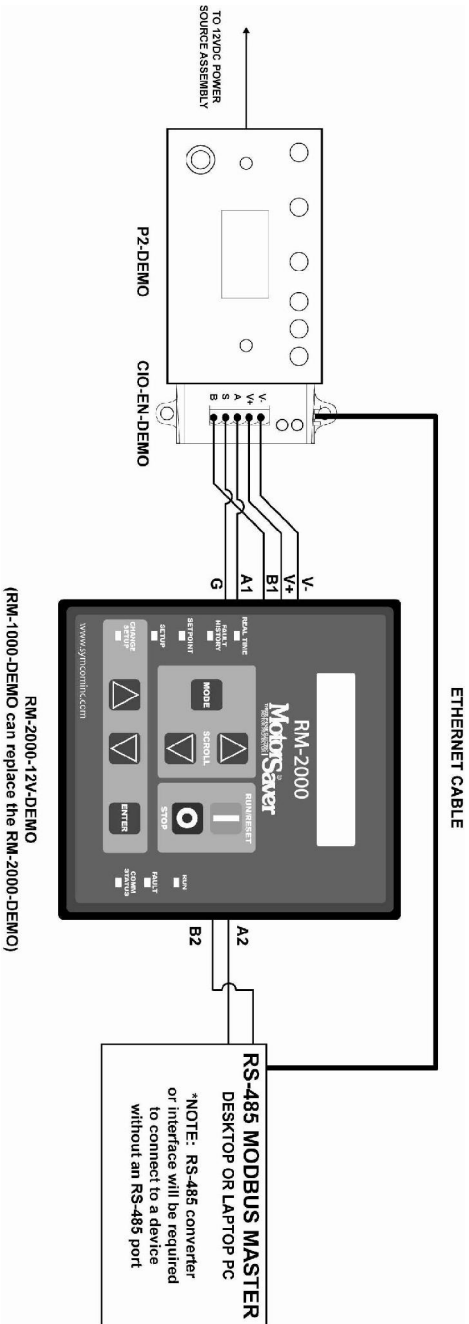
### CONNECTIONS

The power adapter is included. Connect the power adapter cable to the 12VDC input on the side of the 777-P2-DEMO as shown in Figure 1. The cable is keyed for proper installation. If the cable is connected improperly, the 777-P2-DEMO will not power the display. Connect the AC-to-DC converter to the adapter cable.

To connect a demonstration accessory, reference the instructions at the end of this document. Refer to Figure 2 for connections.



Figure 1: AC to DC Power Converter Setup for 777-P2-DEMO



**Figure 2: Network Diagram for Connecting Accessories to 777-P2-DEMO**

## **PROGRAMMING AND OPERATION**

The 777-P2-DEMO and optional accessories must be programmed prior to first use. Select the operating parameters by following the instructions below.

1. Rotate MODE SELECT to the parameter to be programmed. It is recommended that LV be programmed first.
2. Press and hold the RESET/PROGRAM button.
3. While holding the RESET/PROGRAM button, rotate the DISPLAY/PROGRAM knob until the proper setting for the parameter that is being programmed is displayed.
4. Release the RESET/PROGRAM button. This stores the new parameter in the nonvolatile memory. If the number changes back to what it was before programming, then the tamper guard is on and will need to be unlocked before programming can be completed (see Tamper Guard).
5. Move clockwise through the positions to complete the process. Continue steps 1-4 until all parameters have been programmed.
6. To reset all parameters (except for Address and Communication Parameters) and to clear the last fault history, see CLEARING LAST FAULT/RESETTING PARAMETERS section.

The operation of the Model 777-P2-DEMO is designed to mirror the fail-safe operation of a 777-P2. This means when the voltage is within the programmed limits, the 777-P2-DEMO will run with no faults displayed, showing real-time values while the MODE SELECT is in the RUN position. When the unit senses a fault condition, the 777-P2-DEMO will display the fault condition. Once the unit has been programmed, it is ready to operate. Turn MODE SELECT to the RUN position. The display will show "run" alternating with a number for the duration of the restart delay time programmed into RD1. Once the timer expires, the 777-P2-DEMO will display only the number the DISPLAY/PROGRAM knob is pointing to. If something other than this is displayed, see the Troubleshooting section for more information. If MODE SELECT is taken out of RUN, the 777-P2-DEMO will display the setpoint value indicated by the MODE SELECT knob.

<b>Parameter</b>	<b>Factory Default</b>	<b>Recommended Setting</b>	<b>Simulated Value</b>	<b>Test Point</b>
LV	200V	432V	480V	500V
HV	500V	528V	480V	450V
VUB	6%	5%	3%	2%
MULT	1	1	1	n/a
OC	60A	60A	42.6A	35A
UC	35A	35A	42.6A	50A
CUB	7%	7%	3%	2%
TC	10	5	n/a	n/a
RD1	10s	4s	n/a	n/a
RD2	8min	2 min	n/a	n/a
RD3	20min	2 min	n/a	n/a
#RU/ADDR	1/A01	A/A01	n/a	n/a
#RF/COMM	oc1/C03	ocA/C03	n/a	n/a
UCTD	5	4	n/a	n/a
GF	10A	5A	3.71A	3A

**Table 1: 777-P2-DEMO Simulated Values and Demonstration Settings**

## **PROGRAMMABLE PARAMETERS**

*The following settings are described as they would appear on a production unit. All parameters are actual values except for the VUB and CUB settings; these are programmed as percentages. The range each parameter can be programmed is found in the electrical specifications table. Recommended settings for the 777-P2-DEMO unit are listed below in **BOLD** text with the parameter descriptions. Failure to program all setpoints could prevent the demo from working properly.*

**LV/HV** - The recommended settings for LV (low voltage) and HV (high voltage) depend on many factors such as motor usage, motor size, environmental factors and tolerance of the motor. The motor manufacturer should be consulted for HV and LV settings. However, the NEMA MG1 standard recommends that LV and HV be set to no more than  $\pm 10\%$  of the motor's nameplate voltage. The setting can be determined by multiplying the motor's nameplate voltage by the recommended percent over and under voltage. (e.g., the motor nameplate voltage is 480V, set LV  $0.9 \times 480 = 432V$ , set HV to  $1.10 \times 480 = 528V$ ) LV cannot be set higher than HV, so HV may have to be adjusted higher before the proper LV setting can be programmed. **SET LV AT "432" AND HV AT "528."**

**VUB** - Voltage Unbalance. The NEMA MG1 standard says a motor should not be operated above a 1% voltage unbalance without derating the motor. Most utility supplied power sources have a difficult time sustaining a 1% VUB. The motor manufacturer should be consulted for an exact VUB setting. Setting VUB to 999 will disable voltage unbalance protection, but will not disable voltage single-phase protection. Voltage unbalance is calculated as follows:

$$\% \text{Voltage Unbalance} = [(\text{Maximum deviation from the average}) / \text{Average}] \times 100\%$$

**SET AT "5."**

**MULT** - MULT (multiplier) setting is determined by the number of passes of the motor leads or the size of external CTs and the full load amps of the motor the unit will be monitoring. MULT sets the trip point range for undercurrent, overcurrent and ground fault current faults. Set MULT first, then set UC, OC and GF. **SET AT "1."**

**OC** - Overcurrent. Is typically set to the service factor amperage (SFA) of the motor or 100-135% of motor full-load amps (FLA), which are determined by the motor manufacturer. The value must be higher than UC. If any one leg exceeds the OC setting, the 777-P2-DEMO will trip according to the Trip Class (TC) settings. **SET AT "60"**.

**UC** - Undercurrent. Is most commonly set to 80% of the full-load amperage (FLA) of the motor. This is usually adequate for protection of loss of load for many pumps and motors, including submersibles. If the motor is drawing less than full load amperage, then the UC may be set lower than 80% of FLA for adequate protection. Centrifugal/booster pumps may have to be set to something higher than 80% of FLA for adequate protection. UC can be set to 0 if UC protection is not desired. The 777-P2-DEMO examines average current to determine if an undercurrent trip condition exists. The value must be lower than OC. **SET AT "35"**.

**CUB** - Current Unbalance. SymCom recommends contacting the motor manufacturer for a specific setting. Current unbalance is calculated the same way voltage unbalance is calculated (see formula above). Setting CUB to 999 will disable current unbalance and current single-phase protection. **SET AT "7."**

**TC** - Trip Class. Determines how quickly the 777-P2-DEMO will trip when an overcurrent (overload) condition is detected. TC is a dual-function setting—both a thermal trip class (NEMA standard) and a linear trip delay (in seconds) can be set.

While the standard trip classes are 5, 10, 15, 20, and 30, TC can be set from 2–60, with or without jam protection. The trip class setpoint is the time in seconds that the device will take to trip when any phase current is greater than or equal to 600% of the OC setpoint. These additional “non-standard” trip classes allow the unit to follow a trip curve in-between the “standard” trip class curves shown in Figure 1.

Trip classes 2–60 can be set from approximately the 7 o'clock to 10 o'clock position with the DISPLAY/PROGRAM knob. Trip classes J02–J60, which include jam protection, can be set from approximately the 10 o'clock to 1 o'clock position. This additional jam protection feature, when enabled, is initiated 1 minute after the motor starts and provides a 2-second trip delay for motors exceeding 400% of the OC setting.

The linear overcurrent trip delay can be set from approximately the 1 o'clock to 5 o'clock position from 0–60 seconds (L00–L60) or to “oFF.” If TC is set to L00, the 777-P2-DEMO will trip off within 1 second after current reaches the OC setpoint. If both trip class and linear trip delay settings are programmed, the 777-P2-DEMO will follow the faster trip time. For example, TC is set to J15 and L20, and the amperage is 200% of the OC setting. Following the trip class 15 curve, the 777-P2-DEMO will trip off in approximately 100 seconds. The 777-P2-DEMO will follow the linear trip delay setting because it is faster, and the relay will trip off in 20 seconds.

The motor manufacturer should be contacted for an exact TC setting. Table 3 describes the trip classes, and Figure 3 shows the trip class curves. **SET AT "5."**

**RD1** - Restart Delay One. Rapid-cycle timer, in seconds (default). The purpose of this timer is to provide protection against short cycling and to allow adequate cool down time between motor starts. This timer is initiated when power is first applied to the unit. If no voltage fault conditions exists, the output relay will energize (the NO will close and the NC will open) as soon as RD1 timer expires. In most cases, this is set to 20-30 seconds. This should provide adequate protection for successive power outages or short cycling caused by other motor controls. This timer is also initiated when motor current goes to zero. Setting RD1 to zero will turn off this feature and ensure that when an alarm circuit is used, an alarm will sound only when there is a fault or power to the unit is lost. **SET AT "4."**

**RD2** - Restart Delay Two. Referred to as a motor cool-down timer, in minutes (default). RD2 is used to restart the motor after a trip due to a current unbalance, current single-phasing, or an overcurrent condition. A setting of 5-10 minutes will give most motors adequate time to cool down after an overcurrent condition. The motor manufacturer should be contacted for an exact value. **SET AT "2."**

**RD3** - Restart Delay Three. This timer, in minutes (default), only initiates after an undercurrent trip and is referred to as a dry-well recovery timer in pumping applications. This is set according to the time it takes for the well to recharge after pumping dry. This setting varies widely by application and there is no typical setting. RD3 can be set from 2-500 minutes or to "A" to enable the automatic Dry-Well Recovery Calculator.

The Automatic Dry-Well Recovery Calculator allows the 777-P2-DEMO to automatically select a restart delay based on the run time of the last run cycle before tripping on an undercurrent fault. Table 2 shows the next restart delay vs. run time. In general, a longer run time produces a shorter restart delay. This feature allows the 777-P2-DEMO to optimize running and rest times automatically. **SET AT "2."**

Run Time	Next Restart Delay (minutes)	Starts/Hr
> 1Hr	6	10
30 min.- 59.99 min.	15	4
15 min.- 29.99 min.	30	2
< 15 min.	60	1

**TABLE 2: Automatic Dry-Well Recovery Timer**

**#RU/ADDR** - Restart Attempts (undercurrent)/Address. The #RU/ADDR is a dual-function setting. #RU settings are displayed and selected by turning the DISPLAY/PROGRAM knob from approximately the 7 o'clock to 12 o'clock position. ADDR settings are displayed and selected by turning the DISPLAY/PROGRAM knob from approximately the 12 o'clock to 5 o'clock position.

#RU is the number of restarts the 777-P2-DEMO will attempt after an undercurrent fault before the unit locks out and requires a manual reset. #RU can be set to 0, 1, 2, 3, 4, or A. This counter is cleared one minute after restarting if the 777-P2-DEMO does not trip again on undercurrent.

If #RU is set to "0", the 777-P2-DEMO will require manual resetting after all undercurrent faults.

If #RU is set to "A", the 777-P2-DEMO will always automatically restart after undercurrent faults, once the RD3 timer expires.

ADDR is the RS-485 address of the 777-P2-DEMO and is only used when communicating with any external communication device. The address can be set from A01–A99. **SET #RF AT "A." SET ADDR AT "A01."**

**#RF/COM** - Restart Attempts (other faults)/ Communications Settings. The #RF settings are displayed and selected by turning the DISPLAY/PROGRAM knob from approximately the 7 o'clock to 12 o'clock position. COM settings are displayed and selected by turning the DISPLAY/PROGRAM knob from approximately the 12 o'clock to 5 o'clock position.

#RF is the number of restarts the 777-P2-DEMO will attempt after current unbalance or current single-phase faults before the unit locks out and requires a manual reset. This counter will be cleared one minute after start-up if the unit does not trip again for the same fault condition. Available settings are 0, 1, 2, 3, 4 and A, or to include overcurrent faults, #RF can be set to oc1, oc2, oc3, oc4 or ocA.

If #RF is set to "0", the 777-P2-DEMO will require manual resetting after all current unbalance, current single-phase and overcurrent faults.

If #RF is set to "A", the 777-P2-DEMO will always restart automatically after current unbalance and current single-phase faults, once the RD2 timer expires. Overcurrent faults will require a manual reset.

If #RF is set to "ocA", the 777-P2-DEMO will always restart automatically after current unbalance, current single-phase and overcurrent faults, once the RD2 timer expires.

COM determines the baud rate, even/odd parity, and stop bit. COM can be set to C00–C07. C00 and C04 are duplicates provided for backward compatibility.

- C00 = 9600 baud, No parity, and 1 stop bit
- C01 = 9600 baud, Odd parity, and 1 stop bit
- C02 = 9600 baud, No parity, and 1 stop bit
- C03 = 9600 baud, Even parity, and 1 stop bit
- C04 = 19200 baud, No parity, and 1 stop bit
- C05 = 19200 baud, Odd parity, and 1 stop bit
- C06 = 19200 baud, No parity, and 1 stop bit
- C07 = 19200 baud, Even parity, and 1 stop bit

**SET #RF AT "ocA." SET COM AT "C03."**

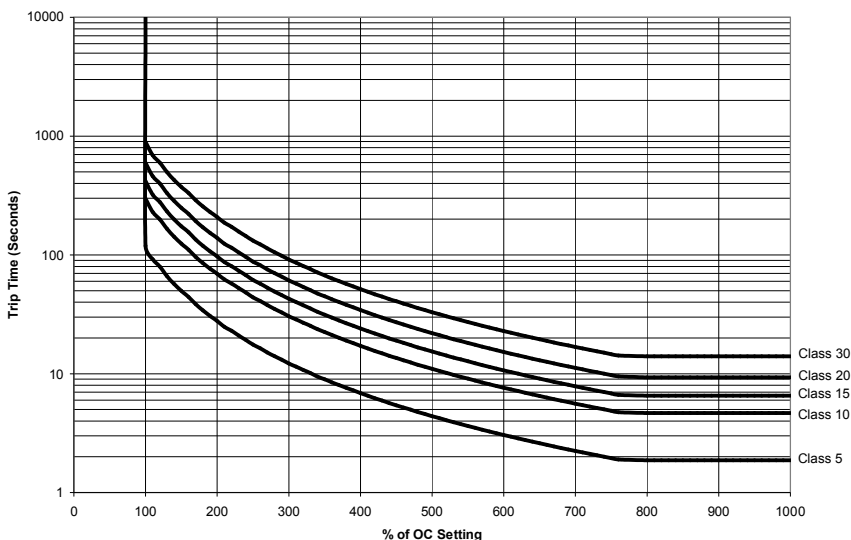
**UCTD** - Undercurrent Trip Delay. The length of time, in seconds (default), the unit will allow the motor to run in an undercurrent situation before de-energizing its relay. Typically, UCTD is set to 2-4 seconds to allow for motor to reach full load. **SET AT "4."**

**GF** - Ground Fault. The maximum allowable current that can flow to ground before the 777-P2-DEMO de-energizes its relay. This is a residual, class II ground fault system and should not be used for personnel safety. A typical setting for GF is 10-20% of motor FLA (in amps). GF may be set to OFF if this feature is not desired. **SET AT "5."**



Trip Class	Application Description
5	Small fractional horsepower motors where acceleration times are almost instantaneous or where extremely quick trip times are required
10	(Fast Trip) Hermetic refrigerant motors, compressors, submersible pumps and general-purpose motors that reach rated speed in less than 4 seconds
15	Specialized applications
20	(Standard Trip) Most NEMA-rated general-purpose motors will be protected by this setting
30	(Slow Trip) Motors with long acceleration times (>10 seconds) or high inertia loads
J Prefix (Jam Protection)	Programming any of the trip classes with the J prefix will enable jam protection. This additional protection is enabled 1 minute after the motor starts and provides a 2 second trip time for motors exceeding 400% of the OC setting
Non-Standard Trip Classes	Trip time in seconds when any phase current is 600% of OC. Time is approximately 90% of the TC setting

**Table 3: Trip Class Descriptions**



**Figure 3: Overload Trip Curves**

## **PROGRAMMING EXAMPLES**

For all examples, use the “Recommended Settings” from Table 1 unless otherwise noted. **NOTE:** Since no network communications are connected in these examples, there are no settings changes needed for ADDR or COM.

LV cannot be set higher than HV, and UC cannot be set higher than OC., If the 777-P2-DEMO will not allow setting a parameter, please verify that the values do not overlap.

### **Example #1**

To simulate an Overcurrent Failure on the 777-P2-DEMO, the OC setpoint limit must be changed to a value lower than the average current. Use the following setpoints to simulate an overcurrent fault on the 777-P2-DEMO.

**OC** - Set OC to 20.

**UC** - Set UC to 0.

**TC** - Set TC to 5.

The time the 777-P2-DEMO will take to trip on the overcurrent fault can be calculated by using the overload trip curve in Figure 3. The trip time is calculated by finding the percentage that the actual current is over the overcurrent setpoint. The highest current leg for the 777-P2-DEMO is 44A.

$$\% \text{ of OC Setting} = \text{Actual Current} / \text{OC setting}$$

### **Example #2**

To simulate an Undercurrent Failure on the 777-P2-DEMO, the UC setpoint limit must be changed to a value higher than the average current. The time the 777-P2-DEMO will take to trip on the undercurrent fault is equal to the UCTD (undercurrent trip delay) in seconds. Use the following setpoints to simulate an undercurrent fault on the 777-P2-DEMO.

**OC** - Set OC to 60.

**UC** - Set UC to 50.

**UCTD** - Set UCTD to 5.

### **Example #3**

To simulate a Ground Fault Failure on the 777-P2-DEMO, the GF setpoint limit must be changed to a value lower than the simulated ground fault current. Use the following setpoints to simulate a ground fault on the 777-P2-DEMO.

**GF** - Set GF to 3.

The time the 777-P2-DEMO will take to trip on the ground fault failure can be calculated by using the trip delay table below. The simulated ground fault current is 3.71A. According to the table, the trip time for this example would be around 8 seconds.

$$\% \text{ of GF setting} = \text{Actual GF} / \text{GF setpoint}$$

Ground Fault Reading (as Percentage of Setpoint)	Trip Time
101% - 200%	8 seconds ± 1 second
201% - 300%	4 seconds ± 1 second

**Table 4: Ground Fault Trip Time**

## **SYSTEM DISPLAY**

On power up, the 777-P2-DEMO will show the current software revision. For example if the software revision is 33.04, the 777-P2-DEMO will show 033 followed by 004.

The output display can show one of the following parameters when MODE SELECT is in RUN: L1-L2, L2-L3, and L3-L1 line voltage; %VUB; A, B, and C phase current; %CUB; measured GF current. Remember, with the 777-P2-DEMO all values are simulated and are constant. The display is used for programming the operating parameters of the device and also identifies what caused the unit to go into a fault condition, and under normal operating conditions, what the last fault was. The last fault can be displayed by pressing and holding the RESET/PROGRAM button while MODE SELECT is in RUN. When the unit trips on a fault condition, the current fault condition will be shown in the display without pressing the button (pressing the reset button at this time will reset the unit). Table 5 lists the fault codes the unit could display.

<b>Displayed Message</b>	<b>Meaning</b>
oc	Tripped on overcurrent
ub	Tripped on current unbalance or unit won't start because the voltage is unbalanced
uc	Tripped on undercurrent
GrF	Tripped on ground fault
HI	A high voltage condition exists (won't allow motor to start)
Lo	A low voltage condition exists (won't allow motor to start)
oFF	A stop command was issued from a remote source
HPr	Tripped on high power
LPr	Tripped on low power
CLo	Tripped on low control voltage
cLr	No previous faults
FFF	Displayed value is greater than 999 (can be due to incorrect MULT setting)

**Table 5: Fault Codes**

## **TROUBLESHOOTING**

The 777-P2-DEMO will display a fault code alternating with a number or with “run” when it has tripped. If the unit is showing a fault code alternating with “run,” it is timing down the restart delay. If the fault code is alternating with a number (a voltage reading or '0'), the unit will not allow the motor to start because there is a problem with the incoming voltage. If the display is showing just a fault code, the unit is in a manual reset mode. This could be because the number of restarts (#RF, #RU) has expired or is not allowed. If the display reads “oFF,” a stop command was issued through the communications network or a remote monitor.

<b>DISPLAY</b>	<b>DESCRIPTION</b>
The unit will not start. Display alternates “ub”, “HI”, or “Lo” with the DISPLAY/ PROGRAM parameter value.	The voltage is not within the limits programmed in the VUB, HV, and LV settings. Turn the DISPLAY / PROGRAM knob to read each line voltage value. Correct the problem by checking programmed limits by turning the MODE SELECT knob. Compare simulated real-time values for HV, LV, and VUB to setpoints to verify they are correct.
Display alternates “ub”, or “oc” with “run.”	The demo has tripped on the fault shown on the display and is timing down RD2 before restarting. Correct the problem by checking programmed limits by turning the MODE SELECT knob. Return the OC and/or CUB setpoints to original setting listed in the programming section.
Display alternates “uc” with “run.”	The overload relay has tripped on undercurrent and is counting down RD3 before restarting. Correct the problem by checking programmed limits by turning the MODE SELECT knob. Return the UC setpoint to “35” in order to stop the undercurrent fault from occurring.
Display is showing a solid “ub”, or “oc.”	The unit has tripped on the fault shown and a manual reset is required because of the programmed setting in #RF. Correct the problem by checking programmed limits by turning the MODE SELECT knob. Return the OC and/or CUB setpoints to original setting listed in the programming section.
Display is showing a solid “uc.”	The unit has tripped on undercurrent and a manual reset is required because of the setting in #RU. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the UC setpoint to “35” in order to stop the undercurrent fault from occurring.
Display is showing a solid “GrF.”	A ground fault current greater than the programmed GF value has been detected. A manual reset is required to clear this message. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the GF setpoint to “5” in order to stop the ground fault from occurring. Press the RESET/PROGRAM button to perform a manual reset.
Display alternates “LPr” <sup>1</sup> with “RUN”	The overload relay has tripped on low power (LPr) and is timing down RD3 before restarting. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the LPr setpoint to “30” in order to stop the low power fault from occurring.

PROBLEM	SOLUTION
Display is showing a solid "LPr" <sup>1</sup>	The unit has tripped on low power and a manual reset is required because of the setting in #RU. Check programmed limits by turning the MODE SELECT knob. Return the LPr setpoint to "30" in order to stop the low power fault from occurring. Press the RESET/PROGRAM button to perform a manual reset.
Display alternates "HPr" <sup>1</sup> with "RUN"	The unit has tripped on high power and is timing down RD2. Check for a high power condition. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the HPr setpoint to "655" in order to stop the low power fault from occurring.
Display is showing solid "HPr" <sup>1</sup>	The unit has tripped on high power and requires a manual reset because of the setting in #RF. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the HPr setpoint to "655" in order to stop the low power fault from occurring. Press the RESET/PROGRAM button to perform a manual reset.
Display alternates "CLO" <sup>1</sup> with "RUN"	The overload relay has tripped on low control voltage (CLO) and is timing down RD2 before restarting. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the LV setpoint to "432" in order to stop the low power fault from occurring.
Display is showing solid "CLO" <sup>1</sup>	The unit has tripped on low control voltage and a manual reset is required because of the setting in #RF. Correct the problem checking programmed limits by turning the MODE SELECT knob. Return the LV setpoint to "432" in order to stop the low power fault from occurring.

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<sup>1</sup> LPr, HPr, and CLO are enabled only from a network master via a communications module.

## **CLEARING LAST FAULT/RESETTING PARAMETERS**

The following steps will clear the last fault and reset all setpoints back to factory settings:

1. Rotate MODE SELECT to GF.
2. Press and hold the RESET/PROGRAM button. Adjust the DISPLAY/PROGRAM knob until "cLr" appears on the display. Release the RESET/PROGRAM button.

To verify the last fault was cleared and that the parameters were reset to factory settings, place MODE SELECT in the RUN position. Then press and hold the RESET/PROGRAM button; "cLr" should be on the display.

## **TAMPER GUARD**

The 777-P2-DEMO setpoints can be locked to protect against unauthorized program changes.

1. Rotate MODE SELECT to GF.
2. Press and hold the RESET/PROGRAM button. Adjust the DISPLAY/PROGRAM knob until "Loc" appears on the display.
3. Release the RESET/PROGRAM button.
4. Turn MODE SELECT to RUN.

The program is now locked, but all settings can be viewed. The unit can be unlocked by following the same steps except adjust the DISPLAY/PROGRAM knob to "unL" in step 2.

## 777-P2-DEMO SPECIFICATIONS

<b>Functional Specifications</b>	
<b>Programmable Operating Points</b>	
LV- Low Voltage Threshold	170–524V
HV- High Voltage Threshold	172–528V
VUB- Voltage Unbalance Threshold	2-25% or 999 (disable)
MULT- # of Conductors or CT Ratio (XXX:5)	1–10, 100, 150, 200, 300, 400, 500, 600, 700, 800
OC- Overcurrent Threshold	$(20-100A) \div \text{MULT}$ or 80–140% of CT Primary
UC- Undercurrent Threshold	$(0, 10-98A) \div \text{MULT}$ or 40–140% of CT Primary
CUB- Current Unbalance Threshold	2–50% or 999 (disable)
TC- Overcurrent Trip Class <sup>2</sup>	2-60, J2-J60, L00-L60, oFF
RD1- Rapid Cycle Timer	0-999 seconds
RD2- Restart Delay After All Faults Except Undercurrent (motor cool-down timer)	2–500 minutes
RD3- Restart Delay After Undercurrent (dry-well recovery timer)	2–500 minutes, A (Automatic)
#RU- Number of Restarts After Undercurrent	0, 1, 2, 3, 4, A (Automatic)
ADDR- RS485 Address	A01–A99
#RF-Number of Restarts After All Faults Except Undercurrent <sup>3</sup>	0, 1, oc1, 2, oc2, 3, oc3, 4, oc4, A, ocA (Automatic)
COM- Communication setting	C00-C07
UCTD- Undercurrent Trip Delay	2–999 seconds
GF- Ground Fault Current Threshold	$(3-20A) \div \text{MULT}$ or 12-40% of CT Primary or oFF
<b>Trip Times</b>	
Ground Fault Trip Time	Trip time
101%-200% of Setpoint	8 seconds $\pm$ 1 second
201%-300% of Setpoint	4 seconds $\pm$ 1 second
301%-400% of Setpoint	3 seconds $\pm$ 1 second
401% or Greater	2 seconds $\pm$ 1 second
<b>Current Unbalance Trip Times</b>	
<u>% Over Setpoint</u>	<u>Trip time</u>
0%	30 seconds
1%	15 seconds
2%	10 seconds
3%	7.5 seconds
4%	6 seconds
5%	5 seconds
6%	4 seconds
11%	3 seconds
15%	2 seconds
<b>Input Characteristics</b>	
Input Voltage	12VDC
<b>General Characteristics</b>	
<b>Environmental</b>	
Temperature Range	Ambient Operating: -20° to 70°C (-4° to 158°F) Ambient Storage: -40° to 80°C (-40° to 176°F)
Pollution Degree	3
Class of Protection	IP20
Relative Humidity	10-95%, non-condensing per IEC 68-2-3

<sup>2</sup> If a “J” is included in the trip class (TC) setting, jam protection is enabled.

<sup>3</sup> If “oc” is displayed in the #RF setting, overcurrent will be included as an automatic restart after RD2 expires. Otherwise, a manual reset is required after an OC fault.

<b>Mechanical</b>	
Dimensions	3.0" H x 3.6" W x 5.1" D (76.2mm x 91.4mm x 12.5mm)
Terminal Torque	7 in.-lbs.
Enclosure Material	Polycarbonate
Weight	1.2 lbs (544g)



## **ACCESSORIES - CIO-EN-DEMO**

If using the CIO-EN-DEMO communications module, connect the CIO-EN-DEMO to the side of a 777-P2-DEMO via the 9-pin D-SUB connector located on the side of the module. The CIO-EN-DEMO will be powered on once connected to the 777-P2-DEMO. The CIO-EN-DEMO module is a convenient Modbus/TCP and Modbus/RTU interface that provides a means of communicating with the 777-P2-DEMO over a network or to a remote monitor display, such as the RM-1000-DEMO or RM-2000-DEMO.

In order to communicate with an upstream device via a RS-485 network, the upstream device must be connected to the CIO-EN-DEMO using a twisted-pair cable connected to A, B, and Shield of the 5-pin connector on the front of the CIO-EN-DEMO module. The CIO-EN-DEMO can be programmed as device address A01-A99 and can communicate at baud rates of 9600, 19200, 38400, and 57600. The default communications settings for the CIO-EN-DEMO are:

- Baud Rate: 19200
- Parity: Even
- Modbus Address: Flexible when attached to 777-P2-DEMO
- When using SymCom *Solutions*, open *Solutions* and click 'Modbus/RTU' in the Select Network Connection Type Box. Ensure the network communication settings are correct, and the device connections are correct. Right click in the network window and select 'Manually Add a Unit'. Select the 777-P2 model and press 'Enter'. Click on the unit to view its properties.

In order to communicate with SymCom *Solutions* via a Modbus/TCP network, connect an Ethernet cable to the Ethernet jack on the top of the CIO-EN-DEMO and to the PC (Ethernet cable included with CIO-EN-DEMO). The default Ethernet communications settings for the CIO-EN-DEMO are:

- IP Address: 192.168.50.FLEX where FLEX = 777-P2-DEMO Modbus Address
- Subnet Mask: 255.255.0.0
- Gateway: 192.168.50.1
- DHCP: Disabled
- When using SymCom *Solutions*, open *Solutions* and click 'Modbus/TCP' in the 'Select Network Connection Type' option menu. Ensure the Ethernet network communication settings are correct, and the device connections are correct. Right click in the network window and select 'Manually Add a Unit'. Select the 777-P2 model and press Enter. Click on the unit to view its properties.

## **ACCESSORIES – RM-2000-DEMO**

If using the RM-2000-DEMO, use the provided cable to connect the RM-2000-DEMO to the CIO-EN (cable included with RM1000-DEMO). Be sure to attach the proper connector to the CIO-EN-DEMO and RM-2000-DEMO (Each connector is labeled for the equipment it is to be connected to). Make sure the jumper connector is securely fastened to the Prog. Lock jack on the back of the RM-2000-DEMO. Once all necessary equipment is connected, connect power to the 777-P2-DEMO by attaching the 12VDC cable to the connector on the side of the 777 module enclosure. NOTE: Ensure all network connections are in place before applying power.

To enable communication between the RM-2000-DEMO and a PC (solutions software), connect the PC port on the RM-2000-DEMO to the provided RS485-RS232 converter cable (included with RM1000-DEMO). The RS485-RS232 converter cable can then be connected to the USB-RS232 converter included with the RM1000-DEMO and then connected to the PC. A demo version of Solutions is available on the SymCom website in order to communicate with the demo units with a PC.

## **ACCESSORIES – RM-1000-DEMO**

If using the RM-1000-DEMO, follow the instructions for the RM-2000-DEMO above. Ensure the correct cable is used to connect the RM-1000-DEMO to the CIO-EN-DEMO.

To enable communication between the RM-1000-DEMO and a PC (solutions software), connect the PC port on the RM-1000-DEMO to the provided RS485-RS232 converter cable (included with RM1000-DEMO). The RS485-RS232 converter cable can then be connected to the USB-RS232 converter included with the RM1000-DEMO and then connected to the PC. A demo version of Solutions is available on the SymCom website in order to communicate with the demo units with a PC.

For warranty information, please see **Terms and Conditions** at  
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