



Model RM-2000

Remote Monitor for the 777 Electronic Overload Relays



UG_RM2000_B2

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FEATURES

The RM-2000 motor-monitoring device can be used to monitor and/or control SymCom's Model 777 Family via an RS-485 Modbus network. A second communication port allows monitoring and control of up to 99 RM-2000 devices from a personal computer (PC) with SymCom's Solutions software, or a PLC, DCS, or SCADA system. The RM-2000 is environmentally protected and can easily be mounted on the front of a panel or MCC.

The RM-2000 includes time logging and historical data tracking.

INFORMATION DISPLAYED

The RM-2000 can display all of the information the Model 777 displays as well as information that the Model 777 maintains but does not display.

The RM-2000 displays the following real-time motor information:

- Line currents, average current and current unbalance
- Current to ground
- Line-to-line voltages, average voltage and voltage unbalance
- Power factor
- Power draw (kW)
- KVARs
- Energy consumption (KWWhs) (reset capable)
- Remaining restart delay times
- Pending faults
- Total motor run-time (reset capable)
- Total number of motor starts and trips (reset capable)

The RM-2000 displays the following fault history information:

- Time and date of last four faults, with voltage and current at time of trip
- Time-stamped event log
- Minimum time between any two starts with time and date
- Run-time since last start (reset capable)
- Time of last motor start

INSTALLATION PROCEDURE

MOUNTING OPTIONS

- **Panel mounting:** a Model 777 is often mounted inside a motor control panel and its display is not visible. The RM-2000 can be mounted on the outside of the panel, allowing all of the information from the Model 777 to be displayed without opening the control panel.
- **Remote mounting:** the RM-2000 communicates with the Model 777 by an RS-485 cable which can be up to 4000 feet long. This allows the RM-2000 to remotely monitor a Model 777.

INSTALLATION

1. Attach the template drawing to the panel where the RM-2000 is to be mounted.
2. Take caution when drilling the holes to mount the RM-2000. Use an 11/64" drill bit for the four corner mounting screws. Drill a 1 15/16" – 2 3/16" hole for the terminals to protrude through to the inside of the panel.
3. Verify the gasket is in place on the back of the RM-2000. Attach the RM-2000 to the panel using the four screws provided.
4. Run the appropriate wires to the back of the RM-2000 and terminate the wires in the provided screw-type, depluggable connectors; see the wiring diagram on the following page. This should include at least 120VAC control power, one set of communication wires to the 777, and ground wire to case ground on the panel.
5. It is important to have the A phase of the breaker connected to L1 on the 777, B phase to L2 and C to L3. Equally important, is to have the A phase conductor through the A phase hole, B through the B phase hole, and C through the C phase hole of the 777.
6. The 777, when used with the RM-2000, should be connected according to the following wiring diagram.

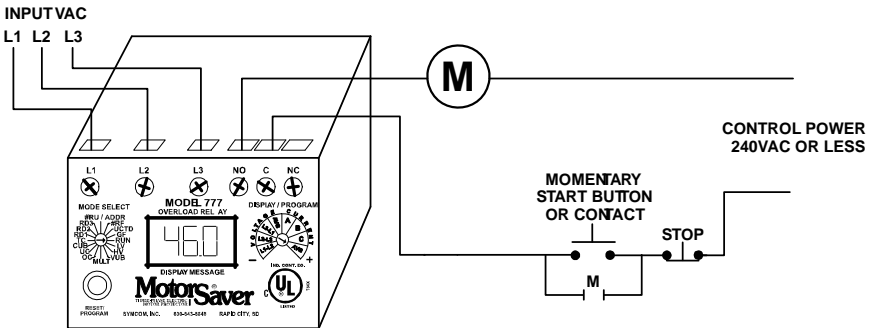


Figure 1: Typical 777 Wiring Diagram

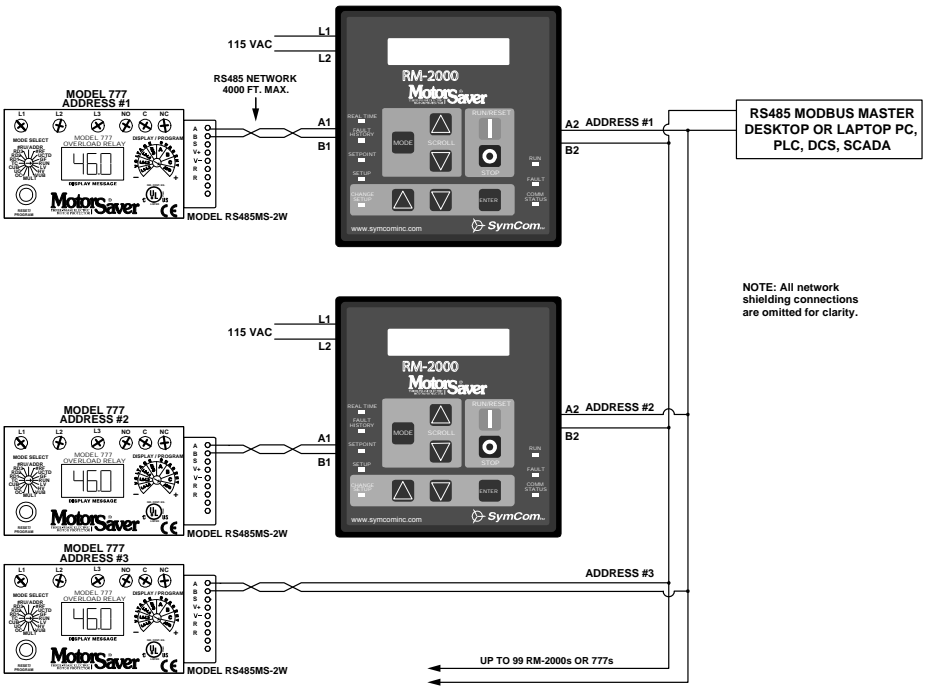


Figure 2: RM-2000 Wiring Diagram

CONNECTIONS - NEW INSTALLATION

A **Model RS485MS-2W** communications module is required to connect the Model 777 to the RS-485 network. A shielded, twisted-pair cable connected to A and B of the RS485MS-2W must be connected to Comm Port 1 (A1 & B1) on the back of the RM-2000.

The RM-2000 has a second RS-485 port allowing connection to a network host, such as a PLC, DCS, or SCADA system or a PC running Modbus master software such as SymCom's *Solutions*.

The network host is not required. If present, the network host must be connected to Comm Port 2 at the connections labeled **A2** and **B2**. The RM-2000 can be programmed as device address A01– A99 and up to 99 RM-2000s or 777s can exist on the same network. The RM-2000's slave and master ports can be programmed for 300, 600, 1200, 2400, 9600, 14400, 19200 or 28800 baud. It can use even, odd or no parity and have 1 or 2 stop bits. The RM-2000 slave communication parameters must match the communication parameter of the attached overload. The network communication parameters of the RM-2000 must be the same for all devices connected to the upstream network.

The RS-485 Network - Terminating Resistors

In Figure 2 there are three RS-485 networks. Each of the two RM-2000s with their slave Model 777 forms a separate, independent RS-485 network. The third network links the host PC to the two RM-2000s. Each independent network may require terminating resistors and may require a ground connection for the shield around the twisted pair cable.

If the length between the RM-2000 and the Model 777 exceeds 100 feet or if the twisted pair cable is in a noisy environment, 120Ω terminating resistors should be connected at both the RM-2000 (across A1 and B1) and also at the Model 777 (across A and B of the RS485MS-2W module). In addition, the shield of the twisted pair cable should be tied to the RM-2000's ground connection (labeled GND) with a single 100Ω resistor. If unsure, install the terminating resistors.

Unlike the port-powered RS-232 to RS-485 converter, the transceiver inside the RM-2000 is capable of supplying enough current to operate the RS-485 network, even with terminating resistors installed. The RM-2000 to host is a separate network. It may require separate terminating resistors and ground connection.

CONNECTIONS - EXISTING NETWORK INSTALLATIONS

If an RM-2000 is being added to a Model 777 in an existing network, the RM-2000's network address must be set to the existing Model 777's address and the Model 777's address must be set to match the overload address of the RM-2000.

The RM-2000 will map the data from the Model 777 into the same register locations as the Model 777, so the RM-2000 will respond just like the Model 777 as far as the Modbus Master software application is concerned. The Modbus Master software will not have to be reprogrammed to communicate with the RM-2000, unless the additional information from the RM-2000 is desired.

OPERATION

RM-2000 information and functions are divided into five modes:

- REAL TIME
- FAULT HISTORY
- SETPOINT
- SETUP¹
- CHANGE SETUP (key switch or jumper required)

Press the [MODE] button to switch between these modes. An LED on the left side of the RM-2000 indicates which mode is selected.

Within any mode, the [SCROLL DOWN] and [SCROLL UP] buttons will change the information being displayed.

Only the SETPOINT and SETUP modes allow setting changes. The CHANGE SETUP LED is lit along with the SETPOINT or SETUP LED when a mode setting is ready to be changed. The [CHANGE SETUP DOWN] and the [CHANGE SETUP UP] buttons decrease and increase the value of a setup option. When the desired value is displayed, press [ENTER] to save the setting.

The [RUN/RESET] and [STOP] buttons will energize and de-energize the Model 777's control relay provided the Start/Stop option is enabled in the SETUP mode ("EN.START/STOP: YES"). Set the option to "NO" to disable the [RUN/RESET] and [STOP] buttons.

Note: whether the [RUN/RESET] and [STOP] buttons actually start and stop the motor is dependent on proper motor control connection of the Model 777 and the state of other auxiliary devices in the control circuit.

MODES

REAL TIME: displays all real-time information as well as calculated power factor, power consumption, and total number of starts and trips.

FAULT HISTORY: displays detailed information about the last 4 faults that caused the Model 777 to trip. It also displays the last 10 starts; the length of time the motor has been running; and the date, time and length of the minimum time the motor was off.

SETPOINT: displays the parameters programmed into the Model 777. Examples of these parameters would include the overcurrent and undercurrent limits (OC and UC), the current unbalance (CUB) limit, etc., programmed into the Model 777.

SETUP: displays the parameters that affect the operation of the RM-2000, such as real-time clock settings (month, day, hour, etc.), the network host communications parameters, the voltage multiplier and others.

CHANGE SETUP: allows you to change the parameters that are displayed in the SETUP and SETPOINT modes. **A jumper² connected between K1 and K2 on the back of the RM-2000 is required to enter this mode.** The CHANGE SETUP mode will be skipped when scrolling through the modes if the jumper is not in place.

¹ When using with the 777-LR-P, select Model "777-P" in setup.

² If desired, a key-switch can be installed in place of the jumper to allow only authorized personnel to make system/setting changes.

LED STATUS INDICATION

Eight LEDs indicate the status of the RM-2000:

- Five red LEDs on the left side indicate the display mode.
- The green COMM STATUS LED on the lower right indicates the RM-2000 is communicating with the Model 777.
- The green RUN LED on the upper right indicates the motor is drawing current.
- A solid red FAULT LED indicates the Model 777 has tripped on a fault and is either in manual reset mode or the Model 777 is going through restart delay RD2 or RD3. When a fault occurs, the RM-2000 automatically switches to the FAULT HISTORY mode and displays FAULT 1—the most recent fault. The RM-2000 will not switch to the FAULT HISTORY mode if it is currently in the CHANGE SETUP mode.
- A blinking red FAULT LED indicates the Model 777 has a pending fault. If the motor is not running, this may be a condition that is preventing the Model 777 from starting, such as high or low voltage. Look at the pending fault screen in the REAL TIME mode to view the existing fault condition.

COMMUNICATION LOSS

If the RM-2000 loses communications with the Model 777, the green COMM STATUS LED will not be lit and the REAL TIME mode screens will contain asterisks. For example, the screen showing 3-phase voltages and the average voltage will look like:

V	a	b	=					*			V	b	c	=					*
V	a	c	=					*			V	a	v	g	=				*

Things to look for:

- 1) Verify the Model 777 has power on lines L1 and L2.
- 2) Verify the Model 777 is programmed with the correct address.
- 3) Verify the RS-485 cable connects A1 of the RM-2000 to A of the Model RS-485MS-2W module and B1 to B.
- 4) If using an older communications module, Model **RS485MS**, verify that A is shorted to Y and B is shorted to Z.
- 5) Verify continuity of the RS-485 cable with an ohmmeter (**NOTE: test for continuity only when the RS-485 circuit is de-energized!**).

NAVIGATION AND SCREEN MODES

REAL-TIME MODE

The REAL TIME mode displays real-time information as well as calculated power factor and power consumption, and total number of starts and trips. By scrolling through the REAL TIME mode the following screens can be viewed:

Current and Voltage Information - displays line-to-line voltages and phase currents.

I =		5	.	5	0		5	.	6	5		5	.	3	5		
V =				2	3	0				2	3	5			2	2	5

Line Currents and Average Current

I a =		5	.	5	0				I b =		5	.	6	5
I c =		5	.	3	5				I a v g =		5	.	5	0

Line-to-Line Voltages and Average Voltage

V a b =				2	3	0			V b c =				2	3	5
V a c =				2	2	5			V a v g =				2	3	0

If potential transformers (PTs) are used with the 777, the voltage multiplier ("VOLTAGE MULT" in the SETUP menu) should be programmed with a voltage multiplier equal to the PT ratio. The voltage displayed on the RM-2000 will be higher than the voltage displayed on the 777, but will be consistent with the actual voltage.

Calculated Current and Voltage Unbalance

C	U	R	R	.	U	N	B	A	L	A	N	C	E	=			3	%
V	O	L	T	.	U	N	B	A	L	A	N	C	E	=			2	%

Restart delays RD1, RD2 and RD3

R	E	S	.	D	E	L	A	Y	R	D	2	=					0	M	
R	D	1	=					0	S	R	D	3	=					0	M

RD1: power-up and rapid-cycle delay

RD2: restart delay after all faults except undercurrent

RD3: restart delay after an undercurrent fault

NOTE: This screen displays the time remaining for each restart delay, not the setpoint value programmed into the Model 777.

Ground Fault Current: for a motor, this value would likely represent the current leaking through the insulation of one or more phases.

G	R	O	U	N	D	F	A	U	L	T	C	U	R	R	E	N	T
						0	.	1	0	A	M	P	S				

Accumulated Hours and Energy

A	C	C	.		H	O	U	R	S	=									0	.	1
E	N	E	R	G	Y	-	K	W	H	=									3	.	0

The Accumulated Hours is the number of hours the Model 777 has detected current flow and the Energy-kWh (or Energy-MWh) is the calculated energy consumed during these hours. The information displayed is updated every minute.

The Accumulated information is stored in memory and will not be lost if the RM-2000 loses power. The values can be reset to zero with the CLEAR HISTORY option in the CHANGE SETUP mode.

Number of Starts and Trips - values can be reset to zero by the CLEAR HISTORY option in the CHANGE SETUP mode.

N	O	.		S	T	A	R	T	S	=											5
N	O	.		T	R	I	P	S	=												2

Average Voltage, Current and Power Factor

V	A	V	=		2	3	0		I	A	V	G	=		5	.	5	0
P	O	W	E	R		F	A	C	T	O	R	=			0	.	9	6

If connected to a Model 601, be sure to set the Model to 601 in the CHANGE SETUP mode. This allows the Frequency information of the Model 601 to be displayed on this screen instead of Average Voltage and Average Current.

Power and KVARs - displays consumed motor power in kW and reactive power in KVARs.

P	O	W	E	R	(K	W)	=												1	.	2	1	
K	V	A	R	S		=																0	.	6	4

Input Status Bits - displays the status of the RM-2000 input channels (if configured).

I	n	p	u	t		B	i	t	s	=	7	6	5	4	3	2	1	0		
						S	t	a	t	u	s	=	0	0	0	0	0	0	0	0

This screen is only visible if the I/O Screens are set to ON (CHANGE SETUP mode).

Pending Fault Information

				P	E	N	D	I	N	G		F	A	U	L	T			
									N	O	N	E							

The Pending Fault screen will display up to three pending faults the Model 777 has sensed. The RM-2000's FAULT LED will blink anytime a pending fault condition exists. If the Model 777 is in a de-energized state, the pending fault identifies present conditions that will prevent the Model 777 from starting. The RM-2000 uses the following codes to represent the faults:

<u>Fault Code</u>	<u>Fault Description</u>
OC	Overcurrent
I SP	Single-phase current
V SP	Single-phase voltage
CUB	Current unbalance
RP	Reverse phase
UC	Undercurrent
VUB	Voltage unbalance
HV	High voltage
LV	Low voltage
GF	Ground fault

FAULT HISTORY MODE

Fault Information

The RM-2000 will store detailed information about the last 4 faults. The fault information may be cleared by the CLEAR FAULTS option in the CHANGE SETUP mode.

NOTE: When a fault occurs the RM-2000 will jump to the FAULT HISTORY mode and display the Fault 1 screen. To return to the previous mode, press ENTER.

Fault Description, Date & Time - fault #1 is the most recent, fault #4 is the oldest.

F	A	U	L	T		1		[	C	U	R	R		U	N	B	A	L]
2	0	1	5	/	0	3	/	1	4		0	2	:	5	5	:	2	6	P

Fault Currents - displays phase current measurements just before the fault.

F	A	U	L	T		1			C	U	R	R	E	N	T	S	=		
		5	.	5	0				5	.	6	5			5	.	3	5	

Fault Voltages - displays voltage measurements just before the fault.

F	A	U	L	T		1			V	O	L	T	A	G	E	S	=		
		2	3	0					2	3	5				2	2	5		

Fault Current Unbalance and Average Current - reported just before the fault.

F	A	U	L	T		1		C	.	U	N	B	A	L	=		3	%	
A	V	E	R	A	G	E		C	U	R	R	.	=			5	.	5	0

Fault Voltage Unbalance and Average Voltage - reported just before the fault.

F	A	U	L	T		1		V	.	U	N	B	A	L	=		3	%	
A	V	E	R	A	G	E		V	O	L	T	.	=			2	3	0	

Fault Ground Fault Current - reported just before the fault.

F	A	U	L	T		1		[	C	U	R	R		U	N	B	A	L]
G	R	O	U	N	D		F	A	U	L	T	=		1	.	2		A	

Event Information

The RM-2000 will store the time of the last 10 events: motor starts, motor stops, RM-2000 power on, RM-2000 power loss, communication on, and communication loss. Event information can be cleared by the CLEAR EVENTS option in the CHANGE SETUP mode.

Event Description Date & Time - event 1 is the most recent, event 10 the oldest.

E	V	E	N	T		1	:	M	T	R		S	T	A	R	T			
2	0	1	5	/	0	3	/	1	5		0	7	:	5	7	:	2	3	P

Last Start - date and time of the last motor start.

L	A	S	T		S	T	A	R	T	:									
2	0	1	5	/	0	3	/	1	5		0	7	:	5	7	:	2	3	P

Run Time - length of time between the last motor start and stop.

R	U	N		T	I	M	E	:										1	D	A
2	0		H	R	S		2	8		M	I	N		5	4		S	E	C	

Minimum Off Time

Date of Minimum Off Time - date and time of the start following the Minimum Off Time.

D	A	T	E		O	F		M	I	N		O	F		T	I	M	E		
2	0	1	5	/	0	3	/	1	1		1	0	:	2	5	:	5	3	P	

Minimum Off Time - the minimum length of time the motor was off.

M	I	N		O	F		T	I	M	E	:									
							1	M	I	N		2	S	E	C					

Very short times may signify a motor was not allowed to cool down before restarting indicating a programming error or operator override.

NOTE: The Last Start, Run Time, Date of Minimum Off Time and Minimum Off time screens can be cleared by the CLEAR MIN OFF option in the CHANGE SETUP mode.

SETPOINT MODE

The SETPOINT mode displays the parameters that are programmed into the Model 777. Each setting can be viewed and changed using the RM-2000, without interrupting the Model 777's control relay.

Current Limits – overload and underload limits.

O	V	E	R		C	U	R	R	.	:			1	6	.	0	
U	N	D	E	R		C	U	R	R	.	:			1	0	.	0

Voltage Limits - HV and LV settings.

O	V	E	R		V	O	L	T	.	:				2	7	2	
U	N	D	E	R		V	O	L	T	.	:				2	0	7

Unbalance Limits - CUB and VUB settings.

C	U	R	R	.	U	N	B	A	L	:					7	%
V	O	L	T	.	U	N	B	A	L	:					5	%

Current Multiplier and Ground Fault Limit - MULT and GF settings.³

C	U	R	R	.	M	U	L	T	:							5
G	R	N	D		F	A	U	L	T	:	1	.	2	0	A	

Restart Delays⁴ - RD1, RD2, RD3 settings.

R	E	S		D	E	L	A	Y		R	D	2	:			3	0	M
R	D	1	:			0	S			R	D	3	:			2	0	M

RD1: rapid-cycle delay

RD2: restart delay after all faults except undercurrent

RD3: restart delay after an undercurrent fault

Trip Class and Under Current Trip Delay - TC and UCTD settings.

T	R	I	P		C	L	A	S	:							1	0	
U	C		T	R	I	P		D	E	L	A	Y	:				5	S

Number of Restart Attempts after an Undercurrent Fault - #RU setting.

N	U	M	B	E	R		O	F		R	E	S	T	A	R	T	S
O	N		U	N	D	E	R		C	U	R	R	:	A	U	T	O

³ The CURR MULT settings will be "N/A" for a 777-P series.

⁴ This screen shows the setpoint for each restart delay, not the time remaining.

Number of Restart Attempts after any other Fault - #RF setting.

N	U	M	B	E	R		O	F		R	E	S	T	A	R	T	S			
O	T	H	E	R		F	A	U	L	T	S	:						o	c	A

Power Limits - High and low kW settings.

H	I	G	H		K	W	:											1	.	2	0	
L	O	W		K	W	:													0	.	4	0

777-P Multiplier/Divisor - Multiplier and divisor setpoints for 777-P series⁵

7	7	7	P		M	u	l	t	i	p	l	i	e	r	:							1
7	7	7	P		D	i	v	i	s	o	r	:										1

MULT Setting	Multiplier	Divisor
1	1	1
2	1	2
3	1	3
...
9	1	9
10	1	10
100	20	5
150	30	5
200	40	5
300	60	5
400	80	5
500	100	5
600	120	5
700	140	5
800	160	5

MULT Setting	Multiplier	Divisor
1	1	1
2	1	2
25	10	2
50	10	1
75	15	1
100	20	1
150	30	1
200	40	1
300	60	1
400	80	1
500	100	1
600	120	1
700	140	1
800	160	1

Table 1: 777-P Multiplier / Divisor Settings

Table 2: 777-LR-P Multiplier / Divisor Settings

Message Builder - read/write data to 777⁶.

V	a	l	u	e	=		0	0	0	0	h	=									F	F		
A	d	d	r	=			0	0	6	5	H										S	K	I	P

The message builder screen allows you to read and write 777 information.

Writing: the value to be written is displayed as both hexadecimal and decimal numbers. Set the proper address, scroll to show "WRITE", and press [ENTER].

Reading: set the address, show "READ," press [ENTER]—the value will be displayed,

⁵ This screen only appears if the RM-2000 is connected to a 777-P series device.

⁶ Please refer to SymCom's 777 Programming Guide for more information.

Command Line

S	e	n	d		c	o	m	m	a	n	d	:							
F	A	U	L	T		R	E	L	A	Y							O	F	F

The command line allows you to do several things:

- Turn off/on slave communication watchdog
- Send an off or reset command to the 777
- Lock/unlock network programming—prevents/allows 777 parameter setting changes
- Clear run hours
- Clear last fault

Model and Software

M	o	d	e	l	:													7	7	7	
S	o	f	t	w	a	r	e		R	e	v	:		2	5	.	3	8			

SETUP MODE

The SETUP mode displays parameters that affect the operation of the RM-2000.

Real Time Clock

Clock Date Settings - real-time clock *date* settings.

C	L	O	C	K			Y	E	A	R	:	2	0	1	5		
M	O	N	T	H	:	0	3			D	A	Y	:	1	4		

Clock Time Settings - real-time clock *time* settings.

H	O	U	R	:	0	1	P			(	A	M	/	P	M)	
M	I	N	U	T	E	:	5	9		S	E	C	:	2	6		

The time can be displayed in 24 hour values by changing (AM/PM) to (24HR).

777 Comm Port (Port 1, A1 & B1)

777 Port Address

O	V	E	R	L	O	A	D		(	P	O	R	T		1)	
O	V	R	L	D		A	D	D	R	:			A	0	0	1	

The Overload Address must match the address programmed into the 777.

777 Port Communication Parameters

O	V	R	L	O	A	D		B	A	U	D	:	9	6	0	0	
P	A	R	I	T	Y	:	E			S	T	O	P	:	1		

To communicate with the 777, the RM-2000 must be set to 9600 baud, even parity, with one stop bit. The RM-2000 also has the ability to be setup to communicate with other overloads with different communication settings.

Network Comm Port (Port 2, A2 & B2)

Network Port Address

		N	E	T	W	O	R	K		(P	O	R	T		2)			
		N	E	T	W	O	R	K		A	D	D	R	:		A	0	2	6	

The host network allows communication between an RM-2000 and a PC with SymCom's *Solutions* software, or a PLC, DCS, or SCADA system. Up to 99 RM-2000s can exist on this network; thus, the network address can be set from A001–A099.

Network Port Communication Parameters

		N	E	T	W	O	R	K		B	A	U	D	:	9	6	0	0	
		P	A	R	I	T	Y	:	N			S	T	O	P	:	1		

The RM-2000 can communicate on a host network using 300, 600, 1200, 2400, 9600, 14400, 19200 or 28800 baud; even, odd or no parity; and 0, 1 or 2 stop bits.

Network Watchdog

N	e	t	w	o	r	k	W	a	t	c	h	d	o	g		
							D	I	S	A	B	L	E	D		

An upstream communication watchdog occurs when no upstream messages are received for 10 seconds. Another watchdog will not occur, and no watchdog actions will be taken again until communication is re-established and then lost again for 10 seconds. The network watchdog can be disabled—meaning there will be no action taken if a network watchdog occurs.

- 1) **Send OFF** – when an upstream communication watchdog occurs, the RM-2000 will send an off command to the overload, de-energizing the 777's output relay. Use the Send OFF feature if you want the overload fault relay to open when the RM-2000 loses communications with the network host.
- 2) **Send RHWD (Remote Host Watchdog)** – (If the overload supports this feature) When an upstream communication watchdog occurs, the RM-2000 will send a remote host watchdog command to the overload. The overload will immediately perform its configured watchdog action (The standard 777 does not support this feature).
- 3) **RLY (Relay)** – when an upstream communication watchdog occurs, the RM-2000 will turn off its relays (if the RM-2000 is configured with relays).

Model and Voltage Multiplier

M	O	D	E	L	:										7	7	7
V	O	L	T	A	G	E	M	U	L	T	:					1	

Model Number

The Model Number setting should match the model number of the 777 monitored by the RM-2000. **NOTE: When using with the 777-LR-P, select Model "777-P" in setup.**

Voltage Multiplier

Voltage Multiplier should be set to 1 unless the 777 is powered by potential transformers (PTs). This multiplier is used to scale the voltage readings up to the actual line voltages being monitored.

Model 777 Power Factor Correction

M	O	D	E	L	7	7	7	M	V	W	I	T	H		
O	N	L	Y	1	P	.	T	.	?	:				N	O

If the Model 777-MV (Medium Voltage) is installed with only ONE potential transformer (PT), set this function to YES—the RM-2000 will adjust the power factor to correct the Power, kVARs, and Energy Usage values. Be sure to check the Model 777-MV installation instructions to keep the proper relationship between PT and CT connections.

LCD Control and UC Alarm Control

A	U	T	O		L	C	D		D	I	M		:		Y	E	S	
A	L	A	R	M		O	N		U	/	C		:		Y	E	S	

LCD Control

If the Auto LCD Dim option is set to NO, the backlighting of the LCD will remain on all the time. If the option is set to YES, the backlighting will automatically turn off 2 minutes after the last button is pressed. The backlight will come on again once a button is pressed.

UC Alarm Control

This setting is commonly used in pumping applications. If a well runs dry, the Model 777 will shut down the motor because of an undercurrent condition. Since this may occur frequently in pumping applications, the undercurrent faults can fill up the last four faults of the RM-2000. If you do not want the fault screen to pop up on the RM-2000 when an undercurrent fault is detected, set this field to "NO". This allows the last four faults to keep track of other, unexpected faults.

Starting with Voltage Errors

I	F		S	T	A	R	T	I	N	G		W	/	V	O	L	T	.
E	R	R	O	R	S	:					S	E	N	D		O	F	F

This setting controls how a [RUN/RESET] button is handled when the Model 777 is trying to start, but voltage errors are present.

If a motor has been shut down and the Model 777 detects a voltage error—overvoltage, undervoltage, reverse phase, or voltage unbalance—the Model 777 will not close its control relay until the voltage fault is no longer present.

When "If Starting w/ Volt. Errors:" is set to SEND OFF—if the [RUN/RESET] button is pressed while the voltage faults are present—the RM-2000 will send an OFF command instead of a START command. This prevents the Model 777 from starting, even after the voltage fault goes away. The RM-2000 displays a message to report this change for about two seconds. The [RUN/RESET] button must be pressed again after the voltage faults are cleared to make the motor start.

When this setting is "SEND ON" and you push the [RUN/RESET] button, a START command will be sent to the Model 777. When the Model 777 receives a START command, it will restart the control contacts as soon as the voltage fault goes away.

Type of Events to Track

L	O	G		M	T	R		S	T	A	R	T	S	:		Y	E	S	
				M	T	R		S	T	O	P	S	:		Y	E	S		
L	O	G		R	M		P	W	R		O	N	:		N	O			
				R	M		P	W	R		L	O	S	:		N	O		
L	O	G		C	O	M	M		O	N			:		N	O			
				C	O	M	M		L	O	S	S	:		N	O			

The RM-2000 will track up to 10 events with the date and time of each event. Specify YES or NO for each of the events according to your system preferences.

CHANGE SETUP MODE

The CHANGE SETUP⁷ mode allows changes to be made to the SETPOINT and SETUP information. To change SETPOINT parameters, press the MODE button until both SETPOINT and CHANGE SETUP LEDs illuminate. To change SETUP parameters, press the MODE button until SETUP and CHANGE SETUP LEDs illuminate.

In the CHANGE SETUP mode, a ">" and "<" will indicate the selected parameter. Use the [SCROLL UP] and [SCROLL DOWN] buttons to move through the parameters. To change the value or a parameter, press the CHANGE SETUP [UP] and [DOWN] buttons. When a value is changed, an asterisk will appear. To save the displayed value, press [ENTER].

777-P, 777-LR-P SUPPORT

The RM-2000 supports the following features of the 777-P and 777-LR-P:

- Voltage and Current reading
- Ground current fault readings
- Setpoint changes
- Power and Power factor readings
- Pending fault status
- Logging of faults codes

The RM-2000 has the following limitations in support of 777-P and 777-LR-P:

- Ground fault current will be logged with the fault data, but will max out if the current is above 2.52 Amps for a 777-LR-P and 25.2 Amps for a 777-P; however, the ground fault will still display correctly on the real-time screen.
- When reading 777-P ground fault currents over the network with the legacy memory map, the ground fault current will max out if above 2.52 Amps for a 777-LR-P and 25.2 Amps for a 777-P, however, the ground fault will still read correctly from the 777-P memory map.

The 777-P uses a 16 bit memory map, where all setpoints and real-time values will be read and written as 2-byte numbers. The 777-P supports the legacy memory map that contains both 16 bit and 8 bit parameters.

Because of this difference when reading OC, UC, GF setpoint from the legacy memory map, in some cases the values will not match the front panel display. This is caused by mathematical rounding that occurs when converting from an 8 bit memory map to a 16 bit memory map. All trip conditions are based on what is displayed on the front panel of the 777-P or 777-LR.

See PG-RM-2000 for more information about network programming of the RM-2000.

⁷ K1 and K2 must be shorted.

RM-2000 SPECIFICATIONS

Functional Characteristics													
Control Voltage Transient Protection Maximum Input Power Communications Baud Rate Setup Protocol Serial Interface Available Addresses Real-Time Clock Battery Back-up Life Last Fault Memory	115VAC \pm 10%, 50/60Hz 2500V for 10ms 3 W <table border="1"> <thead> <tr> <th>Overload Comm. Settings</th> <th>PC, PLC, etc.</th> </tr> </thead> <tbody> <tr> <td>300-28800</td> <td>300-28800</td> </tr> <tr> <td>None, Odd, or Even Parity, 1 or 2 Stop Bits</td> <td>None, Odd, or Even Parity, 1 or 2 Stop Bits</td> </tr> <tr> <td>Modbus RTU</td> <td>Modbus RTU</td> </tr> <tr> <td>RS485MS-2W</td> <td>RS485MS-2W</td> </tr> <tr> <td>A001-A099</td> <td>A001-A099</td> </tr> </tbody> </table> 10 years @ 25°C without external power Stores up to 4 faults with time and date stamp, includes voltages and currents at time of trip	Overload Comm. Settings	PC, PLC, etc.	300-28800	300-28800	None, Odd, or Even Parity, 1 or 2 Stop Bits	None, Odd, or Even Parity, 1 or 2 Stop Bits	Modbus RTU	Modbus RTU	RS485MS-2W	RS485MS-2W	A001-A099	A001-A099
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RS485MS-2W	RS485MS-2W												
A001-A099	A001-A099												
General Characteristics													
Enclosure Dimensions Weight Material Terminal Torque Display Size Lighting Keypad Mechanical Life Overlay Material UV Exposure w/out Degradation Electrical Noise Immunity Electrostatic discharge Electrostatic field Fast transient burst Surge Conducted RF Environment Class of Protection Ambient Operating Temperature Ambient Storage Temperature Humidity	6.1" L x 6.5" W x 1.1" D 1.2 lbs. Black polycarbonate Depluggable terminal block 3 in.-lbs. max. Liquid crystal with extended temperature range 2 rows x 20 characters LED backlight Eight 0.5" stainless steel dome buttons for tactile feedback 50,000 actuations Polyester 2000 hrs. IEC 61000-4-2, Level 3 (6kV contact, 8kV air discharge) IEC 61000-4-3, Level 3 (10 V/m) IEC 61000-4-4, Level 4+, 4 kV power supply port and 2 kV inputs/output ports IEC 61000-4-5, 24V supply, Level 1 (\pm 500V) RS-485 & Reset Lines, Level 2 (\pm 1kV) IEC 61000-4-6, Level 3+ (30 V _{rms}) NEMA 3R / UL Type 12 -20° to 70°C -4° to 158°F -30° to 70°C -22° to 158°F Up to 85%, non-condensing												

NOTES

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