RM-1000

User's Manual

SymCom Inc
Motor Protection & Controls Since 1974

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General Operation

INSTALLATION

Mounting

1. Tape or temporarily glue the mounting template on the panel in the desired location.
2. Drill four screw holes with a #23 bit (5/32”).
3. Drill or punch a 2” round or 0.6” x 1.5” rectangular hole for the terminal connections.
4. Attach the RM-1000 to the panel using 4 #6 x 1/2” screws. Tighten the screws to no more than 10 in-lbs.
5. Attach the wires to the terminal block and plug into the connector. (See the Wiring section.)

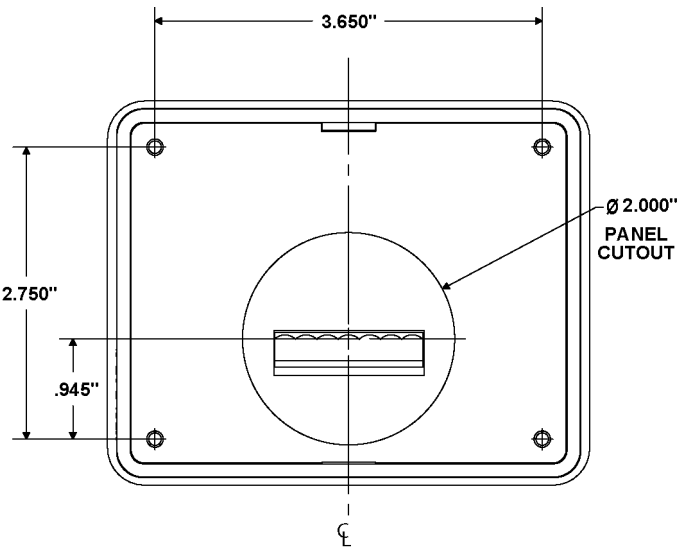
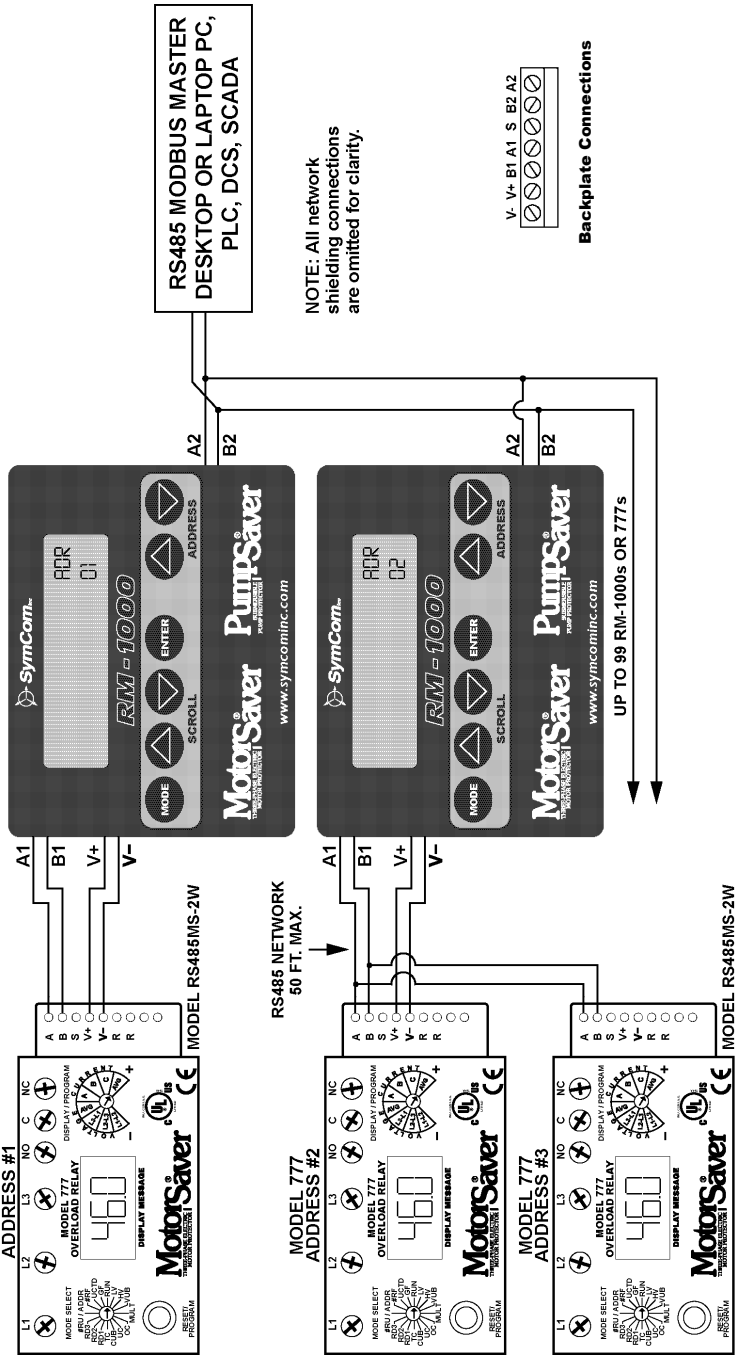


Figure 1. Mounting Diagram

Wiring


RS485 MODBUS MASTER
DESKTOP OR LAPTOP PC,
PLC, DCS, SCADA
NOTE: All network
shielding connections
are omitted for clarity.
V- V+ B1 A1 S B2 A2
Backplate Connections
UP TO 99 RM-1000s OR 777s
RS485 NETWORK
50 FT. MAX.
MODEL 777
ADDRESS #1
MODEL 777
ADDRESS #2
MODEL 777
ADDRESS #3
MODEL RS485MS-2W
MODEL RS485MS-2W
A1
B1
V+
V–
A2
B2
RM-1000
SymCom
MotorSaver
PumpSaver
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MODE
SCROLL
ENTER
ADDRESS
ADR 01
ADR 02

Quick Start

Setup of a new or existing RM-1000 can be achieved very quickly by using the **Learn Nodes** and the **Delete All Nodes** features. The **Learn Nodes** feature can be used to scan all 99 addresses to find all existing addresses. The **Delete All Nodes** feature is helpful when many or all of the addresses have changed, or the installer is not sure which address(es) no longer exist.

New RM-1000 Installation

1. Apply power to all MotorSaver® and/or PumpSaver® relays to be monitored.

2. Set a different address into each MotorSaver® or PumpSaver® to be monitored by the RM-1000.

3. Enter **Learn Mode**.
   - 3.1. Press ENTER at the **45_Learn Network** submenu.
   - 3.2. Scroll to answer yes (451_Confirm ?Yes) and press ENTER.
   - 3.3. Allow the RM-1000 to scan all 99 addresses. The RM-1000 will display the found nodes as they are located and will display the number of found nodes when complete.
   - 3.4. Press ENTER to leave this screen.

4. Go to **Real Time** mode.
   - 4.1. Press MODE to get to the **Main Menu**.
   - 4.2. Press scroll down to get to the **1_REAL TIME** submenu selection.
   - 4.3. Press ENTER.

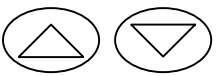
5. Scroll through the addresses, by pressing the up or down address key, to verify the RM-1000 found all the installed devices.

6. If all the installed devices were found you are ready for normal operations. If some devices are missing, manually set up the addresses in question and/or check the wiring and power to the device(s) in question.

Keypad Buttons

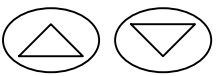
MODE Button – switches to the previous mode or menu. It can be thought of as a *previous*, *escape*, or *back* button.

ENTER Button – moves to the selected mode, chooses the selected option, or saves a setup parameter



SCROLL

SCROLL Up/down – moves up or down through a set of menu options or to increment or decrement a programmable setpoint.



ADDRESS

ADDRESS Up/down – moves up or down through the addresses on the network.

Keypad Programming

Fundamentals

The programming structure is a series of menus and submenus followed by a series of programming options. The menus, submenus, and options are navigated by using a four-button interface as shown in Figure 2.

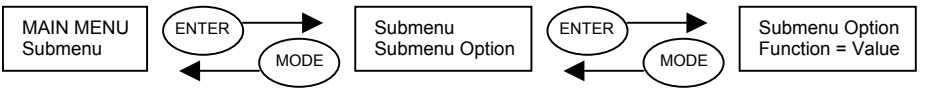


Figure 2. Menu Navigation

Changing Values

The function parameters or setpoints are changed using the SCROLL up/down buttons. When the current value of a parameter is shown an "=" sign is used. When the value is changed, the "=" changes to "?." When the new value is saved by pressing ENTER, the "?" changes to "=."

Enable Network Programming

The overload relay can have network programming disabled from a PC, PLC, or other device. If the network programming is disabled, the setpoints cannot be changed until the overload relay has the network programming enabled. This can be done from the RM-1000. To enable network programming, go to 3_CNTRL MENU, press and hold the MODE button, then press both the SCROLL up and down buttons. The screen should display "Network Unlock Command Sent." Network programming cannot be disabled from the RM-1000.

Main Menu Options / Modes

The main menu has four options: **1_REAL TIME, 2_SET POINTS, 3_CNTRL MENU** and **4_SETUP MENU**. A new RM-1000 will startup locked into the **MAIN MENU** at the **4_SETUP MENU**. The RM-1000 will not leave the setup menu/mode until at least one node is programmed.

After a node has been programmed, the RM-1000 will start up in the **1_REAL TIME** menu/mode. To access the other menus press the MODE button.

1_REAL TIME Mode

Run Information

In the REAL TIME mode, the user can scroll through a list of run information. The SCROLL down button moves the operator down through the list of real time data. The SCROLL up button moves the operator up through the list.

Fault Information

The Fault Status screen is used to display both pending and existing faults. Faults that are in the process of timing down a trip delay will be described as “pending.” Faults that have caused the relay to trip and are in the process of timing down the restart delay are described as “tripped.” The Fault Status screen is a two-line screen. The Fault History screens, Flt1-Flt4, are one-line screens showing the last four trip faults (see Table 5).

Model 777

Vavg=	456 Axx
Iavg =	10.00
I1 =	10.00
I2 =	10.00
I3 =	10.00
Iub =	0%
Vab =	456
Vbc =	456
Vac =	456
Vub =	0%
GF =	0.00
Hours =	33
PwrFr =	1
RD1 =	0s
RD2 =	0m
RD3 =	0m
Flt1	[UndCur]
Flt2	[OvrCur]
Flt3	[Clear]
Flt4	[Clear]
Fault Status	

Model 777-KW/HP

Vavg =	456 Axx
Iavg =	10.00
I1 =	10.00
I2 =	10.00
I3 =	10.00
Iub =	0%
Vab =	456
Vbc =	456
Vac =	456
Vub =	0%
GF =	0.00
Hours =	33
PwrFr =	1
KW =	100
RD1 =	0s
RD2 =	0m
RD3 =	0m
Flt1	[Low kW]
Flt2	[OvrCur]
Flt3	[Clear]
Flt4	[Clear]
Fault Status	

Model 601

Vavg =	456 Axx
Vab =	456
Vbc =	456
Vac =	456
Vub =	0%
Freq =	60.0
RD1 =	0s
RD2 =	0m
Flt1	[Hi Vlt]
Flt2	[Lo Frq]
Flt3	[Clear]
Flt4	[Clear]

Model 77C

V =	456 Axx
I =	10.00
Hours =	33
RD1 =	0s
RD2 =	0m
RD3 =	0m
Flt1	[UndCur]
Flt2	[OvrCur]
Flt3	[Clear]
Flt4	[Clear]

Table 1. REAL TIME Mode Screens

Abbr.	Description	Abbr.	Description
Vavg	Average Voltage	GF	Ground Fault
Iavg	Average Current	Hours	Run Hours
I1	Phase 1 Current	PwrFr	Power Factor
I2	Phase 2 Current	kW	Power
I3	Phase 3 Current	Freq	Frequency
Iub	Current Unbalance	RD1	Rapid-Cycle Timer
Vab	Voltage A-B	RD2	Cool Down Timer
Vbc	Voltage B-C	RD3	Dry-Well Recovery Timer
Vac	Voltage A-C	Flt#	Last Faults
Vub	Voltage unbalance		

Table 2. REAL TIME Mode Abbreviations

Abbr.	Description	Abbr.	Description
OC	Overcurrent	VUB	Voltage Unbalance
ISP	Current Single Phase	HV	High Voltage
VSP	Voltage Single Phase	LV	Low Voltage
CUB	Current Unbalance	GF	Ground Fault
RP	Reverse Phase	HF	High Frequency
UC	Undercurrent	LF	Low Frequency
LPr	Low Power		

Table 3. Pending Fault Abbreviations

Abbr.	Description	Abbr.	Description
HV	High Voltage	CUB	Current Unbalance
LV	Low Voltage	OC	Overcurrent
CF	Contactor Failure	UC	Undercurrent
RP	Reverse Phase	HF	High Frequency
SP	Single Phase	LF	Low Frequency
GF	Ground Fault	LPr	Low Power
Hot	High Motor Temp.		

Table 4. Tripped Fault Abbreviations

Abbr.	Description	Abbr.	Description
Hi Vlt	High Voltage	C Unbl	Current Unbalance
Lo Vlt	Low Voltage	OvrCur	Overcurrent
Cnt Fl	Contactor Failure	UndCur	Undercurrent
Rev Ph	Reverse Phase	Hi Frq	High Frequency
Sng Ph	Single Phase	Lo Frq	Low Frequency
Grnd F	Ground Fault	Low Pr	Low Power
Hot	High Motor Temp.		

Table 5. Last Fault Abbreviations

2_SET POINTS

In the SET POINTS mode, the user can scroll through a list of setpoints for each installed device. The SCROLL up/down buttons are used to move through the list. The ADDRESS up/down buttons are used to change devices. If change setpoints is enabled in the Setup menu, the user can change the setpoint by pressing ENTER. Then, the SCROLL button is used to change the value and ENTER is used to accept the value.

777

2a	LV
2b	HV
2c	VUB
2d	MULT
2e	OC
2f	UC
2g	IUB
2h	TC
2i	RD1
2j	RD2
2k	RD3
2l	#RU
2m	#RF
2n	UCTD
2o	GF

777-KW/HP

2a	LV
2b	HV
2c	VUB
2d	MULT
2e	OC
2g	IUB
2h	TC
2i	RD1
2j	RD2
2k	RD3
2l	#RU
2m	#RF
2n	* UCTD
2o	GF
2p	LKW

77C

2a	LV
2b	HV
2d	MULT
2e	OC
2f	UC
2h	TC
2i	RD1
2j	RD2
2k	RD3
2l	#RU
2m	#RO
2n	UCTD

601

2a	LV
2b	HV
2c	VUB
2i	RD1
2j	RD2
2m	#RF

* UCTD can only be changed from the network. KWS does not apply to the RM-1000.

Table 6. Setpoint Screens

Abbr.	Description	Abbr.	Description
LV	Low Voltage	RD1	Rapid-Cycle Timer
HV	High Voltage	RD2	Cool-Down Timer
VUB	Voltage Unbalance	RD3	Dry-Well Recovery Timer
MULT	Current Multiplier	#RU	Number of Restarts after UC Faults
OC	Overcurrent	#RF	Number of Restarts after Faults
UC	Undercurrent	UCTD	Undercurrent Trip Delay
IUB	Current Unbalance	LKW	Low Power
TC	Trip Class	GF	Ground Fault
HF	High Frequency	TD1	Trip Delay for Voltage/Frequency Faults
LF	Low Frequency	TD2	Trip Delay for Single-Phasing Faults

Table 7. Setpoint Screen Abbreviations

3_CNTRL MENU

The CONTROL submenus are used to reset a tripped relay, send an OFF command to a relay, clear the last fault memory and to clear the run-hour counter.

After pressing ENTER to select a control option, the RM-1000 will ask for confirmation before executing the command. Press the SCROLL up or down button to change the response to yes and press ENTER to confirm the request.

31_Set OFF

Press ENTER at this menu option to send an OFF command to a relay. After confirming the request an OFF command will be sent. The MotorSaver® or PumpSaver® will remain in the off state (relay de-energized) until the reset button is pressed, or a RESET command is sent from the RM-1000 or the host network.

32_Reset

Press ENTER at this menu option to send a RESET command. The relay will be reset after confirming the request.

33_Clear LF (Clear Last Fault)

Press ENTER at this menu option to clear the last fault memory location in the relay, provided the relay supports the clear last fault function. Placing a CLEAR in the last fault memory location can be a helpful tool in system troubleshooting, ending any uncertainty about whether the last fault is new or very old.

34_Clear Hrs (Clear Run Hours)

Press ENTER at this menu option to clear the accumulated run hours, provided the relay supports the run hour feature. The run hour counter will be cleared when the command is confirmed.

4_SETUP MENU

41_Gen Options

411_Unl Set point

The unlock setpoint option allows enabling or disabling network programming of the setpoints of the relays on the network. If disabled, the operator can only view the setpoints of the relay, not change them.

412_A/S Rate

The Auto Scroll feature allows the RM-1000 REAL TIME mode screens to automatically scroll from one screen to the next at a desired interval. The intervals range from 0.5-127.5 seconds at 0.5-second intervals. Setting the delay to OFF disables the Auto Scroll feature.

413_A/S KeyDelay

If the Auto Scroll feature is enabled and one of the buttons on the keypad are pressed, the Auto Scroll feature is temporarily disabled for the amount of time set in the Auto Scroll Key Delay. The delay range is 0.5-127.5 seconds at 0.5 second intervals. Setting the delay to OFF disables the Auto Scroll feature.

414_Reference

This menu option displays the firmware version number.

42_Edit Nodes

4212_Model

Options: 777, 777-KW/HP, 77C, 601
777- All Model 777 relays except Model 777-KW/HP
777-KW/HP- All Model 777-KW/HP relays
77C- All single-phase relays, Model 77C and 777-HVR-SP
601- all Model 601 voltage monitors
This menu option is only needed for older model 601 relays. The RM-1000 is able to recognize the model of all compatible relays except older model 601s. This setting will automatically be overridden by the RM-1000 if it is programmed incorrectly.

4213_UC Alarm

Treat undercurrent as alarm if enabled.

43_Comm Settings

The communication settings can be set to standard or custom. Standard is the default setting. The custom slave communication settings are included for forward compatibility. The existing product line only supports the standard communication settings of 9600 baud, even parity and one stop bit (9600,E,1).

431_Slave Comm

Selecting “Cst” (Custom) allows the individual setup of baud rate, parity and stop bits for the slave port.

4311_Slave Baud

Slave port baud rate. 9600 is the default.
Options: 1200, 2400, 9600, 14400, 19200

4312_Slave Prty

Slave port parity. Even is the default.
Options: E (Even), O (Odd), N (None)

4313_Slave Stop

Number of Stop bits for the slave port. One is the default.
Options: 0, 1, 2

432_Host Comm

The communication settings can be set to standard or custom. Standard is the default setting which sets the communication parameters to 9600 baud, even parity and one stop bit (9600,E,1).

4321_Host Baud

Host port baud rate - 9600 is the default.
Options: 1200, 2400, 9600, 14400, 19200, 28800

4322_Host Parity

Host port parity - even is the default.
Options: E (Even), O (Odd), N (None)

4323_Host Stop

Number of Stop bits for the host port - One is the default.
Options: 0, 1, 2

44_Del All Nodes

This function deletes all programmed nodes from the RM-1000 memory. This feature is useful when moving an RM-1000 or making many changes to the system.

NOTE: If all nodes are deleted, the RM-1000 will remain in the 4_SETUP MENU until at least one node is programmed.

45_Learn Network

This function scans all network addresses from 1-99 in search of installed equipment. Any device that is found is programmed into the next available node. Devices already programmed into the RM-1000 will not be lost.

This function can be aborted at any time by pressing the MODE or ENTER buttons. The found nodes will be programmed. This allows the scan to be stopped as soon as all existing nodes have been found.

If the model can be read, no further programming is necessary. Only older Model 601 voltage monitors need to have the model programmed in submenu 4212.

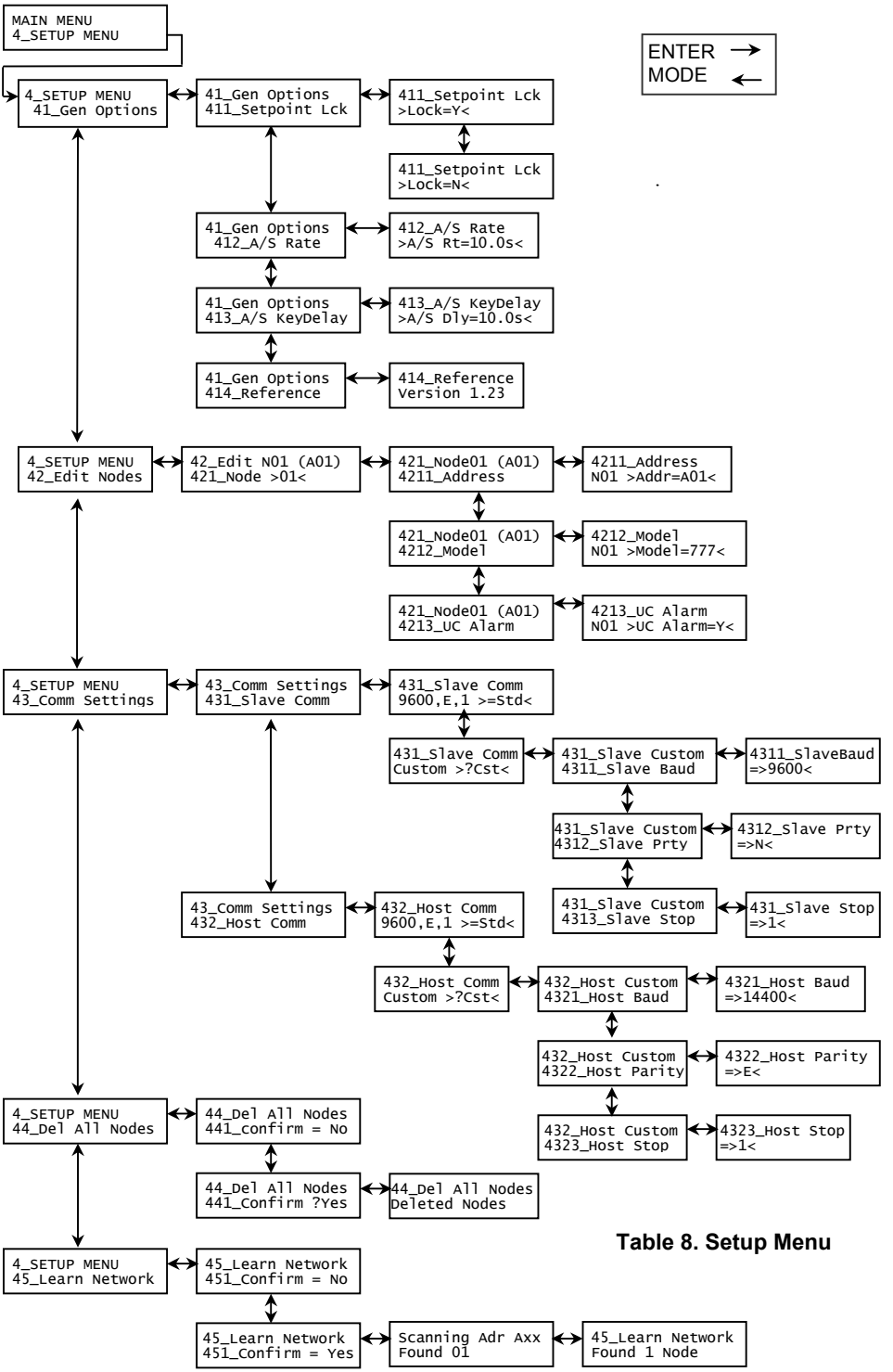


Table 8. Setup Menu

RM-1000 SPECIFICATIONS	
Power	
Nominal Power Supply Voltage Rating	12-24VAC or VDC (isolated power source with maximum 4A overcurrent protection)
Max Current	100mA
Environment	
Protection Class	NEMA 3R, IP44
Operating Temperature	-20° to 70°C
Storage Temperature	-40° to 80°C
Humidity	85% Non-condensing
Enclosure	
Dimensions	4.5" L x 3.2" W X 0.9" D
Weight	6 oz.
Material	Black Polycarbonate
UV Exposure w/o degradation	2000 hrs
Keypad Mechanical Lifetime	200,000 cycles
Keypad Material	Polyester
Panel Thickness	.03" min.
Terminal	Depluggable, Max Torque 3 in.-lbs.
Electrical Noise Immunity	
Electrostatic discharge	IEC 61000-4-2, Level 3 (6kV contact, 8kV air discharge)
Electromagnetic field	IEC 61000-4-3, Level 3 (10 V/m)
Fast transient burst	IEC 61000-4-4, Level 4+ (4kV on cable clamp)
Surge	IEC 61000-4-5, 24V supply, Level 1 (±500V) RS-485 & Reset Lines, Level 2 (±1kV)
Conducted RF	IEC 61000-4-6, Level 3+ (30 V_{rms})
Voltage dips & interruptions	SEMI F47
Agency Approvals	
UL	UL 508
CE	IEC 60947-1, IEC 1131-2
Communications	
Baud Rate	1200 - 19200
Protocol	Modbus RTU
Serial Interface	RS-485
Range	50 ft., 4000 ft. with separate supply