



ENGINEERING SPECIFICATION

SYMCOM MODEL RM-2000-RTDW REMOTE MONITOR FOR SYMCOM 777 / 77C / 601 PRODUCTS

PART 1 GENERAL

1.1 REFERENCES

- A. UL 508 Industrial Control Equipment – Underwriters Laboratories
- B. IEC 60947 Low Voltage Switchgear and Controlgear – International Electrotechnical Commission
- C. CSA C22.2 No. 14 Industrial Control Equipment – Canadian Standards Association
- D. ANSI/IEEE C62.41 – American National Standards Institute/Institute of Electrical & Electronics Engineers

Remote monitors shall be installed according to the latest version of the National Electrical code.

1.1 WARRANTY

A. Manufacturer Warranty: The manufacturer shall guarantee the voltage monitor to be free from defects in material and workmanship for a period of five years from the date of manufacture when installed and operated according to the manufacturer's requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

The equipment specified shall be the RM-2000-RTDW, manufactured by SymCom, Inc.

2.2 DESCRIPTION

A. Regulatory Requirements:

1. The equipment shall be UL Listed as type NKCR—Industrial Control Equipment-Motor Controllers-Auxiliary Devices.
2. The equipment shall be cUL Listed as type NKCR7—Industrial Control Equipment-Motor Controllers-Auxiliary Devices Certified for Canada.
3. The equipment shall be CE marked for use in the European Union and evaluated against IEC 60947 Low Voltage Switchgear and Controlgear.
4. The equipment shall be CSA certified as class 3211-03—Industrial Control Equipment-Motor Controllers-Auxiliary Devices.

2.3 PERFORMANCE/DESIGN CRITERIA: RM-2000-RTDW REMOTE MONITOR FOR SYMCOM 777 / 77C / 601 PRODUCTS

A. Capabilities and Features

1. The remote monitor shall be able to discover, monitor, and control a SymCom 777 / 77C / 601 device on a Modbus network.
2. The remote monitor shall be able to communicate with a remote RTD module via Modbus.
3. The remote monitor shall provide the ability to send motor/pump start and stop commands to the 777 / 77C / 601 using the keypad.
4. The remote monitor shall be able to display the following real-time parameters for the product specified:
 - a. Model 777 real-time parameters:
 - 1) average voltage
 - 2) average current
 - 3) individual phase currents
 - 4) current unbalance
 - 5) individual line-to-line voltages
 - 6) voltage unbalance
 - 7) ground fault current
 - 8) run hours
 - 9) power factor
 - 10) power reading (in KW)
 - 11) rapid cycle time remaining
 - 12) restart delay after undercurrent trip
 - 13) restart delay after any fault excluding undercurrent
 - 14) reactive power (KVARs)
 - 15) motor power draw (kW)
 - 16) motor energy consumption (kWh)
 - 17) total number of motor starts
 - 18) total number of motor trips
 - 19) remote monitor input status bits
 - 20) pending fault information
 - 21) 777 model number
 - 22) 777 software revision number
 - 23) 8 RTD temperature measurements
 - 24) warnings based on settable warning levels
 - b. Model 77C real-time parameters:



- 1) voltage
 - 2) current
 - 3) run hours
 - 4) rapid cycle time remaining
 - 5) restart delay after undercurrent trip
 - 6) restart delay after any fault excluding undercurrent
 - 7) reactive power (KVARs)
 - 8) motor power draw (kW)
 - 9) motor energy consumption (kWh)
 - 10) total number of motor starts
 - 11) total number of motor trips
 - 12) remote monitor input status bits
 - 13) pending fault information
 - 14) 77C model number
 - 15) 77C software revision number
 - 16) 8 RTD temperature measurements
 - 17) warnings based on settable warning levels
- c. Model 601 real-time parameters:
- 1) average voltage
 - 2) individual line-to-line voltages
 - 3) voltage unbalance
 - 4) rapid cycle time remaining
 - 5) restart delay after faults
 - 6) remote monitor input status bits
 - 7) frequency
 - 8) 601 model number
 - 9) 601 software revision number
 - 10) 8 RTD temperature measurements
 - 11) warnings based on settable warning levels
5. The remote monitor shall be able to display the following detailed information about the last 4 recorded faults:
- a. type of the fault
 - b. date and time when the fault occurred
 - c. individual phase current measurements just before the fault occurred
 - d. line-to-line voltage measurements just before the fault occurred
 - e. current unbalance just before the fault occurred
 - f. average current just before the fault occurred
 - g. voltage unbalance just before the fault occurred
 - h. average voltage just before the fault occurred
 - i. ground fault current just before the fault occurred
6. The remote monitor shall be able to store the date and time of the last 10 events, which include:
- a. motor starts
 - b. motor stops
 - c. remote monitor power on
 - d. remote monitor power off
 - e. communication on
 - f. communication loss
7. The remote monitor shall be capable of displaying the following event data:
- a. date and time of the last motor start
 - b. length of time between the last motor start and stop
 - c. the minimum length of time the motor was off (minimum off time)
 - d. date and time of the start following the minimum off time
 - e. minimum time before the next start
8. The remote monitor shall provide the ability to view/modify the following set points for the product specified:
- a. Model 777 set points:
- 1) overcurrent trip point
 - 2) undercurrent trip point (except for 777-KW/HP models)
 - 3) high voltage trip point
 - 4) low voltage trip point
 - 5) current unbalance trip point
 - 6) voltage unbalance trip point
 - 7) current multiplier
 - 8) ground fault trip limit
 - 9) rapid-cycle delay time
 - 10) restart delay after all faults excluding undercurrent
 - 11) restart delay after an undercurrent fault
 - 12) trip class setting
 - 13) undercurrent trip delay setting (except for 777-KW/HP models)
 - 14) number of restarts after an undercurrent fault
 - 15) number of restarts after all faults excluding undercurrent
 - 16) high power trip point (777-KW/HP models only)
 - 17) low power trip point (777-KW/HP models only)



- b. Model 77C set points:
 - 1) overcurrent trip point
 - 2) undercurrent trip point (except for 77C-KW/HP models)
 - 3) high voltage trip point
 - 4) low voltage trip point
 - 5) current multiplier
 - 6) rapid-cycle delay time
 - 7) restart delay after all faults excluding undercurrent
 - 8) restart delay after an undercurrent fault
 - 9) trip class setting
 - 10) undercurrent trip delay setting (except for 77C-KW/HP models)
 - 11) number of restarts after an undercurrent fault
 - 12) number of restarts after all faults excluding undercurrent
 - 13) high power trip point (77C-KW/HP models only)
 - 14) low power trip point (77C-KW/HP models only)
- c. Model 601 set points:
 - 1) high voltage trip point
 - 2) low voltage trip point
 - 3) voltage unbalance trip point
 - 4) rapid-cycle delay time
 - 5) restart delay after faults
 - 6) number of restarts after faults
 - 7) high frequency trip point
 - 8) low frequency trip point
- 9. The remote monitor shall provide the ability to manually read from and write to all available 777 / 77C / 601 Modbus registers.
- 10. The remote monitor shall be capable of sending the following commands to the attached 777 / 77C / 601:
 - a. turn on/off communication watchdog
 - b. send an off command
 - c. send an on command (reset)
 - d. lock/unlock network programming
 - e. clear run hours
 - f. clear last fault
- 11. The remote monitor shall provide the ability to view/modify the following operating parameters:
 - a. year, month, day, hour, minute, and second of the real-time clock
 - b. remote RTD communication settings including:
 - 1) module Modbus address (A16 to A23)
 - 2) baud rate (300, 600, 1200, 2400, 9600, 14400, 19200, or 28800)
 - 3) parity (even, odd, or none)
 - 4) number of stop bits (0, 1, or 2)
 - c. 777 / 77C / 601 communications settings including:
 - 1) Modbus address (A00 to A99)
 - 2) baud rate (300, 600, 1200, 2400, 9600, 19200, or 28800)
 - 3) parity (even, odd, or none)
 - 4) number of stop bits (0, 1, or 2)
 - d. Network (upstream) communications settings including:
 - 1) Modbus address (A00 to A99)
 - 2) baud rate (300, 600, 1200, 2400, 9600, 14400, 19200, or 28800)
 - 3) parity (even, odd, or none)
 - 4) number of stop bits (0, 1, or 2)
 - e. The following upstream network communication watchdog (no messages are received for 10 seconds) settings:
 - 1) watchdog disabled
 - 2) watchdog results in sending an OFF command to the 777 / 77C / 601
 - 3) watchdog results in sending a watchdog command to the 777 / 77C / 601
 - 4) watchdog results in turning off board relays (if available)
 - f. Model number of the device (777 / 77C / 601) to monitor
 - g. Voltage multiplier if potential transformers are in use
 - h. Automatic LCD dim enabled/disabled
 - i. Undercurrent alarm enabled/disabled (excludes 601 models)
 - j. Type of events to log including:
 - 1) motor starts
 - 2) motor stops
 - 3) remote monitor power on
 - 4) remote monitor power off
 - 5) communications on
 - 6) communications loss
 - k. RTD limits settings including:
 - 1) RTD trip temperature (the temperature that must be exceeded to trip the output relay of the attached 777 / 77C / 601)
 - 2) RTD alarm temperature (the temperature that must be exceeded to energize the remote monitor RTD alarm relay)
 - l. Minimum time between motor/pump starts
 - m. Motor nameplate nominal voltage
 - n. Motor nameplate full load amperage (FLA)



- o. Warning settings, including:
 - 1) Undercurrent percentage of FLA (Off to 1,275% in 5% increments)
 - 2) Overcurrent percentage of FLA (Off to 1,275% in 5% increments)
 - 3) Low voltage percentage of nominal voltage (Off to 1,275% in 5% increments)
 - 4) High voltage percentage of nominal voltage (Off to 1,275% in 5% increments)
 - 5) Current unbalance percentage (same current unbalance limits as 777 / 77C / 601)
 - 6) Voltage unbalance percentage (same current unbalance limits as 777 / 77C / 601)
 - p. Output relay status
12. The remote monitor shall provide the ability to configure whether the warning relay energizes if the remote monitor loses communication with the 777 / 77C / 601.
 13. The remote monitor shall provide the ability to configure whether the RTD relay energizes if the remote monitor loses communication with the RTD module.
 14. The remote monitor shall provide the ability to configure whether the attached overload will trip if the remote monitor loses communication with the RTD module.
 15. The remote monitor shall provide the ability to clear all of its internally stored data including:
 - a. motor history information
 - b. fault history
 - c. event history
 - d. minimum off time
 16. The remote monitor shall have a hardware programming lock which enables/disables the ability to change set points. This lock shall be disabled when two pins (K1 and K2) are shorted together; otherwise it is enabled.
 17. The remote monitor shall provide the ability to display the status of the hardware programming lock.
 18. The remote monitor shall provide the ability to enable/disable its start/stop buttons.
 19. The remote monitor shall be capable of displaying its firmware version number.
 20. The remote monitor shall contain five red LEDs to indicate the display mode.
 21. The remote monitor shall contain a green LED to indicate the communication status between the remote monitor, 777 / 77C / 601, and RTD module using the following logic:
 - a. LED is on, communication is good with both slaves
 - b. LED is blinking, communication has been lost with one slave
 - c. LED is off, no communication with either slave is detected
 22. The remote monitor shall contain a green LED to indicate if the motor is drawing current.
 23. The remote monitor shall contain a red LED to indicate faults using the following logic:
 - a. LED is on solid, the attached 777 / 77C / 601 has tripped
 - b. LED is blinking, the attached 777 / 77C / 601 has a pending fault
 - c. LED off, no faults
- B. Input/Output Configurations
1. The remote monitor shall contain a form C output relay rated at 240VA / 5A @ 120 VAC to be utilized as an RTD alarm.
 2. The remote monitor shall contain a form C output relay rated at 240VA / 5A @ 120 VAC to be utilized as a warning alarm.
 3. The remote monitor shall contain an input to connect to a ground-fault module.
 4. The remote monitor shall contain an input to connect to a remote reset button.
- C. Warning Relay Functionality
1. The warning relay will energize if at least one of the following criteria is met:
 - a. the average of the measure phase currents drops below the undercurrent warn level
 - b. any of the measured phase currents exceed the overcurrent warn level
 - c. the average measured voltage is greater than the high voltage warn level
 - d. the average measured voltage is less than the low voltage warn level
 - e. the current unbalance warn level is exceeded
 - f. the voltage unbalance warn level is exceeded
- D. Power Requirements
1. The remote monitor shall require 115 VAC.
 2. The remote monitor shall consume no more than 3 Watts.
- E. Electromagnetic Compatibility
1. The equipment shall be immune to electrostatic discharge per IEC 1000-4-2, Level 3, 6 kV contact discharge and 8 kV air discharge.
 2. The equipment shall be immune to electrostatic discharge per IEC 1000-4-3, Level 3, 10 V/m.
 3. The equipment shall be immune to electrical fast transient bursts exceeding IEC 1000-4-4, Level 4+, 4 kV power supply port and 2 kV inputs/output ports".
 4. The equipment's 24V supply shall be immune to electrical surges per IEC 1000-4-5, Level 1. Specified limits shall be 500V line-to-line and line-to-ground.
 5. The equipment's RS-485 and reset lines shall be immune to electrical surges per IEC 1000-4-5, Level 2. Specified limits shall be 1kV line-to-line and line-to-ground.



6. The equipment shall be immune to radiated radio frequency emissions per IEC 1000-4-6, Level3+. Specified limits shall be 10 V/m at 150 MHz.
- F. Enclosure Class of Protection: The equipment shall provide NEMA 3R protection.
- G. Environmental Requirements
1. The equipment shall operate continuously without de-rating in ambient temperatures of -20° to 70°C (-4° to 158°F).
 2. The equipment shall operate continuously without de-rating in relative humidity of up to 85% non-condensing.
 3. The equipment shall operate properly after storage in ambient temperatures of -30° to 70°C (-22° to 158°F).
- H. Dimensions:
1. The equipment dimensions shall not exceed 6.4" high X 6.1" wide X 1.1" deep.
- I. Mounting:
1. The equipment shall be surface mountable on a backplane using 4 screws, bolts or similar mounting hardware.

End of Section