



ENGINEERING SPECIFICATION

SYMCOM MODEL 460/ 460-L/ 460-575 /460-MR /460-VBM /460-400Hz 3-PHASE VOLTAGE MONITOR/PROTECTION RELAY

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. ANSI/IEEE C62.41 – American National Standards Institute/Institute of Electrical & Electronics Engineers
- D. CSA C22.2 No. 14 Industrial Control Equipment – Canadian Standards Association

1.1 WARRANTY

- A. Manufacturer Warranty: The manufacturer shall guarantee the equipment to be free from material and workmanship defects 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

For Model 460

The equipment specified shall be the Model 460, manufactured by SymCom, Inc.

For Model 460-L

The equipment specified shall be the Model 460-L, manufactured by SymCom, Inc.

For Model 460-575

The equipment specified shall be the Model 460-575, manufactured by SymCom, Inc.

For Model 460-MR

The equipment specified shall be the Model 460-MR, manufactured by SymCom, Inc.

For Model 460-VBM

The equipment specified shall be the Model 460-VBM, manufactured by SymCom, Inc.

For Model 460-400Hz

The equipment specified shall be the Model 460-400Hz, 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 ULC 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.

2.3 PERFORMANCE/DESIGN CRITERIA: 3-PHASE VOLTAGE MONITOR/PROTECTION RELAY

- A. Protective Relay Functions
 1. The equipment shall provide protection against the following conditions (*For All Models*):
 - a. phase loss (single-phasing)
 - b. phase reversal
 - c. low voltage
 - d. high voltage
 - e. voltage unbalance
 - f. rapid cycling
- B. Capabilities and Features
 1. Inputs
 - For Model 460*
 - a. an adjustable voltage range of 190-480VAC
 - For Model 460-L*
 - a. an adjustable voltage range of 190-480VAC
 - For Model 460-MR*
 - a. an adjustable voltage range of 190-480VAC
 - For Model 460-VBM*
 - a. an adjustable voltage range of 190-480VAC
 - For Model 460-575*
 - a. an adjustable voltage range of 475-600VAC
 - For Model 460-400Hz*
 - a. an adjustable voltage range of 190-480VAC for 400Hz
 2. Outputs
 - a. The equipment shall include one Form C output relay contact pilot duty rated 480VA @ 240VAC.
 - b. The equipment shall include one Form C output relay contact general purpose rated 10A @ 240VAC.



3. Functional Specifications
- a. The equipment shall include:
- For Model 460*
- an adjustable phase unbalance trip point of 2–8%
 - an adjustable trip delay of 1–30 seconds for low, high, and unbalanced voltage faults
 - an adjustable restart delay of 1–500 seconds
 - a low voltage trip (90% of nominal setting)
 - a high voltage trip (110% of nominal setting)
- For Model 460-L*
- a phase unbalance trip point of 6%
 - a trip delay of 4 seconds for low, high, and unbalanced voltage faults
 - a trip delay of 1 second for single-phasing faults
 - an adjustable restart delay of 1-500 seconds
 - a low voltage trip of 90%
 - a high voltage trip of 110%
- For Model 460-MR*
- an adjustable phase unbalance trip point of 2–8%
 - an adjustable trip delay of 1–30 seconds for low, high, and unbalanced voltage faults
 - a manual reset and an adjustable restart delay of 1–500 seconds
 - a low voltage trip of 90%
 - a high voltage trip of 110%
- For Model 460-VBM*
- an adjustable low voltage trip point of 185-480VAC
 - and adjustable high voltage trip point of 208-528VAC
 - a phase unbalance trip point of 6%
 - an adjustable trip delay of 1-30 seconds for low, high, and unbalanced voltage faults
 - an adjustable restart delay of 1-500 seconds
- For Model 460-575*
- an adjustable phase unbalance trip point of 2–8%
 - an adjustable trip delay of 1–30 seconds for low, high, and unbalanced voltage faults
 - an adjustable restart delay of 1–500 seconds
 - a low voltage trip of 90%
 - a high voltage trip of 110%
- For Model 460-400Hz*
- an adjustable phase unbalance trip point of 2–8%
 - an adjustable trip delay of 1–30 seconds for low, high, and unbalanced voltage faults
 - an adjustable restart delay of 1–500 seconds
 - a low voltage trip of 90%
 - a high voltage trip of 110%
- b. The equipment shall have a voltage accuracy of $\pm 1\%$
- c. The equipment shall open the control relay in 1 second if the VUB is 15% or greater.
- d. The equipment shall have two indicator lights. The light scheme shall have the capability to indicate whether the phase monitor is in run mode, restart delay mode, or fault mode. Fault modes shall be high/low voltage, unbalance/single-phase and phase reversal.
- E. Electromagnetic Compatibility
- The equipment shall be immune to electrostatic discharge per IEC 61000-4-2, Level 3, 6kV contact discharge and 8kV air discharge.
 - The equipment shall be immune to electrical fast transient bursts exceeding IEC 61000-4-4, Level 3. Specified limits shall be 3.5kV.
 - The equipment shall be immune to electrical surges per IEC 61000-4-5, Level 3 and Level 4. Specified limits shall be 4kV line-to-line and 4kV line-to-ground.
 - The equipment shall be immune to electrical surges per ANSI/IEEE C62.41 Surge and Ring Wave Compliance. Specified limits shall be 6kV line-to-line and line-to-ground.
 - The equipment shall be immune to radiated radio frequency emissions. Specified limits shall be 10V/m at 150 MHz.
- C. Dielectric Isolation: Equipment withstands an alternating current potential of 1000V plus twice the rated voltage of the equipment for one minute without breakdown between uninsulated live parts and the enclosure with the contacts open and closed; between terminals of opposite polarity with the contacts closed; and between uninsulated live parts of different circuits.
- F. Enclosure Class of Protection: The equipment shall provide IP20 (finger safe) protection.
- G. Environmental Requirements
- The equipment shall operate continuously without derating in ambient temperatures of -20° to 70°C (-4° to 158°F).
 - The equipment shall operate continuously without derating in relative humidity of up to 95% non-condensing per IEC 68-2-3.
 - The equipment shall operate properly after storage in ambient temperatures of -40° to 80°C (-40° to 176°F).
- H. Dimensions: The equipment dimensions shall not exceed 3.5" H X 2.084" W X 2.350" D.



- I. Mounting:
 - 1. The equipment shall be mountable on standard 35 mm DIN rail.
 - 2. The equipment shall be surface mountable.

End of Section