

# Syncrocloser<sup>®</sup> Check Plus M-0359



- Enhances system stability when applied to transmission and primary distribution reclosing schemes.
- Detects a static phase angle across an open breaker in 0.5 second to assure a fast permissive for reclosure.
- Simultaneously measures voltage magnitudes to ensure that they are within upper, lower and difference limits.
- Includes dead line/dead bus closing features.
- Remote command widens the phase angle setpoint to respond to system emergencies or to narrow the setpoint when the two systems are isolated to close the breaker very close to 0°.
- Transducer analog outputs are SCADA compatible.

## INPUTS

1. Power is derived from either the Line or Bus input, whichever is greater. Below 65 V, the low voltage detection circuitry will shut down the M-0359.
2. Line voltage, nominal 120 V ac, 145 V ac maximum continuous. Will withstand 240 V ac for 1 sec.
3. Bus voltage, nominal 120 V ac, 145 V ac maximum continuous. Will withstand 240 V ac for 1 sec.

**NOTE:** Line and Bus voltage inputs are transformer-isolated, allowing complete freedom in applications.

4. Select Dead Bus Close (by closing contact)\*.
5. Select Dead Line Close (by closing contact)\*.

\* **NOTE:** One input must be greater than 100 V ac to ensure output relay closure.

6. Shift **PHASE ANGLE LIMIT** setpoint. An external contact closure will reduce the setpoint by a specified ratio. This can also be used as a widening function by operating with the external terminals normally closed.
7. Enable Sync-Check.

## BURDEN

Whichever input voltage is high, 11 VA; other input, 1 VA.

## CONTROLS

**UPPER VOLTAGE LIMIT:** 110 to 140 V ac either input, dial calibration accuracy  $\pm 2\%$  of full scale.

**LOWER VOLTAGE LIMIT:** 90 to 120 V ac either input, dial calibration accuracy  $\pm 2\%$  of full scale.

**DELTA V LIMIT:** 1 to 5 V, dial calibration accuracy  $\pm 5\%$  of full scale. Other ranges available.

**DEAD LINE LIMIT:** 10 to 60 V, dial calibration accuracy  $\pm 7\%$  of full scale.

**DEAD BUS LIMIT:** 10 to 60 V, dial calibration accuracy  $\pm 7\%$  of full scale.

**PHASE ANGLE LIMIT:** 0 to  $\pm 30^\circ$ , dial calibration accuracy  $\pm 5\%$  of full scale. Other ranges available.

**DELTA F LIMIT:** 0.01 to 0.5 Hz, dial calibration accuracy  $\pm 5\%$  of full scale.

**NOTE:** Controls are independent of each other and do not require additional instrumentation for field setting.

## LED INDICATORS

All LEDs are lit when conditions are met to close the breaker.

**BUS UPPER VOLTAGE LIMIT OK**  
**LINE UPPER VOLTAGE LIMIT OK**  
**BUS LOWER VOLTAGE LIMIT OK**  
**LINE LOWER VOLTAGE LIMIT OK**  
**DELTA V OK**  
**LINE HOT**  
**BUS HOT**  
**ANGLE OK**  
**DELTA F OK**

## BREAKER CLOSE RELAY

Dry output contacts rated to make and carry 20 A at 250 V dc, and interrupt 0.9 A at 120 V dc or 0.4 A at up to 250 V dc inductive load. Open contacts will withstand 1500 V ac for 1 min. Contacts to ground will withstand 1500 V ac for 1 min.

## RESPONSE TIME

When the Line and Bus inputs are first applied to the unit, the voltage magnitude circuits require approximately 0.5 sec. to sense the correct voltage. The unit will simultaneously measure phase angle and close the breaker with proper phase angle after this initial delay. In closing on dead line or dead bus, the phase condition is ignored so that the unit will close upon a voltage below the set threshold in approximately 0.5 sec.

## STATUS RELAY CONTACTS

**Voltage Status Relay:** Closed when Voltage conditions are within limits.

**Phase Angle Status Relay:** Closed when Phase Angle is within limits.

**Delta Frequency Status Relay:** Form C contact provided.

These are light duty contacts intended primarily for status interrogation by supervisory. They can be used to light local lights with the following restrictions:

1/2 A at 125 V dc resistive; 1 A at 120 V ac, 250 V dc across open contacts.

## ANALOG OUTPUTS

Various dc analog outputs are provided for Bus Voltage, Line Voltage, Delta V, Phase Angle, and Delta F. These analog outputs can interface with most SCADA systems.

## RELIABILITY

The M-0359 Syncrocloser® Check Plus relay is assembled on three glass-epoxy printed circuit boards. All semiconductor components are hermetically sealed, and of the highest and most reliable quality available. Highly stable, instrument-grade capacitors and resistors are used in critical measurement circuits to minimize the possibility of error.

## TRANSIENT PROTECTION

Input and output circuits are protected against system transients. The M-0359 will pass all requirements of ANSI/IEEE C37.90.1-1989, which defines oscillatory and fast transient surge withstand capability. All inputs and outputs will withstand 1500 V ac to chassis or instrument ground for one minute. Voltage inputs are electrically isolated from each other, from other circuits, and from ground.

## ENVIRONMENTAL

**Temperature Range:** Units will operate properly over a temperature range of -40° to +80°C.

**Humidity:** Stated accuracies are maintained at up to 95% relative humidity (non-condensing).

**Fungus Resistance:** A conformal printed circuit board coating inhibits fungus growth.

## PHYSICAL

**Size:** 19" wide x 3-1/2" high x 13" deep (48.3 cm x 8.9 cm x 33.0 cm). Requires two rack units space in a standard 19" rack. May also be panel mounted horizontally or vertically.

**Approximate Weight:** 15 lb (6.8 kg).

**Approximate Shipping Weight:** 20 lb (9.1 kg).

## SYNCROCLOSER® COVER KIT M-0217

The M-0217 may be ordered that includes a transparent cover and mounting bracket to cover the controls and prevent accidental resetting.

## PATENT

The M-0359 Syncrocloser Check Plus relay is covered by U.S. Patent 4,218,625.

## WARRANTY

The M-0359 Syncrocloser Check Plus relay is covered by a five year warranty from date of shipment.

*Specification is subject to change without notice.*



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