

# Syncrocloser<sup>®</sup> Unit M-0193B



- **Accurate, independent controls require no additional instrumentation for field setting**
- **Various  $\Delta V$  and  $\Delta F$  limits available**
- **Breaker closing times are field programmable**
- **50 Hz operation available**

## Inputs

**Gen/Line Voltage**, nominal 120 V ac, 145 V ac maximum continuous. Will withstand 200 V ac for 1 sec.

**Bus Voltage**, nominal 120 V ac, 145 V ac maximum continuous. Will withstand 200 V ac for 1 sec.

**Supply Voltage**, minimum 100 V ac, maximum 140 V ac.

**Enable Auto-Sync** close.

**Breaker Closing Time**; field programmable from 20 to 800 ms.

■ **NOTE:** Gen/Line, Bus and Supply voltages are transformer-isolated to allow complete freedom in applications.

## Burden

**Gen/Line or Bus:** 0.5 VA maximum at 120 V ac

**Supply:** 7 VA maximum at 120 V ac

## Controls

**UPPER VOLTAGE LIMIT** (either input): 110 to 140 V ac, accuracy  $\pm 1\text{--}1/2\%$  of full scale

**LOWER VOLTAGE LIMIT** (either input): 90 to 120 V ac, accuracy  $\pm 1\text{--}1/2\%$  of full scale

**$\Delta V$  LIMIT** (MAXIMUM VOLTAGE DIFFERENCE LIMIT): 1 to 5 V ac, accuracy  $\pm 5\%$  of full scale. Multiples of this range are available. A  **$\Delta V$  LIMIT** of 4 to 20 V ac or lower must be specified if the M-0193B is to be used in conjunction with the M-0194 Generator Control Unit.

**$\Delta F$  LIMIT** (Maximum Frequency Difference Limit): 0.05 to 0.5 Hz, accuracy  $\pm 3\%$  of full scale. An additional range of 0.005 to 0.05 Hz is available.

## LED Indicators

These LEDs are lit when conditions are met to close the breaker:

**BUS UPPER VOLTAGE LIMIT OK**

**GEN/LINE UPPER VOLTAGE LIMIT OK**

**BUS LOWER VOLTAGE LIMIT OK**

**GEN/LINE LOWER VOLTAGE LIMIT OK**

**$\Delta V$  LIMIT OK**

**$\Delta F$  LIMIT OK**

**M-0193B READY**

## Breaker Close Relays

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

## Status Contacts

Relay contacts; closed indicates  $\Delta F$  conditions OK

Relay contacts; closed indicates  $\Delta V$  conditions OK

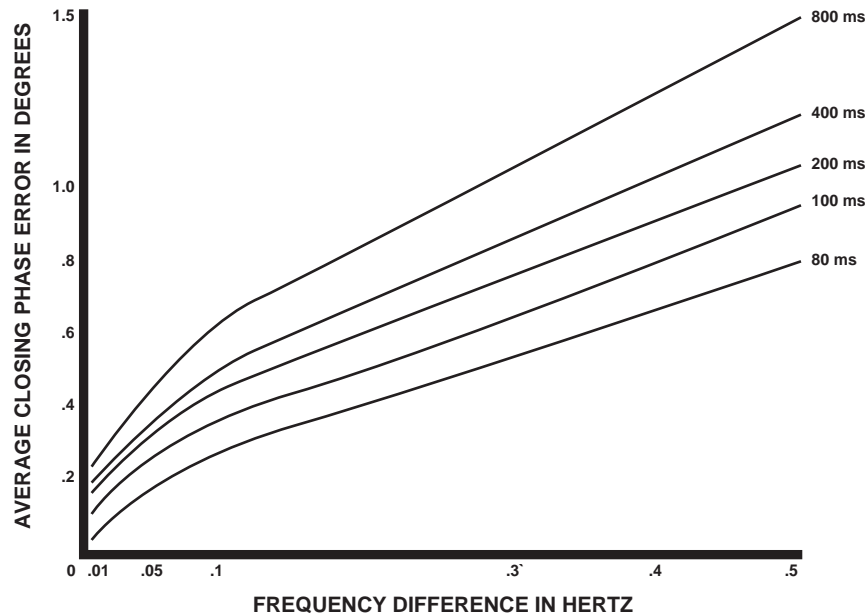
These are light duty contacts intended primarily for status interrogation by supervisory control. They can be used to light local lights with the following maximum restrictions: 1/2 A at 125 V dc resistive, 1 A 120 V ac, 250 V dc across open contacts

## Minimum Frequency Difference

The guaranteed minimum frequency difference for operation is 0.0005 Hz; however, typical units consistently operate with frequency differences of 0.0001 Hz.

## Zero Phase Prediction

The figure below illustrates the average closing phase error as a function of frequency difference for 80 ms, 100 ms, 200 ms, 400 ms, and 800 ms breaker closing times. This data was taken under lab conditions with a constant frequency difference.



## Anti-Motoring

The Anti-Motoring feature prevents closing of the breaker when the generator frequency is slower than the line frequency, thus preventing motoring power from flowing into the generator. This feature is enabled/disabled by a switch internal to the M-0193B. This default position is OFF (disabled).

## Operator Window Option

The Operator Window Option allows an operator to work in conjunction with the M-0193B. The operator's contact must be closed within a variable time and phase angle "window", otherwise the M-0193B will block closing of the breaker. The unit will then automatically reset for the next attempt to close.

## Anti-Pump Option

The breaker close contacts will close for approximately 0.5 sec. Power must be removed for approximately 10 sec. before another closure is possible, regardless of other inputs. A front panel LED (M-0193B Ready) indicates that the M-0193B is active and ready to operate, provided input conditions meet their respective limits. The M-0193B can be ordered without the Anti-Pump Option. In this case, the M-0193B will close once on each slip cycle when all input conditions are within their limits and the unit is enabled.

## Generator Control Unit Compatibility Option

This option must be ordered if the M-0193B is to be used in conjunction with the M-0194 Generator Control Unit. Please refer to the M-0193B Application Guide for further information.

## **50 Hz Option**

This option allows the M-0193B to operate with Gen/Line and Bus frequency at nominal 50 Hz.

## **Mounting Options**

Horizontal mounting is standard; vertical mounting or vertical General Electric GES21A Retrofit Panel mounting are available as options.

## **Syncrocloser® Unit cover Kit**

The M-0193B Syncrocloser Unit includes a transparent cover with associated mounting bracket to cover the dials and prevent accidental resetting.

## **Reliability**

The M-0193B Syncrocloser Unit is assembled on a single glass-epoxy printed circuit board, thereby eliminating the need for plug-in connectors. All semiconductor components are hermetically sealed and are 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.

The output relay is picked up for approximately 0.5 sec. by a capacitor which also forms the time delay. No sela-in is required, because once the capacitor discharge into the relay is started, it cannot be stopped by input conditions.

## **Transient Protection**

Input and output circuits are protected against system transients. The M-0193B will pass 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:** Stated accuracies are maintained from  $-40^{\circ}$  to  $+80^{\circ}$  C

**Humidity:** Stated accuracies are maintained under 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 (48.26 cm x 8.89 cm x 33.02 cm). Horizontal mounting requires two rack units space in a standard 19" rack.

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

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

## **Patents**

U.S. Patent 3,491,248

## **Warranty**

The M-0193B Syncrocloser Unit is covered by a five year warranty from date of shipment.

*Specification subject to change without notice.*

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