

# Electronic Frequency Relay

EFRs for Acceleration of Wound Rotor Motors  
 P/N 5330-48746-xxx with Power Supply, P/N 5330-48751-xxx without Power Supply

Specification Sheet • May 1991

## General Information

The Electronic Frequency Relay (EFR) master/slave system is designed to be used with wound rotor motor controls. The master unit is a complete frequency relay providing one point of frequency detection. The master relay can be used as a stand-alone relay. The slave unit must be used with the master unit and provides additional points of frequency detection.

Standard features of the EFR master/slave system include: Green "Relay On" indicator; Red "Relay Picked Up" indicator; 5.5-218 hz response range; single frequency adjustment set point for each device; fixed or adjustable differential between pick-up and drop-out points; and a hand held calibration module to monitor, calibrate, or troubleshoot the system.

## Application

The EFR master/slave frequency sensor system is comprised of two basic relay assemblies:

The first assembly is the master unit with power supply which can be used as a single accelerator, plugging relay, overspeed indicator or frequency limit indication relay.

The second assembly is the slave unit without power supply which must be operated with the master unit. The slave unit provides additional steps of acceleration. As many as five (5) slave units can be connected to the master unit.

The advantage of frequency control plugging, anti-plugging, overspeed sensing or acceleration is that the control is responsive to the actual motor speed. The EFR system can be applied to any wound rotor induction motor having a secondary voltage between 75-600 volts.

## Description

The Type 5330 EFR master unit consist of a rotor transformer (which provides motor secondary signal isolation), power supply transformer, electronic input module, electronic frequency module, and a DPDT output relay. The relay requires an input voltage of 120V AC, 60 hz.

The 5330 EFR slave unit consist of an electronic frequency module and a DPDT output relay. The slave unit receives its operating power and the motor rotor frequency signal from the master unit.

## Frequency Calibration Module

(P/N 5330-48771-101)

The calibration module is a hand held digital frequency meter and signal generator which can be used to set up or calibrate an existing master/slave frequency sensor system or to troubleshoot an installed system.

In one mode of operation, the calibration module will monitor the motor secondary frequency. The digitally displayed frequency can be used for system speed indication.

In the second mode of operation, the calibration module will generate an adjustable frequency signal to test and verify system frequency points.

The calibration module connects to the EFR system with three signal wires. The module is portable which allows calibration and/or troubleshooting of the EFR to be made "in the field" rather than on a test bench. When calibration is complete, the module can be easily disconnected and stored for future use.

## Typical Uses and Settings♦

Contact	Frequency Range	Setting	Part Number	
			w/ Pwr Supply (Master)	w/o Pwr Supply (Slave)

### 5 Speed Bridge or Trolley

PR	50-260 hz	DO 62 hz	5330-48746-105	—
1AR	15-80 hz	DO 39 hz	—	5330-48751-103
2AR	15-80 hz	DO 20 hz	—	5330-48751-103
3AR	5-30 hz	DO 9 hz	—	5330-48751-101

### 5 Speed Hoist

2AR	15-80 hz	DO 42 hz	5330-48746-103	—
3AR	15-80 hz	DO 23 hz	—	5330-48751-103
4AR	5-30 hz	DO 9 hz	—	5330-48751-101

### 6 Speed Hoist

2AR	15-80 hz	DO 45 hz	5330-48746-103	—
3AR	15-80 hz	DO 30 hz	—	5330-48751-103
4AR	5-30 hz	DO 15 hz	—	5330-48751-101
5AR	5-30 hz	DO 7 hz	—	5330-48751-101

## Special Application Settings♦

Frequency Range	Setting	Part Number	
		w/ Pwr Supply (Master)	w/o Pwr Supply (Slave)

### Plugging Relay for Bridge or Trolley

50-260 hz	DO 62 hz	5330-48746-105	5330-48751-105
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### Plug to Stop Relay for Bridge or Trolley

15-80 hz	PU 62 hz	5330-48746-107	5330-48751-107
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### Non-Hoist Relay for Counter Torque Hoist

15-80 hz	PU 59 hz	5330-48746-107	5330-48751-107
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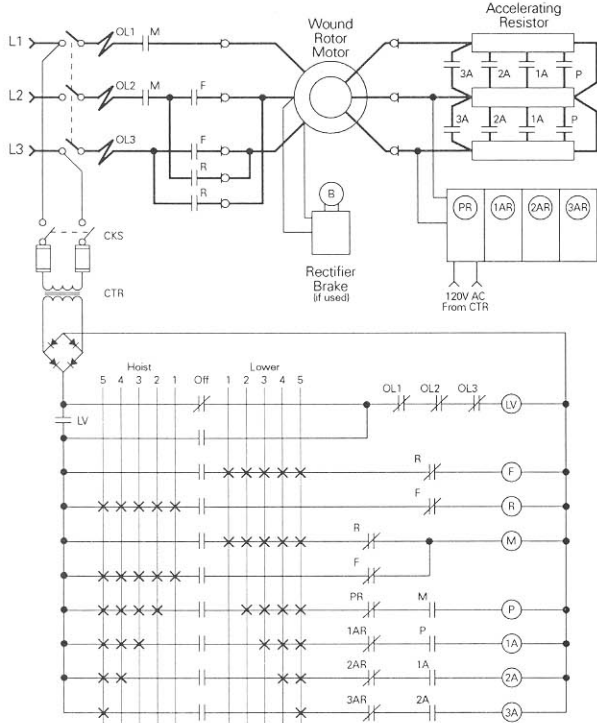
### Overspeed Relay for Counter Torque Hoist

50-260 hz	PU 130 hz	5330-48746-105	5330-48751-105
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♦ When Used with 60hz Motors; DO - Drop Out; PU - Pick Up

# Type 4010 Reversing-Plugging

Elementary Diagram for Bridge or Trolley Control



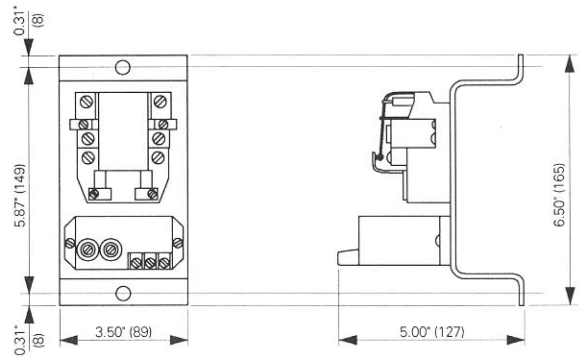
Typical Connection Diagram

Contactor Sequence		Reverse	Forward
		5 4 3 2 1	1 2 3 4 5
F		X	
R			X
M		X	X
P		X	X
1A		X	X
2A		X	X
3A		X	X

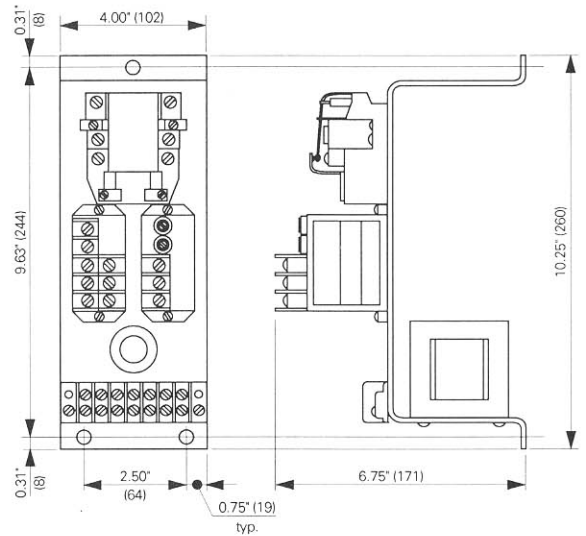
⊗ - Contact Closed  
 Contactors "F" and "R" are mechanically interlocked.

# Dimensional Illustrations

Without Power Supply (Slave Unit)



With Power Supply (Master Unit)



Dimension in parentheses are in millimeters

## Specifications

### Frequency Sensor Power Supply (Master Unit)

Input Power to Power Supply ..... 120V AC  $\pm$ 10%, 50/60 hz, 70VA max.  
 Input Power From Motor Sec. .... 50-600V, 50/60 hz  
 Ambient Operating Temp. .... -40°F (-40°C) to +158°F (+70°C)

### Frequency Sensor (Master and Slave Unit)

Input Power to Sensor ..... 24V DC, Terminals 9 & 10, #9 - 0V & #10 - +24V  
 Signal Input ..... 0V to +15V Square Wave  
 Output Relay ..... 2 SPDT Contacts each relay  
 Contact Ratings ..... 15.0A: 120/240V AC, .8 pf  
 30.0A: 120/240V AC, Resistive  
 0.25A: 250V DC, Inductive single break  
 0.50A: 250V DC, Inductive double break  
 30.0A: 28V DC, Resistive  
 Ambient Operating Temperature -40°F (-40°C) to +158°F (+70°C)

### Calibration Unit

Input Power to Sensor ..... 24V DC, Terminals 9 & 10, #9 - 0V & #10 - +24V  
 Signal Input ..... 0V to +15V Square Wave, Oscillator Off.  
 Output Display shows motor secondary frequency.  
 Signal Output ..... 0V to 15V Square Wave, Oscillator On.  
 Output Display shows internal generator frequency.  
 Display Accuracy .....  $\pm$ 1 digit of displayed value  
 Ambient Operating Temperature -40°F (-40°C) to +158°F (+70°C)

## Ordering Instructions

For frequency sensor units with or without power supplies supply the part number required, and frequency range/setting required.



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