

# Hoffman Controls

## Product Data

# Model 610 Digital Current Monitor

## General

The NEW Model 610 Digital Current Monitor is a microcontroller based motor and compressor protector that provides positive overcurrent and both over & under temperature protection for across-the-line or part winding motors and their A/C compressors. The control has a current sensing circuit module that derives information from up to three C.T.s (current transformers). When a current in any phase exceeds a pre-determined adjustable "trip or phase imbalance level", the control de-energizes the motor's starter, contactor or control circuit.

When monitored currents exceed the trip point, the control calculates the energy dissipated in the motor due to the over current and trips before damage can be done. The greater the current above trip level, the shorter the time-to-trip. The lesser the current above trip level, the longer the time-to-trip. The time to trip is two seconds for locked rotor and can be over 20 minutes for marginal overloads.

The Model 610 can verify correct motor phase rotation during every power up for 3 phase and part winding motors. This feature may be turned off after the initial power up, when desired. If the rotation is out of sequence, the controller will shut off 3 phase and part winding motors within 2 seconds. The control can also be set to trip on an adjustable phase imbalance.

In addition, the Model 610 has a temperature sensing circuit that watches up to 2 optional temperature sensors that are typically attached to an A/C compressor's exhaust (discharge) line and/or the oil crankcase. The controller will trip the compressor's motor off when the exhaust temperature exceeds an adjustable trip point or when the crankcase oil temperature is too low or high.

The Model 610 can be operated locally, with the control's four push buttons and LCD screen, or remotely through a Modbus RTU interface.

The Model 610 Motor & Compressor Monitor is a Class II control and requires an external 24 VAC (2.5 VA) power source supplied by the installer. Contactors used with the Digital 610 must use 24 VAC coils.



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level" current. This set of contacts opens after a trip occurs and when power to the controller is off. The "Alarm" relay's "N.O." To "COM" contacts may be used when an alarm output is desired.

When part winding motors are used, two Model 610 Digital Current Monitors are suggested. The control circuit relays should be wired in series to assure both parts are removed from the line when either or both monitors trip. Most faults on part winding motors can be detected using a single Model 610. Complete fault protection requires two (2) Model 610s. See I&O Instructions for Part Winding Motors.

When the controller circuit trips due to an over current or abnormal temperature, a red "TRIP" LED will indicate a "fail-safe" condition. The LCD display will show the type of trip, the value that caused the trip, when the trip occurred and other useful information. When an alarm condition occurs, a red "ALARM" LED illuminates, indicating the "ALARM" relay has closed the "N.O." and "COM" contacts. The "ALARM" relay contacts can be used to indicate the alarm at a remote location.

Carefully evaluate and correct any system fault, that caused a trip, before resetting the control. There are two methods to reset the circuit; 1) from the LCD's Home Screen, press the "MODE" button once and then press the "ENTER" button once, or 2) remotely reset the control using the Modbus interface. Resetting the control allows the motor to restart or reconnect the load.

## Description

The Model 610 Digital Current Monitor consists of a Kydex covered PCB (on standoffs) with a 32 character LCD display and four push buttons. The LCD screen displays 1) real time motor currents, 2) real time compressor temperatures (when activated) and 3) trip related operational information. The four push buttons allow the installer to 1) set up the control's over current trip values, 2) set up the under/over temperature trip values, 3) select the trip auto reset and alarm options and 4) select the Modbus RTU communications options.

Input power is provided by 24 VAC to designated terminals on the controller. Two sets of isolated Form C (N.O./N.C.) relay contacts are also provided. The "TRIP" relay's "N.O." to "COM" contact is closed for all, powered on, conditions below the "trip

## Applications

The Digital 610 Motor & Compressor Monitor is not limited to A/C compressor motor applications. Any electrical, inductive or resistive load may be monitored and protected from over current or abnormal temperature conditions. Typical applications include:

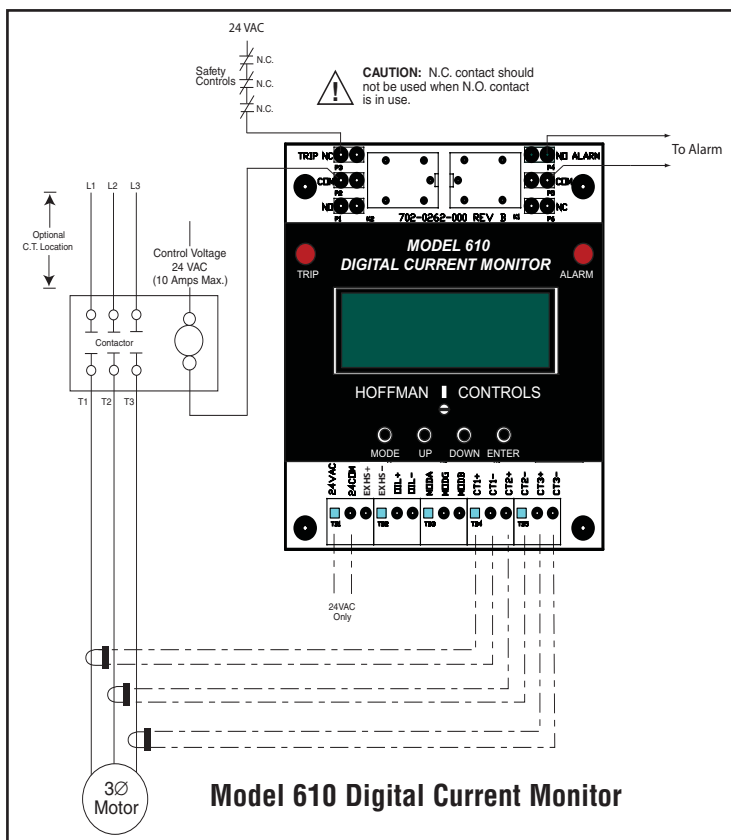
- A/C or refrigeration compressors (open or hermetic type).
- Fans
- Blowers
- Pumps
- Conveyors
- Elevators
- Machine Tools

Trip level is adjustable for any current for the type load, service factor, and/or insulation rating of the motor. The trip level may be set above nominal full load amps (FLA) to obtain the degree of protection required by the application. For part winding motor applications, divide FLA by two since each winding carries 1/2 of the current.

Single phase, three phase, and three phase part winding applications are incorporated.

## Features and Benefits

- Field selectable current trip level adjustment from 5 to 250 amps.
- Field selectable exhaust temperature trip level adjustments from 80°F to 300°F or 100 to 20000 ohms, depending on sensor type.
- Field selectable oil temperature trip level adjustments from 20°F to 200°F or 250 to 50,000 ohms, depending on sensor type.
- Manual push button reset or Modbus RTU remote reset.
- Current transformers (C.T.s) remote from logic.
- Two isolated output Form C (N.O./N.C.) control circuits. One Trip and one Alarm.
- Accurate positive over current protection with a no nuisance trip function.
- Trips on adjustable phase imbalance for three phase systems.
- A selectable number of automatic trip resets with adjustable time delay between trip and reset.
- Detects improper phase rotation.
- All sensor readings and trip information can be read remotely over Modbus RTU and all parameters can be set over Modbus RTU.



## Principles of Operation

Protection of an electrical system (current load) is directly proportional to the excess current that occurs above what is normally anticipated. Evaluating energy generated, by a voltage, is an indirect method of determining overload. The measurement of current will always indicate and provide the magnitude of over current as a result of electrical or mechanical abnormality.

The Model 610 Digital Current Monitor has unique provisions for current overload protection for inductive loads. The "time-to-trip" from an extreme overload condition (locked rotor) to a marginal overload condition (1% above trip) varies infinitely. "Time-to-trip" is calculated from the time varying magnitude of the overload current. If the operating current exceeds and remains above trip level current, a fail-safe trip will occur.

If integration begins as a result of excessive current, and then the current falls below the set trip level, a trip will not occur. Integration will begin again only when the trip level current is once again exceeded. This function provides positive and proportional time-to-trip for electrical or mechanical overloads while guarding against nuisance trips.

## Specifications

Voltages, Input & Output	24 VAC
Power	2.5 VA
Frequency	60 Hz
Response Time To Trip	
Minimum	2 Sec. @ LRA
Maximum	20 Min. @ 1.02% FLA
Trip Current Range, Min./Max.	5 to 250 Amps
Trip Level Setting	Adjustable
Relay Rating	
Volts	24 VAC
Current (Max.)	10 Amps
Ambient Temperature Range	-20°C to 70°C
Operating & Storage	-4°F to 158 °F
Dimensions (L x W x H)	4.75" x 4" x 1.25"
Available Models :	

- 1) **Model 610-1PH** Single phase motor protection.
- 2) **Model 610-3PH** Three phase motor protection.
- 3) **Model 610-1PH(MOD)** Single phase motor protection with Modbus RTU.
- 4) **Model 610-3PH(MOD)** Three phase motor protection with Modbus RTU.

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