

# RX

## MOTOR PROTECTION / OVERLOAD RELAY 200 - 15,000VAC, 1 through 2000A



### RX for a Healthy Motor!

- “Thermal Model” Motor Protection
- True Motor Power Monitoring
- Voltage, Current and Power Metering
- Flexible Control Features
- Optional Ground Fault Plug
- Dry Pump Protection
- Remote Monitoring optional

Green Energy Management



# RX Series for Maximum Motor Protection

## Motor Protection

Take your motor protection to a new level. The RX Series provides more than just solid state overload or power protection relays. By using features previously found only in large expensive Motor Protection Relays, the RX Series allows even small to medium sized motor applications to be protected by the best technology available, yet at a price affordable to all.



**Easy to read and simple to use, the RX Series display shows more than just "trip indication".**



- 4 digit bright display shows values up to 9999
- LED indicators to show what the display is reading
- Status LEDs for Trip and Relay operations
- Large keypad, no dip switches or rotary dials that may require tools
- Passcode protection can keep out unwanted changes

**NEMA 4 Operator Interface can be remote mounted up to 6 feet away.**



# Advanced Metering and Communication

## Advanced Technology for Maximum Motor and System Protection

The RX Series uses Thermal Modeling software normally found only in the most sophisticated Motor Protection Relays. This software keeps track of power related issues occurring in the motor circuit that contribute to causing a thermal overload. If there is a power loss, a unique combination of non-volatile memory and a real-time clock ensure that this protection is in effect when power is restored. Should an overload occur, the RX Series is intelligent enough to make sure that it can only be reset when the motor is sufficiently cooled down and is ready to start again successfully. Voltage input features allow true Motor Load Monitoring, not just current, along with Power Factor, kVA and Frequency.

## Built-in Flexible Control Features Provide Cost and Space Savings

A 24 hour / 7 day Real Time Clock on board allows for several additional features that can eliminate the need for other discrete devices. Duty cycle can be controlled by using the Starts/Hour and Minimum Time Between Starts features, plus a Coast-Down / Backspin timer can prevent restarting while a motor is spinning backwards. In addition, simple Batch Time processes of up to 7 events can be programmed for daily, multi-day or weekly operations without the need for an external time clock. A Restart Delay timer allows staggered restarting of multiple units as well.

## Add Metering and Communications to New or Existing Starters

Metering for Three Phase Currents, Voltages, kW, kVA, kVAR, Power Factor, Frequency, kWh, Elapsed Run Time, Run Cycle Count, Lock-Out Time, Reset Time and Remaining Thermal Capacity are all included, and can be both read on the display and communicated via the built-in RS-485 Modbus RTU comm. Port. Optional converters allow communications via DeviceNet, Field Bus, Profibus and other protocols as well. Fault memory with time and date stamps helps in troubleshooting and returning to operation. Great for remote monitoring.



# Protect your 3-Phase Motor from:

- ✓ Line power problems; Single Phasing
- ✓ Phase Reversal, Voltage Imbalance
- ✓ Thermal Overload ( $i^2t$ ), Class 5-30
- ✓ Equipment Ground Fault
- ✓ Current Imbalance
- ✓ Jammed Load / Locked Rotor
- ✓ Broken shaft / belt / loss of prime
- ✓ Over / Under Voltage
- ✓ Low / High Power Factor
- ✓ Short Cycling, Too Many Starts per Hour
- ✓ Back-Spin Restart Lockout
- ✓ Excessive Run Time
- ✓ Acceleration / Incomplete Sequence
- ✓ Over / Under Frequency from a Generator



# “Thermal Model” Motor Protection

## Specifications

### Type of Load

3 Phase AC induction motors

### Ambient Conditions

0 to 50°C, 0 to 90% relative humidity  
Up to 10,000' elevation (3000m) w/o derating

### LED Alphanumeric Display

High brightness 7-segment display can be seen in high ambient light conditions.  
4 digit display allows display of high values

### Power Wiring

Feed through or external CT lead feed-through

### AC Supply Voltage (Motor Voltage)

**Direct:** 200-600VAC, +/- 10% 50/60Hz  
**With 120V PTs:** 690-15,000VAC

### Service Factor (for NEMA design motors)

1.00-1.30

### LED Status Lights

10 LED indicators on the front panel give relay status or quick reference for the alphanumeric display.

### Packaging

Open panel mount with DIN rail clips (IP00)

### Current Ranges

1-2000 Amps

### Current Measurement

2 window CTs on units up to 5A  
External CTs for larger ranges  
Meets NEC requirements for leg protection

### Full Function Keypad

4 quadrant navigation keys provide easy access to status information and programmable functions.

### Operator interface

Built-in, or remote mount up to 6ft (1.8m) away

## CONTROL SYSTEM

### Control Voltage

Universal control voltage supply  
85-265VAC or DC, 50/60Hz

### Programmable Output Contacts:

1 Form C (SPDT) 5A, 240VAC max., +  
1 Form A (SPST) 10A max. 1/2HP @240VAC  
33 programmable functions

### 1 Multi-function Digital Input

Dry contact input for Timer Start, Remote Start, Remote Trip.

### Fault Reset

Manual button on display, or  
Cycle control power for remote reset

## PROTECTION SYSTEM DESIGN AND ADJUSTMENTS

### Overload Protection Method

Real-time Motor Thermal Modeling uses current sensors and microprocessor to continuously calculate motor temperature.

### Retentive Thermal Memory

Remembers the thermal condition of the motor even if control power is lost. Thermal Register is adjusted for Off-Time when power is resumed.

### Dual Overload Curve Settings for RV start

Start Curve can be set to Class 5-30  
Run Curve can be set to Class 5-30  
Automatic Full Speed detection and change over

### Learned Dynamic Reset

Overload Trip will not reset unless motor has regained enough thermal capacity based on learned motor starting profiles.

### Programmable Service Factor

Service Factor setting automatically adjusts other settings to compensate.  
Adjustment Range: 1.0-1.15 SF

### Current Imbalance Protection

Provides monitoring of phase-to-phase current levels and trips if imbalance exceeds setting.  
Setting: Off or 1-30% FLA w/1-20 sec. delay

### Phase Loss/Sequence Protection

Trips on any phase under 20% of Voltage.  
Sequence selectable A-B-C, C-A-B or Off

### Over-Current Trip

Electronic Shear-Pin / Shock Relay  
Setting: Off or 50-300% FLA w/1-20 sec. delay

### Under-Current Trip

Load-Loss /Loss of Prime protection  
Setting: Off or 10-90% FLA w/1-60 sec. delay

### Over Voltage Trip

Any phase voltage over trip level  
Off or 1-10% of set voltage, w/1-20 sec. delay

### Under Voltage Trip on Startup

Off, or 1-30% of set voltage  
1-180 second startup time

### Under Voltage Trip at Full Speed

Off, or 1-30% of set voltage  
1-20 second trip delay

### Load Monitor (True Motor Power)

Under or Over kW trip or alarm  
Off, or 20-100% motor kW, w/1-20 sec. delay

### Power Factor Monitor

Leading or Lagging PF, trip or alarm  
Off, or 0.01-1.00, lead or Lag w/1-20 sec. delay

### Frequency Monitor

Over or Under programmed frequency  
Trip Setting: Off, or 1-10Hz, w/1-20 sec. delay

### Equipment Ground Fault Protection

Electronic Residual current protection method, no additional CTs needed  
Setting: Off, 5-90% of CT w/1-60 sec. delay

### Short Circuit / Shorted Load

Peak Current quick trip (electronic fuse)  
Trip level: Off or 800-1400% FLA, with .1-.5 sec. delay

### Restart Delay Timer

Programmable delay for restarting after a power failure for use in multiple installations.  
Setting: 0-999 sec.

# True Motor Power Monitoring

## Specifications (Continued)

### PROTECTION SYSTEM DESIGN AND ADJUSTMENTS

#### Starts-per-Hour Lockout

Programmable maximum starts-per-hour to prevent exceeding motor limits.  
Setting: Off or 0-10 start / Hr

#### Minimum Time Between Starts

Used with or without Start-per-Hour protection to prevent short cycling of motor  
Setting: Off or 1-60 minutes between starts

#### Coast-Down Timer

Back Spin or Anti-Wind Milling protection  
Prevents Restart after Stop Command  
Time Setting: Off or 1-60 min.

### METERING AND DISPLAY SPECIFICATIONS

#### Amp Meter for Each Phase

Default is Phase A  
Scroll up or down for Phases B, C and Ground  
0-9999A (999A for Ground), +/- 2% accuracy

#### Elapsed Time Meter

Running time from At-Speed detection.  
Non-Resettable except with password  
0-9,999,999.9 hours

#### Run Cycle Counter

Counts starts (At-Speed) for maintenance  
Non-Resettable except with password  
0-99,999,999 counts

#### Volt Meter for Each Phase

0-600V, or 1-15kV, +/- 2% accuracy  
Total Voltage Imbalance %

#### Power Metering

kW, kWhr, kVA, kVAR, or MW, MWhr, MVA, MVAR. 0-9999 units +/- 2% accuracy

#### Power Factor Metering

Leading (Inductive) or lagging (capacitive)  
0.01-1.00 PF

#### Fault Display

Alpha abbreviated English display  
Shows fault code plus 10 LEDs indicate phase and trip status

#### Fault Event Recorder

Records previous 3 fault trips  
Shown on display and stored in non-volatile memory

#### Time and Date Stamps

Fault history stored with time and date stamps from Real Time Clock. Can be cleared with password protection.

#### Thermal Capacity Meter

Real-time display of Remaining Thermal Capacity of motor after starting or running  
0-100%, counts up while cooling

#### Remaining Time Value Displays

View values of lockout timers such as Time Between Starts or Coast-Down,  
View process timer or time clock values

#### Remote Display Mounting

Display is built-into front of unit  
Can be remotely mounted up to 10ft. away  
NEMA 12 display membrane kit available



## RX Series

**Note:** The RX is not suitable for use with variable frequency drives.

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