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Total reliability in power system protection & monitoring
... a mark of quality

MICROCONTROLLER BASED MOTOR PROTECTION RELAY PD-MMPR-303

IEEE Device Code 49, 51, 46, 49S, 37 & 47

Introduction:

Prok dv's make Microcontroller Based Motor Protection Relay PD-MMPR-303 uses the state-of-the-art Microcontroller based measurement techniques for providing protection for Motors up-to 75HP. The comprehensive protection features of the relay make it ideal for Motor protection. The heart of the relay is microcontroller based reliable hardware with special algorithms to calculate the tripping time. The relay continuously monitors the Three Phase Currents to build the thermal replica of the Motor. This thermal replica is used to protect the Motor against Thermal over Loads.

The Microcontroller Based Motor Protection Relay does not require external Current Transformer (CT) for its operation for within the range of I_m ranges. The three phase R, Y and B cables are made to pass through the CT hole which is provided in the relay. The built in CT's takes care of stepping down of the Currents to the required level. The stepped down three phase Currents are continuously monitored by the relay to detect any abnormal behavior of the Motor and to make tripping decision.



FEATURES

- Accurate and Real Time TRUE RMS measurements.
- Motor Rated Current (I_m) Selection by means of Potentio-meter with markings.
- Earth Fault Setting provided by means of Potentio-meter with markings.
- Selectable Thermal Trip Time characteristics Class - 10A, 10, 20 & 30.
- Pre-alarm at 105 % of I_m by Potential Free Output Contacts.
- Thermal replica of Motor Overload condition.
- Continuous monitoring of Motor IDLE/STOP, COLD, WARM, HOT, I> & Various Fault status through visual LED indication.
- Protection against – UB (Unbalance), UC (Under current), LR (Locked rotor), EF (Earth fault) can be enabled or disabled using Dip switch setting.
- Motor Trip class – Class 10A, Class 10, Class 20, Class 30 can be configured using dipswitch
- If none of the trip class selected, Default: CLASS 20 Selected internally
- By default Fail safe mode provided for output TRIP and ALARM Relay
- Front end Communication through Modbus protocol with RS-485 Port baud rate of 9600bps for Fixed slave I.D- (optional).
- Various Models with Current ratings.
- Compact and Reliable.
- Manual TEST / RESET Facility.

PROTECTIONS OFFERED



Applications: Protection of LV Motors up-to 75HP in Motor Control Center

Protections Offered By PD-MMPR-303 Series

- Prok dv's make Microcontroller Based Motor Protection Relay PD-MMPR-303 Series is designed to offer the following protections to Low Voltage (LV) 3-Phase Induction Motors rated up to 75HP. Whenever the Relay detects any of the following faults, Prok dv's make Microcontroller Based Motor Protection Relay having one set of potential free output contact (C & NO) for TRIP circuit & One set of potential free output changeover contact (C & NO) for alarm circuit for Thermal Overload.
- **Thermal Over Load Protection:** Prok dv's make Microcontroller Based Motor Protection Relay continuously monitoring Motor Current of all the Three Phases. When the Motor Current exceeds the set value I_m , the relay issues a trip command after the calculated time elapse (Based on selection of trip Class). The relay visually indicates the trip status by means of LED's Exclusively One Set of potential free output changeover contact is provided in the relay for alarm circuit when the Motor Current exceeds 105% of I_m and the relay has one set of potential free output change over contact for trip circuit The relay continuously monitors the Currents and using this data it builds Thermal Replica of the Motor and monitoring the Thermal status of the Motor. This information is used to protect the Motor against Thermal Over Loading.
- **Earth Fault Protection:** Prok DV's make Microcontroller Based Motor Protection Relay senses the Zero sequence components of the TRUE RMS Currents are measured simultaneously and detecting the Earth Faults. The moment the Earth Fault crosses the Threshold Set value, a trip command is given by the relay to the trip circuit with a time elapse. The Earth Fault phenomenon is predominant in the Motor and Motor Control Centers, Hence protection against Earth Fault is necessary. Microcontroller Based Motor Protection Relay uses the proven Holmgren technique for detection of Earth Fault in the Motor.
- **Unbalance Protection:** Prok dv's make Microcontroller Based Motor Protection Relay measures and monitors all the Three Phase Currents and extracts the Unbalance Currents presents in the Three Phase Motor circuit. The moment an Unbalance Current is detected and if it crosses the Set value, the relay is activated in tripping the circuit.
- **Locked Rotor Protection:** Prok dv's make Microcontroller Based Motor Protection Relay detects Locked Rotor condition i.e. Motor not withstanding Over Loads beyond 3 times as per Thermal withstand time characteristics and this is predominantly observed in old unused and rewound Motors. In the Locked Rotor Condition if the Motor Current crosses 3 times of I_m , the relay is activated in tripping the circuit with a time elapse.
- **Under Current Protection:** Prok dv's make Microcontroller Based Motor Protection Relay detects the Under Current Fault in a situation that sudden load Throw-Off or Loss of load, resulting in dry run of Motor. During the sudden loss of load the Motor takes low Current i.e. Under Current and if this value crosses the Set value, the relay trips the circuit with a time elapse.
- **Loss of Phase/ Single Phasing:** Prok dv's make Microcontroller Based Motor Protection Relay detects the Loss of Phase/ Single Phasing in a Motor circuit. Motor burnouts are predominant due to Single Phasing or Loss of Phase at the main source / HT side and Fuse failure at the Motor Circuit. The Single Phasing / Loss of Phase is sensed by the relay and trip the circuit with a time elapse.
- **Phase Reversal:** Prok dv's make Microcontroller Based Motor Protection Relay monitors the Phase Sequence Currents and detects the Phase reversal and trips the circuit with a time elapse.

Specifications:

1) Thermal over Load Protection:

- Over Load Current Setting Range 1.0Amps – 96.0Amps in 4 ranges
- Trip Time Characteristics Class -10A, 10, 20 &30 as per IEC 947-4-1 (Default: Trip class 20, if none of the trip classes selected by means of Dip switch.
- Thermal pick up Alarm at 105 % of I_m by One set of Potential Free output Contacts (C& NO) only
- Calculates the Thermal Replica for Motor Over load
- Thermal pick up Alarm I> indicated through visual LED indication

2) Earth Fault Protection

- Earth Fault Current Setting Range - 10% to 50% of I_m , in steps of 10%
- Fixed Trip Time Delay - 0.5Sec
- Enable / Disable Option using Dip switch

3) Unbalance Protection

- Fixed Unbalance current setting - 40% of I_{avg}
- Fixed Trip Time Delay - 5.0Sec
- Enable / Disable Option using Dip switch

4) Locked Rotor Protection

- Locked Rotor Current -Greater than 3 times of I_m
- Fixed Trip Time Delay –0.5Sec.
- Enable / Disable Option using Dip switch

5) Under Current Protection

- Fixed Under Current Setting - 15% of I_m
- Fixed Trip Time Delay – 1 Sec
- Enable / Disable Option using Dip switch

6) Loss of Phase / Single Phasing

- Applicable when one or two line currents falls below the 50% of motor rated current
- Fixed Trip Time 3.0 Sec

7) Phase Reversal Monitoring

- When Power sequence reversed
- Fixed Trip Time Delay 0.1 Sec

8) **Contacts:** C & NO 240V@5A AC, 30V@5A DC, Potential-Free Output Contact for Overload alarming Circuit.C & NO 240V@ 5A AC, 30V@5A DC Potential-Free Output Contacts for Tripping Circuit for all seven Faults

9) **Auxiliary Power Supply:** 85-275V AC / DC 50/60Hz

10) **Trip Accuracy:** As per IEC 947-4-1, for Trip Class 10A, 10, 20, & 30

11) **Pick-Up Accuracy:** +/- 12.5%

12) **Reset:** Manual

13) **Models:** PD-MMPR-303-1(1.0A-10.0Amps) PD-MMPR-303-3 (20.0Amps-64.0Amps)
PD-MMPR-303-2 (10.0Amps-32.0Amps) PD-MMPR-303-4 (30.0Amps-96.0Amps)

14) **Output contact:** Fail safe- trip by default

15) **Communication:** Through RS-485 MODBUS Protocol (HALF DUPLEX), fixed Baud rate: 9600 bps & For fixed device ID -

10, Data:8Bit, stop bit:1, (communication feature is optional)

16) **Mounting:** DIN Rail

17) **Dimensions in mm:** 70X55X108 (WXHXD)

18) **Operating Temp:** 0^oc to +55^oc

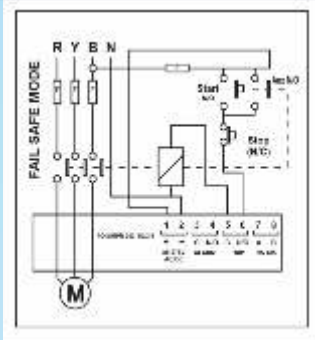
Note 1: Output Relays shall be normally energize state – FAIL SAFE MODE

Note 2: Alarm Relay activated if Motor Load Current exceeds above 1.05 times the set Motor Rated Current

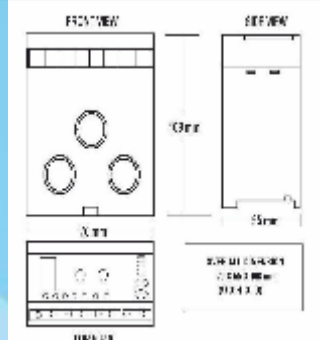
Note 3: The Diameter of the Holes provided on Relay is 13mm and the same is suitable up to 100A copper cable.

Note 4: The Motor Protection Relay is also suitable for CT sec of /5A & /1A with suitable turns ratio modification.

WIRING DIAGRAM - PDMMPR-303-1/2/3/4



DIMENSIONAL DRAWING FOR PDMMPR-303-1/2/3/4



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