



MEDIUM VOLTAGE AC ELECTRICAL MACHINES INSULATION MONITOR MODEL MHV-H

Model MHV-H Insulation Monitors are designed to monitor Medium Voltage AC motor installations for insulation deterioration whenever they are not energized. In such installations personnel safety is paramount and MHV-H Monitors incorporate features to maximize that safety. They are entirely automatic in operation and are CSA Certified and UL Listed as High Voltage Industrial Control Devices.

FEATURES:

- ◆ Easy Installation
- ◆ Three models cover voltages to 13.8kV AC
- ◆ Surge capacitor discharge delay included
- ◆ Vacuum contactor rated
- ◆ Test voltage 400 v. DC, current limited for personnel safety
- ◆ Completely automatic operation
- ◆ Solid state circuitry
- ◆ High/Low alarm selection
- ◆ LED local alarm
- ◆ Remote alarm capability
- ◆ Local/Remote reset capability
- ◆ Small footprint DIN rail mounting



APPLICATION:

The Model MHV-H Insulation Monitor is designed to provide safe monitoring of electrical insulation integrity in medium voltage motors to 13.8 kV., such as are used, for example to power chippers in pulp mills. Normally installed on machines in intermittent use, to monitor the micro-cracking of the insulation caused by repeated starting and stopping, they are also very useful to monitor continuously running machines during their annual shutdowns, giving early warning of the moisture-induced degradation of the insulation which causes failure on restarting.

Insulation resistance is monitored at 400 volts DC, current limited for personnel safety, whilst the motor is idle. Safety is ensured when the motor is running by connection to the motor circuit through the neutral point of a high resistance Intermediate Resistor Block (IRB). This ensures that the insulation monitor's Sense terminal is normally at ground potential. If a ground fault occurs on the motor supply, the high impedance of the Intermediate Resistor Block, which limits the Sense terminal voltage to a safe level, ensures personnel safety.

Model MHV-H monitors allow for the complete discharge of surge capacitors and the dissipation of residual charge in motor cabling before commencing monitoring, to eliminate nuisance alarms.

To eliminate the hazard to personnel, the connection between the Intermediate Resistor Block in the high voltage compartment and the MHV-H monitor unit in the low voltage compartment of the motor control gear, is current limited by the high internal impedance of the Intermediate Resistor Block to a maximum of 1.4 milliamperes, i.e. 28% of the mandated GFCI trip level. This maximum current flows through the "Sense" line (the red conductor of the Intermediate Resistor Block IRB7200 or the red marked conductor of IRB13800) to terminal 11 of the MHV-H monitor unit only if terminal 11 is shorted to ground when a ground fault exists on one phase of the motor supply.

ORDERING INFORMATION

- Refer to the Specifications and include the control voltage required. Example: For use with a 7.2 kV max. motor, order MHV-H7200, 120 v. control. (The correct IR Block will be shipped as part of the order).
- The Installation Kit includes the bracket set DIN-MHV, the flashing alarm light FAL, a Test Resistor and hook-up wire, wire connectors, Ty-wraps and mounting screws sufficient to install the unit and IR Block, explanatory and warning labels.

SPECIFICATIONS

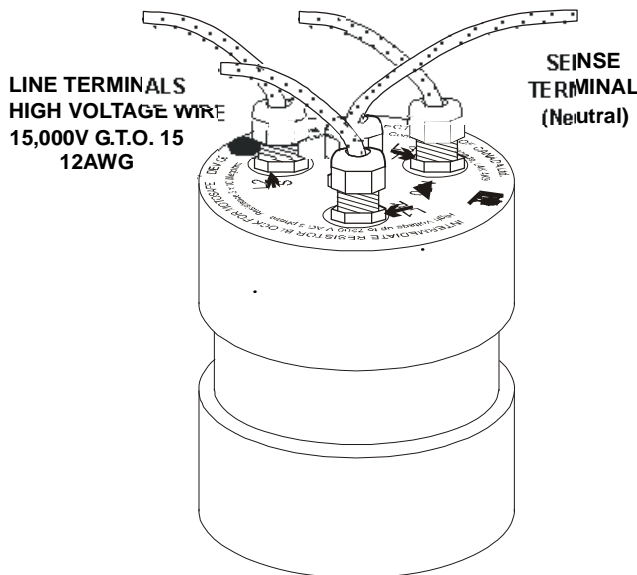
MotoSafe Model MHV-H Medium Voltage Insulation Monitors

Model	MHV-H 4600 MHV-H 7200 MHV-H 13800	IRB 4600	IRB 7200	IRB 13800
Parameter				
Max. Line Voltage	N / A	4.6 kV AC	7.2 kV AC	13.8kV AC
Control Voltage	120 or 220 V, +20%, 50/60 Hz	N / A		
Control Power	6 VA	N / A		
Isolation Voltage	24–300V AC/DC	N / A		
Factory Setpoints* Low / High	2.5 / 5 MΩ 7 / 10 MΩ 14 / 20 MΩ	N / A		
Contacts Rating	5 A, 250 V Resistive	N / A		
Isolation Time	0.5 ms	N / A		
Dimensions (mm) WxHxL (in)	103 x 68 x 112 4.05 x 2.67 x 4.4	180x115x65 7.1x4.5x2.6	125Øx165 4.9Ø x6.5	238Øx500 9.4Øx19.7
Weight (kg)/(oz)	0.5 / 17.6 0.57 / 20	1.9 / 67	1.2 / 42	7.7 / 270

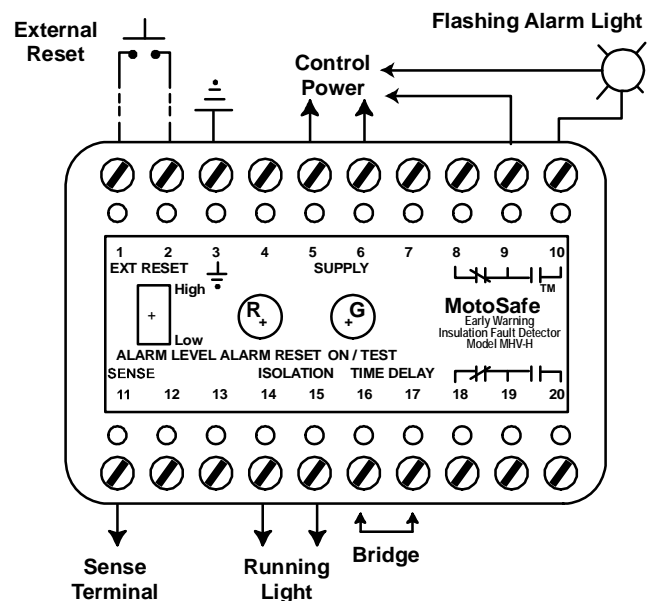
- * Set points in the range to 100 MΩ available - contact factory.
Minimum recommended setting - 1MΩ / 1kV
 - ** For other control voltages - contact factory
- All units suitable for DIN Rail Mounting.
Maximum short circuit current is 2 milliamperes.
Temperature:
operating: -20°C to +50°C;
storage: -40°C to +100°C.
Environment: maximum 95% relative humidity, non-condensing.

INSTALLATION / CONNECTION DIAGRAM

HIGH VOLTAGE COMPARTMENT



LOW VOLTAGE INSTRUMENT COMPARTMENT



MOTOSAFE™ MONITOR MODEL MHV-H; INSTALLATION.

IMPORTANT: READ THE FOLLOWING INSTRUCTIONS BEFORE INSTALLING THE MONITOR.

MotoSafe INSULATION MONITOR FOR MEDIUM VOLTAGE MOTORS, MODEL MHV-H

The MotoSafe device continuously monitors the insulation resistance of idle machines and operates an alarm relay when the resistance falls below a set value. This value may be 10 Megohms ("High" setting) or 7 Megohms ("Low" setting). If other values have been specified by the customer, the device will be so marked.

THE INTERMEDIATE RESISTOR BLOCK

The Intermediate Resistor Block contains three high voltage resistors connected in star to form an artificial neutral. The three black leads connect the free ends of the resistors to the motor terminals and the red lead is used to connect the sense terminal (#11) of the Model MHV -H monitor to the star point, which, under normal conditions, is at ground potential. Should a ground fault occur on one of the phases, the star point potential increases to 57.7% of the phase voltage (4.15kV for a 7.2 kV system), but the high resistance of the Intermediate Resistor Block limits the current which flows if terminal 11 becomes grounded to a maximum of 1.7 mA., which is not dangerous to personnel.

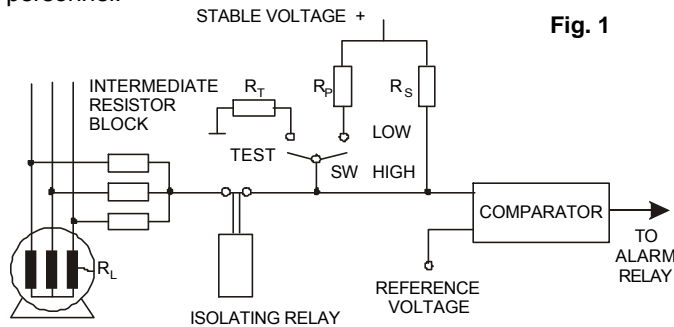


Fig. 1

When the motor is idle, the isolating relay contacts are closed, as shown in Fig. 1. This connects the motor windings to a stable voltage source through the series resistor R_s . The series resistor and the generator windings leakage resistance R_L form a voltage divider with a comparator connected to the R_s / R_L junction. The voltage seen by the comparator is therefore a function of the leakage resistance R_L . When this resistance falls below the set value, the comparator voltage falls below the reference voltage and the alarm relay is activated.

INSTALLATION INSTRUCTIONS

To install the MotoSafe device in the low voltage (instrumentation) compartment and the Intermediate Resistor Block in the high voltage compartment of the motor control enclosure:

1. Disconnect the power from the enclosure.
2. Fasten the mounting bracket in place with the screws supplied. Clip the device securely to the bracket. If required (and regulations permit), install the long-life local alarm lamp (supplied) on the motor control front panel close to the hinges and affix the adhesive warning label around the lamp.
3. Install the Intermediate Resistor Block close to the motor cable using the supplied accessories, suitably protected from damage.

WIRING INSTRUCTIONS

CAUTION: OBSERVE SAFETY PRECAUTIONS - DO NOT WORK ON LIVE CIRCUITS!

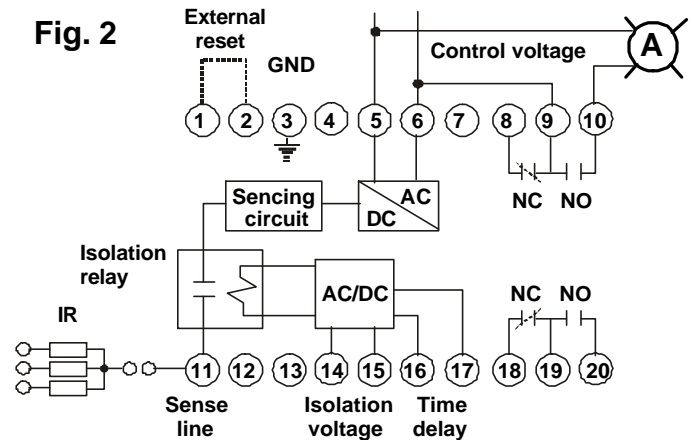
1. Disconnect the supply and control voltages.
2. Connect terminals 5 & 6 of the MotoSafe device to the control voltage supply.
3. Connect terminals 14 & 15 across the breaker coil, auxiliary relay coil or running light; input may be AC or DC 24-300V.
4. Connect terminal 3 to ground and terminal 11 to the red neutral wire of Intermediate Resistor Block.
5. If a local alarm light is required, connect terminal 9 to terminal 6, connect one lead of the flashing alarm light to terminal 10 and the other to terminal 5.
6. Energize the FailSafe monitor.

Note: Terminals 1 & 2 may be used for an external, NO push button switch to reset the alarm. Terminals 16 & 17 are time delay terminals. Bridged, the unit senses the motor phases 8-10 seconds after the motor is stopped. Unbridged, there is a time delay of 10 minutes before sensing begins. The units are shipped with the terminals bridged.

TESTING

1. Ground one of the motor phases momentarily via the test resistor. The red LED should light and the external alarm circuit be activated after a delay of 8-10 seconds. Reset the monitor with the RESET button. Repeat this test with two other phases.
2. Start the motor. The red LED should NOT light and the external alarm devices should NOT operate.
3. Stop the motor. If the insulation resistance is satisfactory the alarm should not operate.

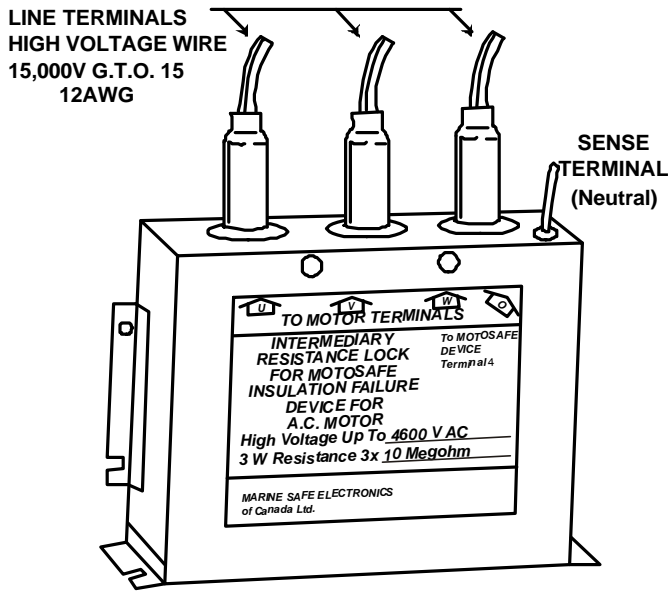
Fig. 2



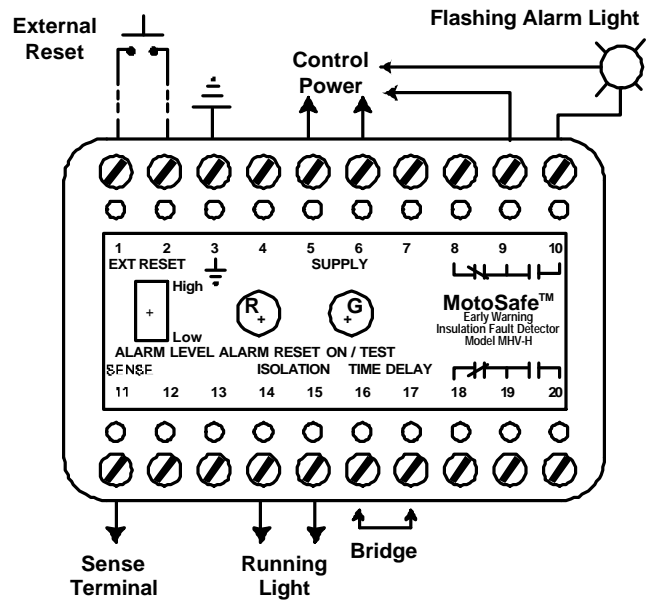
Note: The green LED indicates "Power ON" and the red LED is the alarm indicator. Should the alarm indicator light but the external alarm device does not, recheck the connections. If the connections are correct, test the contacts used for the external alarm (see Wiring Instruction #5) with a low range ohmmeter. If the results are not correct, replace the unit.

Connection Diagram Model MHV-H 4600

HIGH VOLTAGE COMPARTMENT

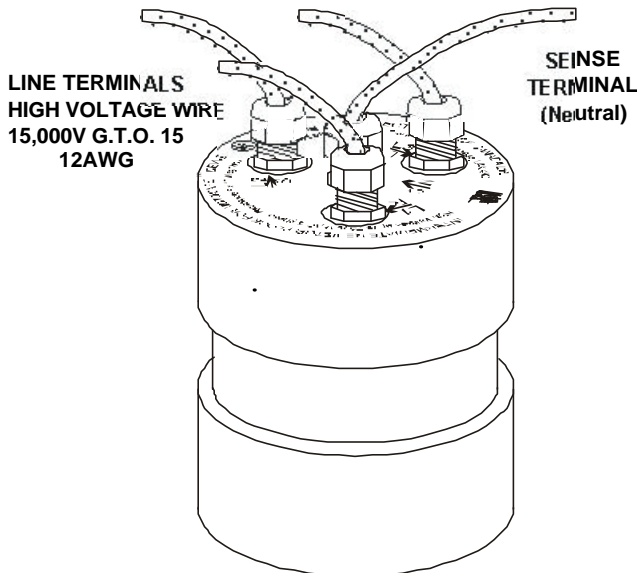


LOW VOLTAGE INSTRUMENT COMPARTMENT

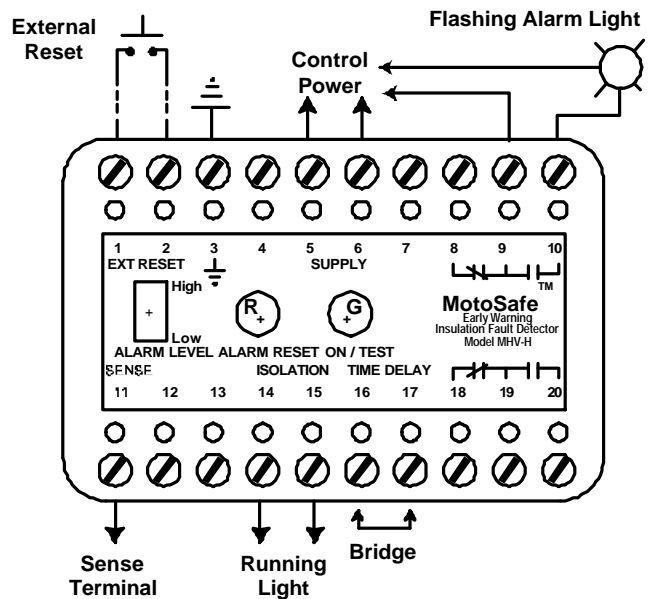


Connection Diagram Model MHV-H 7200-13800

HIGH VOLTAGE COMPARTMENT



LOW VOLTAGE INSTRUMENT COMPARTMENT



The Intermediate Resistor Block contains three high voltage precision resistors, connected in Star (WYE) configuration. During normal operation the neutral terminal will be close to ground potential. The resistors are protected by total encapsulation. This method of connection complies with all applicable codes and is approved by CSA and UL.

All MotoSafe devices withstand the high voltage (to 1000V DC) applied by a Megger™ Tester. Megger is the trademark of Megger Instruments Ltd.

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