



MotoSafe®

MSE of Canada Ltd.

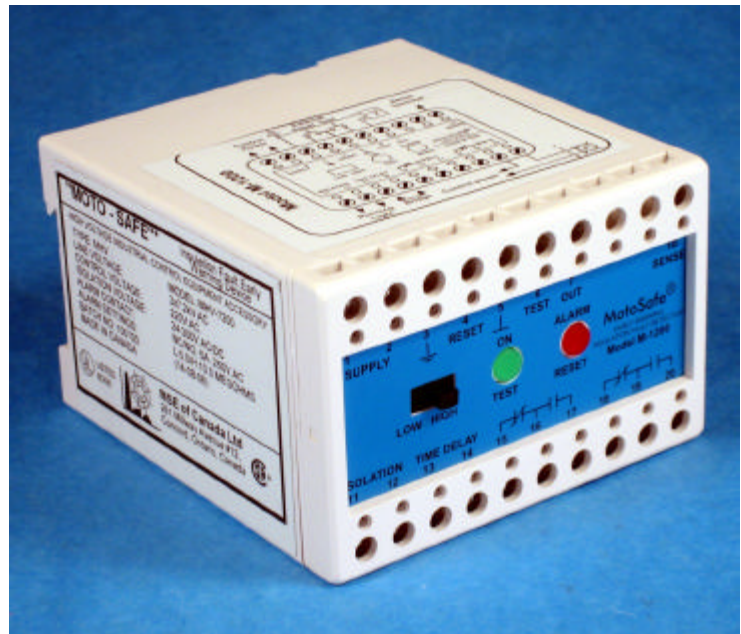
LOW VOLTAGE AC / DC ELECTRICAL MACHINES INSULATION MONITOR MODEL M-1200

Model M1200 Insulation Monitors are designed to monitor Low Voltage DC or AC motor installations for insulation deterioration whenever they are not energized. They are entirely automatic in operation and are CSA Certified and UL Listed as Industrial Control Devices.

FEATURES:

- ◆ Easy Installation
- ◆ Covers supplies to 1,200 V DC and to 1,000 V AC
- ◆ Residual charge dissipation circuit
- ◆ Low test voltage for personal safety
- ◆ Completely automatic operation
- ◆ Solid state circuitry
- ◆ High/Low alarm selection
- ◆ LED local alarm
- ◆ Remote alarm capability
- ◆ Local & remote test & reset capability
- ◆ Actual resistance reading output
- ◆ Small footprint DIN rail mounting

APPLICATION:



MotoSafe Insulation Monitors are designed to provide safe monitoring of electrical insulation integrity whenever electrical machines and equipment are not in use.

The primary use of the Model M1200 is to monitor motors operating on DC supplies to 1,200V., such as drive motors on drilling platforms. A second application is in mining, where they are used to monitor AC motors operating at 600 volts to 1,000 volts, such as are found in some mining installations.

Such motors, which are in intermittent service, are subjected to thermal stresses generated by the repeated starting and stopping of the machines, which causes microcracking of the insulation, thus exposing the conductors to the environment. Moisture condensing from the air and combining with contamination deposited on the insulation and in the microcracks causes degradation of the insulation's properties. MotoSafe Insulation Monitors detect the deterioration of the insulation which precedes failure, giving early warning in plenty of time for preventative maintenance to prevent the failure.

The speed of insulation deterioration is easily determined by switching from the "High" range to the "Low" when the alarm occurs and recording the time interval before an alarm occurs at the "Low" setting. The monitor is equipped with analogue output which provides the actual value of the insulation resistance in the range of 0 to 40Megohm.

To maximize personnel safety they use a low DC voltage, grounded through terminal 3, to sense insulation resistance and the sense terminal (# 10) is connected directly to one of the motor feeder conductors, on the load side of the final running contactor.

The Model M1200 monitor is similar to the Model MHV in that it requires an input from a source, such as the motor running light, which is energized only when the motor is running.

ORDERING INFORMATION

- Refer to the Specifications and include the control voltage required. Example: M1200, 120V AC control.
- 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. The Kit includes Explanatory and Warning labels. (The resistance indicating panelmeter is sold separately.)

SPECIFICATIONS

MotoSafe Model M-1200 Low Voltage Insulation Monitors

Line voltage max.	1,200 V DC; 1,000 V AC
Control voltage*	120 or 220 V, $\pm 20\%$, 50/60Hz
Control power	3 VA
Isolation voltage	24 - 300 V AC/DC
Factory Setpoints**	Low - 2.5 M Ω ; High - 5 M Ω
Contacts rating	5 A, 250 V AC, resistive
Isolation time	0.5 ms
Dimension (mm) WxHxL (in)	103x68x112 4.05x2.67x4.4
Weight (kg) / (oz)	0.42 / 14.8

* DC and 400Hz control voltages available - contact factory

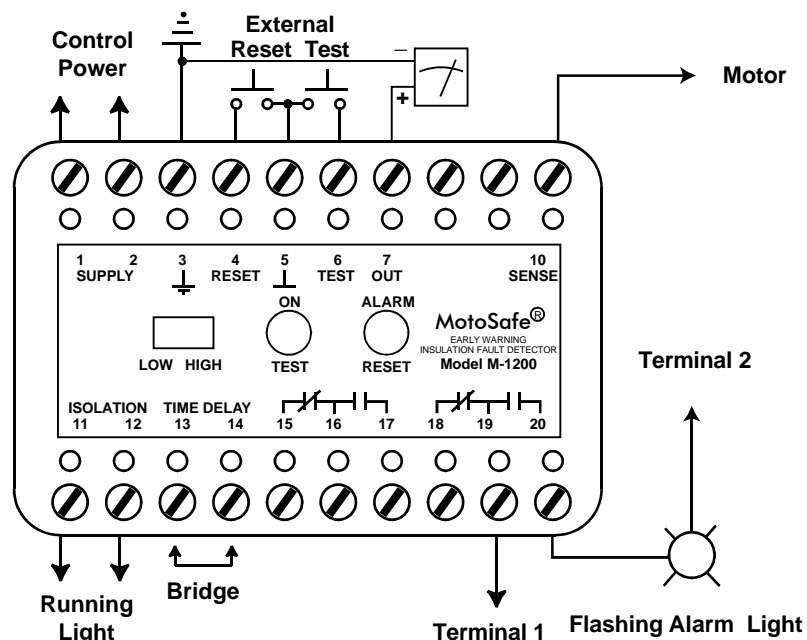
** Set points in the range to 10 M Ω available - contact factory

- May be equipped with optional panel meter PM-40
- All units suitable for DIN Rail Mounting.
- Maximum short circuit current is 1 microampere.
- Operating temperature -20°C to +50°C; storage temperature -40°C to +100°C.
- Environment maximum 95% relative humidity, non-condensing.
- UL and CSA approved.

The M-1200 device available in two versions of the analogue output voltage in relation to the resistance:

R, M Ω	0	1	2	3	5	7	10	12	15	17	20	25	30	35	40
U _{7ver.1} V	0	0.88	1.66	2.35	3.52	4.46	5.59	6.20	6.69	7.38	7.93	8.65	9.21	9.66	10.0
U _{7ver.2} V	10.0	9.12	8.34	7.65	6.48	5.54	4.41	3.80	3.04	2.62	2.07	1.35	0.79	0.34	0

CONNECTION DIAGRAM



MotoSafe MONITOR TYPE M-1200: INSTALLATION INSTRUCTION

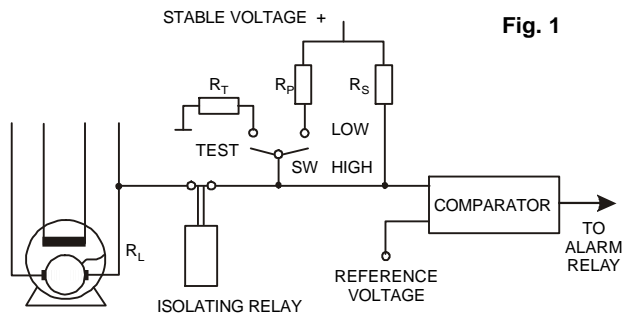
IMPORTANT: READ THE INSTRUCTION BEFORE INSTALLING THE MONITOR

MotoSafe INSULATION MONITOR for DC MOTOR ARMATURES up to 1.2kV

The MotoSafe device continuously monitors the insulation resistance of idle machines and operates an alarm relay when the insulation fails below a set value. This value may be 5 Megohm ("High" setting) or 2.5 Megohm ("Low" setting). If the customer has specified other values, the device will be so marked.

OPERATION

When the motor is idle, the isolation relay contacts are closed, as shown on Fig. 1.



This connects the motor windings to a stable voltage source through the series resistor R_S . The series resistor and the motor windings leakage resistance R_L form a voltage divider with a comparator connected to 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.

The slideswitch "SW" changes the alarm set point from "High" at lower position to "Low" at upper position by shunting resistor R_S with R_P . The TEST switch connects the resistor R_T between the sensing input and ground, simulating a low insulation resistance to activate the alarm.

When the motor is started the isolating relay contacts open and the device is disconnected from windings.

INSTALLATION INSTRUCTIONS

To install the MotoSafe device in the low voltage (instrumentation) compartment of the starter enclosure:

1. Disconnect power from the starter enclosure.

2. Fasten the mounting bracket in place, with the screws supplied. Clip the device securely to the bracket. If required (and regulation permit), install the long-life local alarm lamp (supplied) on the starter enclosure front panel; affix the self-adhesive warning label around the lamp. (Site the lamp close to the panel hinges).

WIRING INSTRUCTIONS

CAUTION: OBSERVE SAFETY PRECAUTION – DO NOT WORK ON LIVE CIRCUITS!

1. Disconnect the supply and control voltages.
2. Connect terminals 1 & 2 of MotoSafe device to the incoming control voltage (see Fig. 2).
3. Connect terminals 11 & 12 across the breaker coil, auxiliary relay coil or running lights.
4. Connect terminal 3 to the ground.
5. Connect terminal 10 to one armature lead.
6. If a local alarm light using the control voltage is required, connect terminal 2 to 19 and lamp between 1 and 20.
7. Reconnect the supply and control voltages.

Terminals 5 & 4 and 5 & 6 are for an external, NO push-button switch to reset or test the unit relatively.

Terminals 13 & 14 are time delay terminals.

Bridged, the unit senses the motor phases immediately after the motor is stopped.

Unbridged, sensing begins after 7 minutes delay.

For actual resistance reading a PLC I/O or panel meter may be connected to terminals 3 & 7.

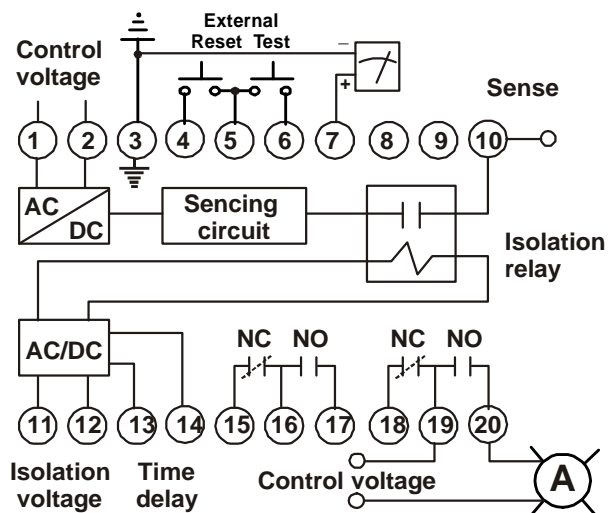


Fig. 2

TESTING

1. Ground one of the motor leads momentarily via the supplied test resistor. The red LED should light and the external alarm circuit be activated after a delay of 10 seconds. Reset the monitor with the reset button.
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.

Note: The green light indicates “Power on” and the red light is an alarm indicator. Should the alarm indicator light active but the external alarm device not, recheck connections

The MotoSafe device will withstand high voltage (up to 2500V DC) applied by a Megger™ Tester. If higher testing voltage should be applied to the motor, disconnect Sense terminal (#10).

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The analog output provides actual readings of the insulation resistance converted to 0 to 10V DC scale. Voltage at terminal 7 may be either zero for full ground and 10V for resistance over 40Megohm (option 1) or 10V for full ground and zero resistance over 40Megohm (option 2) depending on the option ordered. The relation between output voltage and resistance is:
 for option 1 $U_7 = 24(4.33+R_L)/(14.33+R_L)/1.23-5.9$
 and for option 2 $U_7 = 15.9-24(4.33+R_L)/(14.33+R_L)/1.23$
 where R_L is the insulation resistance

R_L Meg.	0	0.5	1	2	3	5	7	10	12	15	17	20	25	30	35	40
$U_{7opt.1}$ V	0	0.45	0.88	1.66	2.35	3.52	4.46	5.59	6.20	6.96	7.38	7.93	8.65	9.21	9.66	10.0
$U_{7opt.2}$ V	10.0	9.55	9.12	8.34	7.65	6.48	5.54	4.41	3.80	3.04	2.62	2.07	1.35	0.79	0.34	0

The accuracy of the alarm settings and analog output is $\pm 5\%$