

FAQ's

MotoSafe / FailSafe Insulation Monitors

1. What causes motor insulation deterioration?

In motors, which operate intermittently, the heating and cooling of the windings promote cracking of the insulation, allowing moisture and environmental contamination access.

2. What are the real benefits of monitoring motor insulation resistance?

The benefit is seen on the bottom line:

- with early warning, production downtime cost from motor insulation failures is eliminated
- spare motor inventory costs can be minimized, and
- preventive maintenance can be scheduled and its costs controlled.

3. Can I use the monitors on AC and DC motors?

Yes

4. Can I use the monitors on grounded or ungrounded power systems?

Yes. The type of system is not relevant, as the motor(s) must be isolated from the system when being monitored.

5. Is there any deterioration of motor insulation or equipment as a result of continuously tested?

No, the unit uses a very low non-destructive current for monitoring.

6. Is 24 volts sufficient voltage to monitor insulation resistance?

The purpose of the MotoSafe Insulation Monitor is to alert the operator of a low insulation condition which may lead to failure on starting. For this purpose, 24 volts is more than adequate, as the insulation has effectively lost its dielectric strength when it has reached this condition.

7. I think 24 volts is too low – can you offer monitors with high monitoring voltages?

Yes. We have the Type [MHV-H](#) and the Type [LM602IND](#), which monitor with 400 volts DC.

8. Can I do 500V Megger Test with the monitor installed?

Disconnect the control power to the monitor to isolate it from the motor.

9. How does it work?

Electric motors are wound with copper wire, which is insulated to resist the leakage of current from the winding to the motor frame. MotoSafe Insulation Monitors compare the resistance of the insulation to a standard resistance in the unit, to monitor the insulation resistance.

When the motor is idle, the standard resistance joins to the winding isolation resistance and the monitor uses a fixed DC voltage to pass the same electric current through them both. By comparing the voltage across the two resistances, it determines whether the insulation resistance is greater than, equal to or smaller than the standard resistance. If it is equal or smaller than the standard resistance, the MotoSafe unit goes into alarm. The value of the standard resistance can be selected by selecting the alarm level with the switch on the MotoSafe faceplate.

10. How does the MotoSafe unit connect itself and disconnect itself?

The isolation circuit senses whether or not the motor is energized. If it is not, it closes the isolation relay in the MotoSafe unit to begin monitoring. When the motor is energized, the isolation circuit responds by opening the relay contacts, disconnecting the MotoSafe unit from the motor.

11. Where is the monitor normally located in a typical installation?

It is mounted in the starter enclosure or control center.

12. How is the MotoSafe unit connected to the motor?

Details of the connections for all common types of motors are given in the 'Installation Instructions' supplied with each unit. It describes the procedure to follow for the installation – a process which is simple and easily done.

13. When the MotoSafe unit goes into alarm, do I have to have the motor rewound?

The purpose of monitoring the insulation resistance with the MotoSafe unit is to receive early warning of insulation problems, so that preventative maintenance can be carried out before it is necessary to rewind – or – replace the motor. Generally, all that is required is that the windings be cleaned, dried and re-varnished before the motor is returned to service. Following this procedure, the original motor efficiency level is retained, whereas when a motor is rewound the efficiency can be expected to be reduced somewhat.

14. Will your units handle remote alarm systems?

The alarm relay in monitors is rated at 250 volts 5amps AC and 30 volts 8 amps DC. If your DC control voltage exceeds 30 volts, an external relay will be required.

15. I want to supply the MotoSafe unit from a 24 volt battery. Is this possible?

Yes

16. Can I have a meter indication of the actual insulation resistance?

For motors and generators to 600 volts we offer such a unit – our Type [IM600IND](#). It has a single alarm level of 2 meg ohms and has an external, i.e. separately mounted, meter showing the insulation resistance.

17. Can I perform trend analysis using the MotoSafe unit?

Yes, because the low voltage units have three selectable alarm levels, so the analysis can be done by switching the alarm level to its highest setting, recording the date, then when an alarm occurs, switching it to the next lower level and monitoring the time until the next alarm occurs. With the Indicating MotoSafe Type [IM600IND](#), it is only necessary to record the meter indication at suitable intervals.

18. How can I be sure the unit is working?

When the **green light** is on, the MotoSafe unit is receiving power. Its operation can be checked by pushing the "Test" button and holding it for 10 seconds. During that time the red "**Alarm**" light will light, showing that the unit is in good working order. Note however that this procedure does NOT check the external connections to the motor. Those connections can be checked when

the motor is NOT energized by grounding one of the motor terminals with the Test Resistor supplied with the unit.

19. Can I connect the MotoSafe unit to monitor all my motors at once?

The MotoSafe Insulation Monitor is designed to monitor insulation resistance of motors when they are not energized, so it will only monitor several motors at the same time if they are all controlled by the same disconnect. The results will be difficult to interpret, as the insulation resistances will all be in parallel, i.e., two identical motors will produce an indication equal to one-half of that of a single motor, and the motor with the lowest insulation resistance will dominate the indication. Because of the difficulty of interpreting the results, we do not recommend such as installation.

For such cases we recommend our Type [MCM603INDE](#) which can monitor up to eight electrical motors individually in a single industrial application (see complete listing of models at bottom of page).

20. Are the Insulation Monitors compensated for the variations of insulation temperature?

No. Temperature compensation is unnecessary at the insulation resistance alarm levels used and would complicate the units without conferring any benefits.

21. If I connect the units for start prevention, can I bypass that feature in an emergency?

Yes. If the selected alarm level is one of the highest levels, switching to a lower level and resetting the unit will bypass the start prevention connection. If the MotoSafe unit is set to the lowest alarm level, the start prevention may be by passed by pushing the “Reset” button and starting the motor immediately, i.e., within 8 seconds.

22. Is there only one model of insulation monitor available?

No. There are a series of “MotoSafe” monitors available for industrial motor and generator applications, and another series of “FailSafe” monitors for marine motor and generator applications. A summary listing follows:

MotoSafe Monitors – Industrial Motor / Generator

[M603IND](#) – for any AC or DC motor or generator up to 600 VAC/DC

[MCM603INDE Multiple](#) – for up to 8 de-energized AC motors

[LM602IND](#) – for large low voltage applications, uses 400 VDC test voltage

[IM600IND](#) – as M603IND, except includes meter of actual insulation resistance

[MHV](#) – for 3 phase motors up to 6.6 KV

[MHV-H](#) – as MHV, except uses 400 VDC test voltage

FailSafe Monitors – Marine Motor / Generator

[MGM600D](#) - for any 600V AC or DC motor; control voltage of 115 V or 220 V

[CVM-AC](#) – for ungrounded AC single phase control

[CVM-DC](#) – for 24 VDC ungrounded control

[USM](#) – for three phase AC ungrounded control

[M1200](#) – for large low volt motors, DC to 1,200 Volts, AC from 600 to 1,000 V

Monitors are also available to meet special requirements associated with airport runway lighting systems.