



## INDICATING INSULATION MONITOR FOR ELECTRICAL MACHINES MotoSafe™ TYPE MG600 MODEL IM600IND

Model IM600IND Indicating Insulation Monitors are designed to meet the need for an indication of actual insulation resistance of low voltage electrical machines in addition to providing a visual alarm indication and contacts for external alarm functions, start prevention and excitation control. It is intended for use with machines to 600 volts AC or DC.

### FEATURES:

- ◆ Easy Installation
- ◆ Small footprint DIN Rail Mounting
- ◆ Completely automatic in operation
- ◆ Gives early warning of insulation problems
- ◆ Clear, unambiguous meter indication
- ◆ Solid state circuitry
- ◆ High phase to ground impedance
- ◆ High / Low alarm level selection
- ◆ Low monitoring voltage for personnel safety
- ◆ LED local alarm
- ◆ Contacts provided for remote alarm and start prevention
- ◆ Local and Remote test and reset capability



### APPLICATION:

MotoSafe Insulation Monitors are designed to provide safe monitoring of electrical insulation integrity. In certain installations, e.g. offshore drilling platforms, it is necessary to shut down equipment until weather conditions improve and it is essential to know the state of the insulation of the generator(s) before power is restored. The MotoSafe Monitor Type IM600IND was designed to meet this requirement and the start prevention contacts are used for excitation control. However, its application is not limited to such installations and it can be applied to provide a readout of insulation resistance wherever that information is beneficial, e.g. before starting large, low voltage motors following shutdown for maintenance, plant shutdown, etc.

The meter is separate from the monitor, so the monitor may be installed as convenient in the instrument compartment, with the meter mounted on the door or wherever required and wired back to the monitor. Alternatively the output of the monitor may be connected to a PLC's I/O or any other voltage reading device. The standard alarm level of  $1.5M\Omega$  set accordingly to the recommendations of minimum operating conditions for the low voltage electrical machines and  $3M\Omega$  is recommended as an early warning setting. Non-standard alarm levels may be obtained by special order.

Monitors are entirely automatic in operation and carry UL Listing and CSA Certification.

## ORDERING INFORMATION

- Specify the supply voltage required and version of the analog output. Example: For 120V AC supply with the output version 1, order Type IM600IND-120-1.
- Specify meter, if required (this is an optional accessory, sold separately).
- Installation Kit IK-IM includes: Explanatory and Warning labels, the bracket 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.

## SPECIFICATIONS

Model IM600IND

Max Line Voltage	600 AC/DC
Supply Voltage*	120 or 220V AC +20% 50/60 Hz
Isolation voltage	24 - 600 V AC/DC
Power Requirements	3 va.
Factory Set points**	1.5 / 3.0 Megohms
Contact Rating	5 A, 250 V AC resistive
Isolation Time	0.5 milliseconds
Dimensions (mm) WxHxL (in)	103 x 68 x 112 4.05 x 2.67 x 4.4
Meter	3.5" panel mounting
Weight (kg)/(oz)	0.42/14.8

\* DC supply or 400Hz units available – contact factory

\*\* For other set points, consult factory.

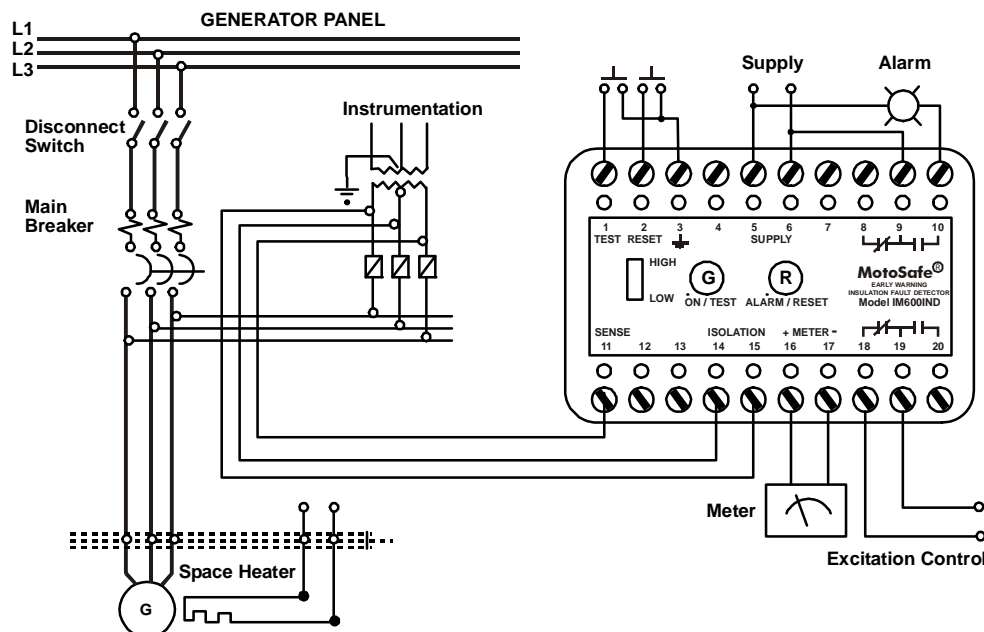
- Analogue output range: 0 – 10V DC; For distances greater than 6 feet twisted pair cable wiring is recommended.
- Maximum short circuit current 5 microamps.
- Operating temperature -20°C to +50°C; storage temperature -40°C to +100°C.
- Environment: maximum 95% relative humidity, non-condensing.
- UL and CSA Approved.

Two versions of the analogue output voltage in relation to the resistance available:

$R_L M\Omega$	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	6.96	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

The precision of the output is  $\pm 3\%$

## CONNECTION DIAGRAM - MOTOSAFE MODEL IM600IND MONITOR



# MotoSafe™ MONITOR TYPE IM600IND; INSTALLATION.

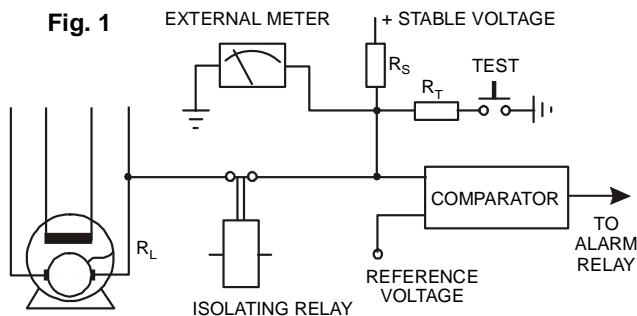
**IMPORTANT: READ THE FOLLOWING INSTRUCTIONS BEFORE INSTALLING THE MONITOR.**

MotoSafe INSULATION MONITOR FOR 600 V GENERATORS AND MOTORS, TYPE IM600IND.

The MotoSafe device continuously monitors the insulation resistance of idle machines and operates an alarm relay when the resistance falls below preset level. The device provides choice of two alarm levels indicated on the rating label. It also provides an indication of insulation resistance on an external meter and has capability for remote test and reset.

## OPERATION

When the generator (or motor) is idle, the isolating



relay contacts are closed, as shown (see Fig. 1)

This connects the machine windings to a stable voltage source through the series resistor  $R_S$ . The series resistor and the machine 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  $R_L$ , which is shown on the external meter. 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 of the starter 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 starter enclosure front panel close to the door hinges and affix the adhesive warning label around the lamp.
3. Install the meter in the front panel, using the template from the meter package for dimensions.

## 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. (When DC control voltage is specified the polarity is not important. The DC control should be ungrounded or negative grounded).
3. Connect terminals 11, 14 & 15 to the generator phases as shown in the diagram overleaf. Terminals 14 & 15 alternatively can be connected to motor's breaker coil.
4. Connect terminal 3 to ground.
5. If a local alarm light is required, connect the supplied flashing alarm light to AC control voltage supply via a normally open contact (terminals 9 & 10 or 19 & 20).
6. Connect the meter terminals to the MotoSafe terminals 16 & 17, observing the polarity.
7. Reconnect the supply and control voltages to the starter.

**Note:** Terminals 1 & 3 and 2 & 3 may be used for an external N.O. push-button switch to test and reset the unit remotely respectively.

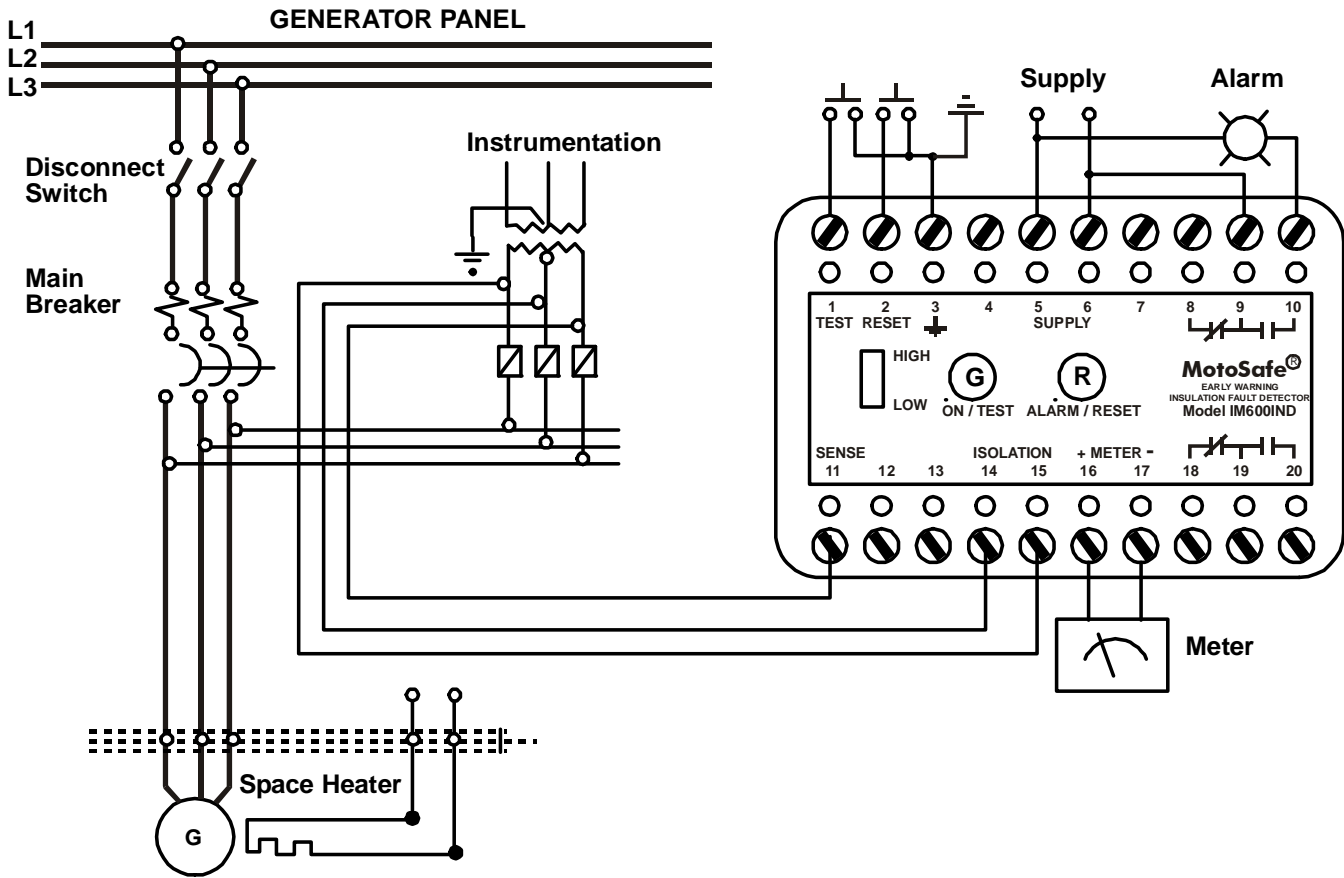
## TESTING

1. Ground one of the generator phases temporarily via the supplied test resistor. After 8 - 10 seconds the red LED should light, the meter should indicate 1 Megohm and the external alarm circuit should activate. Disconnect the test resistor and press the RESET button.
2. Start the generator. The meter should read infinity and no alarm should occur.
3. Stop the generator. The meter should indicate the insulation resistance. If its value is above the alarm level no alarm should occur.

### Note:

The green LED indicates "Power ON" and the red LED is the alarm indicator. If the meter does not indicate or the alarm indicator lights 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. The meter output may be checked using any meter with a 10 volt range.

## Connection Diagram MotoSafe Model IM600IND Monitor



The analog output (Meter terminals 16 & 17) provides actual readings of the insulation resistance converted to 0 to 10V DC scale. Voltage at terminal 16 in reference to terminal 17 may be either zero for full ground and 10V for resistance of 40Megohm or over (option 1) or 10V for full ground and zero for resistance of 40Megohm or over (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	0.4 5	0.8 8	1.6 6	2.3 5	3.5 2	4.4 6	5.5 9	6.2 0	6.9 6	7.3 8	7.9 3	8.6 5	9.2 1	9.6 6	10. 0
$U_{7opt.2} V$	10. 0	9.5 5	9.1 2	8.3 4	7.6 5	6.4 8	5.5 4	4.4 1	3.8 0	3.0 4	2.6 2	2.0 7	1.3 5	0.7 9	0.3 4	0

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