HOW TO TEST THE BATTERIES:

1. REMOVE THE PLASTIC PROBE GUARDS.
2. FLIP THE LEFT HAND TOGGLE SWITCH TO THE “ON” POSITION.
3. TURN THE POTENTIOMETER KNOB UNTIL THE NEEDLE GOES FULL SCALE (TO THE RIGHT).
4. IF THE NEEDLE WILL NOT GO FULL SCALE, THE TWO “C” SIZE BATTERIES MUST BE REPLACED. BY REMOVING THE 4 PANEL SCREWS AND LIFTING OFF THE FRONT PANEL TO ACCESS THE BATTERIES.

HOW TO CHECK A FLANGE GASKET USING THE TWO FIXED PROBES

a. FLIP THE LEFT-HAND TOGGLE SWITCH TO THE “ON” POSITION.
b. FLIP THE RIGHT HAND TOGGLE SWITCH TO THE “ZERO” POSITION.
c. ADJUST THE POTENTIOMETER KNOB UNTIL THE NEEDLE IS AT “ZERO”.
d. FLIP THE RIGHT HAND TOGGLE SWITCH TO THE “TEST” POSITION. (NEEDLE WILL JUMP HARD TO THE RIGHT).
e. APPLY THE TWO FIXED PROBES ACROSS THE FLANGE SYSTEM, MAKING SURE TO BREAK THROUGH ANY PLANT COATING THAT MAY BE PRESENT.

POSSIBLE OUTCOMES: [1] NEEDLE REMAINS PEGGED TO THE RIGHT – GASKET IS A GOOD INSULATOR. [2] NEEDLE MOVES ON SCALE OR PAST ZERO – GASKET IS NOT A GOOD INSULATOR, OR, THERE IS A SHORTED BOLT (SEE BELOW REGARDING HOW TO TEST THE INDIVIDUAL FLANGE BOLTS)
HOW TO CHECK A FLANGE GASKET USING THE FLEXIBLE PROBE AND ONE FIXED PROBE

a. FLIP THE LEFT-HAND TOGGLE SWITCH TO THE “ON” POSITION.
b. FLIP THE RIGHT-HAND TOGGLE SWITCH TO THE “TEST” POSITION.
c. TOUCH (SHORT) THE FLEXIBLE PROBE TO THE FIXED PROBE IDENTIFIED BY A WHITE DOT ON THE FRONT PANEL.
d. ADJUST THE POTENTIOMETER KNOB UNTIL THE NEEDLE GOES PAST “ZERO” AND JUST TOUCHES THE LEFT-HAND METER STOP.
e. BREAK CONTACT BETWEEN THE PROBES - THE NEEDLE SHOULD JUMP HARD TO THE RIGHT-HAND METER STOP.
f. APPLY THE FLEXIBLE PROBE TO ONE SIDE AND THE FIXED PROBE IDENTIFIED BY THE WHITE DOT TO THE OTHER SIDE OF THE FLANGE SYSTEM, MAKING SURE TO BREAK THROUGH ANY PAINT COATING THAT MAY BE PRESENT.

POSSIBLE OUTCOMES: [1] NEEDLE REMAINS PEGGED TO THE RIGHT – GASKET IS A GOOD INSULATOR. [2] NEEDLE MOVES ON SCALE OR PAST ZERO – GASKET IS NOT A GOOD INSULATOR, OR, THERE IS A SHORTED BOLT (SEE BELOW REGARDING HOW TO TEST THE INDIVIDUAL FLANGE BOLTS)

HOW TO LOCATE A SHORTED FLANGE BOLT USING THE FLEXIBLE PROBE AND ONE FIXED PROBE

a. FLIP THE LEFT-HAND TOGGLE SWITCH TO THE “ON” POSITION.
b. FLIP THE RIGHT-HAND TOGGLE SWITCH TO THE “TEST” POSITION.
c. TOUCH (SHORT) THE FLEXIBLE PROBE TO THE FIXED PROBE IDENTIFIED BY A WHITE DOT ON THE FRONT PANEL.
d. ADJUST THE POTENTIOMETER KNOB UNTIL THE NEEDLE GOES PAST “ZERO” AND JUST TOUCHES THE LEFT-HAND METER STOP.
e. BREAK CONTACT BETWEEN THE PROBES - THE NEEDLE SHOULD JUMP HARD TO THE RIGHT-HAND METER STOP.
g. [1] ON A DOUBLE INSULATED FLANGE UNIT, APPLY THE FIXED PROBE IDENTIFIED BY THE WHITE DOT TO ONE FLANGE AND THE FLEXIBLE PROBE TO EACH BOLT IN TURN ON THE OPPOSITE FLANGE, MAKING SURE TO BREAK THROUGH ANY PAINT COATING THAT MAY BE PRESENT. [2] ON A SINGLE INSULATED FLANGE UNIT (WHERE THE BOLTS ARE INSULATED THROUGH ONE FLANGE ONLY), APPLY THE FIXED PROBE IDENTIFIED BY THE WHITE DOT TO THE FLANGE THROUGH WHICH THE BOLTS ARE INSULATED AND THE FLEXIBLE PROBE TO EACH BOLT IN TURN AROUND THE SAME FLANGE, MAKING SURE TO BREAK THROUGH ANY PAINT COATING THAT MAY BE PRESENT.


ADDITIONAL NOTES:

1. TO CONSERVE BATTERY POWER, TURN THE INSTRUMENT “OFF” AFTER EACH SET OF TESTS.
2. THE MODEL 601 INSULATION CHECKER SHOULD NOT BE HARMED BY DC VOLTAGES NORMALLY ENCOUNTERED IN CATHODIC PROTECTION, SINCE THE UNIT HAS BEEN CONSTRUCTED TO WITHSTAND UP TO 50 VOLTS DC ACROSS THE PROBES.
3. AC VOLTAGES PRESENT ACROSS AN INSULATOR SHOULD NOT HARM THE INSTRUMENT UNDER NORMAL OPERATING CONDITIONS. A SLIGHT POSSIBILITY EXISTS, HOWEVER, THAT HIGH TRANSIENT AC VOLTAGES MIGHT DAMAGE THE IN34 DIODE.
Model 601 Above-Ground Insulation Checker

Principals of Operation

The Model 601 above-ground insulation checker is an instrument for locating electrical shorts occurring between adjacent (normally insulated) pipe sections in a (potentially) complex pipe network.

The resistance of metallic pipe is so small that it is virtually impossible with conventional DC measuring systems to accurately determine where adjacent pipes are shorted together. The issue can be particularly difficult when other pipes are (electrically) interconnected with the pipe under study, since short circuits can be present that are indistinguishable, by conventional DC measuring devices, from a short circuit at the insulator of interest.

The Model 601 insulation checker circumvents this issue by applying a radio frequency signal across the insulator of interest, rather than a DC source of energy. Radio frequency electromagnetic signals do not travel through a pipe (conductor) in a uniform fashion (as would DC current) but, rather, they ride completely on the surface of the pipe which leads to a relatively high AC resistance to the pipe, in contrast to a low DC resistance. This phenomenon is known as the “skin effect”.

The Model 601 utilizes the phenomenon by applying a radio frequency signal across normally insulated adjacent portions of a pipe via two probes. Since the effective AC resistance of the pipe system will be at large (due to the skin effect), any electrical shorts that may be present around the pipe system, that would impact DC measurement, will have little effect on the Model 601 measurements (the pipe system will appear as an “open circuit” to the AC source, compared to appearing as a short circuit to a DC source).

Consequently, only the effective AC resistance of the material (normally an insulator) appearing directly between the probes will be a factor with regard to the output of the Model 601 meter. Thus, the Model 601 unit can distinguish between insulation “shorts” and shorts associated with interconnected piping.
As mentioned above, it is the effective AC resistance of the material appearing between the probes that affects the output of the Model 601 unit. In case of a perfect insulator (non-conductor), the AC resistance will be high and, in the case of a leaky insulator, the AC resistance will be relatively low. The Model 601 assesses the AC resistance level by detecting the magnitude of the RF voltage appearing between the probes. A large value for the RF voltage will suggest a large AC resistance value and a small RF voltage value will indicate a relatively-small AC resistance.

The RF voltage appearing across the probes is determined by a built-in detector circuit that is tuned to the same frequency as that of the RF oscillator and the RF voltage is rectified internally to produce a DC voltage. It is this DC voltage that indicates the needle position on the meter scale.

Consequently, the Pointer’s location on the meter will reflect the level of AC resistance for the material appearing between the probes. For a perfect insulator, the pointer will be fully to the right on the scale (reflecting a large value of AC resistance) and the pointer will move to the right hand side of the scale when lower AC resistances are detected. Again, lower AC resistance would indicate the presence of non-perfect (leaky) insulators (ionically-conducting materials) or metallic shorts.

Because of the skin-effect discussed above, it is possible to locate a shorted bolt in a normally insulating flange using the Model 601, even though the bolt being examined may or may not be the only shorted bolt in the flange.

NOTE: The Model 601 Insulator Checker cannot be used to check the condition for a buried flange from remote test leads. However, the Mode 702 Insulation Checker can be used to check the quality of insulation in the buried flanges and carrier pipe/casing systems.
WARRANTY

MCM provides a 12 month parts and labor warranty on its products, commencing on the date of shipment. Defects occurring during the warranty period will be repaired or products will be replaced at MCM’s option and expense, if MCM received notice during the warranty period. The express warranty will not apply to defects or damage due to the accidents, neglect, misuse, alterations or failure to properly use AND maintain the products.

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