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ENGINEERING MEMO JOSLYN "TRANSMASTER" ELECTRIC FURNACE SWITCHES

MONITORING VACUUM MODULES

The reliability of Joslyn's vacuum fault interrupters in electric furnace applications has been proven with over 35 years of successful experience in more than 3,000 electric furnace installations worldwide. Joslyn electric furnace switches are warranted for 40,000 operations or 4 years. This extraordinary warranty is unparalleled in the history of electric furnace systems.

The electrical controls and operating mechanisms of "TRANSMASTER" electric furnace switches rarely require maintenance or inspection. This is a major advantage of "TRANSMASTER" switch systems and one reason for the wide acceptance of the product. Loss of dielectric strength in the individual interrupting modules can occur and is unfortunately not predictable with respect to either time or number of operations.

Fortunately, "TRANSMASTER" systems can function normally for a considerable period of time after loss of dielectric strength. It is desirable, however, to replace modules as soon as possible after loss of dielectric strength occurs.

HIGH POTENTIAL TESTING

The most positive means of establishing that vacuum is present in a Joslyn interrupter module is performing the high potential test per instruction book I.750-315 for VBT "TRANSMASTER" or I.750-314 for VBU "TRANSMASTER" or alternate instructions provided by Joslyn as part of our supply of your TRANSMASTER equipment.

Joslyn recommends that high potential withstand testing (using AC not DC) of the individual vacuum interrupter modules be performed at least once every six months. The test has no detrimental effect on the modules. Since it requires no disassembly of the switch and can be performed in a short time, Joslyn suggests that this test be coordinated with your established schedules for testing or servicing of other components in your system. High potential testing should be performed immediately if any abnormal condition be observed on your system.

In addition there are other means of determining that loss of vacuum has occurred.

1. POWER CIRCUIT MONITOR (PCM)

The Joslyn Power Circuit Monitor continuously monitors the system to alert the user to the loss of vacuum. The Joslyn Power Circuit Monitor has been designed for voltages of 11kV minimum to 38kV maximum. The PCM connects to the load side of the vacuum switch and will activate alarm output contacts if loss of vacuum is detected.

If the Power Circuit Monitor is installed on 15kV systems, Joslyn's recommendation for periodic high potential testing remains the most positive test but the PCM provides full time surveillance. Different ratings and installations will have varying sensitivities to this condition. For higher voltages up to 38kV where two modules or contacts are applied in series, loss of dielectric strength of a single module may or may not be detected by the Power Circuit Monitor. Therefore, Joslyn's recommendation for periodic high potential testing continues to be applicable. The Power Circuit Monitor will respond immediately if both modules in series lose dielectric strength.

2. FURNACE SYSTEM PROVISIONS

PHASE BALANCING LIGHTS/SECONDARY VOLTMETERS

15kV vacuum switch systems which use only one vacuum module in series per phase (regardless of the number of modules which may be in parallel) offer the unique advantage of allowing continuous testing each time the switch is in the open position. Any indications of potential on one or more phases when the switch is open is evidence of loss of dielectric strength. This can be observed by energization of one or more phase balancing lights typically installed above the operator's panel or any reading other than zero on the secondary voltmeter. These lights are supplied as part of many furnace control systems.

3. THERMAL SENSING

One indication that loss of dielectric strength has occurred is increasing module resistance. A module which has a higher than normal resistance will operate at a higher temperature than other modules. Various temperature sensing techniques have been used to monitor the temperature of vacuum modules while the "TRANSMASTER" switch is in service.

Remote temperature sensing equipment is made by various manufacturers. This equipment allows focusing on a small part of any piece of apparatus to detect the temperature rise above normal ambient. In this way, one vacuum contact can be compared with another. If a temperature differential of more than 5 degrees C is observed, a high potential test should be performed on the modules.

4. RADIO NOISE

Static observed on an AM radio when the switch is in the open position, but which stops when the switch is closed, is an indication that loss of dielectric strength may have occurred.

5. SURGE ARRESTER DISCHARGE OR "COUNTING"

Surge arresters can be supplied with counters to record the number of times the arrester has discharged. Occasional discharges may be observed. It is helpful to monitor the number of counts per period. Deviation from the normal number of "counts" per period could be an indication of loss of vacuum. The switch should be high potential tested immediately if a deviation is observed.

ANTI-SINGLE PHASING CONTROL PROVISIONS

Anti-single phasing control circuits are incorporated in Joslyn resistor insertion switches and other complex switches incorporating 6 or more mechanisms. Also, all "TRANSMASTER VBU" electric furnace switches contain anti-single phasing control circuits. If all phases do not close within the approximately one (1) second, the vacuum fault interrupter automatically trips. The circuitry is valuable for detecting most control and mechanism failures within the switch.

Please contact Joslyn Hi-Voltage if you have any questions about the application, operation or testing of your TRANSMASTER switch and accessories.