

SURE-TRIP, INC.

RECOMMENDED RETROFIT KIT SPECIFICATIONS

1. ELECTRICAL:

1.1. RF EMISSIONS:

Any unit containing circuitry operating at a frequency of greater than 10,000 Hz shall meet FCC emission requirements for Class B equipment. It may not be necessary to register the equipment with the FCC but it is a requirement to verify compliance within these limits and keep the test data on file.

1.2. RF SUSCEPTABILITY:

All units shall be subjected to radiated RF energy to assure that the unit will function normally under these conditions.

1.2.1 RADIATED RF:

All units shall be tested with 5 watts of RF energy at a distance of 6 inches over a frequency range of 30 Mhz to 460 Mhz. Test shall be conducted with power on and unit at 95% full load.

Units shall be subjected to fields with both horizontal and vertical orientations. No abnormal operation should be observed.

1.3 SURGE SUSCEPTABILITY:

All units shall be able to withstand a 3Kv x 50 uSec. surge on the AC input and meet ANSI C37.90.1-1989.

1.4. OPERATING FREQUENCY:

All units operating from AC power shall be capable of operating at either 50 or 60 Hertz.

1.5. OVER-VOLTAGE:

All units shall operate normally and shall be within specified temperature limits when operated at 110% of nominal operating voltage. Test shall be conducted at both 50 and 60 Hz.

1.6. UNDER-VOLTAGE:

All units shall operate normally when operated at 85% of nominal operating voltage. Test shall be conducted at both 50 and 60 Hz.

1.7. ELECTRICAL NOISE:

1.7.1. HARMONIC CONTENT:

All units shall be subjected to a distorted sine wave with 20% RMS harmonic content. Harmonic frequency should include all through the 7th order. No abnormal operation should be observed.

2. MECHANICAL:

2.1. CIRCUIT BOARD SPACINGS:

All circuit boards shall be reviewed per UL 489, paragraph 10, and UL 840 for conductor spacings. Note that in almost all instances, conformal coating will be required to achieve the required spacings.

2.2. CIRCUIT BOARD MATERIALS

All printed circuit boards shall be reviewed per UL 489 and UL 796 for material usage. Note that in almost all instances, a base material of epoxy, glass cloth NEMA grade FR-4 will be required as a minimum, with the material to meet UL 94V-O flammability.

2.3. TERMINALS

2.3.1. TYPE

Unless otherwise specified, all terminals shall be of the barrier terminal strip type with self-lifting pressure wire connector suitable for 1 or 2, 19 or 26 strand #12 - 18 Awg. copper wire.

2.3.2. FINGER SAFE

Terminals shall be suitably covered or enclosed to meet finger safe requirements per IEC 529-1976.

3. ENVIRONMENTAL REQUIREMENTS:

The following environmental conditions shall be simulated and test data recorded. All records must be maintained in a reproducible format and retained per appropriate retention policies.

3.1. OPERATING TEMPERATURE RANGE FOR TRIP UNITS, METERING AND TRIP INDICATOR UNIT

Units shall operate within specified tolerance over a range of -20 to +70 degrees Celsius, air temperature surrounding the printed circuit boards.

3.2. VIBRATION

All units shall be tested for damage resulting from vibration. The following details apply:

1. Endurance time: 2 minutes
2. Frequency range: 10 – 150 Hz
3. Maximum Acceleration: 13 G's

4. ASSEMBLY WORKMANSHIP:

All units shall be inspected for general construction techniques, to include:

1. Visual adherence to appropriate IPC Workmanship Standards.
2. Suitable mechanical support for printed circuit boards, transformers, large or heavy electronic components, etc.
3. Careful application of conformal coating or any other post board assembly coating. Coating thickness to be 3 mils or more.

5. PRODUCTION TESTING:

All units shall undergo 100% production testing to insure operation within stated tolerances. Test records shall be reproducible in hard copy and retrievable for a time that conforms to appropriate records retention policies. Minimum acceptable record retention policy is 20 years beyond date of last manufactured unit.

6. QUALITY SYSTEM:

All units shall have been manufactured in accordance with a written and traceable Quality System, as evidenced by the presence of date codes, inspection stamps, traceable test records, certified vendors, etc. Each phase of the manufacturing process should be able to successfully pass appropriate QA audits.

7. TESTING FOR SUITABILITY FOR USE:

7.1. CURRENT TRANSFORMER INPUTS:

All units shall be capable of withstanding a current/voltage waveform consistent with that which the intended CT system is capable of delivering at the following limits:

Input 125% 3-phase current with tripping disabled until a stable temperature is reached. There should be no heating of components in excess of 50% of their rated value.

Input 600% 3-phase current for the maximum Long-Time delay (tolerance included) plus 25%, tripping disabled.

Input 1200% 3-phase current for the maximum delay (either Long-Time or withstand Short-Time) plus 10%, tripping disabled.

Input the maximum current with the control set to the maximum withstand delay, tripping enabled.

In all cases, there should be no damage of the current carrying path or electronic components.

7.2. FLUX SHIFTER OUTPUT:

All units shall be capable of delivering a current/voltage waveform that is, at a minimum, 125% of that stated to be the maximum current required by the flux-shifter. To be considered is the maximum current required at the intended delivered voltage and the time duration required, to insure proper operation of the flux-shifter. Flux-shifter must have a minimum of 5 pounds holding force to prevent false tripping or shock out tripping.

7.3. INTER DEVICE PERFORMANCE CONFORMANCE

All units shall have their operating performance specifications (trip curves, etc.) carefully reviewed against the intended breaker frames' performance characteristics to determine if there are any areas of critical conformance or non-conformance.

Critical Conformance is any area where the trip unit will allow the time-current product to exceed 90% of the breaker frame's maximum time-current limit.

Non-Conformance is any area where the trip unit will allow the time-current product to exceed 100% of the breaker frame's maximum time-current limit.

8. PERFORMANCE FEATURES:

All trip units must have the following features:

1. Targets for fault indication.
2. Long-Time pickup indication.
3. I squared T short-time function.
4. Sealed metal enclosure to shield against noise, magnetic interference and contaminates.
5. RMS measurement, of sinusoidal and non-sinusoidal current, capability.
6. Circuit design that allows switch adjustments while the breaker is in operation, without tripping the breaker.
7. Circuit design for protection against RF noise, transient voltage, and harmonic problems.
8. Sealed, gold contact, rotary switch adjustments that provide precise repeatable settings.
9. Preferred two year manufacturer's product warranty that covers the complete kit.
10. The finished circuit breaker must be tested and confirmed per the published manufacturer's time/current curve through the full range of the logic control settings.
11. Ground Fault function that works at a definite current pick-up, not a percentage of the current transformer rating.
12. All power for the retrofit kit must be supplied by the current transformers.