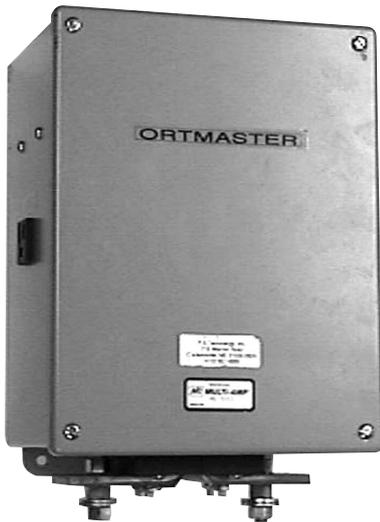


ORTMASTER Interface Module



- **Patented technology**
- **Rugged steel enclosure protects against the elements**
- **Integrates with the TCC software for immediate "GO/NOGO" verification of time current curves**

DESCRIPTION

The ORTMASTER interface module is a compact, high accuracy current and time measurement device that monitors both the magnitude and time that current is applied to a recloser during a test. The module has proven accuracy and consistency, when used in conjunction with a recloser test set, especially on waveforms with moderate to severe current decay.

The ORTMASTER is designed to connect to the output of any recloser test set. A parallel port connects to a PC and the software program displays trip current, trip times, and reclose times for recloser operations. A precision 12 bit A/D converter reads the current flowing through the bus bar connection and stores the waveform in memory. A continuous readout of true rms current is indicated at all times, and accurate readings of time and current for each operation are displayed as they occur. After the test, the waveform of each shot can be analyzed by direct viewing or saved to disk for future reference. After a recloser completes all operations, the ORTMASTER module supplies the current magnitude and time data for analysis. The software controlled true rms computation always gives the correct current reading and properly reads waveforms with DC offset and distortion.

Low Voltage Testing

When a fault occurs on a power line protected by a recloser, typically 14.4/24.9 KV AC, the impedance of the power line circuit is fairly high, so that fault currents are in the order of 5 to 20 times continuous rated current. A 100 ampere recloser will typically see a fault current of about 1000 amperes, which translates to an impedance of about 14 ohms.

When a recloser operates, a plunger is drawn into a coil, which causes an increase in impedance. A 100 ampere, type 4E recloser has an impedance change from 0.072 ohms to 0.227 ohms, as the plunger moves inside the coil. At 25 KV, this change of impedance has minimal effects on current. Recloser curves assume current flow to remain constant. The impedance change at 25 KV has a negligible effect on timing.

Practical test methods for reclosers are limited by reasonable available power, and safe voltage levels. Most recloser test sets are 10 to 50 KVA, which limits power available for testing. The manufacturer recommended test voltage for the 100 ampere, type 4E recloser is 138 VAC. If a solid 138 VAC with no resistive compensation is applied to the recloser, it will begin its operation at 1916 amps (which requires over 200 KVA), but will complete its operation at only 608 amps. Unless a true rms computation of the entire pulse is utilized, it will be difficult to measure the current. Most recloser test sets incorporate some sort of resistive compensation, which can limit the current change to about 10-20%, but even this amount of decay can affect the current metering.

Instrumentation

Several methods of current measurement are utilized by different recloser test sets. Some systems read the current near the beginning of the operation, and others track the current and read it near the end of the operation. However, the recloser operates on the true rms value of the current over the entire length of the pulse.

For example, assume the recloser is a 100 amp type L, with a D curve, and current decay of 20%. The expected trip time at 1000 amps is 0.3163 seconds, but 0.4914 seconds at 800 amps. The average current is actually about 900 amps, with an expected trip time of .3807 seconds. If the .3807 trip time is compared to the curve at 1000 amps, the time would appear to be about 17% slow. If your test set measures at the end of the operation, reading 800 amps, the recloser would appear to be about 29% fast. Either reading would appear to be out of tolerance.



How ORTMASTER Works

The ORTMASTER records the entire waveform of each current pulse, by taking current samples at a rate of 2000 samples per second, or about 33 samples per cycle. After each operation has completed, a true rms computation is performed, taking into account any distortion, decay, or DC offset, which directly affect recloser operation and timing. Extensive testing has determined that timing will closely match that which will be produced at high voltages and minimal decay under actual operating conditions. This technology enables low voltage testing to achieve the accuracy and repeatability that previously required more compensation than was possible within the limitation of a practical test system.

P S Technology, Inc. Version 3.11

| OPER | CURRENT | DECAY | TRIP TIME | RECL TIME |
|---------------------------------------|---------|-----------------------|-----------|-----------|
| 1 | 488 A | -24.6% | 0.1262 | 1.7315 |
| 2 | 404 A | -28.6% | 0.1825 | 1.6183 |
| 3 | 508 A | -27.4% | 0.5723 | 1.5732 |
| 4 | 499 A | -28.3% | 0.5561 | 5.0000 |
| 5 | 0 A | | 0.0000 | 0.0000 |
| CURRENT: 6 A | | RANGE: 1.0 kA | | |
| +/- to adjust | | | | |
| STATUS: TEST COMPLETE - - PRESS <ESC> | | Serial Number: 950000 | | |

In addition to its unequalled accuracy of current measurement, the ORTMASTER also excels in timing measurement. At 2000 samples per second, a precision of 0.5 msec is possible. When interfaced with the TCC software, test results can be instantly verified.

Time Current Curve (TCC) Software

TCC is a computerized recloser time current curve verification program designed to streamline the time current curve verification process. The optional TCC software package integrates with the ORTMASTER to compare test results with manufacturer’s data for immediate “GO/NOGO” verification of time current curves.

SYSTEM SPECIFICATIONS

Dimensions:

- Height:** 12 inches (305 mm)
- Width:** 8 inches (203 mm)
- Depth:** 6 inches (152 mm)

Net Weight

18 lbs (8.2 kg)

Current Ranges (Amperes)

50/100/250/500/1 K/2.5K/5K/10K

ORDERING INFORMATION

| Item (Qty) | Cat. No. |
|----------------------------|-----------|
| Ortmaster Interface Module | Ortmaster |
| Optional Item | |
| TCC Software | TCC |

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