THREE PHASE PRIMARY INJECTION

TriRaptor

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TriRaptor: Applications

Motor protection relays

Modern inline relays feature numerous functional options and user-selectable settings, and use the line's power to operate, so they cannot be easily tested with single-phase injection. The TriRaptor produces a stable and accurate output of up to 9 kA with 120° between phases, and can measure operation time by monitoring the relay's tripping output or directly the current flow.

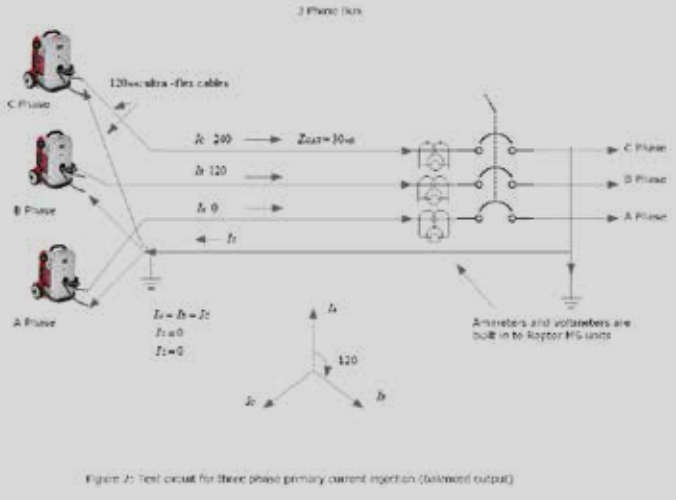
Circuit breaker testing

Single- and three-phase protective functions in low-, medium-, and high voltage circuit breakers can be now easily tested with the TriRaptor, thanks to its wide current range, 3 kVA output power, and pre-selectable current values. Trip time is automatically measured even when a secondary protective device e.g. a relay cannot be accessed for testing.

Substation commissioning

Connect the TriRaptor's three-phase output to both ends of a busbar and let it maintain a pre-defined test current while you browse the entire installation for inaccuracies and possible connection mistakes, quickly and safely, using harmless voltage. Typical commissioning targets:

- Circuit continuity
- CT ratio and polarity
- Secondary equipment connections
- Phase order
- Differential circuits
- Phase consistency
- Shorting jumpers left in place
- Protective relay settings
- Grounding
- Instruments



Example of connection

TriRaptor: Commissioning

RELAY READINGS
Check measured secondary values

INSTRUMENTATION
Verify operation and accuracy

SECONDARY CONNECTIONS
Locate errors quickly

PHASE CONSISTENCY
Locate errors quickly

CIRCUIT BREAKERS
Check for adequate tripping

CIRCUIT INTEGRITY
Assess continuity and proper grounding

CURRENT TRANSFORMERS
Ratio, polarity

TEST TEMPLATES

Using the same user-friendly philosophy as in the single phase Raptor, the TriRaptor's user interface has been implemented on a larger touch screen and furnished with pre-defined templates that provide ON/OFF synchronization of the three output phases. Test current values can be preset and dynamically adjusted individually and time results and other measurements are recorded and displayed for each phase.

When injecting in polarized (asymmetrical waveform) mode, the Raptor Polarity Tester can be used to check the entire installation for connection errors in a matter of minutes.

TriRaptor: Specifications

RAPTOR MS (3 units per system)

(values @240 Vac, 50 Hz, 1 turn sec. 960 mm², measured 25 cm on each side)

HIGH CURRENT OUTPUT	
Output Current	Output Voltage
No Load V (0%Imax)	0 - 1.20 Vac - Continuous
3.8 KAac (25%Imax)	0 - 0.81 Vac - Continuous
7.5 KAac (50%Imax)	0 - 0.42 Vac - 3 min
9.5 KAac (Imax)	0 - 0.22 Vac - 3 s
No Load Resolution	25 uVac
Output Frequency	Same as supply's (50/60 Hz)
Ranges	0-1 KAac/N; 0-15 KAac/N (n: number of secondary turns)
Resolution	1 Aac, 10 Aac
Accuracy	±0.2% of the value ±0.2% of the range
Phase angle	±0.25°
LOW CURRENT OUTPUT (not simultaneous with high current output)	
Output Current	0 - 35 Aac (0 – 9 Aac continuous)
Voltage Output	0 - 200 Vac
Output Frequency	Same as supply's (50/60 Hz)
Isolated output	Yes
Protection	Fuse
AMMETER/LOW LEVEL VOLTMETER	
Ammeter Ranges	0 - 0.2 / 0 - 2 / 0 - 20 Aac
Ammeter Resolution	0.1 mAac, 1 mAac, 10 mAac
Ammeter Impedance	<10 mΩ
Voltmeter Ranges	0 - 30 mVac, 0 - 0, 3 Vac, 0 - 3 Vac
Voltmeter Resolution	0.015 mVac, 0.15 mVac, 1.5 mVac
Voltmeter Impedance	>3000 KΩ
Frequency range	20 - 400 Hz
Accuracy	±0.1% of the value ±0.1% of the range
Phase angle	±0.25°
Isolated input	Yes
VOLTMETER	
Ranges	0 - 0.2 / 0 - 2 / 0 - 20 / 0 - 300 Vac
Resolution	0.1 mVac, 1 mVac, 10 mVac, 0.15 Vac
Impedance	>120 KΩ
Frequency range	20 - 400 Hz
Accuracy	±0.1% of the value ±0.1% of the range
Phase angle	±0.25°
Isolated input	Yes

BINARY INPUT	
Type	Dry contact / Voltage
Voltage mode Levels	1.5 V, 15 V ; Max. Voltage 250 Vac.
Time resolution	1 ms
Isolated input	Yes
COMMUNICATIONS	
2 x RS-485 Raptor Bus connectors from previous R-MS or 3xHH to next R-MS	
GENERAL	
Supply	230 V ±10%, 50/60 Hz, single phase (all the 3 units must be plugged into the same phase and must be connected in parallel or wye)
Weight	35 Kg / 77 lb
Dimensions	550 x 440 x 230 mm / 21 ½" x 17 ½" x 9"
Working temperature	0-50° C
Storage temperature	-25 to + 70 °C
Protections	MCB, overload, temperature, supply, communications, polarity
Sec. hole diameter	85 mm
Transport	Wheels, folding handle, fixed handle

RAPTOR 3xHH

Mini-PC powered by Windows CE

CONTROL	
Display	7" high definition color TFT
Interface	Resistive touch panel + Rotary Encoder (turn & push)
LEDs	Alarm, Connectivity, Power
COMMUNICATIONS	
RS-485	Raptor BUS Communication with Raptor-MS
USB	Connection to PC
RJ-45	Ethernet for software updates
GENERAL	
Power Supply	Self-powered from Raptor-MS, or with external 5V AC/DC power adapter with a real consumption of about 1A
Weight	1 Kg / 2 lb
Dimensions	224 x 164 x 40 mm / 8" x 6" x 1 ½"
Case	High quality injection-molded ABS. Entire backface covered with magnet + rubber for fixation
Transport	Soft nylon bag.
Connection cable	5 m / 16 ½ ft (3 no.)
Compliance	The instrument is intended for use in high-voltage substations and industrial environments. All EuroSMC products comply to CE-marking directives and IEC and international standards, and are designed and manufactured in accordance with ISO-9001 quality standard.

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