

HPI-1200

PRIMARY CURRENT INJECTION FOR PROTECTION AND TRIP TESTING

Timed pulse · Trip time · Pickup · Time-current curve · Reclosers

Reference standards

IEC 60947-2, IEC 60898-1, IEC 60947-4-1, IEC 60255-151, IEC 62271-111 / IEEE C37.60, IEC 61869-2, ANSI/NETA ATS and MTS (primary injection)

0.1 ms
TRIP
TIMER



Primary Current Injection Test Set — HPI-1200

Description

The HVEX HPI-1200 is a portable primary current injection test set for protection and trip-time testing in substations, switchgear, MCCs and laboratories. It injects regulated AC current directly into the primary circuit, as a timed pulse or a ramp, and its built-in timer measures the time until the circuit breaker, relay or recloser operates. Primary injection verifies the whole protection chain in one test — CT, wiring, relay, trip coil and breaker — which secondary injection cannot cover. One person moves and operates the unit, powered from a 220 V / 32 A industrial socket.

Operating principle

A solid-state power amplifier with a high-current output transformer synthesizes the sinusoidal current in closed loop. A Rogowski coil on the test loop feeds the true-RMS measurement to the controller, which reaches the set value within the first cycles and holds it until trip, compensating for supply and loop variations. The timer starts with the injection (or a START binary input) and stops when current is interrupted, when the STOP binary input changes state — breaker auxiliary contact or relay trip contact — or at the programmed maximum time. An automatic capacitor bank compensates the loop reactance.

Features

- 0 to 1,200 A continuous and pulses up to 3,000 A, with zero-crossing synchronized start (no DC offset);
- Timer with 0.1 ms resolution and recording of the current at the instant of trip;
- Two binary inputs (START/STOP) for dry or wet contacts and one binary output;
- Pulse, ramp, ramp + pulse, point sequence and reclosing modes;
- 7" touchscreen HMI and HVEX Acquisition supervisory software over Ethernet, with PDF reports.

Tests performed

- Trip time of LV circuit breakers in long-time, short-time and instantaneous functions;
- Pickup and dropout current of relays and trip units;
- Time-current curve points, with programmable cooling interval;
- CT-relay-breaker chain verification by primary injection;
- Recloser opening and reclosing times and sectionalizer counting.

Advantages

- Tests the protection system as it actually operates, with real primary current;
- Portable: about 70 kg on wheels with a retractable handle — one person moves and operates it;
- 220 V / 32 A supply available at any site, no three-phase supply needed;
- Output ≤ 5 V: no electric shock hazard in the test circuit;
- Made in Brazil, with local support, calibration and maintenance.

Applications

- Commissioning and maintenance of LV circuit breakers (molded-case and air) with thermal-magnetic and electronic trip units;
- 50/51 and 50N/51N overcurrent relays, overload relays and motor protection breakers;
- Distribution reclosers and sectionalizers;
- CT ratio and polarity and differential scheme stability;
- Switchgear, panels and MCCs in substations and industrial plants.

1,200 A

continuous (S1), 0–1,200 A

3,000 A

pulse of up to 1 s

0.1 ms

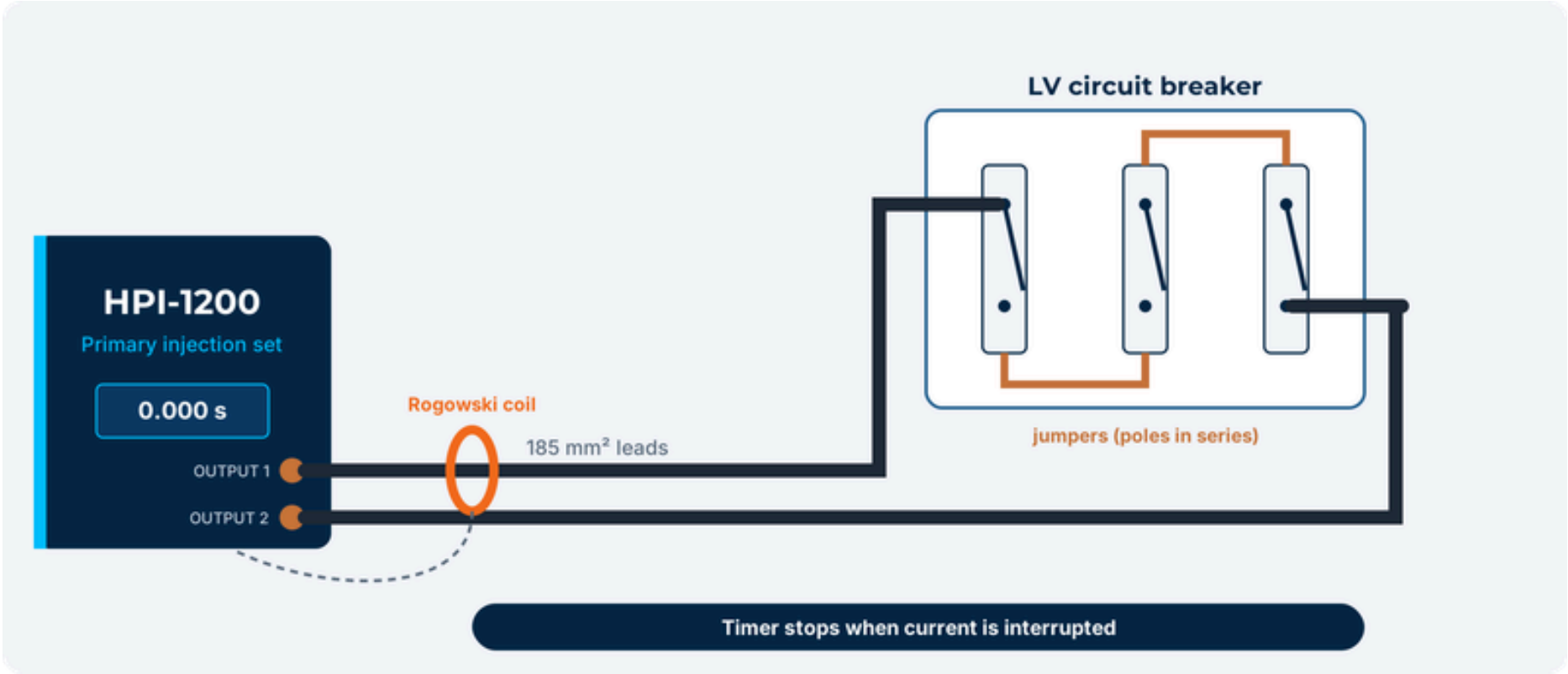
timer resolution

220 V · 32 A

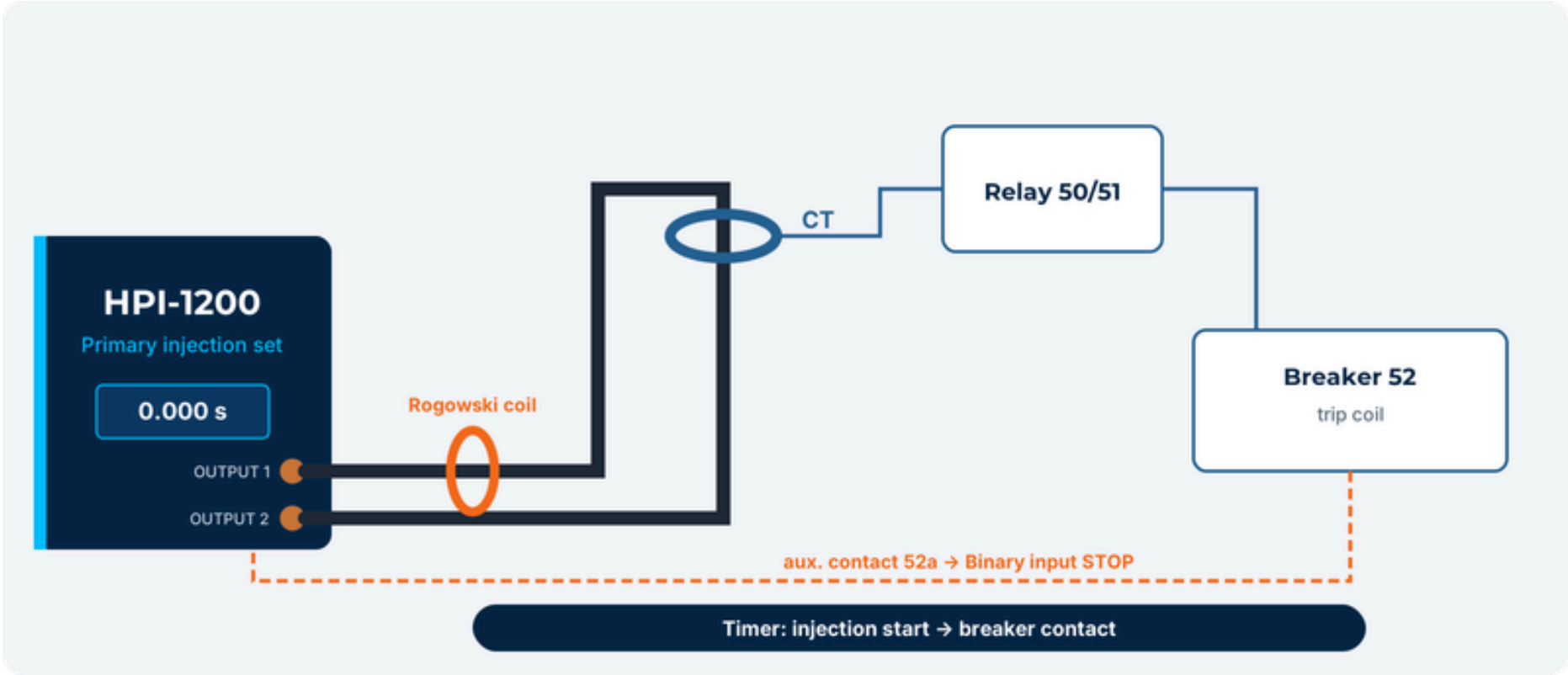
single-phase supply

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Typical test connections



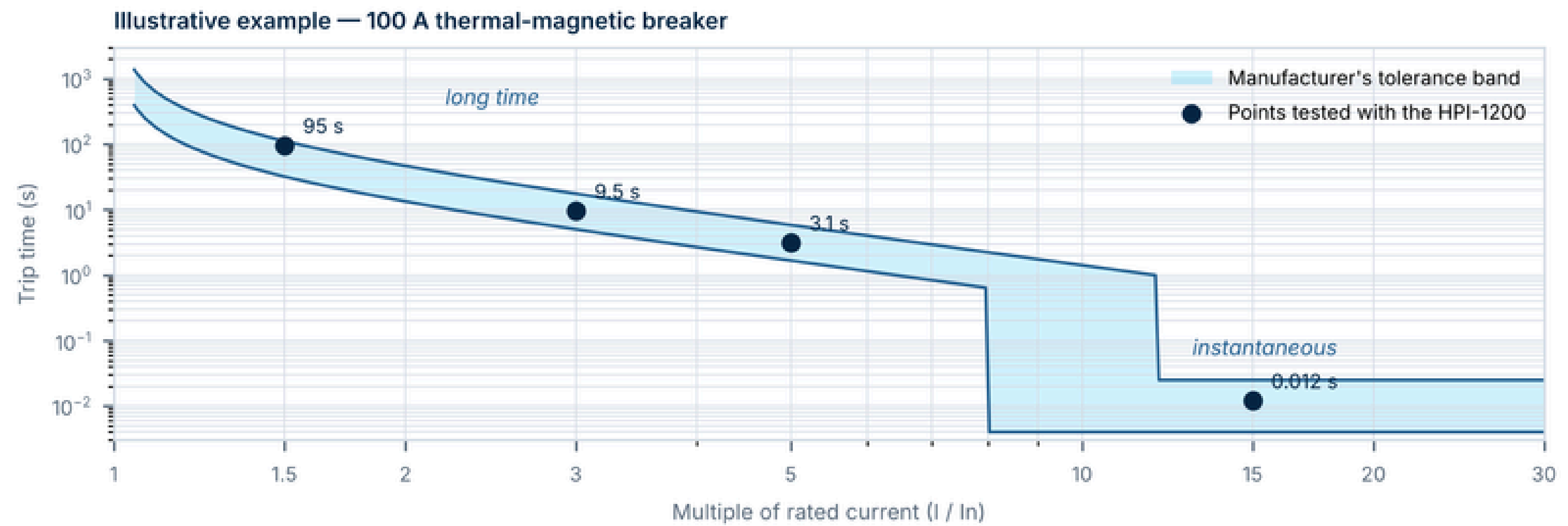
LV breaker trip: the three poles in series carry the same current; the timer stops when the breaker interrupts the current.



Protection chain: current injected into the CT primary picks up the relay, which trips the breaker; the breaker auxiliary contact stops the timer.

Test modes

Mode	How it works	Result
Timed pulse	Injects the preset current until trip or maximum time	Trip time (ms) and trip current
Ramp	Raises current at a programmable rate (A/s) until operation; lowers it until reset	Pickup and dropout
Ramp + pulse	Finds pickup by ramp and applies pulses at multiples of it	Pickup and operating times
Point sequence	Up to 10 points (current, maximum time, cooling) in automatic sequence	Time-current curve points
Reclosing	Keeps injecting through the recloser operating sequence	Opening times, intervals and number of operations
Constant current	Regulated current with automatic timed switch-off	CT ratio and polarity check



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Front panel



- 7" color touchscreen HMI: current, test mode and time settings; display of trip time, current, voltage and protection status;
- Mushroom-head emergency stop with immediate output shutdown;
- Key switch: prevents operation by unauthorized users;
- Green (ready) and red (output energized) pilot lights with audible warning;
- OUTPUT 1 and OUTPUT 2 high-current copper terminals for M12 lugs;
- Rogowski coil (SENSOR) and external interlock (INTERLOCK) connectors;
- START/STOP binary inputs and binary output; RJ-45 Ethernet;
- 220 V / 32 A supply via IEC 60309 industrial plug.

HVEX Acquisition supervisory software

- Reusable test plans per breaker, relay or recloser type;
- Recording of trip time, trip current, pickup and dropout at each point;
- Time-current plot overlaid with the user-entered tolerance band and pass/fail indication;
- PDF reports and CSV export; history per tested device;
- Firmware update and remote diagnostics.

Safety and protections

- Designed to the safety requirements of Brazilian standard NR-10;
- External interlock input for remote push-button, barrier or switchgear door;
- Protection against overtemperature, overload, short circuit and supply under/overvoltage;
- Open-loop and missing-sensor detection: output is blocked;
- Grounded metal enclosure, line filter and shielded measurement leads for substation use.

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Technical Specifications

Current output

Output type	Single-phase AC, direct injection through two copper terminals
Continuous current	0 to 1,200 A rms (S1 duty, 40 °C), 1 A resolution
Short-time current	2,000 A for up to 10 s; 3,000 A for up to 1 s (loop ≤ 1.2 mΩ)
Output voltage	Up to 5 V rms at 1,200 A
Output power	6 kVA continuous; up to 11 kVA for 1 s
Frequency	60 Hz or 50 Hz, selectable
Current regulation	± 1 % of set value, closed loop
Current settling	≤ 2 cycles, with value pre-set
Start angle	0° to 360° programmable (default: zero crossing)

Timer and binary I/O

Timer range	0.0000 s to 99,999 s
Resolution / accuracy	0.1 ms / ± (0.01 % of reading + 0.5 ms)
Start	Injection start or START binary input
Stop	Current interruption (adjustable threshold), STOP binary input or maximum time
Binary inputs	2 (START/STOP), isolated; dry or wet contact up to 300 V DC/AC; NO/NC; 0–20 ms debounce
Binary output	1 dry contact, 250 V AC / 2 A

Measurement

Sensor	Flexible Rogowski coil with integrator, opening up to 150 mm
Range / accuracy	0 to 5,000 A rms / ± 1 % of reading ± 1 A, true-RMS
Quantities	Trip current, pickup, dropout, output voltage, power and power factor

Supply, interface and physical data

Power supply	220 V AC phase-phase or phase-neutral, ± 10 %, 50/60 Hz, up to 32 A; 2P+E 32 A plug (IEC 60309), 5 m cord
Interfaces	7" touchscreen HMI; RJ-45 Ethernet; external interlock
Dimensions / weight	600 × 450 × 850 mm (W × D × H) / ≈ 70 kg, without leads
Environment	Operation 0 to 45 °C; storage –10 to 60 °C; humidity up to 95 % non-condensing; IP20

Scope of supply

Included	HPI-1200; 5 kA Rogowski coil; 2 × 3 m, 185 mm² leads with M12 lugs; binary input leads; power cord; HVEX Acquisition software; calibration certificate; FAT report; manual
Options	High-current clamps for busbars; additional leads; on-site training
Warranty	2 years (24 months) against manufacturing defects; support and calibration from HVEX

The standards listed identify the field of application and do not constitute certification of the device under test. Short-time currents depend on the test loop impedance. Specifications subject to change without notice. Rev. 10/2026.



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