

# PCITS2000/2

## Primary Current Injection Test Sets



- **Test relay protection systems and their current transformers together**
- **Current level maintained though test circuit resistance may rise due to heating**
- **Built-in timer to record protection relay operation**

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### DESCRIPTION

This primary current injection test set is rugged, self-contained and designed for operation by one person. The PCITS2000/2 is a two-wheeled unit (with a handle).

The test set has a separate hand-held controller connected by an expandable cable. This allows the operator to work close to a protective relay while controlling a test. The maximum output current is 2000 A a.c. at line frequency. By changing the range switch, half the rated output can be obtained at twice the voltage. Additionally, a separate auxiliary voltage output of 250 V, 2 A a.c. or 125 V, 2 A a.c. is available for testing voltage operated relay coils or checking the magnetisation characteristics of current transformers. All outputs are fully variable and each test set has a nominal duty cycle when delivering full current and voltage. Continuous operation is possible at 40% of maximum current.

Current and voltage outputs are varied automatically from the controller. The output current is supplied through wing nut terminals to the low inductance lead set (available optionally).

The voltage output has a separate pair of terminals. Each test set has a built-in timer which itself has three modes of operation 'Forward', 'Run-back' and 'Dual'. These enable the function of a protective relay to be fully tested in regard to its operating times. The timer may be stopped by the contacts of the protection relay under test, or by the cessation of current flow or manually by the operator.

The timer stop inputs accept either unenergised or a.c./d.c. energised relay contacts.

All current and voltage levels are shown on the dot-matrix liquid crystal display incorporated in the controller. The display also shows the elapsed time measured by the counter. The equipment is microprocessor controlled and three tactile keys on the control box take up the selected function allotted to them during the testing programme. These functions are indicated on the display. The display can be set to read in any of five languages, English, French, German, Italian and Spanish.

Circuit protection is by circuit breakers and fuses, and a thermal cut-out prevents overheating. Controlled switching ensures that, in the event of power failure or the thermal cut-out operating, the output cannot be re-energized until the controls are reset, thereby offering protection to the equipment and the operator.

### APPLICATIONS

Primary current injection test sets have two main applications. The first of these is the testing of complete relay protection systems comprising the isolated high voltage conductor, the current transformer, the protection relay and the circuit breaker. Because of the inconvenience of breaking into the feeder circuit on the primary side of the current transformer, primary current injection is normally applied at the time of commissioning

protection equipment or after major repair. Routine testing is carried out using secondary current injection with equipment such as the SCITS100 (100 A) or SCITS50D (50 A).

As many of the protection systems requiring testing have a critical performance in relation to time, the primary current injection test sets incorporate a time counter facility.

The second role of the primary current injection test set is in the testing of the current transformer in a protection system. Again, this test is normally applied prior to commissioning equipment or after repair.

In addition to these protection system applications, current injection test sets are ideal for any application where it is necessary to supply a low resistance load with a controlled and measured heavy current.

### **Primary or Secondary Testing, Which?**

#### **Primary injection testing**

Most electricity supply protective equipment is fed from a current transformer on the supply cable or busbar. Primary current injection testing checks all the components of the protective system. A high test current, enough to cause the protection equipment to operate, is injected into the supply cable. Time taken for the protection relay to operate is then measured.

The primary current injection test is essential when commissioning new protection systems and after major repair and component replacement, since it tests the whole system. It will detect current transformers connected with incorrect polarity or relays that have been set in the wrong sequence in differential systems. However, the inconvenience of breaking the primary circuit means that the method is unsuitable for routine testing.

#### **Secondary Injection Testing**

Secondary current injection testing checks the operation of the protective relay etc. but does not test the overall system including the current transformer. Primary testing usually requires a high current (over 500 A). A secondary injection test is easier since there is not the need to break the primary circuit and it requires a lower current (up to 100 A) through the operating coil of the protective device. The time taken for the protection device to operate is then measured.

A test winding is sometimes provided on the current transformer through which the secondary testing can be carried out.

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**SPECIFICATIONS**

**Current output ranges (a.c.)**

20 A to 2000 A (0 to 3 V) 50 Hz/60 Hz  
 (Programmable in 10 A steps)  
 40 A to 1000 A (0 to 6 V) 50 Hz/60 Hz  
 (Programmable in 10 A steps)

**Accuracy:**

Output  $\pm 2.5\%$  of programmed value  
 Note: Motor Variac driven - subject to mains variation.

**Auxiliary voltage output (a.c.)**

0 to 250 V, 2 A, 50 Hz/60 Hz  
 0 to 125 V, 2 A, 50 Hz/60 Hz

**Display**

Dot matrix L.C.D.

**Measurement ranges**

**Current**

0 - 2000 A, resolution 1 A

**Auxiliary voltage/current**

0 - 250 V, resolution 1 V;  
 0 - 2 A, resolution 0,01 A

**Accuracy:**

$\pm 3\%$  of reading,  $\pm 2$  digits.

**Timer**

**Range:** 0-600 sec, resolution 0,01 sec

**Accuracy:**  $\pm 0.1\%$ ,  $\pm 0.05$  sec

**Duty cycle**

21/2minutes on circuit and 15 minutes off circuit at full range current and voltage. Duty cycle increases until continuous use is possible at 40% of full range.

**Temperature range**

**Operation:**

0°C to 40°C (32 to 104°F)

**Storage:**

-20°C to +60°C (-4 to 140°F)

**Humidity range**

**Operation:**

90% RH at 40°C (104°F)

**Storage:**

93% RH at 40°C (104°F)

**Supply voltage**

220 V/240 V +6% -10%, 50 Hz/60 Hz  
 7 kVA

**Timer stop inputs**

Unenergised or 100 V to 264 V a.c./d.c. energised contacts.

**Safety**

The test set will, in general, meet the requirements of the IEC61010-1 specification.

**EMC**

IEC 61326-1

**Equipment protection**

**Circuit Breakers:**

30 A rating

**Auxiliary Output Fuse:**

2 A ceramic HBC 20 mm x 5 mm IEC 127/1

**Controller Supply Fuse:**

1 A ceramic HBC 20 mm x 5 mm IEC 127/1

**Dimensions**

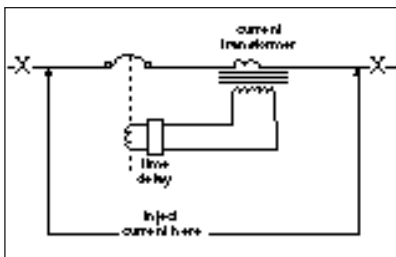
320 mm x 305 mm x 510 mm  
 (12<sup>1</sup>/<sub>2</sub> in x 12 in x 20 in approx.)  
 excluding handle and wheels.

**Controller**

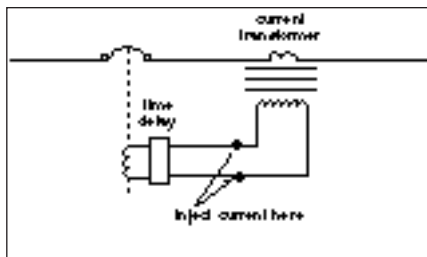
202 mm x 127 mm x 55 mm  
 (8 in x 5 in x 2<sup>1</sup>/<sub>8</sub> in approx.)

**Weight**

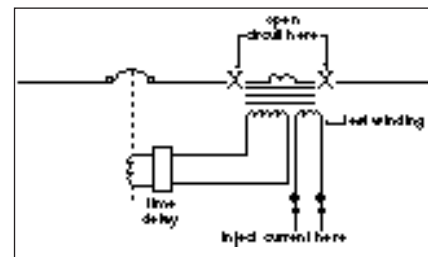
61 kg (134 lb approx.)



Primary injection testing



Secondary injection testing



Secondary testing with test winding

**ORDERING INFORMATION**

Item	Order Code	Item	Order Code
Primary Current Injection Test Sets	PCITS2000/2	<b>Optional Accessories</b>	
		2000 A low inductance lead set (3 m long)	6220-462
		Timer/low current leadset	6131-340

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