

## SPI225 Smart Primary Injection test system

咨询热线：010-68940148

# Megger<sup>®</sup>



- Up to 2000A output
- Smallest primary injection test system in its class
- Output current regulation
- Designed for switchgear commissioning, circuit breaker, CT commissioning, ground grid and relay testing
- Software includes thousands of circuit breaker TCC curves

### 康高特-MEGGER SPI225智能一次注入测试系统 DESCRIPTION

The Model SPI225 is a high current primary injection test system for all forms of high current testing required in a substation, including testing overcurrent relays, circuit breakers, motor overloads, and current transformers.

The SPI system is the FIRST high current test systems to permit a user to type in a predetermined current and the SPI system will generate and regulate the requested high current without preheating the test sample by pulsing the output current at high currents. The SPI system also has the unique ability to turn on at the current zero crossing every time for any load by automatically adjusting the output firing angle. This eliminates DC offset for every circuit breaker type and the need for the user to determine and adjust the firing angle for different loads and circuit breakers.

All SPI systems are fully automated and/or manually controlled. The Smart Touch View Interface (STVI) permits users to manually control the unit and also perform automated testing. The SPI225 unit can also be controlled by a PC for fully automatic testing and report generation.

### 康高特-MEGGER SPI225智能一次注入测试系统 APPLICATION

Universal in application, the SPI225 is a high current primary injection test unit with the ability to perform high current commissioning tests as well as test low-voltage molded-case circuit breakers. A single SPI225 is designed to test low-voltage molded- case circuit breakers up to a rating of 225 A.

The SPI225 is the smallest and lightest primary injection test system designed to perform high current testing on switchgear, current transformers, and ground fault protection systems, as well as in a multitude of other high current testing applications.

### MEGGER SPI225智能一次注入测试系统 FEATURES AND BENEFITS

**Smart Touch View Interface (STVI) is a simplified input and control touch screen**

A key feature of the SPI system is the simplified touch screen input. The STVI touch screen input eliminates the confusing menu system of other primary injection and circuit breaker test systems. The touch screen makes the STVI simple for any technician to use even if the technician does not use the STVI on a consistent basis.

### Automatic control

- The SPI system has many unique abilities to assist in testing
- The user can type a high current setting then the SPI system will generate the requested output without additional user intervention
- Automatically regulate the systems output to the pre-programmed setting
- Automatically regulate the systems output current to compensate for test sample heating or changing load
- Deliver the requested current without user intervention.

Most primary injection systems require the user to turn on the system high current, then manually adjust the output until the desired test current is set. Once the output is set, the user must still manually adjust the output in order to maintain the desired test current. The SPI system eliminates both of these requirements.

### Manual control

The STVI manual controller of the SPI system is sometimes the desired test method. The SPI system permits the operator to run any of the standard tests required for primary injection, as well as low voltage circuit breakers, without the need for a laptop computer.

### DC offset elimination

DC offset is a common problem when testing instantaneous trips on low voltage circuit breakers. A standard high current test system will commonly cause DC offset in the initial 2 to 4 cycles of an output waveform. This DC offset will cause circuit breakers to trip at incorrect current amplitudes therefore providing incorrect results.

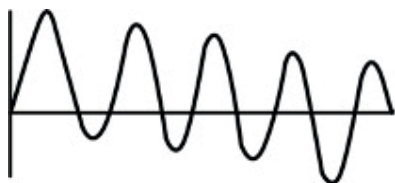


Figure 1: DC current with offset

### Current decay

When performing primary injection testing, the test leads, or test sample will heat up due to the high currents applied. This will result in current decay unless the operator manually intervenes. This manual intervention can cause inconsistent test results that misinform the decisions made by the individual operator.

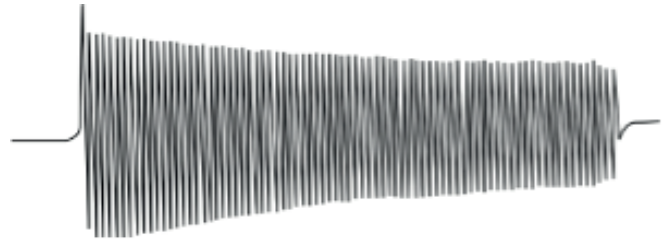


Figure 2: Current decay

The SPI systems eliminates all these problems by providing a constant current output from the beginning of the waveform until test completion.

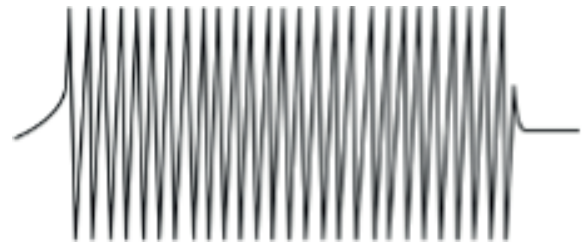


Figure 3: Current decay eliminated

### Construction

This test set is built for years of trouble-free, reliable operation. SPI systems feature rugged instrumentation and controls designed to withstand the vibration and shock of frequent transportation.

### Protection

Fuse, circuit breaker, and overload protective devices are incorporated into the SPI systems. Temperature sensors provide protection from overheating. An emergency stop button is provided to de-energise all input power to the test set.

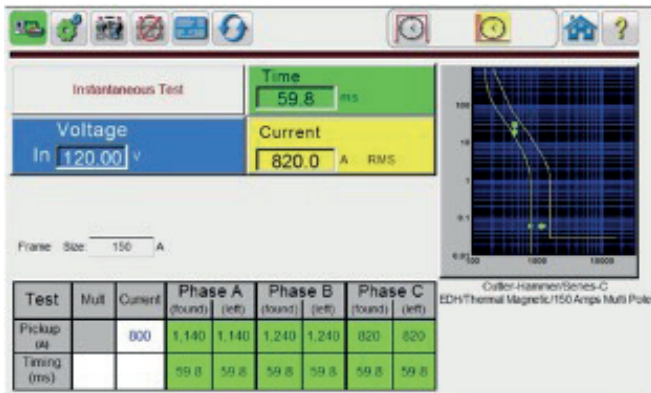


Figure 4: Manufacturer specific test screen

### SPI software

SPI software is the premier software for automated testing, report generation, and maintenance record keeping of all primary injection and low voltage circuit breaker tests. These results are then recorded in the PowerDB database for archival or report generation.

The SPI software is specifically designed for primary injection testing of circuit breakers, relays, and other substation equipment. In order to simplify testing the SPI software is pre-loaded with circuit breaker curves in order to permit the user to verify that the circuit breaker under test is operating correctly. Since the SPI software has the curves pre-loaded the user can test all breaker parameters including:

- Long time pick-up
- Long time timing
- Short time pick-up
- Short time timing
- Instantaneous pick-up
- Ground fault pick-up
- Ground fault timing

### Included complex breaker curves

The SPI software includes report generation for all testing. Thus, the user can not only perform all the primary injection testing required and generate a report for an end customer or for historical purposes.

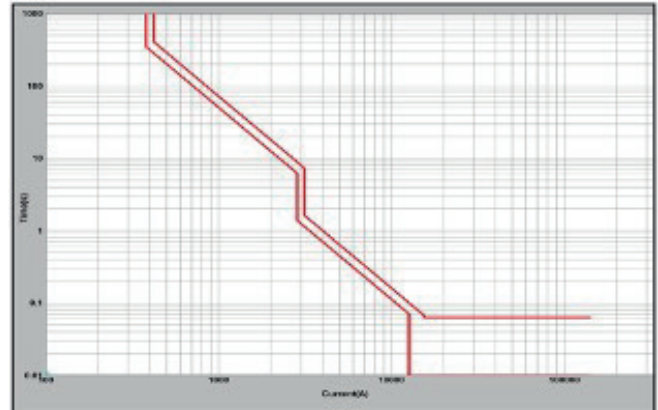


Figure 5: Complex breaker curves in the SPI225 software

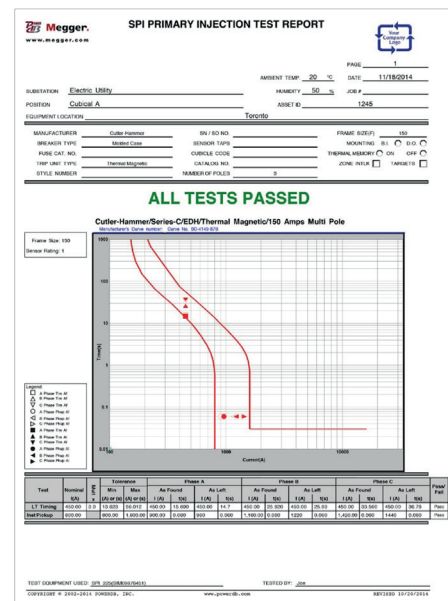
### PARALLEL/SERIES OPERATION

Up to four SPI225 units may be operated in a parallel or series configuration. SPI225 units operated in a parallel or series configuration requires the main supply source to have the same phase angle.

### SPI225 PARALLEL CURRENT

|              | Number of SPI225 units | 1      | 2      |
|--------------|------------------------|--------|--------|
| 120 V source | 2 ft (61 cm) leads     | 1952 A | 3523 A |
| 240 V source | 10 ft (305 cm) leads   | 1394 A | 2429 A |

Figure 6: Actual data taken from testing with an 800 A breaker



# SPI225

## Smart Primary Injection test system



### SPECIFICATIONS<sup>1</sup>

| Input            | Input voltage      | Input current | Frequency |
|------------------|--------------------|---------------|-----------|
| Standard (N)     | 115/230 $\pm$ 15 % | 15/8 A        | 60/50 Hz  |
| CE compliant (C) | 230 $\pm$ 15 %     | 8 A           | 60/50 Hz  |

### Outputs

#### Output ranges

Continuously adjustable in three ranges to meet a variety of test circuit impedances:

25 to 500 A at 3.5 V max.

6.25 to 125 A at 14 V max.

1.25 to 25 A at 70 V max.

#### Output capacity

| Percent rated current | Max. time on | Max. time off |
|-----------------------|--------------|---------------|
| 100 % (1X)            | 30 min.      | 30 min.       |
| 200 % (2X)            | 3 min.       | 8 min.        |
| 300 % (3X)            | 30 sec.      | 4 min         |
| 400 % (4X)            | 7 sec.       | 2 min.        |

The output ranges will provide several times their current rating, provided the output/compliance voltage is sufficient to push the desired current through the impedance of the test circuit.

The SPI225 will test the time-delay characteristic of thermal devices rated up to 225 A using the recommended test current of three times their rating (675 A). To perform an instantaneous trip test, it will provide 2000 A through a typical 225 A molded- case circuit breaker.

Because the magnitude of the output current is determined by the impedance of the load circuit, the voltage rating must be sufficient to push the desired current through the device under test and the connecting test leads.

### Ammeter

**Operating mode:** Memory, continuous

**Digital display:** 5-digit auto ranging display

**Ranges:** 1.0000 A to 99.999 kA

**Overall, ammeter system:** Continuous  $\pm$  1 % of reading or  $\pm$  0.05 A

**Accuracy:** RMS pulse  $\pm$  1.5 % of reading or  $\pm$  0.075 A

### Voltmeter

**Digital display:** 5-digit auto ranging display

**Ranges:** 0.01 to 600.00 V

**Accuracy:**  $\pm$  1 % of reading

### Timer range

**Digital display:** 5-digit auto ranging display

**Ranges:** 0.001 to 99999 seconds

0.01 to 99999 cycles

**Accuracy:**  $\pm$  1 % of reading

### Communications port

Ethernet (2)

USB 2.0

Bluetooth (optional)

### Dimensions

**(N):**

14.2 W x 7.6 H x 12.0 D in.

(360 W x 194 H x 305 D mm)

**(C):**

14.2 W x 7.6 H x 17.0 D in.

(360 W x 194 H x 432 D mm)

### Weight

**Standard system (N):**

47.5 lb. (21.5 kg)

**CE compliant system (C):**

50.7 lb. (23 kg)

### Operating temperature range and humidity

**Operating:** 0 °C to 50 °C

**Storage:** - 30 °C to 70 °C

**Humidity:** 0 to 90 % non-condensing

### Conformance standards

**Safety:** EN 61010-1

**Shock:** EN/IEC 60068-2-27

**Vibration:** EN/IEC 60068-2-6

**Transit drop:** ISTA 1A

**Free fall:** EN/IEC 60068-2-32

**Drop/topple:** EN/IEC 60068-2-31

**Electromagnetic compatibility**

**Emissions:** EN 61326-2-1, EN 61000-3-2/3,

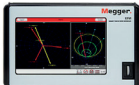
FCC Subpart B of Part 15 Class A

**Immunity:** EN 61000-4-2/3/4/5/6/8/11

## INCLUDED ACCESSORY DESCRIPTIONS

| Description                                                                                                                                                                                                                                                                                                                                      | Part No.   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|  <b>Accessory carry case:</b><br>Used to carry power cord, Ethernet cable, optional STVI and test leads.                                                                                                                                                        | 2003-725   |
| <b>Alligator clip:</b> 4.1 mm, use with test leads up to 1000 V/32 A CAT III. Excellent for test connections to terminal screws and pins where spade lugs cannot be used.                                                                                                                                                                        |            |
|  Alligator clip, <b>red</b> , 4.1 mm                                                                                                                                                                                                                            | 684006     |
| Alligator clip, <b>black</b> , 4.1 mm                                                                                                                                                                                                                                                                                                            | 684007     |
| <b>Sleeved pair of test leads with retractable shroud:</b> Sleeved test leads, one red, one black, 200 cm (78.7 in) long, 600 V, 32 A CAT II                                                                                                                                                                                                     |            |
|  Sleeved test leads in pairs will reduce tangling. These leads and alligator clips are used when the 25 A, 70 V output tap is used. This lead set allows the user to utilise the maximum output compliance voltage.                                             | 2008-539-2 |
| The 4/0 high <b>current leads</b> allow the SPI225 to generate the maximum current specified. These leads also include Megger's unique adapters to allow connection to multiple breaker styles. The AWG #6 high current lead is used with the SPI225's 125 A 14 V output tap. This lead is used when 14 V output compliance voltage is required. |            |
|  <b>Current lead:</b> AWG#6<br>61 cm (2 ft) long                                                                                                                                                                                                              | 1017-003   |
|  <b>Current lead:</b> AWG 4/0<br>61 cm (2 ft) long, red                                                                                                                                                                                                       | 1017-002   |
| <b>Current lead:</b> AWG 4/0<br>61 cm (2 ft) long, black                                                                                                                                                                                                                                                                                         | 1017-001   |

## OPTIONAL ACCESSORY DESCRIPTIONS

| Description                                                                                                                                                                                                                                                                            | Part No. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|  <b>Smart Touch Screen Interface:</b><br>Handheld controller for SPI225                                                                                                                             | STVI-10  |
| <b>SPI 6' lead set consists of:</b><br><b>SPI 6' RED 4/0    SPI 6' BLK 4/0    SPI 6' RED 14V</b><br>Note: Reduces max current to 1725 A. 2 current leads, AWG 4/0, 183 cm (6 ft) long one red, one black                                                                               |          |
| <b>SPI 10' lead set consists of:</b><br><b>SPI 10' RED LEAD    SPI 10' BLK LEAD</b><br>Note: Reduces max current to 1650 A. 2 current leads, AWG 4/0, 305 cm (10 ft) long one red, one black                                                                                           |          |
|  <b>High current test probe:</b> Current lead AWG 4/0, 305 cm (10 ft) Probe dimensions: 61 cm (2 ft), 15 cm (6 in) in diameter supplied with 2 high current tips. Return Lead AWG 4/0 122 cm (4 ft) | 1007-833 |

| Description                                                                                     | Part No.  |
|-------------------------------------------------------------------------------------------------|-----------|
| <b>Power cord:</b> Depending on the style number, the unit will come with one of the following: |           |
| Line cord, North American                                                                       | 620000    |
| Line cord, Continental Europe with CEE 7/7 Schuko Plug                                          | 50425     |
| Line cord, international colour coded wire                                                      | 15065     |
| Line cord, United Kingdom                                                                       | 90002-989 |
| <b>Ethernet cable:</b> for interconnection to PC<br>210 cm (7 ft.) long                         | 90038-983 |
| <b>SPI software</b> and manual on USB stick                                                     | 83404     |

| Description                                                                                                                                                 | Part No.  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|  <b>Ground lead:</b><br>610 cm (20 ft)                                  | 2003-724  |
|  <b>Current lead:</b> with 400 A clip, AWG 4/0, 400 cm (10 ft) long, red | 1014-164  |
| <b>Current lead:</b> with 400 A clip, AWG 4/0, 400 cm (10 ft) long, black                                                                                   | 1014-165  |
| Line Cord, North America 250 V NEMA L6-20P                                                                                                                  | 90038-265 |
| <b>Power Cord Splitter:</b> C14-2X C13 300 V                                                                                                                | 90038-266 |

## SPI225

### Smart Primary Injection test system

#### ORDERING INFORMATION

##### STYLE NUMBER IDENTIFICATION

##### Model SPI225 -

##### Regulatory

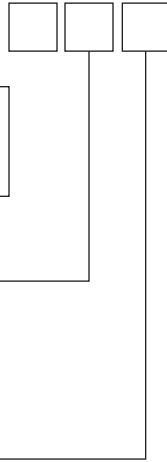
**N** = Standard System 115/230 VAC  
**C** = CE Compliant System 230 VAC\*

##### Bluetooth Option

**1** = With Bluetooth  
**0** = Without Bluetooth

##### Power Cord Option

**A** = North American power cord  
**I** = International power cord  
**E** = Continental Europe power cord  
**U** = United Kingdom power cord



##### NOTE:

\*CE Marked units operating at 230V will have reduced outputs