

## MCT1605

# Multi-Tap Automatic Current Transformer Saturation, Ratio and Polarity Test Set



- **One button automated test: Demagnetization, on multi-ratio CTs test all Knee Point, Saturation, Polarity and Deviation, Winding Resistance, Insulation Resistance, and Burden**
- **Displays multiple instantaneous Saturation Curves with Knee Point**
- **Integrated 1 kV DC insulation test system**
- **Color daylight viewable graphical display**
- **"Save & Print Later" with USB stick**
- **Fast data entry using full QWERTY keyboard**
- **1600 VAC Saturation Test Voltage**
- **Automatic or manual testing selectable**

### DESCRIPTION

The Megger MCT1605 test set is a lightweight, robust, portable unit used to automatically or manually perform saturation, ratio, polarity, demagnetizing tests and insulation tests on current transformers. The MCT provides a microprocessor controlled variable voltage output and precision instrumentation for automatically testing single and multi-ratio CTs. The MCT1605 possesses microprocessor controlled output voltage with precision instrumentation and storage, reducing testing time and increasing productivity. The MCT1605 will directly connect to multi ratio CT's and perform all three tests – saturation, ratio and polarity – on all taps with the push of a button and without changing leads. The MCT1605 has a large display, permitting the user to easily read all pertinent data while the test is being performed and providing the ability to view the current transformer's saturation curve.

Current transformers can be tested in their equipment configuration, such as being mounted in transformers, oil circuit breakers or switchgear. It is necessary for the equipment to be completely isolated from the electrical system prior to testing.

### APPLICATIONS

#### Saturation Test

With the single push of a button, The MCT1605 performs a CT saturation test and calculates the rated knee point. The saturation test is performed at mains rated frequency of 50 or 60 Hz as required by IEC regulations. The MCT1605 will calculate the rated knee point in compliance with IEEE C57.13.1, IEC 60044-1 or IEC 60044-6. While the saturation test is being performed, The MCT will plot the

CT saturation curve on the large graphical display and automatically provide the user with the rated knee point per the desired IEEE or IEC standard. Many substation CT's include a multi-ratio secondary, therefore the MCT1605 has the ability to plot and simultaneously display up to 10 CT saturation curves.



### Ratio Test

Ratio testing is performed by comparing a voltage applied to the secondary winding to the resulting voltage produced on the primary winding. For example, if 1 volt per turn is applied to the secondary winding, the voltage present on the primary winding would be 1 volt. More specifically, if 120 volts were applied to the secondary of a 600/5 current transformer (120:1 ratio), 1 volt would be present on the primary winding. This test is performed automatically during a CT saturation test or manually with the output control knob and metering display. The MCT1605 will also provide the operator with a direct reading ratio, thus removing the need to calculate CT ratio manually.

### Polarity Test

Polarity of the current transformer under test is indicated to the operator by a simple "Correct" or "Incorrect" indication on the display accompanied by the measured phase angle.

### Demagnetization

Normal operating conditions and typical winding resistance measurements can cause a CT to become magnetized. The MCT1605 has the ability to automatically demagnetize the CT under test. This automatic demagnetization routine is useful to ensure that the CT Saturation test yield correct results. Prior to testing demagnification is recommended per ANSI C57.13.1.

### CT Burden Measurement

In addition to performing any required CT test, the MCT1605 has the ability to measure the actual connected Burden. When the actual measured burden is compared against the calculated burden, the user confirms that the CT will operate with published rating.

### Insulation Resistance Test

In order to ensure that the CT secondary wiring is properly insulated, the MCT1605 system includes a 500/1000V insulation resistance test system. This test ensures that the CT secondary winding and secondary wiring is properly insulated per ANSI C57.13.1.

The MCT1605 will also automatically switch the test leads to perform all required insulation test. These test include H-L, H-G, L-G

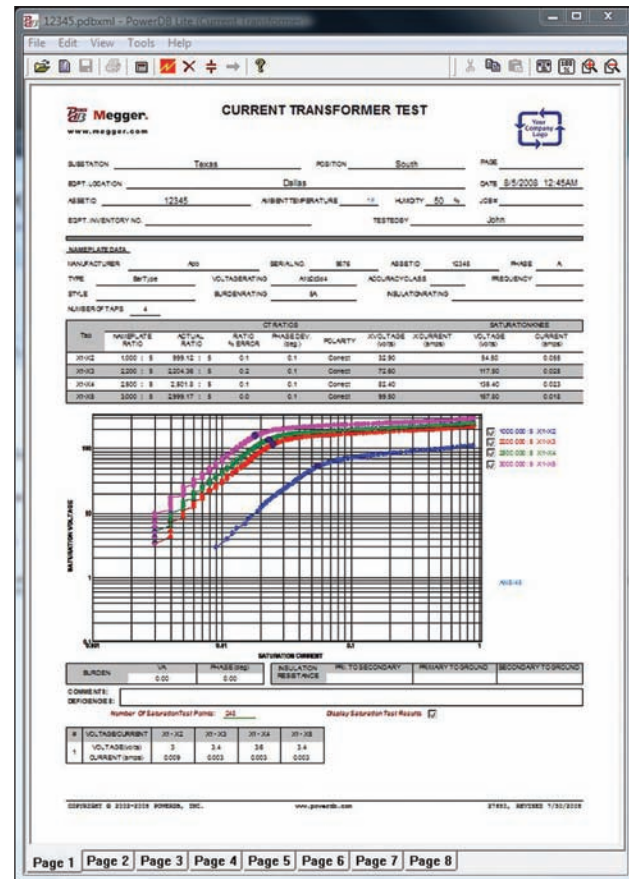
**Note:** Disconnect all electronic loads before performing this test.

### Winding Resistance

Measuring the DC resistance of transformer windings will aid in identifying problems such as shorted or open windings as well as loose connections.

### Data Storage and Printing

The MCT1605 test system not only permits accurate and automated CT testing, but also catalogues and stores test results within the instrument for simple retrieval by software at a later date. All catalogued test results can be uploaded to Megger's PowerDB™ Lite for report generation and saturation curve plotting on a computer. PowerDB Lite also has the ability to operate the MCT1605 with no operator intervention, thus providing a completely computer controlled automated test system.



**Complete report generation with PowerDB Lite**

The operator also has the option to print any catalogued test results immediately using an optional printer, providing hard copy of test reports immediately upon CT test completion.

Onboard memory allows complete test results and data to be stored in one complete file, permitting easy access to quick construction of reports such as saturation curve with knee point. The MCT1605 test file is saved in a Microsoft XML format, thus the data is available to any application that will accept an XML format.



**With a manual voltage output control knob, the user is able to perform any test required manually if only a spot check is required.**



### Upgradeability

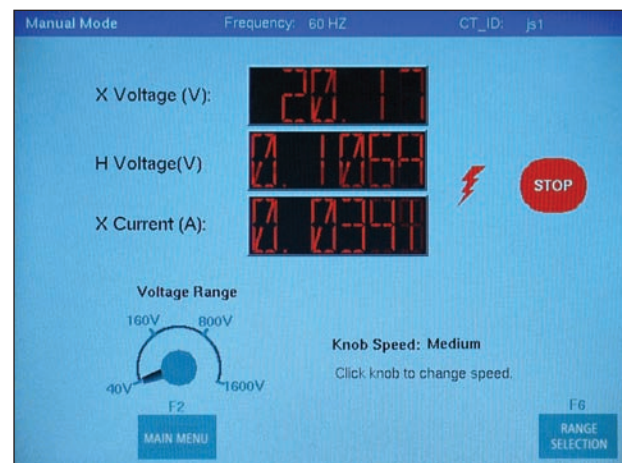
The MCT1605 includes the ability to upgrade the user interface and testing capability using updates supplied on a USB memory device and a simple “upgrade” command. This upgrade capability permits the MCT1605 system to improve as new testing needs are developed.

### FEATURES AND BENEFITS

- **Direct Connection to Multi Ratio CT's** - The MCT1605 will directly connect to all taps on multi ratio CT's to eliminate lead changes required to test all interwinding CT ratios, saturation curves and knee points. The MCT1605 will test all programmed ratios with the push of one button.
- **Large Display** - The large graphical display provides the user with immediate, easy to read test results including a plot of the CT saturation curve. This display also provides the user with simple, easy to read test results for Ratio and Polarity Test.
- **CT Saturation, Ratio and Polarity Automated Testing** - The microprocessor-controlled output fully automates testing of CT's. This automated testing simplifies CT testing and reduces testing time. Automated testing is accomplished directly on the MCT1605 or via PowerDB Lite.
- **CT Demagnetization** - During operation and routine DC winding resistance testing, it is possible for a CT to become magnetized. The MCT1605 includes an automated CT Demagnetization function, which allows determination of accurate Knee Point as well as stable, repeatable test results, and reduces test time.
- **Insulation Test** - The MCT1605 includes a 500/1000V insulation test system to verify the CT secondary winding and secondary wiring. This insures that the secondary insulation has not degraded and will continue to perform its function during high current faults.
- **CT Burden Measurement** - The CT Burden test ensures that the CT secondary load is properly connected. A CT load that is not properly connected can become a fire hazard.
- **CT Winding Resistance Testing** - The CT Winding Resistance test aids in identifying shorted or open windings and can also aid in identifying any loose connections.
- **Complete CT Testing** - The MCT1605 system provides a complete CT saturation, ratio and polarity test. Eliminating the need for multiple pieces of test equipment to perform a CT test. All test are performed in compliance with IEEE C57.13.1 test guidelines.
- **Full QWERTY Keyboard** - The field ruggedized full QWERTY keyboard simplifies nameplate data input.
- **Test Result Report** - The MCT1605 offers storage of complete test files in an easy-to-use, versatile format that permits upload to PowerDB Lite, or printing test results using the optional external printer. These options provide a simple, complete, easy way to store over 200 test results and saturation curves. All test results can be catalogued and stored in the MCT1605.



Saturation Curve and all test results displayed at a glance.



Manual testing screen.

- **High Voltage Warning Indication** - The MCT1605 can produce a high voltage output. To ensure the safety of the user, a high voltage warning is issued via both the MCT1605 and the PowerDB Lite interface prior to the presence of any output test voltage.



Download test results to a USB device.

- **Manual Operation** - The MCT1605 is also supplied with a manual voltage output control knob. This permits the user to perform any test required manually if only a spot check is required. This allows the user to ensure that test results are correct, assisting in diagnosis of a faulty CT.
- **Configurable Test Plans** - Configurable Test Plans can be associated with a specific CT and saved along with results simplifying ongoing monitoring and profiling of CTs.

## Multi-Tap Automatic Current Transformer Saturation, Ratio and Polarity Test Set

### SPECIFICATIONS

#### Input

100 to 265 V, 1ø, 50 or 60 Hz, 15 A max.

#### Output

##### Continuously variable in four ranges:

0 to 40 V at 2.0 A max (5 minute on 15 minute off)

0 to 40 V at 5 A max for burden test

0 to 160 V at 2.0 A max (5 minute on 15 minute off)

0 to 800 V at 1.5 A max (3 min on, 15 min off)

0 to 1600 V at 1.0 A max (3 min on, 15 min off)

#### Instrumentation

##### Voltmeters

##### Output

4½ digit, auto ranging

**Resolution:** 0.0000 to 1.9999/19.999/199.99/1999.9

**Ranges:** 0 to 40/160/800/1600 V

**Accuracy:** ±0.5% of reading, and ±.5% range typical  
±1% of reading and ±1 V maximum

##### Input

4½ digit, auto-ranging

**Ranges:** 0 to 2/600

**Resolution:** 0.0000 to 1.9999/19.999/199.99/600 V

##### Accuracy

**2 V Range:** ±0.5% of reading and ±0.25% range

**600 V Range:** ±0.5% of reading and ±0.5% range

##### Ammeter

4½ digit

**Range:** 0.0000 to 1.0000A/5.000

**Accuracy:** ±0.85% of reading and ±1 LSD

##### Phase Angle

##### 3 digits

**Range:** 0 to 360 degrees

**Accuracy:** ±1 degree\*

#### Ratio

##### Range

0.8 to 5000

##### Accuracy

±0.4% typical

±0.8% maximum

#### Ratio Test Frequency

55Hz internally generated providing a universal 50/60Hz test set

#### Winding Resistance

Measuring Range: .01Ω to 99.9Ω

Accuracy: <9.99Ω ±3% of reading ±2 digits

< 99.9Ω ±5% of reading ±2 digits

#### Insulation Test

**Test Voltage:** 1000 VDC, 500 VDC

**Measuring Range:** 10kΩ – 999MΩ

**Short Circuit Current:** 1.5mA nominal

**Test Current on Load:** 1mA at min. pass values of insulation  
(as specified in BS7671, HD 384 and IEC 364)

**Accuracy:** ±3%, ±2 digits up to 10MΩ

±5%, up to 100MΩ

±30% up to full scale

#### Communication Interfaces

Ethernet/USB

#### Environment

**Operating:** -10° C to 40° C

**Storage:** -30° C to 70° C

#### Enclosure

The unit is housed in a rugged enclosure suitable for use in outdoor substations.

#### Standards

IEC 61010, CSA 22.2, CE

#### Dimensions

7.5" H X 19.25" W X 15" D

(190 H X 489 W X 940 D mm)

#### Weight

47.6 lb (21.6 kg)

\*at nominal voltage

### ORDERING INFORMATION

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
MCT1605 Multi-Tap Automatic Current Transformer Saturation, Ratio and Polarity Test Set	MCT1605	Alligator clip, red, 4.1mm, (1 ea)	684006
<b>Included Accessories</b>		Alligator clip, white, 4.1mm, (1 ea)	90000-882
Line cord, North American (1 ea)	620000	Alligator clip, green, 4.1mm, (1 ea)	90000-883
Line cord, International color coded wire (1 ea)	15065	Alligator clip, yellow, 4.1mm, (1 ea)	90000-884
Test lead, H1 & H2, 40 ft, (1 ea)	620148	Alligator clip, blue, 4.1mm, (1 ea)	90000-885
Test lead, X red, 20 ft, (1 ea)	2000-753	Soft side lead case	90001-165
Test lead, X green, 20 ft, (1 ea)	2000-747	USB memory stick	830029
Test lead, X yellow, 20 ft, (1 ea)	2000-748	Ethernet crossover cable (1 ea)	620094
Test lead, X blue, 20 ft, (1 ea)	2000-749	Instruction book	80513
Test lead, X white, 20 ft, (1 ea)	2000-746	PowerDB Lite	DB0001
Ground lead, green with yellow, with large ground clip, 20 ft, (1 ea)	620151	<b>Optional Accessories</b>	
Large test clip, red, 40mm opening, (1 ea)	640266	Printer USB, battery operated, (1 ea)	830030
Large test clip, black, 40mm opening, (1 ea)	640267	PowerDB, 1 <sup>st</sup> copy with USB key	DB10015

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