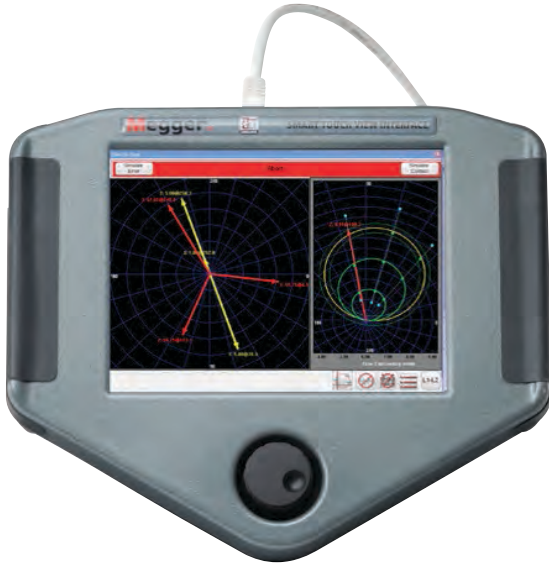


STVI Smart Touch View Interface Handheld Controller for SMRT and MPRT Test Sets



- **New, more powerful and easier to use Click-on-Fault Impedance Relay test screen**
- **Large High Resolution Color TFT LCD touch-screen intuitive smart navigation makes testing relays easier**
- **Designed for either right or left handed operation with control knob centrally located**
- **Automatic Ramp, Pulse Ramp, and Pulse Ramp Binary Search Capability for pick up and dropout tests**
- **Overcurrent Relay Test includes IEC, IEEE and hundreds of Specific Relay Time-Curves Built-in**
- **Dynamic Testing Capability, Multi-Shot Trip and Reclose “Sequencing” test screen**
- **Save/View/Print results from internal PowerDB ONBOARD**

DESCRIPTION

The Smart Touch View Interface™ (STVI) is Megger’s second generation of handheld controllers for the new SMRT and older MPRT¹ relay test systems. The STVI, with its large, full color, new high resolution, and high definition TFT LCD touch screen allows the user to perform manual, steady-state and dynamic testing quickly and easily using the Manual or Sequencer test screens, as well as using built-in preset test routines for most popular relays.

Ergonomically designed for either right or left hand operation using the rubber cushion grips, the centrally located control knob, and the touch screen, the STVI is extremely easy to use. Use the new built-in stand for single-handed operation. The STVI uses a standard Ethernet cable, and Power Over Ethernet (POE) operation. The STVI includes non-volatile built-in data storage for saving tests and test results. A USB port is provided for transferring test results to your PC.

APPLICATION

The most significant feature of the STVI is its ability to provide the user with a very simple way to manually test, for both commissioning and maintenance, from the simple overcurrent relay to the most complex relays manufactured today. Manual operation is simplified through the use of a built-in computer operating system and the touch screen. The STVI eliminates the need for a computer when testing virtually all types of relays. Intuitive menu screens and touch screen buttons are provided to quickly and easily select the desired test function.

Here’s how easy it is

Manual Test Screen

In the following Manual Test Screen the pre-selected outputs are set using the touch screen, or power-up preset default values maybe automatically set from the user defined configuration screen. The user can select from a variety of test options including manual control using the control dial, a dynamic sequence of tests to include trip and reclose operations, an automatic ramp, pulse ramp, or pulse ramp binary search to determine pickup or drop out of relay contacts, or perform relay specific timing tests. By pressing the ON button, the selected output indicators will change colors indicating which outputs are energized. A vector graph indicates the relative phase angles of all of the outputs. The user

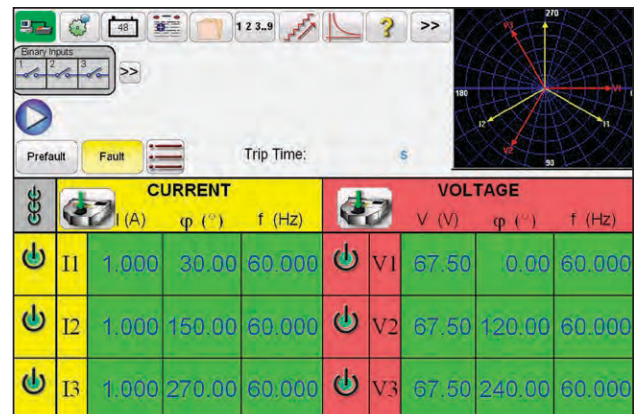


Figure 1. STVI Manual Test Screen

¹ MPRT8415 or MPRT8430 require external power supply adapter

may select to have all output amplitudes metered to provide real time verification of all of the selected outputs, or have setting values displayed.

In the Manual test screen the user can set Prefault and Fault values. The user can toggle back and forth between the two values to monitor contact activity. To do a simple timing test the user can set Prefault time duration in seconds, and then press the Blue Play button. The Prefault values will be applied for the Prefault time, then change to the Fault values and start the Timer running. When the relay trips, it will stop the timer, and may turn selected outputs off depending on the user defined Auto-Off configuration.

Manual Multi-Phase Test Control

In the STVI Manual test screen the user can interface with multiple SMRT units to form a multi-phase test system and manually, or dynamically, control all outputs with the STVI. For example, the following is an STVI manual test screen example of two SMRT36 units interconnected using a single Ethernet cable. To the STVI user it appears as a single six-phase test system (or two three phase systems) with manual control of all outputs from the touch screen.

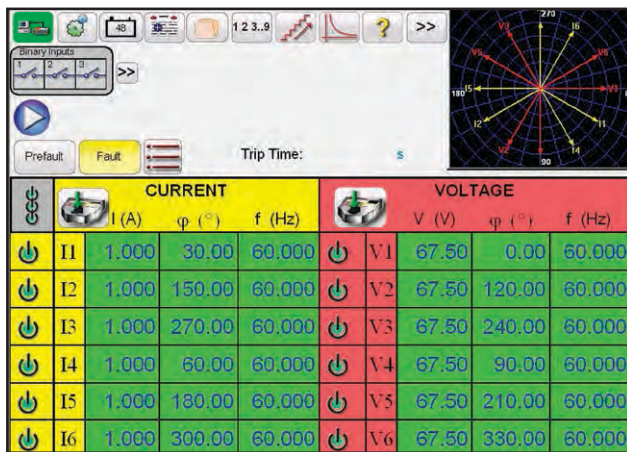


Figure 2. Manual Multi-Phase Test Control screen example

Auto Ramp, Pulse Ramp and Binary Search Features

The STVI may be used to determine pickup or dropout of various types of relays. Pressing the Auto Ramp button presents three choices; Step Ramp, Pulse Ramp, and Pulse Ramp



Figure 3. Ramp and Search Tool Bar

Binary Search. The first selection, Step Ramp, will ramp the output by applying a value and then waiting a specific amount of time before incrementing. For example, to automatically ramp output current the user will select the channel to be ramped, input Start and Stop Amplitudes, an Increment (A), and a Delay time in Cycles (B). See the following figure.

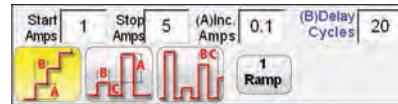


Figure 4. Ramp Setting Example

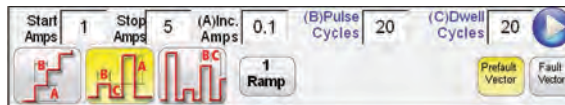


Figure 5. Pulse Ramp Setting Example

Pulse Ramp will start at user defined prefault condition, increment up or down returning to the prefault condition between each increment. Instead of Delay time the user sets the Pulse Cycles time, which applies the fault value to the relay for the specified time. The user can select a 2nd, 3rd and 4th ramp if desired, changing the size of the increment with each ramp. This feature is most used when doing instantaneous pickup tests. The output current, or voltage, can be incremented in large steps getting to the pickup point quickly, and then reduce the size of the increment to zero-in on the pickup value. This reduces the test time, heating of the relay under test, and provides a very accurate test result. This feature is also used when testing multi zone distance relays using three phase voltage and currents. Set the Pulse Cycles duration just long enough for the intended zone to operate. If you are not sure exactly where the pickup value of the relay is, you can use the Pulse Ramp Binary Search feature.

Timing Test Feature

Pressing the Time test button on the top menu bar, the user is presented a menu of relays to test. Built-in timing tests are provided for a wide variety of protective relays, including Overcurrent, Voltage, and Frequency relays. To make it even easier and faster, the STVI has IEEE and IEC standard time curve algorithms built-in. In addition, the STVI also includes time curves and time curve algorithms for hundreds of different specific relays selectable by manufacturer, model number, and curve shape (inverse, very inverse, definite time etc.). In the following example, the G.E. IAC-51 relay with a 2 Amp Tap and a number 5 Time Dial was selected.

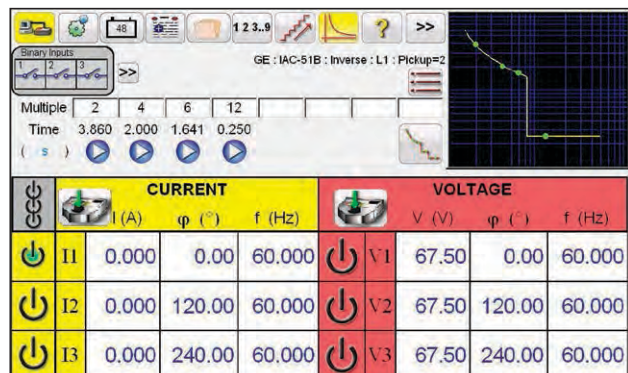



Figure 6. Timing Test Screen for G.E. IAC-51 Inverse Overcurrent Relay

By entering the appropriate values in the setting screen, when the timing test is conducted, the test results will automatically be plotted and compared to the theoretical values from the relay

specific time curve that was selected. If the test Multiple is changed, the appropriate theoretical trip time will change automatically.

View Test Reports

To View the test result, press the Add to Reports  button. The user can now enter appropriate information relative to the test in the Test Report header. See the following example report.

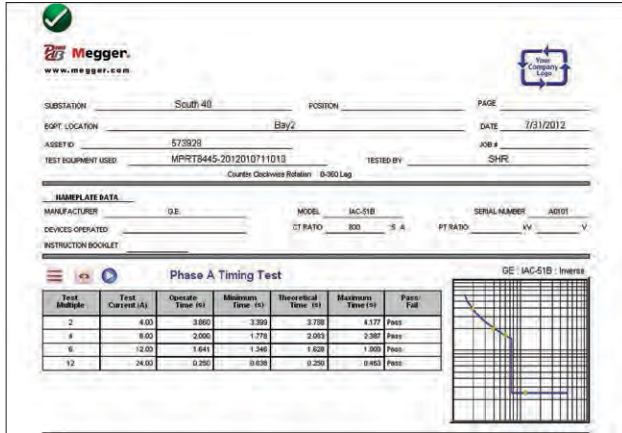



Figure 7. Test Report GE IAC51B Inverse Timing Test

Note that the software automatically compared the Operating Time to the theoretical and made a Pass/Fail determination based upon the manufacturer's time curve characteristic. If the recorded test point(s) is out of specification it appears red in color. If it is within specification it will be green in color. This provides excellent visual As Found reporting. Up to 8 points maybe plotted including Instantaneous trip points. If the data is imported into PowerDB reports can be generated that summarize the comments and failures of every test you perform.

State Sequence Timing Test Feature

Pressing the State Sequence button  on the top menu bar takes the user to the Sequence Timing Test Screen. There are 15 programmable steps available in the Sequence Test Screen.

By default, 9 states are already labeled as Prefault, Trip1, Reclose 1, etc. up to Lockout in step 9. Therefore, it is initially setup for a four

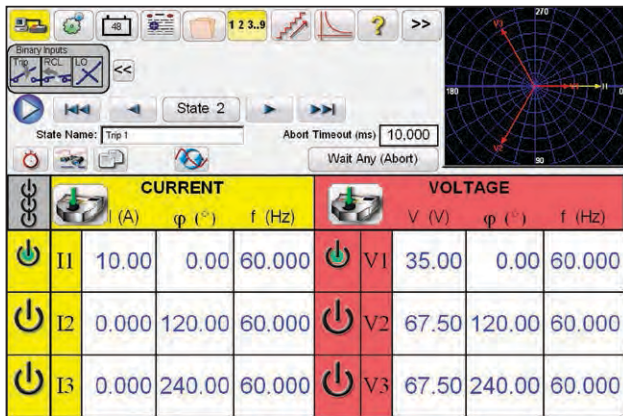


Figure 8. Sequence Test Screen

shot trip, reclose to lockout scenario. The user is free to change the labels, or use the default labels. With each state the user may input values of voltage, current, phase angle, frequency and set the Binary Input sensing for each state. Both single pole and three pole trip can be simulated. There are default values and binary settings for a single phase trip and reclose scenario already programmed in. The user can either use the defaults or change them to suit the application. Press the Timers button to view the Timer Settings and Labels. In addition the user can view where each timer starts and stops in association with each trip and reclose operation (see the following figure).

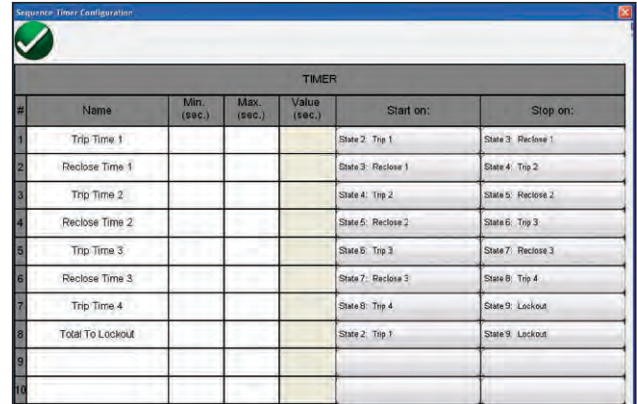



Figure 9. Sequence Timers Settings and Labels Screen

Note that the Total Time to Lockout is also included in the setting and indicates where the total timer starts and stops. This allows for 1, 2, 3, or 4 shots to lockout including reclose times. To set the conditions for each change of state press the Wait button directly under the Timeout window. The user will be presented with several conditional settings to choose from, such as wait milliseconds, wait cycles, wait any contact (OR), and wait all contacts (AND). These are some of the conditions that the unit will take in order to determine when to change to the next state.

To set the Binary Outputs to simulate the 52a and/or 52b contacts press the smaller  "more" button next to the Binary Inputs block to expand the selection window. Press on Show All Binary Outputs, and all the appropriate number of Binary Outputs, along with a select number of Binary Inputs will be displayed. In the prefault state you may choose to have Binary Output 1 contact in the closed condition to simulate breaker closed. Click on Binary Output 1 and the Binary Output setting window will appear. The default setting is Open. Click on the Close Contact Button to simulate breaker closed. Note the Name in the window is defaulted to 1. The user is free to rename it to any name or value (that will fit in the allotted space) by touching the window and use the virtual keyboard.

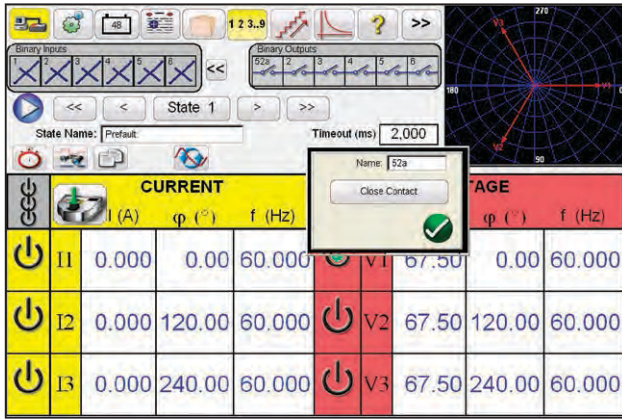


Figure 10. Binary Output Setting Screen

Once all of the Binary Inputs, Outputs, Prefault, Fault and Reclose settings are completed, the user can then press the Preview button to get a visual representation of the voltage and current outputs, as well as a visual of the binary inputs and outputs for each stage of the simulation. The following figure illustrates a sample sequence.

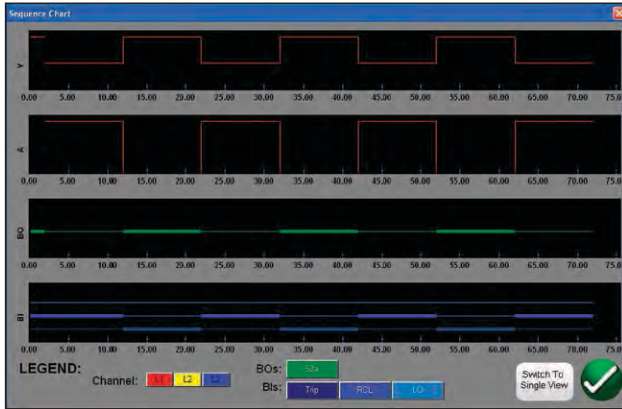


Figure 11. State Sequence Preview Screen

Press the Preview button again to return to the State Sequence Test Screen. To execute the test press the Blue play button. Save and review test results as previously discussed.

Adding New Features

The STVI has many powerful test features. However, there are many new features that are still to come. Megger is continuously developing new products and improving existing products. Once a new feature completes certification tests, it may be downloaded from the Megger website into the STVI as a field upgrade.

New Impedance Relay – The all new Impedance Relay Click-On-Fault

The all new Click-On-Fault (COF) is located as one of the choices under the large More >> button located next to the Help ? button. The new COF provides automatic tests of Impedance (distance) relays. It includes Ramp, Pulse Ramp, Pulse Ramp Binary Search, and Shot test capabilities.

Selection of Relay Operating Characteristics

Select from one the predefined generic relay characteristics of MHO, Half MHO or QUAD (Quadrilateral), or select from the relay specific Library files. The current library includes distance relays from SEL, GE, AREVA, and ABB. There are numerous other library test files

which are still being tested and field evaluated. Therefore, as new relay library files become available a new version of the software will be posted to the website for download.

Definition of Operating Characteristic and Tests

There are several new innovations in the new COF that make testing distance relays easier and faster. For example, selecting the Generic MHO characteristic provides the following user input screen.

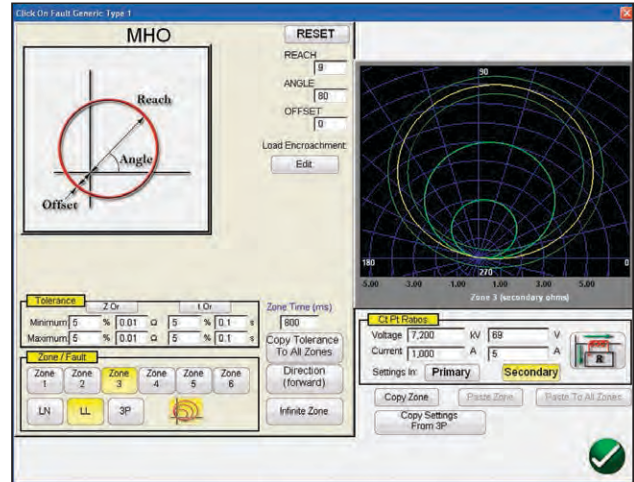


Figure 12. Generic MHO Setting Screen

Here the user selects which Zone (up to 6 zones may be defined), type of fault, direction, tolerance values, inputs the reach, max torque (line) angle, any offset, or load encroachment settings. The software draws the operating characteristic(s) of the relay defined by the user settings. The user may select to view single zone or multiple zones. Pressing the green check button takes the user to the COF test configuration screen, as shown in the following figure.

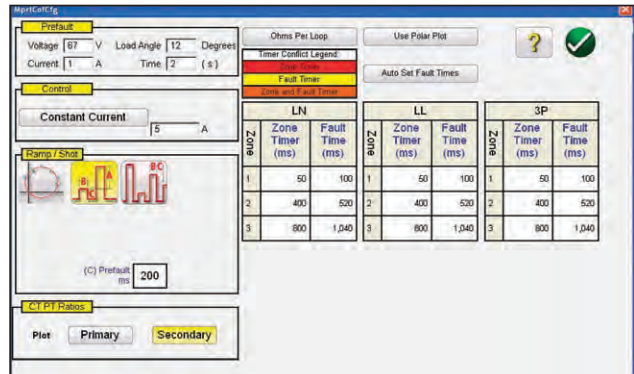


Figure 13. Generic MHO Test Configuration Screen

From this screen the user can select:

Test Method

- Linear Ramp
- Pulse Ramp
- Pulse Ramp Binary Search
- Shot

Test Source Models

- Constant Voltage
- Constant Current
- Constant Source Impedance

Displayed Values

- Primary Values
- Secondary Values

Prefault

- Voltage
- Current
- Load Angle
- Duration Time

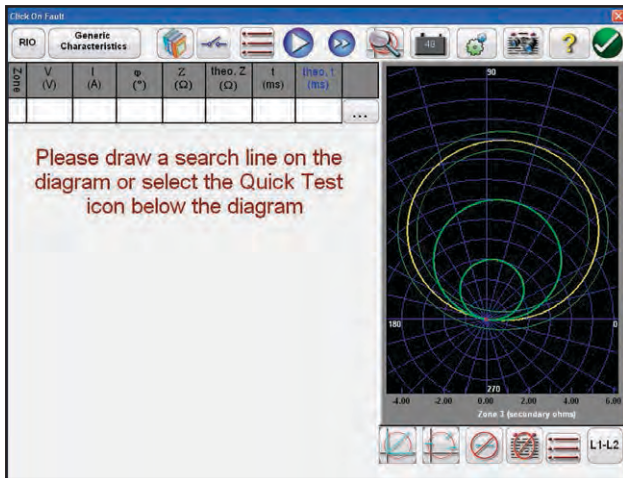


Figure 14. Click on Fault Test Definition Screen

Creating Search Lines or Shot Test Points

The user can define up to 10 search lines or test points per fault type, per zone. Test options include;

The *Impedance Test* option provides maximum freedom to the user to select any test line, at any angle, around the operating characteristic to define the desired test line.

The *Origin Test* option the user clicks a point outside the operating characteristic, and the test line will be drawn to the origin or the intercept of the R and X axis.

The *Shots Test Points* option is used to create one or more test points, each to replicate a fault at a particular magnitude and angle. This type of test provides a quick GO, NO/GO test of the relay after a settings change.

The user does not even have to draw the test lines. There are two Quick Test Options the user may select. The first option draws three test lines for any of the selected Quick Test solutions. The second Quick Test the user may select the desired number of test points by pressing the Test Points button and select from the list. If none of the standard phase rotations meets the user’s needs, they can enter the desired phase rotation in the window provided.

IEC 60255 Test Option

To comply with regulations which require testing to the IEC 60255 standard, the IEC 60255 option is also provided. All defined test lines will automatically be drawn perpendicular to the relay operating characteristic.

Prefault Settings

For testing relays which require a prefault load condition, the user can set the prefault load voltages and currents. This is normally used when testing accelerated tripping or dynamic over-reach characteristics.

Performing Tests

The user then simply presses the blue Play button and the test begins. To save even more time the user can select the Play All button and the software will automatically test all define zones and faults in sequence. Based upon the user input the software will calculate all of the fault values and angles for each defined test point, and then make PASS/FAIL determination of the test results.

A real-time test screen will display the relay operating characteristic with the defined test lines in the right half of the screen with the test vector moving in the impedance plane, and in the left half it will display either the test vectors of voltage and currents being applied in real-time, or it will display the Negative, Positive and Zero Sequence vectors being applied, see the following example.

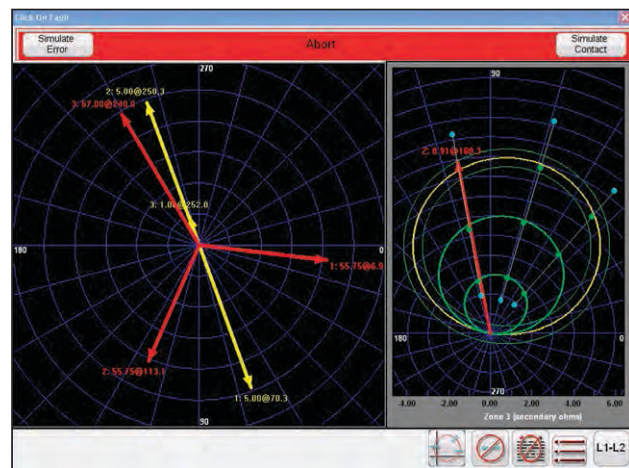


Figure 15. Generic MHO Real-Time Test Screen

The above figure is three zone, Pulse Ramp, Phase L1-L2 fault tests being performed. Note the test amplitudes and angles are displayed in the left half, with the test results displayed in the right half.

FEATURES AND BENEFITS

Large Color TFT LCD touch-screen display – The STVI features an easy to read high resolution display providing manual control of the test set, and displays measured values of voltage, current, along with phase angle and frequency even in direct sunlight. Color contrasts accentuate vital information. This reduces human error and saves time in testing relays.

Use with SMRT and MPRT relay test sets – Operates the new SMRT as well as the MPRT relay test sets. Universal application provides flexibility of use.

Easy to use for manual tests – The STVI touch screen is intuitive to use, and requires no special training. A Full Help is built-in to provide users with step by step operation. Touch screen function buttons, with powerful testing tools such as auto ramp, binary search, pulse ramp binary search, or the simple to use control knob may be used to determine pickup or drop out of relay contacts.

Internal memory – The STVI provides storage of test set-up screens and test results, which reduces testing time and paper work. Saved test results can be downloaded into the PowerDB ONBOARD software for report generation using the built-in USB port.

Steady-State and Dynamic test capability – The STVI in conjunction with either the SMRT or older MPRT provides both steady-state and dynamic testing of protective relays. Set default, fault and simulate circuit breaker operation using the STVI sequence test screen. Perform trip and reclose timing tests with up to 9 operations including lockout. Save trip, reclose times to the internal memory and print out later. The STVI provides complex timing tests without the need of a PC.

Display screen prompts operator – The STVI features a touch screen that prompts the user with easy to use function buttons. Single button operation and intuitive ease of use saves time in testing relays and minimizes human error.

Display screen provides four languages – The STVI display screen currently prompts the user in English, French, German, and Spanish.

Immediate error indication – Audible and visual alarms indicate when amplitude or waveforms of the outputs are in error, such as shorting a voltage channel.

STVI Specification

Input Power:

The STVI draws power through the Ethernet cable using Power-Over-Ethernet (POE) from the host unit (SMRT36), or from an external Power Over Ethernet power supply and Ethernet interface for use with SMRT1, MPRT8415 or 8430 units.

Communication Interfaces:

Ethernet RJ45, 10/100 Mbits/s
USB Ports: 2

Power over Ethernet

IEEE Std 802.3 AF

Display Screen

The TFT LCD display provides high resolution, and features Wide Viewing Angle Technology and a large screen with high luminance for reading in direct sunlight.

Dimensions: 5.13 H X 6.84 W in (128.2 H X 170.9 W mm), 8.4” Diagonal

Display: 262k Colors, backlit, TFT LCD touch screen, Anti-glare surface with hard coating, 800 Cd/m² Luminance, 1024 x 768 pixels

Languages: English, French, Spanish and German.

Temperature Range

Operating: 32 to 122° F (0 to 50° C)

Storage: -13 to 158° F (-25 to 70° C)

Relative Humidity: 5 - 90% RH, Non-condensing

Unit Enclosure

The STVI unit comes housed in a rugged, lightweight and ergonomic plastic enclosure. It features large rubber handles, and a built in stand for hands-off operation.

Dimensions

11 W x 9.375 H x 1.875 D in. (275 W x 234 H x 46.8 D mm)

IEC Enclosure Rating:

IP20

Weight

3.9 lb. (1.75 kg)

CONFORMANCE STANDARDS

Safety

EN 61010-1

Shock, Vibration and Transit Drop

Shock: MIL-PRF-28800F (30g/11ms half-sine)

Vibration: MIL-PRF-28800F (5-500Hz, 2.05 g rms)

Transit Drop Test: MIL-PRF-28800F (46cm, 10 impacts)

Electromagnetic Compatibility

Emissions: EN 61326-2-1, EN 61000-3-2/3/11/12,

FCC Subpart B of Part 15 Class A

Immunity: EN 61326-2-1, EN 61000-4-2/3/4/5/6/8/11

ORDERING INFORMATION	
Item (Qty)	Cat. No.
Smart Touch View Interface for SMRT33, SMRT36 and SMRT410 Relay Test Systems (1 ea)	STVI-1
Smart Touch View Interface for SMRT1, MPRT 8415 or MPRT 8430 Relay Test System (1 ea)	STVI-2
Included Accessories with STVI-1	
STVI Ethernet Cable Assy., 210 cm (7ft.) long, (1 ea)	90003-684
Included Accessories with STVI-2	
Quick Start Guide (1 ea)	81385
STVI Ethernet Cable Assy., 210 cm (7ft.) long, (1 ea)	90003-684
Power Over Ethernet Power Supply for SMRT1 or MPRT (1 ea)	90001-736

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