



PSL50

## PROTECTION RELAY TEST SET

For comprehensive investigations into the theory and practice of electrical power system protection



### KEY FEATURES

- Includes a complete set of modern digital protection relays, specially adapted for educational use
- Transmission line for distance protection and parallel feeder tests
- Transformer with configurable secondary tapplings for tests with different phase displacements
- Tests two relays at the same time
- Includes all controls, supplies, load resistors, transformers and instrumentation needed for the tests
- Additional desk space for the relays

### LEARNING OUTCOMES

- Overcurrent protection
- Relay discrimination using current and time settings
- Directional protection
- Differential protection
- Earth fault protection
- Distance protection
- Current Transformer (CT) polarity

### KEY SPECIFICATIONS

- Five relays
- Five-section transmission line
- Delta and Star Loads
- Test transformer with configurable secondary tapplings

# PROTECTION RELAY TEST SET

## DESCRIPTION

A test set that gives students theoretical and practical experience with a variety of industrial relays. The equipment uses industrial protection equipment and techniques, and a range of industrial relays, adapted for educational use.

The test set allows students to compare individual relay characteristics. It also allows connection of two relays for experiments such as relay discrimination.

The test set includes meters, current and voltage transformers (CTs and VTs), power supplies, a configurable transformer and load resistors. It also has a useful desk space for students to work on.

The configurable transformer has a star connected primary, but the secondary has multiple tapings. So, the user may connect it as delta or star with different voltage ratios.

Controls on the lower panel of the test set allow the user to adjust the test voltage supply, current and load resistances.

A transmission line on the upper panel of the test set allows students to set up distance protection and parallel feeder tests.

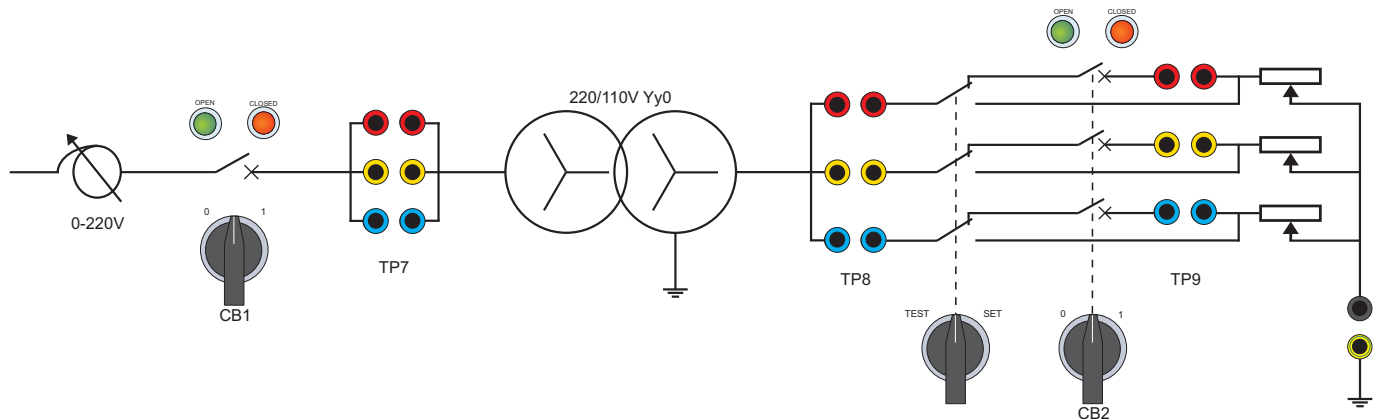
TecEquipment supply each relay in rugged, portable enclosures. The relays rest on the desktop either end of the test set. The user programs the relays either directly or using software. The test set includes relay support software which enables users to program the relay modules using a suitable computer (computer not included).

Students connect the relays to the test circuits on the front of the test set. A multi-core cable connects from the back of the test set to the back of each relay to give it a supply current for correct operation. The test set has clear schematic diagrams to help students carry out and understand the experiments.

## STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer





RELAY TEST CIRCUIT (SCHEMATIC)

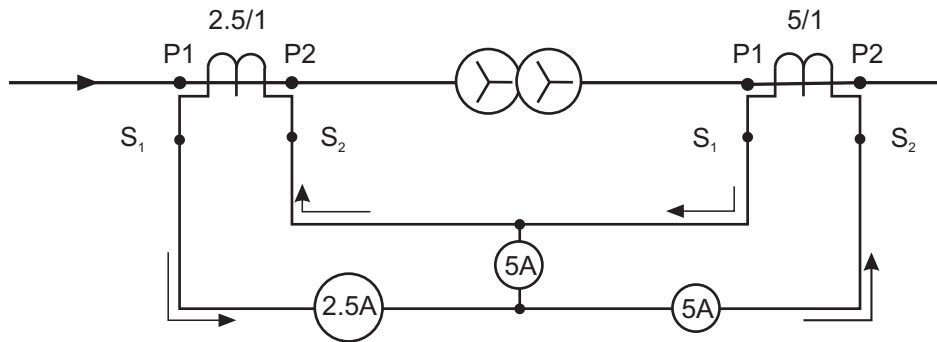


# PROTECTION RELAY TEST SET

## TYPICAL WORK ASSIGNMENTS

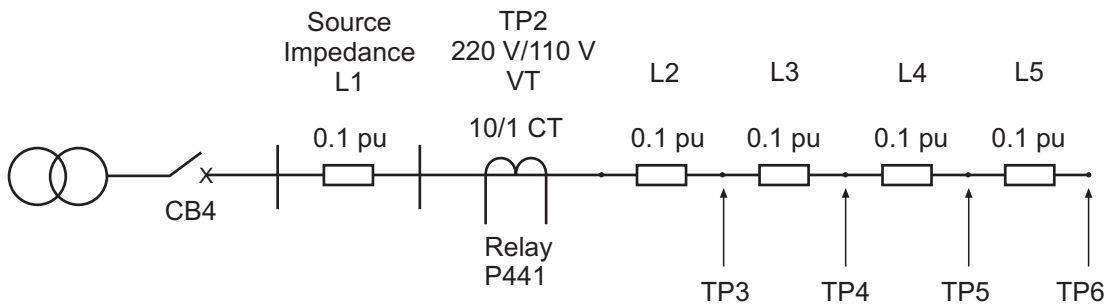
### CT POLARITY IN DIFFERENTIAL PROTECTION CIRCUITS

This test shows the importance of getting the polarity right when connecting current transformers (CTs) in differential protection circuits.



### THREE ZONE DISTANCE PROTECTION SCHEME

This test demonstrates setting up a three zone distance protection scheme, using the transmission line.



# PROTECTION RELAY TEST SET

## DETAILED SPECIFICATIONS

### NETT DIMENSIONS AND WEIGHT (PSL50):

2660 mm long x 1890 mm high x 1020 mm front to back and 731 kg

### APPROXIMATE PACKED DIMENSIONS AND WEIGHT (PSL50):

5 m<sup>3</sup> and 930 kg

### NETT AND PACKED DIMENSIONS OF RELAYS:

Refer to separate datasheets.

### RECOMMENDED FLOOR AREA:

>1000 mm at the back of the test set and >2000 mm around the front and sides

### CONTROLS AND INSTRUMENTATION:

- 0 to 220 V variable voltage supply
- 0 to 10 A variable current supply
- Two fault limiting resistors
- Timed fault application circuit breaker
- Configurable tapped transformer with delta or star secondary
- Variable three-phase load delta connected
- Variable three-phase load star connected
- Four sets of three-phase current transformers
- Two sets of three-phase voltage transformers
- Mains isolator

### TEST CIRCUITS:

- Relay test circuit
- Configurable transformer test circuit
- Transmission line model (5 x 50 km)

Protection relays included:

- Overcurrent and Earth Fault Relay (PSA10)
- Differential Protection Relay (PSA15)
- Directional/Non-Directional Overcurrent Relay (PSA20)
- Feeder Management Relay (PSA25)
- Distance Protection Relay (PSA30)

Refer to separate datasheets for details.

## ESSENTIAL SERVICES

Three-phase 5 kVA, 50 Hz or 60 Hz (specify on order)

50 Hz needs 380 – 440 VAC

60 Hz needs 200 – 240 VAC

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory

### STORAGE TEMPERATURE RANGE:

–25°C to +55°C (when packed for transport)

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### OPERATING RELATIVE HUMIDITY RANGE:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

## SOUND LEVELS

Less than 70 dB(A)