

## ≡ SINGLE-PHASE TRANSFORMERS

### PSL90

A set of three single-phase multi-tapped transformers for a wide range of single-phase or three-phase experiments.



### KEY FEATURES

- For use in single-phase or any common three-phase configuration, including star, delta, interstar and others
- Supplied with mobile frame for easy mobility
- One-volt-per-turn winding design for easy demonstration of transformer principles
- Supplied with a set of loadbanks for a complete range of tests
- Includes thermocouples for core and winding temperature measurements
- Multiple tapplings for selection of output voltages
- Extra tertiary windings for accurate matching in parallel transformer tests

### LEARNING OUTCOMES

- Single-phase and three-phase experiments
- Open and short-circuit tests to find iron and copper losses
- Harmonics and unbalanced loading
- Star-star, star-delta, delta-delta and delta-star connected transformers
- Interconnected star (interstar or zig-zag) connection

### KEY SPECIFICATIONS

- One-volt-per-turn windings
- Three thermocouples
- Three separate transformers
- 1 kVA each transformer
- Tertiary windings

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## DESCRIPTION

The Single-Phase Transformers is an essential tool for experiments and demonstrations of transformer theory. It is made up of three identical transformers (except for the tertiary windings). Each transformer is inside a separate steel enclosure and all fit onto a frame which has small wheels for ease of mobility.

Each transformer has a selection of high-voltage (primary) and low-voltage (secondary) tapplings to select a range of input and output voltages. They also have extra tertiary windings. The tertiary windings help compensate for any slight differences in the transformers when used in parallel. The transformers are separate units and will work as three individual single-phase transformers, or can connect to be a single three-phase transformer.

All tapplings are accessible, so students may link the windings to suit any of the common single and three-phase connections. All tapplings connect to coloured, shrouded sockets for safety.

To show transformer principles clearly, the transformers operate as one volt each turn. This means that the no-load output voltage is the same as the number of turns on the secondary.

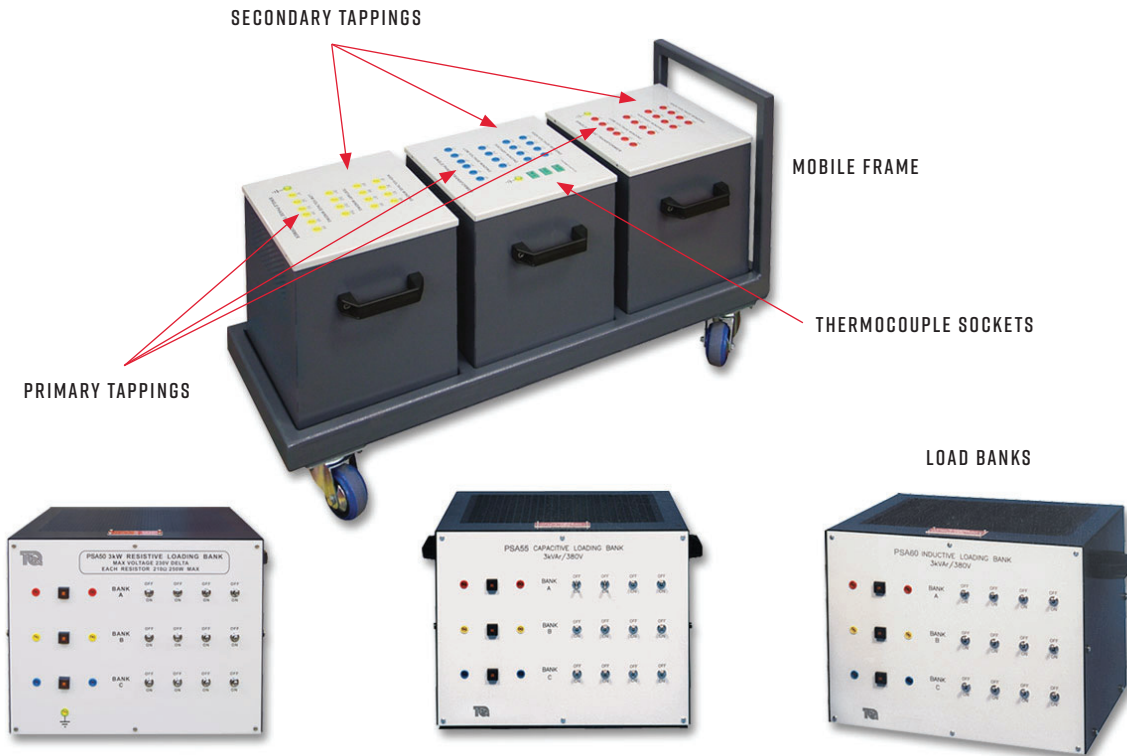
Thermocouples measure the temperatures of the primary windings, the secondary windings and the core of one of the transformers.

The thermocouples help to measure the temperature changes in a transformers. The readings help the student to understand the temperature specification for materials used in transformers. Note: you need a suitable K-type measuring instrument (not supplied) to measure the outputs of the thermocouples.

To allow a complete range of tests, TecQuipment supply this product with three load banks; one resistive, one capacitive and one inductive (PSA50, PSA55 and PSA60).

## STANDARD FEATURES

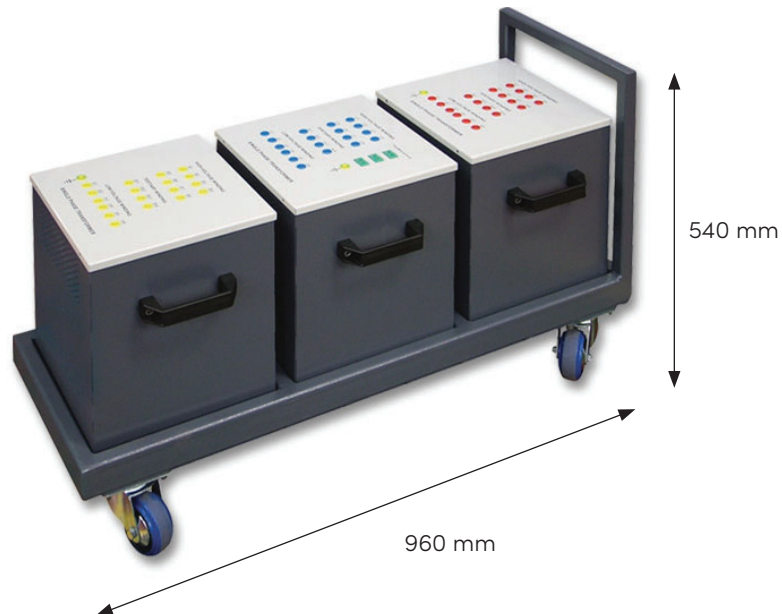
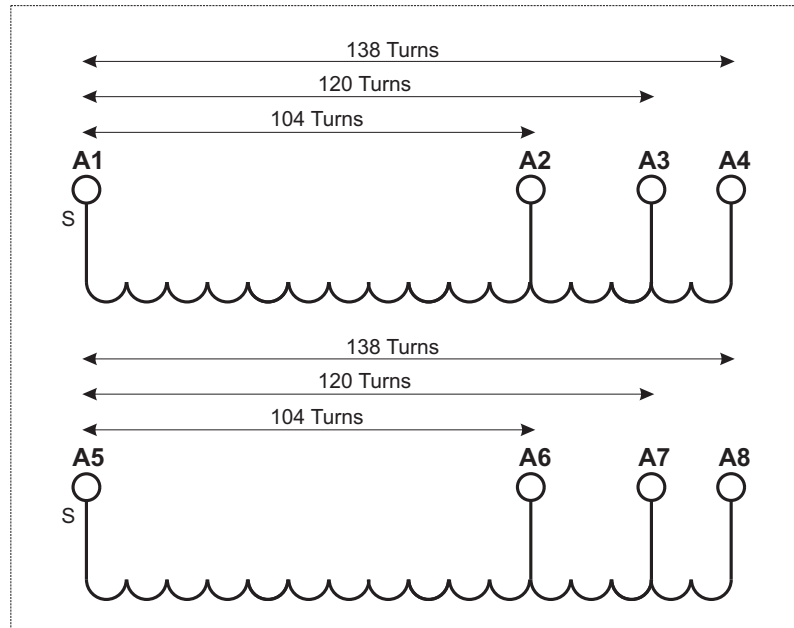
- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer



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High Voltage  
(Primary)  
Windings



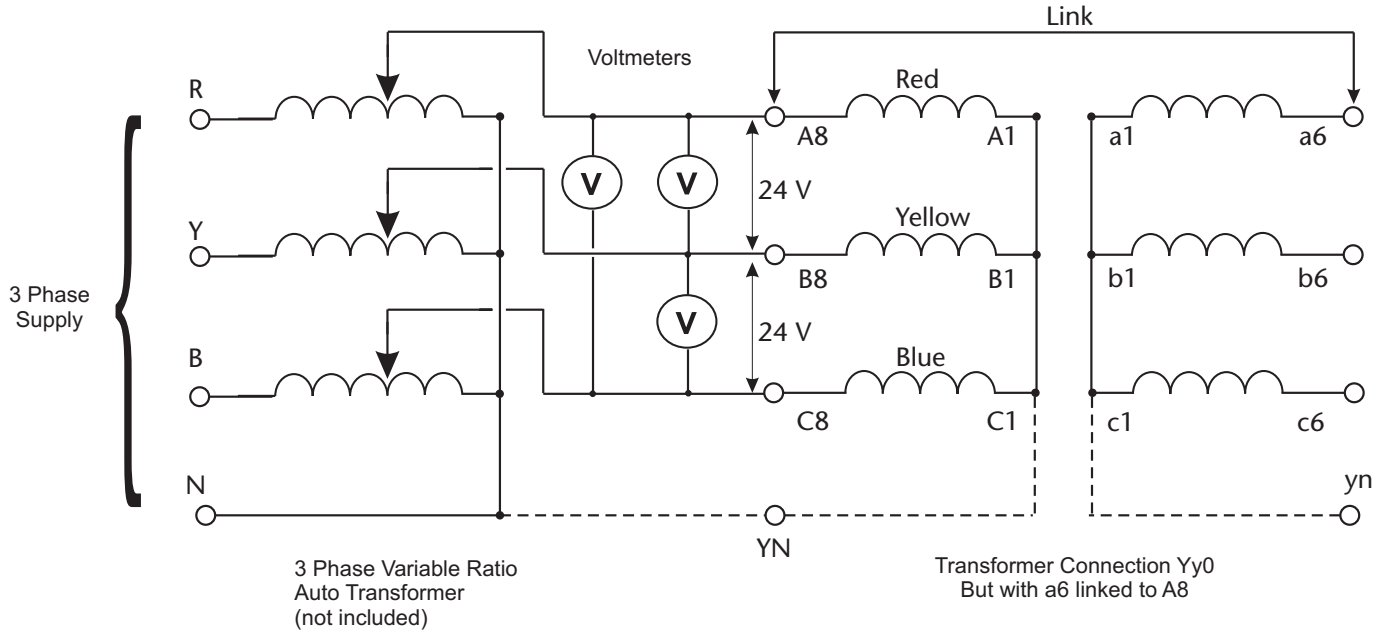
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## TYPICAL WORK ASSIGNMENTS

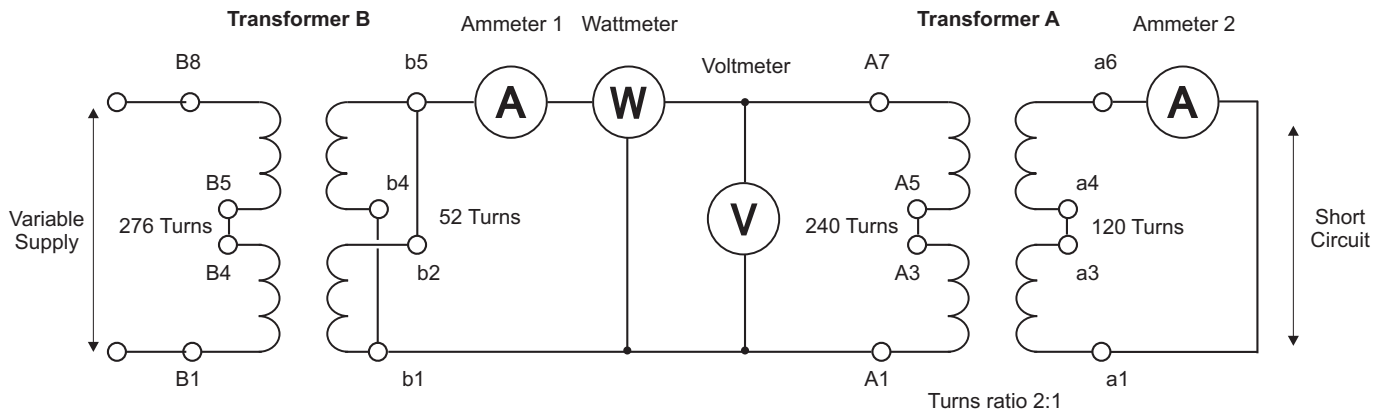
### STAR-STAR CONNECTED TRANSFORMERS - Yy0 CONNECTION

This test connects the primary and secondaries in star-star. Students measure the voltages and produce a phasor diagram.



### SHORT CIRCUIT TEST

This test short circuits the secondary of a transformer to find its winding (copper) losses.



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## DETAILED SPECIFICATIONS

TecEquipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### NETT DIMENSIONS AND WEIGHT (EACH TRANSFORMER):

350 mm x 340 mm x 280 mm and 33 kg each

### NETT DIMENSIONS AND WEIGHT (TRANSFORMERS ON MOBILE FRAME):

960 mm x 540 mm x 400 mm and 121 kg

### APPROXIMATE PACKED WEIGHT AND VOLUME (TOTAL WITH MOBILE FRAME):

200 kg and 0.35 m<sup>3</sup>

### NETT AND PACKED DIMENSIONS OF LOADBANKS:

Refer to separate datasheets (PSA50, PSA55 and PSA60).

### TRANSFORMERS:

1 kVA nominal (each transformer)

Single-phase double-wound transformers. Each primary has two sections with tappings at 0 V, 104 V, 120 V and 138 V. Each secondary has two sections with tappings at

0 V, 52 V, and 60 V. Each transformer has different tertiary tappings:

- one transformer has 0 V, 28 V, 50 V and 52 V
- the second has 0 V, 47 V, 50 V and 52 V
- the third has 0 V, 48 V, 50 V and 52 V

### THERMOCOUPLES:

Three K-type thermocouples, one fitted to the primary, the second to the secondary and the third to the core of one transformer. Each thermocouple connects to sockets on the connection plate of the transformer.

## 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

## ESSENTIAL SERVICES

### ELECTRICAL SUPPLY:

Fused and protected laboratory supply

Variable 0 to 400 VAC line to line at 5 A and

Variable 0 to 208 VAC line to line at 10 A

50 Hz or 60 Hz - determined by order

**NOTE:** Not for direct connection to a mains supply.

## SOUND LEVELS

Less than 70 dB(A)