

DECADE RESISTANCE BOXES

tinsley
PRECISION INSTRUMENTS

ZX70E, ZX80E, & ZX90E SERIES

INSTRUCTION MANUAL



SUBJECT TO CHANGE WITHOUT NOTICE

This manual superseded all previous versions – please keep for future reference

SERIES TYPE
ZX70E, ZX80E, & ZX90E

INSTRUCTION MANUAL

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| Revision History | |
|-------------------------|--|
| Revision Date | Description of change |
| 13.2.2019 | New issue to include ZX70, 80 and 90 range |
| 03.03,2020 | Correction to ZX84 |
| | |

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1 Introduction

The ZX70E to ZX99E DC resistance decade boxes consist of multiple switched units which are connected in series. Connection to the unit is via terminal posts which can accept spade connections or 4mm banana type plugs. An Earth connection is also available on the unit with the same connection capability.

Changing the value of resistance is accomplished by rotating the knobs of the various switches, the resistance values of which are clearly identified on the panel. The resistive elements are wound in a special non inductive way onto formers using enameled manganin wire, which is aged and treated to provide a high level of stability with a low temperature coefficient.

2 Specifications

2.1 Reference and Nominal Temperatures

| Reference Range | Nominal Range |
|-----------------|---------------|
| 20 ± 1.0 °c | 20 ± 10°c |

2.2 Reference and Nominal Relative Humidity

| Reference Range | Nominal Range |
|-----------------|---------------|
| 40% ~ 60% | 25% ~ 75% |

2.3 Measuring Range and Step Resolution

| Type | ZX74E | ZX75E | ZX76E | ZX77E |
|-------|---------|---------|----------|-----------|
| RmaxΩ | 1111.21 | 11111.1 | 111111.0 | 1111110.0 |
| RminΩ | 0.001 | 0.01 | 0.1 | 1 |

| Type | ZX83E | ZX84E |
|-------|------------|-------------|
| RmaxΩ | 11111110.0 | 111111100.0 |
| RminΩ | 10.0 | 10.0 |

| Type | ZX90E | ZX91E | ZX92E | ZX93E | ZX94E | ZX95E | ZX96E | ZX97E | ZX98E | ZX99E |
|-------|--------|-------|---------|---------|--------|----------|----------|---------|-----------|-----------|
| RmaxΩ | 111.10 | 11110 | 1111.10 | 11111.0 | 111110 | 11111.10 | 111111.0 | 1111110 | 111111.10 | 1111111.0 |
| RminΩ | 0.01 | 1 | 0.01 | 0.1 | 1 | 0.01 | 0.1 | 1 | 0.01 | 0.1 |

2.4 Compliance

When the conditions of reference have been met for temperature, relative humidity and power, the accuracy of each decade resistance group should meet the specifications and residual resistance in the following tables for each series.

| Type | Accuracy In Percent (%) | | | | | | | | | | Residual Resistance |
|-------|-------------------------|----------------|----------------|---------------|---------------|--------------|-------------|---------------|----------------|-----------------|----------------------|
| | X1 M Ω | X100k Ω | X10 k Ω | X1 k Ω | x100 Ω | x10 Ω | x1 Ω | X0.1 Ω | X0.01 Ω | X0.001 Ω | |
| ZX74E | -- | -- | -- | - | ± 0.01 | ± 0.01 | ± 0.05 | ± 0.05 | ± 2.0 | ± 5.0 | -- |
| ZX75E | -- | -- | -- | ± 0.01 | ± 0.01 | ± 0.02 | ± 0.02 | ± 0.05 | ± 5.0 | -- | -- |
| ZX76E | -- | -- | ± 0.01 | ± 0.01 | ± 0.01 | ± 0.02 | ± 0.1 | ± 1.0 | -- | -- | 10 \pm 5m Ω |
| ZX77E | -- | ± 0.05 | ± 0.05 | ± 0.05 | ± 0.05 | ± 0.1 | ± 1.0 | -- | -- | -- | 10 \pm 5m Ω |

| Type | Accuracy In Percent (%) | | | | | | | Residual Resistance |
|-------|-------------------------|--------------|-----------------|----------------|--------------|---------------|--------------|----------------------|
| | X10M Ω | X1M Ω | X100 k Ω | X10 k Ω | x1k Ω | x100 Ω | X10 Ω | |
| ZX83E | -- | ± 0.05 | | | | | | 10 \pm 5m Ω |
| ZX84E | ± 0.1 | ± 0.05 | | | | | -- | -- |

| Type | Accuracy In Percent (%) | | | | | | | | Residual Resistance |
|-------|-------------------------|---------------|--------------|---------------|--------------|-------------|---------------|----------------|------------------------|
| | x100k Ω | x10k Ω | x1k Ω | x100 Ω | x10 Ω | x1 Ω | x0.1 Ω | x0.01 Ω | |
| ZX90E | -- | -- | -- | -- | ± 0.1 | ± 0.5 | ± 2.0 | ± 5.0 | 8 \pm 2.5m Ω |
| ZX91E | -- | -- | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | -- | -- | 10 \pm 5m Ω |
| ZX92E | -- | -- | -- | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | ± 5.0 | 10 \pm 2.5m Ω |
| ZX93E | -- | -- | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | -- | 10 \pm 5m Ω |
| ZX94E | -- | ± 0.1 | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | -- | -- | 10 \pm 5m Ω |
| ZX95E | -- | -- | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | ± 5.0 | 12 \pm 2.5m Ω |
| ZX96E | -- | ± 0.1 | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | -- | 12 \pm 5m Ω |
| ZX97E | ± 0.2 | ± 0.1 | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | -- | -- | 12 \pm 5m Ω |
| ZX98E | -- | $\pm 0.1\%$ | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | ± 5.0 | 14 \pm 2.5m Ω |
| ZX99E | ± 0.2 | $\pm 0.1\%$ | ± 0.1 | $\pm 0.1\%$ | ± 0.1 | ± 0.5 | ± 2.0 | -- | 12 \pm 5m Ω |

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2.5 Power Ratings

| | ZX70E Series | ZX80E Series | ZX90E Series |
|-----------------|--------------|--------------|--------------|
| Reference Power | 0.05 W | 0.1 W | 0.05 W |
| Nominal Power | 0.1 W | 0.2 W | 0.1 W |
| Ultimate Power | 0.2 W | 0.3 W | 0.2 W |

2.6 Dimensions and Weights

| Type | Number of Decades | Dimensions (mm) | Weight (kg) |
|-------|-------------------|-----------------|-------------|
| ZX74E | 6 | 440 x 130 x 120 | 4.5 |
| ZX75E | 6 | | |
| ZX76E | 6 | | |
| ZX77E | 6 | | |
| ZX83E | 6 | 440 x 130 x 120 | 4.5 |
| ZX84E | 6 | 380 x 220 x 130 | 7.0 |
| ZX90E | 4 | 200 X 95 X 94 | 0.85 |
| ZX91E | 4 | | |
| ZX92E | 5 | 242 X 95 X 94 | 1 |
| ZX93E | 5 | | |
| ZX94E | 5 | | |
| ZX95E | 6 | 284 X 95 X 94 | 1.15 |
| ZX96E | 6 | | |
| ZX97E | 6 | | |
| ZX98E | 7 | 327 X 95 X 94 | 1.25 |
| ZX99E | 7 | | |
| ZX99E | 7 | 327 X 95 X 94 | 1.35 |

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3 Maintenance and Operation

- 3.1 On the larger decade boxes there are extendable feet on the bottom of the units to allow the decade box to be angled upwards for more comfortable operation.
- 3.2 Whilst using the decade resistors, the applied power should be within the nominal power rating value.
- 3.3 Prior to use, it is recommended to rotate all of the switches several times to ensure the best contact on the contact wiper blades.
- 3.4 The decade box(es) should be kept in a room without corrosive gases and other harmful substances and out of the sun.
- 3.5 The decade boxes should be stored in an environmental temperature of 5 ~ 35° C with a relative humidity of 25 ~ 75%
- 3.6 The insulation resistance between the components and the chassis should be in excess of 100MΩ

4 Service information

The instrument (unless stated otherwise) is covered by a 12 month warranty on parts and labour from the date of dispatch from Tinsley Precision Instruments (provided it has not been damaged in use or tampered with). This warranty does not include costs incurred in returning the equipment to the factory for repair.

Warning:

There are no user serviceable parts inside the instrument. Any service procedure MUST only be carried out by suitably trained personnel.

Please note that opening the instrument without approval will invalidate the warranty.

5 Disposal/End of Life

The materials the units are made of can be recycled. Please dispose of the unit responsibly according to local and national guidelines.

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6 Support

For all technical support, repair, warranty and service inquiries please contact



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