

ZX70 & ZX80 SERIES PRECISION DECADE RESISTANCE BOX

tinsley
PRECISION INSTRUMENTS

OPERATING INSTRUCTIONS



SUBJECT TO CHANGE WITHOUT NOTICE

This manual superseded all previous versions – please keep for future reference

Revision history: Original version 2.0	
Previous releases: None	
Issue and date	Description of change
3.1 – 15/02/2007	Re-written with additional safety information
4.0 – 17/03/2010	Address Change

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Conventions used in this manual

Structure of manual

The manual is divided into sections. Each section deals with a specific topic or related topics. Sections are displayed in a regular, bold typeface, for example - **1.0 Introduction**. Sections are sub-divided into sub-headings, for example - **1.1 Features**. These may also be subdivided.

Terminology

The terms Precision resistance decade box, decade box, ZX70 (series), ZX80 (series) and instrument are used interchangeably in this manual.

Warnings and Notices

These appear in the body of the text, clearly displayed with a box surrounding the text. The first word within the box displays the type - **Warning** or **Note**.

A **Warning** (double box) is designed to draw attention to an aspect that may cause danger to the user or damage to the instrument. A **Note** (single box) is used to bring special attention to something important requiring action or avoidance.

Important safety information

Please read and understand the user instruction manual before attempting to use the instrument.

Warning

The instrument must only be used for its intended purpose.

The instrument must only be used by suitably trained personnel.

Warning

The protection provided by the instrument may be impaired if the equipment is not used in the manner specified.

Only replace items or components with an approved or equivalent spare part. All spare and consumable parts are available from Tinsley Precision Instruments.

Warning

The instrument is NOT designed to be used in a potentially explosive atmosphere or in a medical environment.

Warning

Do NOT clean the display with solvents or abrasives.



General warning symbol. This indicates that a hazardous condition or general danger may exist.

You must read the relevant sections in the User Manual before using the instrument.



Refer to manual symbol. When you see this symbol on the instrument it means that there is more information relating to this in the User Manual.

Important unpacking information

Carefully open the packaging before removing the instrument.

- 1 Identify all the items on the inspection report. The instrument is protected by a plastic bag that includes several desiccant sachets.
- 2 Remove the instrument from the packing case using both hands to lift the base and place securely on the bench before removing the plastic bag.
- 3 Carefully remove all packing materials, avoiding damage to external connectors and controls. Safely dispose of the desiccant sachets.

Warning

Ensure that all relevant health & safety regulations are complied with when unpacking the instrument. If in doubt consult your local safety officer.

- 4 Refer to the installation Instructions.
- 5 Always refer to the model and serial number of your instrument when asking for information, service or ordering spares. The model and serial number are located on the rear of the instrument. For your convenience, space is provided below to record the information you may need in the future.
- 6 Please retain the packaging. In case of return, pack the instrument in the original packaging. Failure to do so may invalidate the warranty and/or incur additional costs outside the warranty period. When the original packaging is unavailable, please contact the agent.

Important installation information

Please ensure that the instrument is installed correctly.

- ✘ Do NOT use the instrument near water
- ✘ Do NOT locate the instrument near a source of heat
- ✘ Do NOT insert objects into any ventilation openings

- ✓ Locate the instrument on a suitable and secure surface
- ✓ Ensure air can freely circulate around the instrument

Warning

Ensure the Decade box is always used within its operating specification.

Important disposal information

If you are responsible for disposal, then please note that this product may contain materials that are regulated in their disposal due to environmental considerations. The presence of these materials is consistent with global regulations applicable at the time this product was placed on the market.



European Union

This symbol means that the product to be disposed of should not be mixed with general commercial or household waste. Products must be treated separately in accordance with legislation that requires the proper treatment, recovery and recycling of the product.

If you wish to discard the product, then please contact your dealer, supplier or representative who will advise the correct procedure for disposal.

Disposing of the product correctly will help to save valuable resources and prevent environmental damage.

Outside the European Union

The symbol only applies within the European Union. If you need to discard the product, then please contact your dealer, supplier or the local authorities and ask for the correct method of disposal.

1.0 Introduction

1.1 Overview

This manual provides information on the Tinsley Precision Instruments ZX70 series and ZX80 series of Precision Decade Resistance Boxes. If there are any questions or problems which cannot be solved by reading this manual, then please contact your local dealer. Alternatively, contact the Tinsley Precision Instruments head office at the address supplied at the end of this manual.

1.2 General features

The Tinsley Precision Instruments ZX70 series and ZX80 series of Precision Decade Resistance Boxes are designed to provide a range of very high accuracy resistances. They are very stable and can be used as extremely precise adjustable resistors.

The various instruments from Tinsley offer different ranges of resistances with a maximum resistance of –

- 1,111,111 Ω for the ZX70
- 111,111,100 Ω for the ZX80

2.0 Operating the Precision decade resistance box

2.1 Operation

The Precision Decade Resistance box consists of six variable resistance dials (one for each decade) and each decade consists of ten series resistances.

The desired resistance can be chosen by selecting a combination of the dials on the front panel.

The resistive elements are bifilar, non-inductively wound on high quality formers using a resistance wire of the specially selected alloy manganin. Each resistive element is heat treated before undergoing a controlled ageing process to produce the highest stability resistors with a low temperature-coefficient.

2.2 Accessories

The Tinsley Precision Instruments ZX70 series and ZX80 series of Precision Decade Resistance Boxes are supplied with the following items –

- Operating manual
- Set of four leads
- Certificate of conformity
- Calibration certificate (when specified with order)
- Quality control inspection report

3.0 Installation

3.1 Unpacking the instrument

Carefully unpack the instrument as previously described (see the section on important unpacking information).

3.2 Set-up and connections

The Precision Decade Resistance Box can be installed horizontally or vertically. To use –

- 1 Rotate the decade dials several times to ensure clean contacts before first use.
- 2 Connect the GROUND terminal (marked with the ground symbol) to ground.
- 3 Choose the correct resistance using the decade dials on the front panel.
- 4 Connect leads from the two R terminals to the circuit where the resistance is required.

Note

Do **NOT** exceed the maximum current. Please ensure you keep within the power specification limits or damage may result.

4.0 SPECIFICATIONS

4.1 Resistance ranges and accuracy

Type	Total resistance (Ω)	Availability and Basic accuracy of decades (%) at 20 ± 2°C										
		x10MΩ	x1MΩ	x100kΩ	x10kΩ	x1kΩ	x100Ω	x10Ω	x1Ω	x0.1Ω	x0.01Ω	x0.001Ω
ZX74	(0.1Ω Min) 1 111.210	-	-	-	-	-	±0.01	±0.01	±0.05	±0.1	±2	±5
ZX75	11 111.1	-	-	-	-	±0.01	±0.01	±0.02	±0.05	±0.5	±5	-
ZX76	111 111.0	-	-	-	±0.01	±0.01	±0.01	±0.02	±0.1	±1	-	-
ZX77	1 111 110	-	-	±0.05	±0.05	±0.05	±0.05	±0.1	±1	-	-	-
ZX83	11 111 110	-	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	-	-	-	-
ZX84	111 111 100	±0.1	±0.05	±0.05	±0.05	±0.05	±0.05	-	-	-	-	-

4.2 Maximum current values

Type	Maximum permissible current in amps										
	x10MΩ	x1MΩ	x100kΩ	x10kΩ	x1kΩ	x100Ω	x10Ω	x1Ω	x0.1Ω	x0.01Ω	x0.001Ω
ZX70	-	-	0.001	0.003	0.01	0.03	0.1	0.3	1.4	1.4	1.4
ZX80	0.0001	0.0003	0.001	0.003	0.01	0.03	0.1	-	-	-	-

4.3 Specifications

Operating temperature range	5°C - 35°C
Reference temperature range	18°C - 20°C
Operating humidity	< 75%
Reference humidity range	40% to 60%
Reference power	0.05W
Nominal power	0.1W
Maximum power	0.2W
Dimensions	440mm (W) x 130mm (H) x 120mm (D)
Weight	4kg

4.4 Environmental

Storage temperature range	-20 °C to +50 °C
Service temperature range	5 °C to +40 °C
Relative humidity	20% to 80% non-condensing

4.5 Standards

This instrument has been designed to meet the requirements of the EMC directive 89/336/EEC using the following standards.

EN61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
Service temperature range	5 °C to +40 °C
Relative humidity	20% to 80% non-condensing

5.0 Cleaning and Maintenance

5.1 Cleaning

Make sure the unit is disconnected from other equipment before cleaning.

Clean with a soft, clean cloth slightly dampened with mild detergent. Do not allow water to enter the instrument.

Warning

Never use alcohol or thinners (unless specified) as these will
damage the instrument.

Never use a hard or abrasive cloth or brush.

5.2 Maintenance procedures

The ZX70 series and ZX80 series requires little or no maintenance with normal use. The special insulators around the input sockets should be kept clean to avoid the shunting affect of accumulated dirt and grease. Wiping with an alcohol-moistened cloth (insulators and sockets only) should be sufficient to maintain accuracy.

Switches are completely sealed and require no maintenance or additional lubrication.

Calibration may be affected if the Precision Decade Resistance Box has been over loaded or subjected to high or low temperatures or shock. It can also be affected if the instrument has been removed from its case and the internal resistors have been touched as this can cause progressive deterioration of accuracy. Replacement of individual resistors is not recommended as resistors are selected and matched by Tinsley Precision Instruments as part of each decade to maintain the specified accuracy throughout the entire resistance range.

Calibration of the ZX70 series and ZX80 series requires a precision bridge such as a Kelvin-Wheatstone type or a Comparator Bridge with another Precision Decade Resistance Box of the same type with known calibration for comparison.

CONTACT US

1 Warner Drive
Springwood Industrial Estate
Braintree, Essex
CM7 2YW

www.tinsley.co.uk



Tel: 01376 335271
E-mail: info@tinsley.co.uk

6.0 SERVICE, WARRANTY AND REPLACEMENT

6.1 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.
The service procedure **MUST** only be carried out by suitably
trained personnel.

Note

Opening the instrument will invalidate the warranty.

6.2 Technical Support

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



Tinsley Instrumentation Ltd
1 Warner Drive
Springwood Industrial Estate
Braintree, Essex
CM7 2YW

Tel: 01376 335271
E-mail: info@tinsley.co.uk

www.tinsley.co.uk

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