

# PRECISION MEASURING INSTRUMENTS







## 2707 Electronic Galvanometer



**270710**

113 x 106 x 46 mm 0.45 kg  
(4-1/2 x 4-1/4 x 1-7/8" 1 lb)

Model 2707 is a compact transistorized electronic galvanometer using a battery. With sensitivity of  $10\mu\text{V}/\text{div.}$ , this instrument is highly suited to field measurements and as an indicator for complex measuring instruments.

- **$10\mu\text{V}/\text{div.}$  sensitivity**
- **Stable measurement**  
Zero drift is as low as  $1\mu\text{V}/\text{h}$  or  $1\mu\text{V}/20^\circ\text{C}$
- **Overload protection circuit**
- **300 hours battery life**

**Measuring Range:**  $\pm 250\mu\text{V}$   $\begin{matrix} +20\% \\ -10\% \end{matrix}$ .

**Maximum Sensitivity:**  $10\mu\text{V}/\text{div.}$   $\pm 10\%$ .

**Input Resistance:** Approx.  $9\text{k}\Omega$ .

**Response Time:** Approx. 3 seconds.

**Common Mode Rejection:** More than 140 dB at DC and commercial frequency (50 and 60 Hz).

**Normal Mode Rejection:** More than 60 dB.

**Vibration of Pointer:** Unrecognizable.

**Drift:** Less than  $1\mu\text{V}/10$  minutes or  $2\mu\text{V}/20^\circ\text{C}$ .

**Max. Allowable Input:** 5 V.

**Life of Battery:** Approx. 300 hours when continuously used.

**Power Source:** One 9V battery (JIS 6F22 or equivalent).

## 2708 Galvanometer



**2708**

113 x 106 x 46 mm 0.4 kg  
(4-1/2 x 4-1/4 x 1-7/8" 0.9lbs)

Model 2708 Galvanometer is a compact pointer type with a quick response (2 seconds). It employs a shock- and vibration-proof taut-band suspension system. This unit is also suitable for classroom applications.

- **$0.9\mu\text{A}/\text{div.}$ ,  $270\mu\text{V}/\text{div.}$  sensitivity**
- **Quick response – 2 seconds**
- **Shock- and vibration-proof taut band suspension system**
- **Compact and lightweight (0.4 kg)**
- **Can be tilted to any desired angle with accessory stand**

**Current Sensitivity:**  $0.9\mu\text{A}/\text{div.}$   $\pm 10\%$ .

**Voltage Sensitivity:**  $270\mu\text{V}/\text{div.}$   $\pm 15\%$ .

**Response Time:** Approx. 2 seconds.

**External Critical Resistance:**  $200\Omega$ .

# 2768 Precision Wheatstone Bridge



**2768**  
310×491×140mm 10kg  
(12-1/4×19-3/8×5-1/2" 22lbs)

Model 2768 is a precision bridge used for exact determination of resistance in the 100 mΩ to 110 MΩ range with accuracy of 0.01 to 0.05%. Since this instrument includes a high-sensitivity transistorized galvanometer and bridge power source, no auxiliary device is required.

- **Superior resistor element**
- **Minimized contact resistance**
- **Guarding and shielding**

Materials of high insulation resistance and low absorption are employed. Guard circuits are provided to insure stable operation even in highly humid atmospheres. The instrument is housed in a (grey) metal case to assure the operator of excellent shielding.

- **Heat-insulated pushbutton keys**

If the operator's body temperature were carried to the galvanometer sensitivity control keys, a temperature difference would arise at the contact point and produce thermal emf resulting in measurement error. To eliminate this effect, the pushbutton keys for the galvanometer sensitivity control are heat-insulated with phenol resin.

## SPECIFICATIONS

**Measuring Method:** Null method (in-line readout).

**Measuring Range:**

Range	Measuring Range	Min. Division
x 100 mΩ	0.10000 to 1.11110 Ω	10 μΩ
x 1 Ω	1.0000 to 11.1110 Ω	0.1 mΩ
x 10 Ω	10.000 to 111.110 Ω	1 mΩ
x 100 Ω	100.00 to 1111.10 Ω	10 mΩ
x 1 kΩ	1.0000 to 11.1110 kΩ	0.1 Ω
x 10 kΩ	10.000 to 111.110 kΩ	1 Ω
x 100 kΩ	100.00 to 1111.10 kΩ	10 Ω
x 1 MΩ	1.0000 to 11.1110 MΩ	100 Ω
x 10 MΩ	10.000 to 111.110 MΩ	1 kΩ

**Measuring Arm:** 0 to 11, 111Ω adjustable in 0.1Ω steps, (consists of five decades: 1,000Ω x 10 + 100Ω x 10 + 10Ω x 10 + 1Ω x 10 + 0.1Ω x 10).

**Multiplier:** x 100mΩ, x 1Ω, x 10Ω, x 100Ω, x 1kΩ, x 10kΩ, x 100kΩ, x 1MΩ and x 10MΩ.

**Accuracy:** (At 23 ± 2°C, less than 75%)

x 100mΩ range ... ±0.5mΩ, x 1Ω range ... ± (0.02% of setting + 0.5mΩ), x 10Ω, x 100kΩ & x 1MΩ ranges ... ±0.02% of setting, x 100Ω, x 1kΩ & x 10kΩ ranges ... ±0.01% of setting, x 10MΩ range ... ±0.05% of setting.

**Maximum Allowable Input:** 0.2W continuously for ratio arm, 0.2 W continuously per element for measuring arms.

**Galvanometer (built-in):** Max. sensitivity ... approx. 10μV/div. (provided with a sensitivity adjuster), power source ... single 9V battery (JIS 6F22 or equivalent), battery life ... approx. 300 hours.

**Insulation Resistance:** More than 1,000MΩ at 250V DC at ambient humidity of less than 75% between electric circuit and case.

**Dielectric Strength:** 500V AC for one minute between electric circuit and case.

**Case:** Grey metal case, with plastic feet and carrying handles.

**Bridge Power Source (built-in):** Power source range ... 1.5/3/6/15 V selectable, power source battery ... four 1.5V batteries (JIS R20P, ANSI D, Mono 1.5V or equivalent) and single 9V battery (JIS 6F22, ANSI 6F22, Energieblock 9V or equivalent).

## 2755 Portable Wheatstone Bridge



**275597**

182×226×128mm 2kg  
(7-1/4×9×4-3/4" 4.4lbs)

Model 2755 measures resistances from 1Ω to 10 MΩ by operation of dials and switches. Batteries and a galvanometer are self-contained. The front control panel is provided with power and galvanometer circuit selectors, one ratio arm dial, and four measuring arm dials.

Model 2755 is also equipped with a Murray and Varley Loop Tester for convenient location of line faults such as "shorts" and "grounds" in power, telephone, telegraph, and signal cables.

- No auxiliary attachment required
- Galvanometer with a built-in protection circuit
- Compact, lightweight (2 kg)
- Built-in Murray & Varley loop tester

### SPECIFICATIONS

**Measuring Range:** 1.000 Ω to 10.00 MΩ.

**Measuring Arms:** 1 Ω × 10 + 10 Ω × 10 + 100 Ω × 10 + 1,000 Ω × 10 (min. one step: 1 Ω).

**Ratio Arms (Multiplier):** × 0.001, × 0.01, × 0.1, × 1, × 10, × 100, × 1,000 (M10, M100, M1000 ... Murray & Varley loop testing).

**Accuracy:** ±0.1% of reading on 100 Ω to 100 kΩ range, ±0.3% of reading on 10 Ω to 1 MΩ range, ±0.6% of reading on 1 Ω to 10 MΩ range.

**Temperature Coefficient of Resistance Elements:** ±5 × 10<sup>-5</sup> /°C at ambient temperature of 5 to 35°C (41 to 95°F), ±2 × 10<sup>-5</sup> /°C at ambient temperature 20 to 35° (68 to 95°F).

**Galvanometer:** Sensitivity ... 0.9 μA/div., internal resistance ... Approx. 150 Ω, external critical damping resistance ... Approx. 800 Ω, period ... within 1.5 seconds.

**Power Source:** Three 1.5 V batteries (built-in).

**Operating Temperature Range:** 5 to 35°C (41 to 95°F).

**Humidity Range:** 85% max., relative humidity.

**Outer Case:** ABS resin.

**Accessory supplied at no extra cost:** Carrying case.

## 2769 Portable Double Bridge



**276910**

182×226×128mm 2.6kg  
(7-1/4×9×4-3/4" 5.7lbs)

Model 2769 is a compact, portable Kelvin double bridge designed for measuring low resistance from 0.1 mΩ to 110 Ω with four multiplication plugs and one measuring dial. It has built-in standard resistors, bridge power source and high-sensitivity taut-band suspension system electronic DC galvanometer.

### SPECIFICATIONS

**Measuring Range:** 0.1 mΩ\* to 110Ω.

**Measuring Dial:** 1.00 to 11.00 Ω at × 1.

**Multipliers:** × 0.0001\*, × 0.001, × 0.01, × 0.1, × 1, × 10 (plug-in system).

**Min. Division:** 0.005 mΩ at × 0.0001\*, 0.05 mΩ at × 0.001, 0.5 mΩ at × 0.01, 5 mΩ at × 0.1, 50 mΩ at × 1, 0.5Ω at × 10.

**Accuracy:** ±(0.05 Ω × multiplier + 0.01 mΩ) at temperature range of 5 to 35°C and humidity range of less than 85%.

**Current Rating:** 10A at × 0.0001\*(0.01Ω), 3A at × 0.001 (0.1Ω), 1A at × 0.01 (1Ω), 0.3A at × 0.1 (10Ω), 0.1A at × 1 (100Ω), 0.01A at × 10 (1,000Ω).

**Galvanometer:** Built-in electronic DC galvanometer, voltage sensitivity ... approx. 20 μV/div. sensitivity changeover;

G<sub>0</sub> ... (input resistance: approx. 11 kΩ).

G<sub>1</sub> ... approx. 1/11 of G<sub>0</sub> sensitivity.

G<sub>2</sub> ... approx. 1/110 of G<sub>0</sub> sensitivity.

power source; one 9 V battery (JIS 6F22),

battery life; approx. 300 hours.

**Operating Temperature Range:** 5 to 35°C (41 to 95°F).

**Humidity Range:** Less than 85% relative humidity.

**Bridge Power Source:** Two 1.5 V batteries (JIS R20P), External power source is also usable. Terminals for an external battery are provided.

**\*Note:** Standard Resistor (Model 2771) is required for measurement on 0.1 to 1.1mΩ range at 0.0001 multiplier.

**Accessory supplied at no extra cost:** Carrying case.

**Optional Accessories:** 2771 standard resistor, 2753 measuring cords (Page 8), 2754 clamp device (Page 8).

# 2752 Precision Double Bridge



**2752**  
310×491×140mm 11.5kg  
(12-1/4×19-3/8×5-1/2" 25.3lbs)

Model 2752 is a precision laboratory standard Kelvin bridge for measuring resistance below  $100\Omega$  to an accuracy of  $\pm 0.03$  to  $0.05\%$ . This instrument is used not only for high-precision measurement of resistance but also for measurement of electrical conductivity of conductors and calibration of low resistance instruments. It is also designed for testing large-capacity shunts and measuring lead resistance per unit length of bar or wire conductors in combination with accessory.

- **Laboratory-grade accuracy** —  $\pm 0.03$  to  $\pm 0.05\%$
- **Quick readout without error**
- **Excellent long-term stability**  
The resistance elements are made of selected manganin wire, stabilized by both artificial and natural aging after being wound.
- **Perfect guard system**
- **Stable measurement**  
The dial switches offer low contact resistance and little change due to aging, giving stable operation. Inner/outer contact type plugs are used for changing the multiplication factor, assuring little change in the resistance due to reinsertion of plugs.
- **Built-in standard resistors**
- **Bar resistor measurement**

## SPECIFICATIONS

- Measuring Range:**  $0.10000m\Omega$  to  $111.10\Omega$  in five digits.
- Measuring Arm:** (at Multiplier  $\times 1$ ):  $100m\Omega \times 10 + 10m\Omega \times 10 + 1m\Omega \times 10 + (0.05 \text{ to } 1.05m\Omega)$ .
- Minimum Division:**  $0.00001m\Omega$  at  $\times 0.001$ ,  $0.0001m\Omega$  at  $\times 0.01$ ,  $0.001m\Omega$  at  $\times 0.1$ ,  $0.01m\Omega$  at  $\times 1$ ,  $0.1m\Omega$  at  $\times 10$  and  $1m\Omega$  at  $\times 100$ .
- Multiplier:**  $\times 0.001$ ,  $\times 0.01$ ,  $\times 0.1$ ,  $\times 1$ ,  $\times 10$  and  $\times 100$ .
- Accuracy:** At resistance of potential leads and current leads less than  $10m\Omega$ /wire;  $\pm(0.03\%$  of reading +  $1\mu\Omega$ ) at  $23\pm 2.5^\circ\text{C}$ ,  $\pm(0.05\%$  of reading +  $1\mu\Omega$ ) at  $10$  to  $40^\circ\text{C}$ .
- Current Rating:**  $30\text{A}$  at  $\times 0.001$ ,  $10\text{A}$  at  $\times 0.01$ ,  $3\text{A}$  at  $\times 0.1$ ,  $0.5\text{A}$  at  $\times 1$ ,  $0.15\text{A}$  at  $\times 10$ ,  $0.05\text{A}$  at  $\times 100$ .
- Case:** Grey metal case, with plastic feet and carrying handles.

**Insulation Resistance:** More than  $100M\Omega$  at  $500\text{V DC}$  between the electric circuit and case.

**Dielectric Strength:**  $500\text{V AC}$  for one minute between electric circuit and case.

**Optional Accessories:** 2707 electronic galvanometer (rear cover), 2012 DC volt-ammeter, 2791 slide resistor (Page 12), 2753 measuring cords, 2754 clamp device.

## OPTIONAL ACCESSORIES FOR 2752 & 2769

### 2753 MEASURING CORDS

2753 is a set of cords, and used for connecting the resistor to be measured.

**Current Cords:** One pair, 2m each, approx.  $3m\Omega$ .

**Voltage Cords:** One pair, 2m each, approx.  $8m\Omega$ .

**Clamp Fixture:** Attached to the end of each cord.

**Weight:** Approx.  $4.1 \text{ kg}$  ( $9.0 \text{ lbs}$ ).

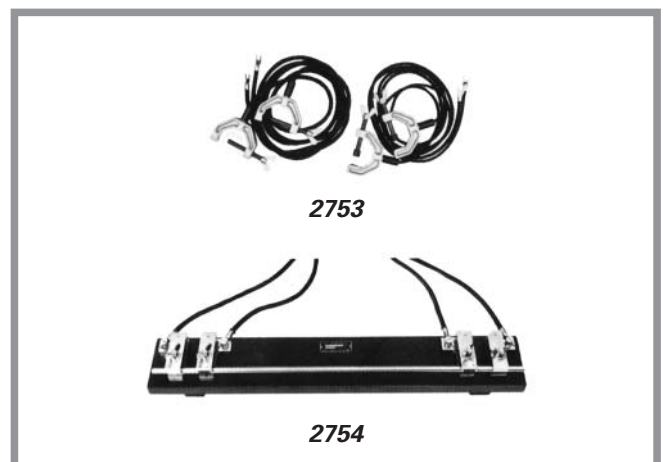
### 2754 CLAMP DEVICE

2754 is used for resistance measurement of bar or wire conductor. 2754 enables easy measurement of resistance per unit length.

**Distance between Voltage Terminals:**  $500\text{mm}$  ( $19\text{-}3/4''$ ).

**Current Cords:** One pair,  $500\text{mm}$  each, approx.  $1m\Omega$ .

**Voltage Cords:** One pair,  $500\text{mm}$  each, approx.  $2.5m\Omega$ .



# 2792A Series Standard Resistors



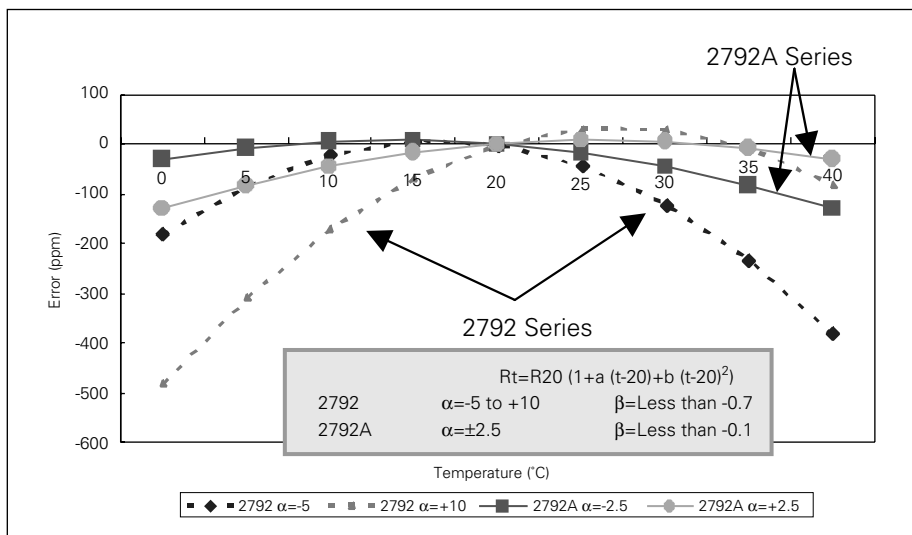
- **Accuracy 40% higher than our previous models!**
- **Temperature coefficient down 2/3!**

## ■ Main Features

- Traced to the national standard for high accuracy; test (calibrated) accuracy of  $\pm 5$  ppm
- Resistance temperature coefficient  
Excellent temperature characteristics in the range of 0 -50°C; resistance temperature coefficient less than  $\pm 2.5$  ppm/°C
- A variety of models  
Eight models with nominal resistance values ranging between 0.001  $\Omega$  and 10 k $\Omega$
- Precision temperature control equipment, such as an oil bath, not needed for calibration due to marked improvement in resistance temperature coefficient
- Included document: Test certificate

The 2792A Series of standard resistors are metal foil resistors, while the previous 2792 Series were winding resistors. The error range of the 2792A Series is much smaller than those of the previous 2792 Series, as demonstrated by the resistance temperature coefficient curves (Graph 1). Precision temperature control equipment such as oil baths, are not needed for measurement and calibration. The 2792A can do these in an air environment.

At development sites, the 2792A serves many purposes, ranging from precision measurement to calibration of equipment. The main body of the 2792A employs the same plastic case as that of the previous series, and the 2792A has a damage-resistant and easy-to-connect terminal block. The 2792A can be even more effective in precision measurement when it is combined with our potentiometer and double bridge.



Graph 1 Error characteristics of the 2792 and 2792A Series with respect to temperature



## SPECIFICATIONS

Model	Nominal value	Accuracy 23°C±2°C	Temperature coefficient α23 (ppm/°C)	Temperature coefficient β(ppm/°C <sup>2</sup> )	Drift per year	Maximum allowable current (A)
2792A01	0.001 Ω	±100ppm	-5 to ±15	Less than -0.1	±100 ppm per year	54.7
2792A02	0.01 Ω	±75ppm	±10	Less than -0.1	±75 ppm per year	17.3
2792A03	0.1 Ω	±50ppm	±5	Less than -0.1	±50 ppm per year	5.47
2792A04	1 Ω	±30ppm	±2.5	Less than -0.1	±30 ppm per year	1.73
2792A05	10 Ω	±30ppm	±2.5	Less than -0.1	±30 ppm per year	0.547
2792A06	100 Ω	±30ppm	±2.5	Less than -0.1	±30 ppm per year	0.173
2792A07	1 kΩ	±30ppm	±2.5	Less than -0.1	±30 ppm per year	0.055
2792A08	10 kΩ	±30ppm	±2.5	Less than -0.1	±30 ppm per year	0.017

Standard test conditions: DC current, temperature: 23 ±2°C, power: below 0.1 W (2792A01) and below 0.01 W (2792A02-2792A08)

Operating temperature and humidity ranges

: 0-50°C / 20-80% RH

Storage temperature and humidity ranges

: -20-60°C / 20-80% RH

Maximum allowable power : 3 W

Test (calibrated) accuracy : ±5 ppm

Power characteristics : ±100 ppm/W

Insulation resistance : More than 1000 MΩ at 500 V DC

Withstand voltage : 1.5 kV for one minute between measurement terminal and casing

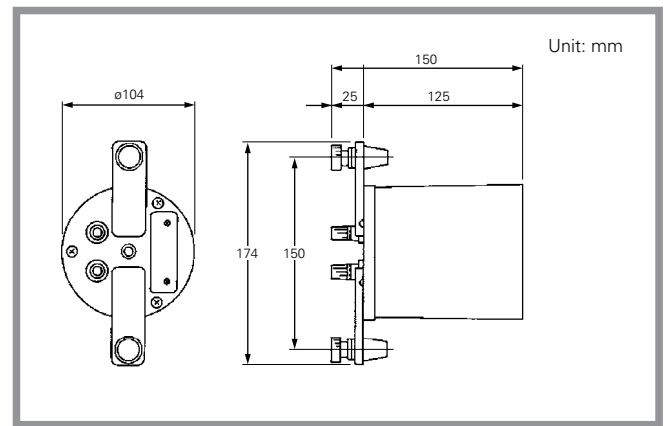
Terminal construction : 4 terminals

External dimensions : Approximately ø104 × 150 mm  
(current terminal width:  
approximately 174 mm)

Weight : Approximately 1.2 kg

Accessories : User'S Manual, One Test Certificate

### • External Dimensions



## OPERATING PRECAUTIONS

### • Temperature

To maintain a high level of measurement accuracy, the Standard Resistor must be used in rooms with a constant ambient temperature or placed in a thermostatic chamber. Measure the ambient temperature accurately and perform compensation according to the temperature coefficient. Ensure that the instrument is not subjected to rapid changes in temperature during storage as changes in resistance or deterioration of the insulator may result. (Instrument can be operated stably for over two hours.)

### • Temperature coefficients and resistance

The resistance at temperature  $t$  is expressed by the following equation:

$$R_t = R_{23} \{1 + \alpha_{23}(t - 23) + \beta(t - 23)^2\}$$

where

$R_t$  : Resistance value at  $t$ °C

$R_{23}$  : Resistance value at 23°C

$\alpha_{23}$  : 1st temperature coefficient at 23°C

$\beta$  : 2nd temperature coefficient at 0 to 50°C

### • Current

When electric current flows through the Standard Resistor, its resistance value changes due to the generated heat. To ensure accurate measurement, use the Standard Resistor below the maximum allowable current, which is one of the standard test conditions. When the applied current exceeds the maximum allowable current, the resistance could change, or the internal circuit could be broken.

### • Thermal emf and Contact Resistance

To minimize the effects of thermal emf, connect the circuit with copper wire, and take the average of two readings obtained by reversing the direction of the current flowing through the current terminals. Incomplete contact between the lead wire and the terminals causes current change due to contact resistance, and temperature errors due to heat generation.

### • Mechanical Shock and Vibration

Mechanical shock and vibration may cause distortion of the resistive elements, which results in instability and changes in the resistance value.

# 2793 Decade Resistance Boxes



## 279301

110 x 491 x 140 mm 4.8 kg  
(4-3/8 x 19-3/8 x 5-1/2" 10.6lbs)

Model 2793 is a high-accuracy, stable DC variable resistor with 6 dials and is available in two styles: 279301 for medium resistance from 0.1 to 1,111.210Ω in 1mΩ steps (best suited for calibration of resistance thermometers or bridges); 279303 for high resistance from 0 to 111.1110 MΩ in 100Ω steps (suitable for calibration of insulation resistance testers or bridges).

### 279301

- **High accuracy and stability**
- **High reproducibility**  
Excellent reproducibility is obtainable because dial switches with low contact resistance are used. For example, changes in contact resistance is within ±1.1mΩ at 0.1Ω setting.
- **1mΩ resolution**
- **Simple, quick dial operation**
- **In-line display for easy reading**
- **Ideal for calibration of resistance thermometers and bridges**  
Due to its high accuracy and a dial system, various types of resistance thermometers and bridges can be calibrated accurately and promptly.
- **Excellent anti-shock and -vibration properties**

### 279303

- **Up to 100MΩ in 100Ω step**
- **Low voltage coefficient**  
Variation of the resistance value is less than ±0.1% at 1MΩ and 10MΩ steps against 100V application, and less than ±0.04% at 100Ω, 1kΩ, 10kΩ, and 100kΩ steps against 10V application.
- **Shock- and vibration-proof construction**
- **Easy-to-read in-line indication**
- **Best suited for calibration of insulation resistance testers and bridges**

## SPECIFICATIONS

### 279301

- Resistance Range:** 0.100 to 1,111.210 Ω (Minimum resistance is 0.100Ω).
- Dial Composition:** 0.001Ω × 10 + 0.01Ω × 10 + 0.1Ω × 11 + 1Ω × 10 + 10Ω × 10 + 100Ω × 10
- Resolution:** 0.001 Ω
- Accuracy:** ±(0.01% + 2 mΩ) at temperature 23 ± 2°C, humidity 45 to 75%, and 0.1 W power application
- Max. Allowable Input Power:** 0.25 W/step. Within 1 W

for overall instrument.

#### Max. Allowable Input Current:

50 mA (100 Ω steps), 150 mA (10 Ω steps), 500 mA (1 Ω steps), and 1.5 A (0.1 Ω steps).

**Insulation Resistance:** More than 500 MΩ at 500 V DC between panel and circuit.

**Dielectric Strength:** 1,000 V AC for one minute between panel and circuit.

#### Temperature Coefficient:

Temperature coefficient	Dial	100 Ω step	10 Ω step	1 Ω step	0.1 Ω step
$\alpha_{20}$ ( $\times 10^{-6}/^{\circ}\text{C}$ )		-5 to +10	-5 to +20	Approx. 20 to 90	Approx. 90 to 900
$\beta$ ( $\times 10^{-6}/^{\circ}\text{C}^2$ )		-0.3 to -0.7	-	-	-

Variation of resistance with temperature change is given by the following equation:

$$R_t = R_{20} [ 1 + \alpha_{20}(t - 20) + \beta (t - 20)^2 ]$$

where,  $R_t$  : Resistance value at  $t^{\circ}\text{C}$

$R_{20}$  : Resistance value at  $20^{\circ}\text{C}$

### 279303

**Resistance Range:** 0 to 111.1110 MΩ.

**Dial Composition:** 100 Ω × 10 + 1 kΩ × 10 + 10 kΩ × 10 + 100 kΩ × 10 + 1 MΩ × 10 + 10 MΩ × 10.

**Accuracy:** 100 Ω, 1 kΩ, 10 kΩ and 100 kΩ steps ... ±(0.05% + 0.05 Ω)

1 MΩ and 10 MΩ steps ... ±0.2%

(At temperature 23 ± 2°C, humidity below 75%, including residual resistance of approx. 0.05Ω).

#### Max. Allowable Input:

100 Ω step . . . . . 100 mA

1 kΩ step . . . . . 30 mA

10 kΩ step . . . . . 10 mA

100 kΩ step . . . . . 3 mA (100 to 600 kΩ)

2,000 V (700 kΩ to 1 MΩ)

1 MΩ step . . . . . 2,000 V

10 MΩ step . . . . . 2,000 V

#### Temperature Coefficient:

100 Ω, 1 kΩ step . . . . .  $\alpha_{20} = (-2 \text{ to } +20) \times 10^{-6}/^{\circ}\text{C}$   
 $\beta = -(0.3 \text{ to } 0.7) \times 10^{-6}/^{\circ}\text{C}^2$

10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ step ±30 × 10<sup>-6</sup>/°C

Variation of resistance with temperature change is given by the following equation:

$$R_t = R_{20} [ 1 + \alpha_{20}(t - 20) + \beta (t - 20)^2 ]$$

where,  $R_t$  : Resistance value at  $t^{\circ}\text{C}$

$R_{20}$  : Resistance value at  $20^{\circ}\text{C}$

**Insulation Resistance:** More than 10<sup>11</sup> Ω at 1,000 V DC between panel and circuit.

**Dielectric Strength:** 2,500 V AC for one minute between panel and circuit.

## 2786 Decade Resistance Boxes



**2786**  
116 x 497 x 120 mm 3.5 kg  
(4-5/8 x 19-5/8 x 4-3/4" 7.7 lbs)

Models 278610 and 278620 six-dial decade resistance boxes allow quick and easy setting of a wide range of resistance. These resistance boxes are used in combination with voltage or current standards to adjust voltage or current, as dummy load resistances or as an arm of AC bridges.

### SPECIFICATIONS

#### Available Models:

Model Number	Resistance Range
278610	0.1 to 111,111Ω (six decade dials)
278620	1 to 1,111,110Ω (six decade dials)

**Residual Resistance:** Less than 23mΩ.

**Power Rating:** 0.3W/step, within 3W for overall instrument.

**Maximum Allowable Input:** 0.5W/step, 5W for overall instrument.

**Maximum Circuit Voltage:** 250V.

**Operating Temperature Range:** 0 to 40°C (32 to 104°F).

**Storage Temperature Range:** -10 to 50°C (14 to 122°F).

**Humidity Range:** 25 to 85%, relative humidity.

**Insulation Resistance:** More than 500MΩ at 500V DC.

**Dielectric Strength:** 1,500V AC for one minute.

#### Accuracy and Temperature Coefficient (2786):

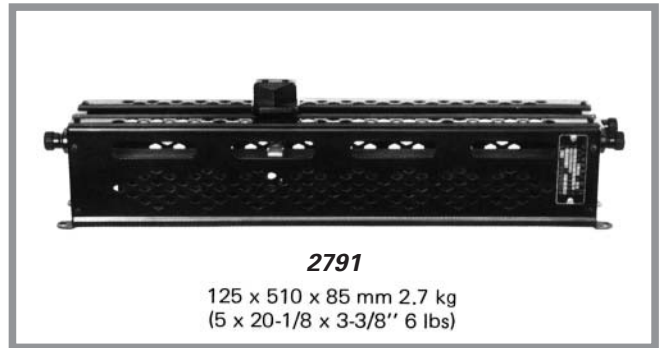
Step	Accuracy *1	Temperature Coefficient *2		Reference Data	
		$\alpha_{23} (\times 10^{-6} / ^\circ\text{C})$	$\beta (\times 10^{-6} / ^\circ\text{C}^2)$	Current Rating	Max. Allowable Input Current *3
0.1Ω	±2	±250	-0.4 to -0.8	1.7A	2.2A
1Ω	±0.5	±100	-0.4 to -0.8	550mA	710mA
10Ω	±0.1	±20	-0.4 to -0.8	170mA	220mA
100Ω	±0.05	±10	-0.4 to -0.8	55mA	71mA
1kΩ	±0.05	±10	-0.4 to -0.8	17mA	22mA
10kΩ	±0.1	±50	±0.1	5.5mA	7.1mA (10kΩ to 30kΩ) 250V (40kΩ to 100kΩ)
100kΩ	±0.1	±50	±0.1	250V (200kΩ to 1MΩ) 1.7mA (100kΩ)	250V

Notes:

\*1. At standard reference conditions of 23±3°C ambient temperature, 45 to 75% humidity and less than 0.1W application.

\*2. The resistance value at t°C can be expressed by the following equation:

## 2791 Slide Resistors



**2791**  
125 x 510 x 85 mm 2.7 kg  
(5 x 20-1/8 x 3-3/8" 6 lbs)

Model 2791 is composed of resistance wire with an insulating coating wound on a frame of special ceramic and a sliding brush that maintains contact with the wire. Resistance is continuously variable and can be increased or decreased as desired.

The device permits current and voltage to be accurately adjusted without disconnecting the circuit. The resistor is widely used in testing laboratories and also in industrial tests and inspection of machinery and equipment.

### SPECIFICATIONS

#### Available Models:

Code	Nominal Value	Allowable Input Current
279101	4,800 Ω	0.18 A
279102	1,400 Ω	0.35 A
279103	600 Ω	0.5 A
279105	170 Ω	1.0 A
279108	39 Ω	2.0 A
279110	10 Ω	4.0 A
279112	4.7 Ω	6.0 A

**Allowable Deviation:** ±20% of nominal value.

**Insulation Resistance:** More than 5MΩ at 500V DC between terminal and case.

**Dielectric Strength:** 1,000V AC for one minute between terminal and case.

$$R_t = R_{23} [1 + \alpha_{23} (t - 23) + \beta (t - 23)^2]$$

Where,  $R_t$  : Resistance value at t°C.

$R_{23}$  : Resistance value at 23°C.

\*3. Within five minutes.



Yokogawa Meters & Instruments Corporation

World Wide Web site at  
<http://www.yokogawa.com/yml>

**NOTICE**

- Before using the product, read the instruction manual carefully to ensure proper and safe operation

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