

# Kelvin Double Bridges

"VAISESHIKA" Kelvin Bridges Type : 9403, 9404 & 9405 are important instruments in the measurement of resistance as low as 0.02 Micro ohms to highest value of 1 Mega ohm. Senior & Industrial Kelvin Bridges employ 10 Standard Resistors drawn from well aged manganin sheet having excellent stability & reproducibility. Manganin has the quality of very low temperature co-efficient which is a critical parameter for resistance standards manufacturing. For Micro ohm measurement 9403 & 9404 have slide wire having total resistance of 0.001 ohm & 0.01 ohm respectively which is further divided into 500 divisions to achieve desired resolution. The slide wire in 9403 is immersed in oil for total stability.

Kelvin cum Wheatstone Bridge 9405 is also constructed with manganin coils & sheet. Phosphor Bronze Silver plated switches have been used to minimise the residual resistance error. Four standard decade dials, ratio selector & plug keys facilitate accurate null detection. User can easily change over from Kelvin section to Wheatstone Bridge section & vice-versa with the help of a selector switch.



## Senior Kelvin Double Bridge Type : 9403

### FEATURES

- Manganin wire having exceptionally low temperature co-efficient of the order of  $\pm 10.10 \text{ }^{\circ}\text{C}$ .
- Resistance measurements conforming to international standards DIN 17471.
- Remarkably long lasting resistance values with excellent stability.
- Adherence to tolerance standard conforming to DIN 46 461.
- Reproducible measurements.
- Wonderful elastic limits of MANGANIN  $20\text{kp/mm}^2$ .
- Perfectly aged Manganin coils/strips employed in Kelvin Bridges.
- Click type hard silver plated self-cleaning switches.
- Oil immersed slide wire in Senior Kelvin Double Bridge.
- Wide resistance measurement range 0.02 micro-ohm to 1 megohm.
- Solid brass blocks for positive plug contacts.
- Quick change-over from Kelvin to Wheatstone mode.
- Easy-to-control knobs.

ACCESSORIES



# Vaiseshika

AN ISO 9001 : 2000 CERTIFIED COMPANY

# Specifications

## SENIOR KELVIN DOUBLE BRIDGE TYPE : 9403

Range of Measurement	0.02 micro-ohm to 1.1 ohm		
Accuracy	below 0.0001Ω	0.2%	±1 slide wire division
	0.0001 to 0.01	0.1%	
	above 0.01Ω	0.05%	
Slide Wire	0.001 ohm divided in 500 equal divisions.(Immersed in oil)		
Variable Standard Resistance	10 steps of 0.001 ohm		
Multiplying Ratio	0.01,0.1,1,10 and 100		

RANGE FACTOR SETTING	TOTAL RANGE	RESOLUTION
0.01	0.00011 ohm	0.02 micro ohm
0.1	0.0011 ohm	0.2 micro ohm
1.0	0.011 ohm	2 micro ohm
10	0.11 ohm	20 micro ohm
100	1.1 ohm	200 micro ohm
Switches	Hard silver plated giving constant values upto 10,000 operations.	
Current Source	25 Amp.	
Dimensions (in cms)	55 (L) x 30 (B) x 17 (H) (approx)	
Weight (in kg.)	15 (approx)	

## INDUSTRIAL KELVIN DOUBLE BRIDGE TYPE : 9404

Range of Measurement	0.2 micro-ohm to 11 ohm		
Accuracy	below 0.0001Ω	0.2%	] ±1 slide wire division
	0.0001 to 0.01Ω	0.1%	
	above 0.01Ω	0.05%	
Slide Wire	0.001 ohm divided in 500 equal divisions.		
Variable Standard Resistance	10 steps of 0.01 ohm		

RANGE FACTOR SETTING	TOTAL RANGE	RESOLUTION
0.01	0.0011 ohm	0.2 micro ohm
0.1	0.011 ohm	2 micro ohm
1.0	0.11 ohm	20 micro ohm
10	1.1 ohm	0.2 milli ohm
100	11.0 ohm	2.0 milli ohm
Switches	Hard silver plated giving constant values upto 10,000 operations.	
Current Source	10 Amp.	
Dimensions (in cms)	48 (L) x 30 (B) x 17 (H)	
Weight (in kg.)	7 (approx.)	



# KELVIN-CUM-WHEATSTONE BRIDGE



Type : 9405

## KELVIN BRIDGE SECTION :

Range of Measurement	: 0.1 micro ohm to 1 ohm		
Accuracy	: below 0.0001Ω	0.2%	] ±1 step of lowest decade dial
	: 0.0001 to 0.01Ω	0.1%	
	: above 0.01Ω	0.05%	
Reference Resistance Standards	: 0.001 ohm, 0.01 ohm, 0.1 ohm and 1.0 ohm		
Dividing Ratio	: 1, 10, 100 and 1000 ohm		
Multiplying Ratio	: 0.1 x 1, 1.0 x 10, 10 x 10 and 100 x 10 ohm in the Shape of Standard Decade Resistors.		

## WHEATSTONE BRIDGE SECTION :

Range	: 1 ohm to 1.0 mega ohm		
Accuracy	: $1\Omega$ to 100.0 K	0.1%	] $\pm 1$ step of lowest decade dial
	above 100.0 K	1.0 %	
Dividing and Multiplying Ratio in Denominations of	: 1, 10, 100 and 1000 ohm		
Variable Arm	: Formulated by decade dials of 10 x 0.1, 10 x 1, 10 x 10 and 10 x 100ohm		

## PHYSICAL PARAMETERS OF PRECISION KELVIN-CUM WHEATSTONE BRIDGE :

Construction	: Metal Cabinet
Panel	: Mica-Hylam of high grade insulation
Dimensions (in cms.)	: 63 (L) x 39 (B) x 19 (H)
Weight (in kg.)	: 18 (approx.)

# Kelvin Double Bridge ACCESSORIES

'Vaiseshika' Senior Kelvin Double Bridge Type 9403, Industrial Kelvin Double Bridge Type 9404 and Precision Kelvin-cum-Wheatstone Bridge Type 9405 require a set of accessories for their successful operations. Please study the following accessories carefully and order for them along with the Principal instrument:

## SPOT REFLECTING GALVANOMETER TYPE 9400 A

This galvanometer is used for null detection. The sensitivity of the galvanometer is approximately 5 microvolt per mm. A moving light spot provides visual detection of the null point. The movement of the galvanometer is protected against shocks and vibrations. Clamping facility is provided to safeguard the moving coil against jerks and jitters during transit.

Different shunts in the order of 1/0, 1/100, 1/1000 and 1 are incorporated in the Spot Reflecting Galvanometer to control the sensitivity of the galvanometer.

Lamp and scale arrangement is built-in for spot null detection.

## CONTINUOUSLY VARIABLE HIGH AMPERAGE DC SOURCE TYPE 9400 B/C/D

It is most essential energizing source for the Bridges. It provides high amperage DC output which when used in conjunction with a Bridge facilitates quick null detection. The DC Source is housed in a stout metallic cabinet having current metering facility. A continuously variable transformer is provided to have smooth variations in the current at the output terminals.

Input Voltage : 230 Volts  $\pm$  10% AC.

## OUTPUT AMPERAGE CONTINUOUSLY VARIABLE

Code 9400 B : 0 to 30 Amp. suitable for Bridge Type 9403

Code 9400 C : 0 to 10 Amp. suitable for Bridge Type 9404

Code 9400 D : 0 to 50 Amp. suitable for Bridge Type 9405

## CONDUCTIVITY ATTACHMENT TYPE 9400 E

This attachment is useful in the determination of specific resistance of a metal rod or metal sheet. Resistance per unit length of a sample can be measured with this attachment. Binding post terminals are provided which can hold the rod of 1/2" dia to 42 SWG Wire. The distance between two potential contacts is 50 cm.

## CURRENT REVERSING SWITCH TYPE 9400 F

The direction of current is reversed in a Kelvin Bridge during the course of measurements. Current reversal is necessary to eliminate the errors due to thermo.e.m.f. This current Reversing Switch is a rugged device for the purpose.



SPOT REFLECTING GALVANOMETER



HIGH AMPERAGE DC SOURCE



CONDUCTIVITY ATTACHMENT



CURRENT REVERSING SWITCH

For further information please write to:

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