STRAIN GAUGE BRIDGE CIRCUIT

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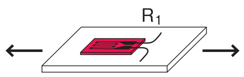
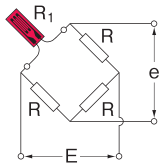
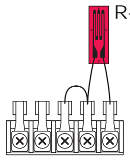
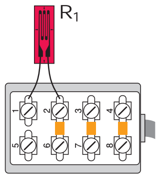
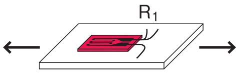
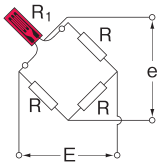
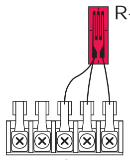
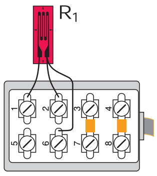
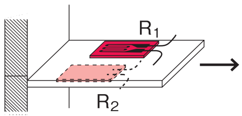
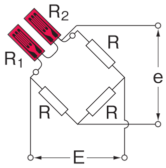
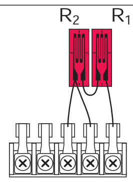
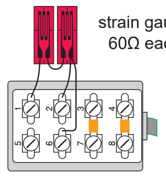
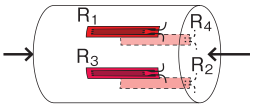
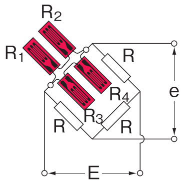
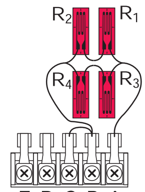
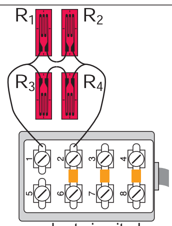
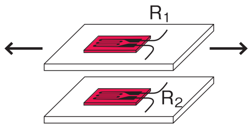
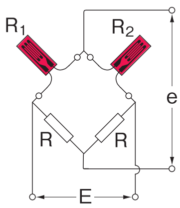
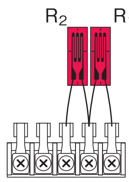
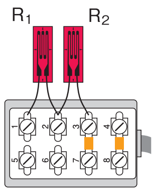
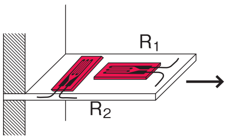
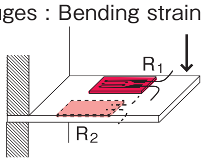
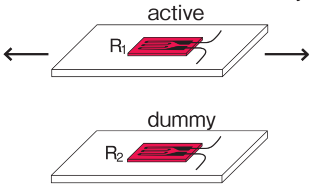
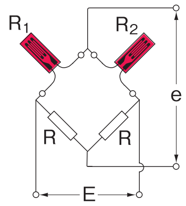
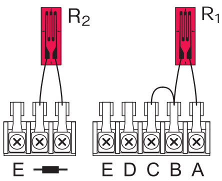
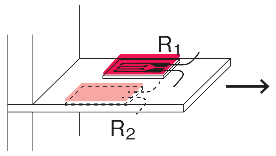
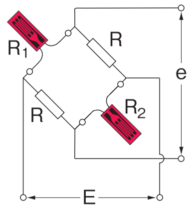
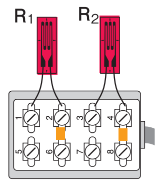
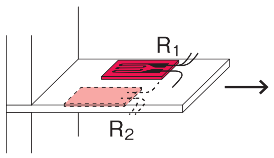
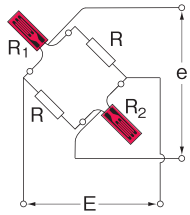
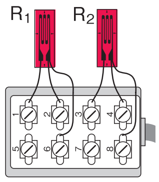
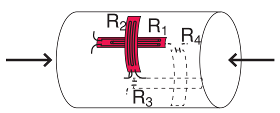
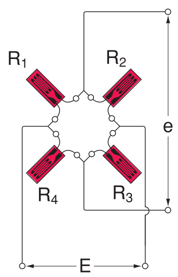
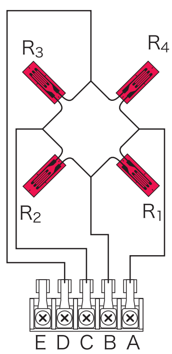
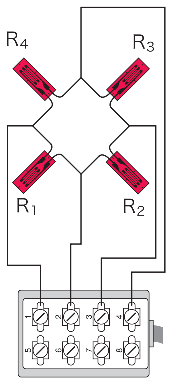
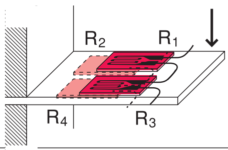
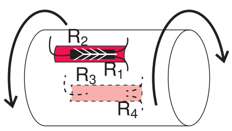
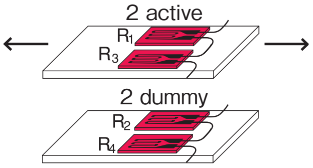
Connection diagram varies according to strainmeter type.

Measuring mode	Bridge circuit	Wiring connection to		Bridge Output
		Switching Box	Bridge Box	
Quarter bridge (with 2-wire) 		 E D C B A Terminal code	 short-circuited	E : Excitation voltage e : Output voltage Δe : Output voltage due to strain e_0 : Output voltage before strain generation R_0 : Resistance change due to generation ΔR : Resistance change due to strain ε : strain K : Gauge Factor of strain gauge
Quarter bridge with 3-wire Thermal output of leadwire is cancelled. 		 E D C B A Terminal code	 short-circuited	$e = e_0 + \Delta e$ $R_1 = R_0 + \Delta R$ $R = R_0$ $\Delta e = \frac{E}{4} K\varepsilon$
Quarter bridge 3-wire with two gauges connected in series in one arm, eliminating bending strain 		 E D C B A Terminal code	 strain gauge 60Ω each, short-circuited	$R_1 = R_0 + \Delta R$ $R_2 = R_0 + \Delta R$ $R = 2R_0$ $\Delta e = \frac{E}{4} K\varepsilon$
Quarter bridge with four gauges connected in series and paralleled in one arm 		 E D C B A Terminal code	 short-circuited	$R_1 = R_2 = R_3 = R_4 = R_0 + \Delta R$ $R = R_0$ $\Delta e = \frac{E}{4} K\varepsilon$
Half bridge with 1-active and 1-dummy gauge 		 E D C B A Terminal code	 short-circuited	$R_1 = R_0 + \Delta R$ $R_2 = R_0 = R$ $\Delta e = \frac{E}{4} K\varepsilon$
Half bridge with two active gauges 				$R_1 = R_0 + \Delta R$ $R_2 = R_0 - \nu \Delta R$ $\Delta e = \frac{E(1+\nu)}{4} \cdot K\varepsilon$ ν : Poisson's ratio
Half bridge with 2 active gauges : Bending strain 				$R_1 = R_0 + \Delta R$ $R_2 = R_0 - \Delta R$ $R = R_0$ $\Delta e = \frac{E}{2} K\varepsilon$

Output voltage due to strain is based on the condition that output voltage before strain generation (e_0) is zero.

STRAIN GAUGE BRIDGE CIRCUIT

Connection diagram varies according to strainmeter type.

Measuring mode	Bridge circuit	Wiring connection to: Switching Box	Wiring connection to: Bridge Box	Bridge Output
Half bridge common dummy R_2 is used for two or more channels as a common dummy 			Available only by switching box	$R_1 = R_0 + \Delta R$ $R_2 = R_0 = R$ $\Delta e = \frac{E}{4} K\varepsilon$
Opposite arm Half bridge with 2 active gauges 		Available only by bridge box Applicable type SB-120B SB-350B SB-128A SB-123A SB-353A		$R_1 = R_0 + \Delta R$ $R_2 = R_0 + \Delta R$ $R = R_0$ $\Delta e = \frac{E}{2} K\varepsilon$
Opposite arm Half bridge with 3-wire 2 active gauges 		Available only by bridge box Applicable type SB-120B SB-350B SB-128A SB-123A SB-353A		$R_1 = R_0 + \Delta R$ $R_2 = R_0 + \Delta R$ $R = R_0$ $\Delta e = \frac{E}{2} K\varepsilon$
Full bridge with 4 active gauges : Uniaxial strain 				$R_1 = R_3 = R_0 + \Delta R$ $R_2 = R_4 = R_0 - \nu \cdot \Delta R$ $\Delta e = \frac{E(1+\nu)}{2} \cdot K\varepsilon$ ν : Poisson's ratio
Full bridge with 4 active gauges : Bending strain 				$R_1 = R_3 = R_0 + \Delta R$ $R_2 = R_4 = R_0 - \Delta R$ $\Delta e = EK\varepsilon$
Full bridge with 4 active gauges : Torque 				$R_1 = R_3 = R_0 + \Delta R$ $R_2 = R_4 = R_0 - \Delta R$ $\Delta e = EK\varepsilon$
Full bridge with 2 active gauges and 2 dummy gauges 				$R_1 = R_3 = R_0 + \Delta R$ $R_2 = R_4 = R$ $R = R_0$ $\Delta e = \frac{E}{2} K\varepsilon$

Output voltage due to strain is based on the condition that output voltage before strain generation (e_0) is zero.