

R5850

# REED INSTRUMENTS

## Multifunction Process Calibrator



## Instruction Manual

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

# Table of Contents

Introduction .....	4
Product Quality .....	4
Safety .....	4-5
Features.....	5
Included .....	5
Specifications .....	6-12
<i>Measure Function</i> .....	6
<i>Thermocouples</i> .....	6-7
<i>RTDs</i> .....	8-9
<i>Source Function</i> .....	9
<i>Thermocouples</i> .....	9-11
<i>RTDs</i> .....	11
<i>Function Specifications</i> .....	12
<i>General Specifications</i> .....	12
Instrument Description .....	13-15
<i>Buttons</i> .....	14-15
Display Description .....	16
Operating Instructions .....	17-18
<i>Power ON/OFF</i> .....	17
<i>Setup Mode</i> .....	17
<i>Set Auto Power Off</i> .....	17
<i>Adjust the LCD Brightness Level</i> .....	18
<i>Select the Temperature Unit of Measure</i> .....	18
<i>Enable/Disable Remote Control Commands</i> .....	18
<i>Enable/Disable the Beeper</i> .....	18
Measurement Modes .....	19-27
<i>Millivolt Measurement (Upper Display)</i> .....	19
<i>Millivolt Measurement (Lower Display)</i> .....	19
<i>Voltage Measurement (Upper Display)</i> .....	20
<i>Voltage Measurement (Lower Display)</i> .....	20

*continued...*

MilliAmp Measurement (Upper Display) .....	21
MilliAmp Measurement (Lower Display) .....	21
Current Measurement with Loop Power (Upper Display) .....	22
Resistance Measurement (Upper Display) .....	22
Resistance Measurement (Lower Display) .....	23
Continuity Measurement (Upper Display) .....	23
Frequency Measurement (Lower Display) .....	24
Pulse Measurement (Lower Display) .....	24
Switch Quantity Measurement (Lower Display) .....	25
Thermocouple Measurement (Lower Display) .....	25-26
RTD Measurement .....	27
Source Modes (Lower Display) .....	28-36
Millivolt Output .....	28
Voltage Output .....	28
Sourcing 4 to 20mA .....	29
Simulating a 4 to 20mA Transmitter .....	29-30
Resistance Output .....	30
Frequency Output .....	31
Pulse Output .....	31-32
Switch Quantity Output .....	32
Thermocouple Output .....	33
RTD Output .....	34
Stepping the Output .....	35-36
Auto Ramping the Output .....	36
Remote Control Commands .....	36
Charging the Battery .....	37
Applications .....	37
Accessories and Replacement Parts .....	37
Product Care .....	37
Product Warranty .....	38
Product Disposal and Recycling .....	38
Product Support .....	38

## Introduction

Thank you for purchasing your REED R5850 Multifunction Process Calibrator. Please read the following instructions carefully before using your instrument. By following the steps outlined in this manual your meter will provide years of reliable service.

## Product Quality

This product has been manufactured in an ISO9001 facility and has been calibrated during the manufacturing process to meet the stated product specifications. If a certificate of calibration is required please contact the nearest authorized REED distributor or authorized Service Center. Please note an additional fee for this service will apply.

## Safety

- Do not apply more than the rated voltage, as marked on the calibrator, between the terminals, or between any terminal and earth ground (30V 24mA max all terminals).
- Before each use, verify the calibrator's operation by measuring a known voltage.
- Follow all equipment safety procedures.
- Never touch the probe to a voltage source when the test leads are plugged into the current terminals.
- Do not use the calibrator if it is damaged. Before using the calibrator, inspect the case. Pay particular attention to the insulation surrounding the connectors.
- Select the proper function and range for testing.
- Make sure the battery door is closed and latched before operating the calibrator.
- Remove test leads from the calibrator before opening the battery door.
- Inspect the test leads for damaged insulation or exposed metal. Check test leads continuity. Replace damaged test leads before using the calibrator.
- When using the probes, keep fingers away from the probe contacts. Keep fingers behind the finger guards on the probes.
- Connect the common test lead before connecting the live test lead. When disconnecting test leads, disconnect the live test lead first.

*continued...*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

- Do not use the calibrator if it operates abnormally. Protection may be impaired. When in doubt, have the calibrator serviced.
- Do not operate the calibrator around explosive gas, vapor, or dust.
- Disconnect test leads before changing to another measure or source function.
- Never attempt to repair or modify the instrument. Dismantling the product, other than for the purpose of replacing batteries, may cause damage that will not be covered under the manufacturer's warranty. Servicing should only be provided by an authorized service center.

## Features

- Rugged design stands up to field use
- Measures/Sources volts, mA, RTDs, thermocouples, frequency, and ohms
- 0.02% output and measurement accuracy
- Easy-to-read measure/source screen lets you view input and output simultaneously
- Perform fast linearity tests with auto step and auto ramp features
- Powers transmitters during the test using a loop supply with simultaneous mA measurement
- Measures and outputs 10 types of RTDs and 12 types of TC signals
- Rechargeable Ni-MH battery
- Adjustable brightness provides better visibility in poor light
- Store frequently-used test setups for later use
- Low battery indicator and auto shut-off

## Included

- Multifunction Process Calibrator
- Test Leads
- Test Clips
- Type K Thermocouple Wire Probe
- USB Cable
- Power Adapter
- Carrying Case

# Specifications

## Measure Function

Function	Range	Resolution	Accuracy
DC Voltage	50, 500mV, 30V (upper display), 50V (lower display)	0.001, 0.01, 1mV, 0.001V	50mV: $\pm(0.02\% +10)$ 500mV: $\pm(0.02\% +5)$ 30V (upper display): $\pm(0.02\% +2)$ 50V (lower display): $\pm(0.02\% +2)$
DC Current	20mA at 0 to 24mA	0.001mA	$\pm(0.02\% +2)$
Loop Current	20mA (loop) at 0 to 24mA		
Resistance	500, 5000 $\Omega$	0.01, 0.1 $\Omega$	$\pm(0.05\% +10)$
Frequency	100Hz, 1, 10, 100kHz	0.01, 0.1, 1Hz	$\pm(0.01\% +1)$

## Thermocouples

Thermocouple	Range	Resolution	Accuracy
Type R	32 to 3212.6°F (0 to 1767°C)	1°F/°C	32 to 932°F (0 to 500°C): $\pm 3.24^\circ\text{F}$ ( $\pm 1.8^\circ\text{C}$ )
Type S			932 to 3212.6°F (500 to 1767°C): $\pm 2.7^\circ\text{F}$ ( $\pm 1.5^\circ\text{C}$ )
Type B	1112 to 3308°F (600 to 1820°C)		1112 to 1472°F (600 to 800°C): $\pm 3.96^\circ\text{F}$ ( $\pm 2.2^\circ\text{C}$ ) 1472 to 1832°F (800 to 1000°C): $\pm 3.24^\circ\text{F}$ ( $\pm 1.8^\circ\text{C}$ ) 1832 to 3308°F (1000 to 1820°C): $\pm 2.52^\circ\text{F}$ ( $\pm 1.4^\circ\text{C}$ )
Type E	-58 to 1832°F (-50 to 1000°C)	0.1°F/°C	-58 to 32°F (-50 to 0°C): $\pm 1.62^\circ\text{F}$ ( $\pm 0.9^\circ\text{C}$ ) 32 to 1832°F (0 to 1000°C): $\pm 2.7^\circ\text{F}$ ( $\pm 1.5^\circ\text{C}$ )

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

Thermocouple	Range	Resolution	Accuracy
Type K	-148 to 2501.6°F (-100 to 1372°C)	0.1°F/°C	-148 to 32°F (-100 to 0°C): ±2.16°F (±1.2°C) 32 to 2501.6°F (0 to 1372°C): ±1.44°F (±0.8°C)
Type J	-76 to 2192°F (-60 to 1200°C)		-76 to 32°F (-60 to 0°C): ±1.8°F (±1°C) 32 to 2192°F (0 to 1200°C): ±1.26°F (±0.7°C)
Type T	-148 to 752°F (-100 to 400°C)		-148 to 32°F (-100 to 0°C): ±1.8°F (±1°C) 32 to 752°F (0 to 400°C): ±1.26°F (±0.7°C)
Type N	-328 to 2372°F (-200 to 1300°C)		-328 to 32°F (-200 to 0°C): ±2.7°F (±1.5°C) 32 to 2372°F (0 to 1300°C): ±1.62°F (±0.9°C)
Type L	-328 to 1652°F (-200 to 900°C)		-328 to 32°F (-200 to 0°C): ±1.53°F (±0.85°C) 32 to 1652°F (0 to 900°C): ±1.26°F (±0.7°C)
Type U	-328 to 752°F (-200 to 400°C)		-328 to 32°F (-200 to 0°C): ±1.98°F (±1.1°C) 32 to 752°F (0 to 400°C): ±1.35°F (±0.75°C)
Type XK	-328 to 1472°F (-200 to 800°C)		-328 to -148°F (-200 to -100°C): ±0.9°F (±0.5°C) -148 to 1472°F (-100 to 800°C): ±1.08°F (±0.6°C)
Type BP	32 to 4532°F (0 to 2500°C)		32 to 1472°F (0 to 800°C): ±2.16°F (±1.2°C) 1472 to 4532°F (800 to 2500°C): ±4.5°F (±2.5°C)

*continued...*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

## RTDs

RTD	Range	Resolution	Accuracy	
Pt100 (2-wire/3-wire)	-328 to 1562°F (-200 to 850°C)	0.1°F/°C	±0.72°F (±0.4°C)	
Pt100 (4-wire)			±0.54°F (±0.3°C)	
Pt200 (2-wire/3-wire)	-328 to 1166°F (-200 to 630°C)		-328 to 482°F (-200 to 250°C): ±0.54°F (±0.3°C)	
Pt200 (4-wire)			482 to 1166°F (250 to 630°C): ±2.88°F (±1.6°C)	
			-328 to 482°F (-200 to 250°C): ±0.36°F (±0.2°C)	
Pt500 (2-wire/3-wire)			482 to 1166°F (250 to 630°C): ±1.44°F (±0.8°C)	
			-328 to 932°F (-200 to 500°C): ±1.08°F (±0.6°C)	
Pt500 (4-wire)			932 to 1166°F (500 to 630°C): ±1.62°F (±0.9°C)	
	-328 to 932°F (-200 to 500°C): ±0.54°F (±0.3°C)			
Pt1000 (2-wire/3-wire)	-328 to 1202°F (-200 to 650°C)		932 to 1166°F (500 to 630°C): ±0.72°F (±0.4°C)	
Pt1000 (4-wire)			±0.27°F (±0.15°C)	
Cu10	-148 to 500°F (-100 to 260°C)			±3.24°F (±1.8°C)
Cu50 (2-wire/3-wire)	-58 to 302°F (-50 to 150°C)			±1.44°F (±0.8°C)
Cu50 (4-wire)				±0.9°F (±0.5°C)
Cu100 (2-wire/3-wire)				±0.72°F (±0.4°C)
Cu100 (4-wire)				±0.45°F (±0.25°C)
Pt100-392 (2-wire/3-wire)		-328 to 1166°F (-200 to 630°C)		±0.9°F (±0.5°C)

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

RTD	Range	Resolution	Accuracy
Pt100-392 (4-wire)	-328 to 1166°F (-200 to 630°C)	0.1°F/°C	±0.54°F (±0.3°C)
Pt100-JIS (2-wire/3-wire)			±0.9°F (±0.5°C)
Pt100-JIS (4-wire)			±0.54°F (±0.3°C)
Ni120 (2-wire/3-wire)	±0.54°F (±0.3°C)		
Ni120 (4-wire)	-112 to 500°F (-80 to 260°C)		±0.36°F (±0.2°C)

## Source Function

Function	Range	Resolution	Accuracy
DC Voltage	100mV, 1, 10V	0.001, 0.01mV, 0.0001V	±(0.02% +10)
DC Current	20mA at 0 to 24mA 20mA (SIM) at 0 to 24mA	0.001mA	±(0.02% +2)
Resistance	400, 4000Ω, 40kΩ	0.01, 0.1, 1Ω	±(0.02% +8) ±(0.05% +10) ±(0.1% +40)
Frequency	200, 2000Hz, 20, 100kHz	0.01, 0.1, 1, 10Hz	±(0.01% +1) (±3 dgt.), 100kHz: ±5 dgt.
Pulse	100Hz, 1, 10kHz	1 cyc	±2 dgt.
Switch Quantity	100Hz, 1, 10, 100kHz	0.01, 0.1, 1, 10Hz	

## Thermocouples

Thermocouple	Range	Resolution	Accuracy
Type R	32 to 3212.6°F (0 to 1767°C)	1°F/°C	32 to 212°F (0 to 100°C): ±2.7°F (±1.5°C)
Type S			212 to 3212.6°F (100 to 1767°C): ±2.16°F (±1.2°C)
Type B	1112 to 3308°F (600 to 1820°C)		1112 to 1472°F (600 to 800°C): ±2.7°F (±1.5°C) 1472 to 3308°F (800 to 1820°C): ±1.98°F (±1.1°C)

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

Thermocouple	Range	Resolution	Accuracy
Type E	-328 to 1832°F (-200 to 1000°C)	0.1°F/°C	-328 to -148°F (-200 to -100°C): ±1.08°F (±0.6°C) -148 to 1112°F (-100 to 600°C): ±0.9°F (±0.5°C) 1112 to 1832°F (600 to 1000°C): ±0.72°F (±0.4°C)
Type K	-328 to 2501.6°F (-200 to 1372°C)		-328 to -148°F (-200 to -100°C): ±1.08°F (±0.6°C) -148 to 752°F (-100 to 400°C): ±0.9°F (±0.5°C) 752 to 2192°F (400 to 1200°C): ±1.26°F (±0.7°C) 2192 to 2501.6°F (1200 to 1372°C): ±1.62°F (±0.9°C)
Type J	-328 to 2192°F (-200 to 1200°C)		-200 to -148°F (-200 to -100°C): ±1.08°F (±0.6°C) -148 to 1472°F (-100 to 800°C): ±0.9°F (±0.5°C) 1472 to 2192°F (800 to 1200°C): ±1.26°F (±0.7°C)
Type T	-418 to 752°F (-250 to 400°C)		±1.08°F (±0.6°C)
Type N	-328 to 2372°F (-200 to 1300°C)		-328 to -148°F (-200 to -100°C): ±1.8°F (±1°C) -148 to 1652°F (-100 to 900°C): ±1.26°F (±0.7°C) 1652 to 2372°F (900 to 1300°C): ±1.44°F (±0.8°C)
Type L	-328 to 1652°F (-200 to 900°C)		-328 to 32°F (-200 to 0°C): ±1.53°F (±0.85°C) 32 to 1652°F (0 to 900°C): ±1.26°F (±0.7°C)
Type U	-328 to 752°F (-200 to 400°C)		-328 to 32°F (-200 to 0°C): ±1.98°F (±1.1°C) 32 to 752°F (0 to 400°C): ±1.35°F (±0.75°C)

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

Thermocouple	Range	Resolution	Accuracy
Type XK	-328 to 1472°F (-200 to 800°C)	0.1°F/°C	-328 to -148°F (-200 to -100°C): ±0.9°F (±0.5°C) -148 to 1472°F (-100 to 800°C): ±1.08°F (±0.6°C)
Type BP	32 to 4532°F (0 to 2500°C)		32 to 1472°F (0 to 800°C): ±2.16°F (±1.2°C) 1472 to 4532°F (800 to 2500°C): ±4.5°F (±2.5°C)

## RTDs

RTD	Range	Resolution	Accuracy	
Pt100-385	-328 to 1472°F (-200 to 800°C)	0.1°F/°C	±0.6°F (±0.33°C)	
Pt100-392			±0.54°F (±0.3°C)	
Pt200-385			-328 to 482°F (-200 to 250°C): ±0.36°F (±0.2°C) 482 to 1166°F (250 to 630°C): ±1.44°F (±0.8°C)	
Pt100-JIS			±0.54°F (±0.3°C)	
Pt500-385			-328 to 932°F (-200 to 500°C): ±0.54°F (±0.3°C) 932 to 1166°F (500 to 630°C): ±0.72°F (±0.4°C)	
Pt1000-385			±0.36°F (±0.2°C)	
Cu10			-148 to 500°F (-100 to 260°C)	±3.24°F (±1.8°C)
Cu50			-58 to 302°F (-50 to 150°C)	±0.9°F (±0.5°C)
Cu100				±0.45°F (±0.25°C)
Ni120			-112 to 500°F (-80 to 260°C)	±0.36°F (±0.2°C)

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

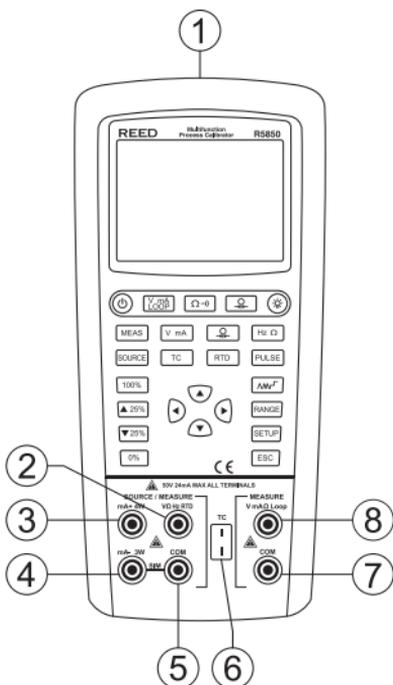
## ***Function Specifications***

Ramp Functions:	Source functions: Voltage, Current, Resistance, Frequency, Temperature Ramps: Slow ramp, fast ramp, 25% step-ramp
Loop Power Function:	Voltage: 24V Accuracy: 10% Maximum current: 22mA, short circuit protected
Step Functions:	Source functions: Voltage, Current, Resistance, Frequency, Temperature Steps: 25% of range, 100% of range

## ***General Specifications***

Display:	20,000 count TFT color LCD display
Kick Stand:	Yes
Power Supply:	1.2V x 6 AA rechargeable batteries
Auto shut-off:	Yes
Low Battery Indicator:	Yes
Replaceable Test Leads:	Yes
Product Certifications:	CE, RoHS
Operating Temperature:	14 to 131°F (-10 to 55°C)
Operating Humidity Range:	≤95%
Storage Temperature:	-4 to 158°F (-20 to 70°C)
Max Operating Altitude:	6561' (2000m)
Dimensions:	7.7 x 3.7 x 2.3" (195 x 95 x 58mm)
Weight:	22.92oz (650g)

# Instrument Description



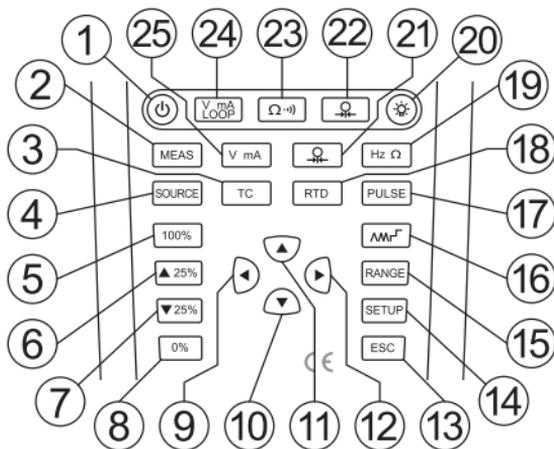
1. USB-C charging, communication and pressure module terminal
- 2+5. Terminals for measurement/output of V, mV, Hz,  $\Omega$ , RTD
- 3+4. Terminals for 3/4-wire measurement of current output and resistance/RTD
- 4+5. Terminals for current measurement or SIM output
6. TC measurement/output terminal
- 7+8. Function terminals for the measurement of isolated module in upper screen

*continued...*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

## Buttons



No.	Symbol	Description
1		Power ON/OFF
2	<b>MEAS</b>	Switch the function of lower screen to measurement mode.
3	<b>TC</b>	Select measurement or output function of TC in lower screen. Continuously press this button to switch between different thermocouple types.
4	<b>SOURCE</b>	Switch the functions of lower screen to output mode.
5	<b>100%</b>	When the lower screen is in output mode, press to recall and output 100% value of the preset range. Hold to reset the 100% value.
6	<b>▲ 25%</b>	When the lower screen is in output mode, press to increase output by 25% of preset range.
7	<b>▼ 25%</b>	When the lower screen is in output mode, press to decrease output by 25% of preset range.
8	<b>0%</b>	When the lower screen is in output mode, press to recall and output 0% value of the preset range. Hold to reset the 0% value.
9	<b>◀</b>	LEFT Button, used to enable the pulse output function.

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

No.	Symbol	Description
10	▼	DOWN Button
11	▲	UP Button, used to revise the output value.
12	▶	RIGHT Button
13	<b>ESC</b>	Exit button
14	<b>SETUP</b>	Setup button, hold to enter the setup interface of system parameter.
15	<b>RANGE</b>	When the lower screen is in output mode, continuously press to switch the range for current range.
16		When the lower screen is in output mode, press to enable ramping output function.
17	<b>PULSE</b>	Select pulse in lower screen, measurement/output function of switch quantity.
18	<b>RTD</b>	Select measurement/output function of RTD in lower screen. Continuously press to switch between different RTD graduations.
19	<b>Hz Ω</b>	Select frequency in lower screen, resistance measurement/output function.
20		Adjust screen brightness.
21		Select pressure measurement/output function in lower screen. Continuously press to switch between different pressure units.
22		Select pressure measurement/output function in upper screen. Continuously press to switch between different pressure units.
23	<b>Ω ·))</b>	Select resistance in upper screen, continuity measurement.
24	<b>V mA Loop</b>	Select measurement function of millivolt, voltage, milliamp, loop current and others in upper screen.
25	<b>V mA</b>	Select measurement/output function of millivolt, voltage, milliamp, SIM and others in lower screen.

## Display Description



Symbol	Description
<b>SOURCE</b>	Source Output Mode
<b>MESURE</b>	Measurement Mode
<b>▲</b>	Data Adjustment
<b>SIM</b>	Transmitter Output Simulation
<b>LOOP</b>	Loop Measurement
<b>🔋</b>	Battery Level
<b>LOAD</b>	Overload
<b>ΛMΓ</b>	Ramp/Step Output
<b>PC</b>	Remote Control
<b>APO</b>	Auto Power Off

# Operating Instructions

## Power ON/OFF

To turn the meter ON, press and hold the  button for approximately 4 seconds. To turn the meter OFF, press and hold the  button for 2 seconds.

## Setup Mode

1. When the meter is powered ON, press and hold the **SETUP** button for 2 seconds to enter the Setup Mode.
2. Press the  and  buttons to scroll through the following parameters.

Parameter	Description
Auto Power Off	Set Auto Power Off
Brightness	Adjust the LCD brightness level
Temperature Unit	Select the temperature unit of measure
Remote Control	Enable/Disable remote control commands
Beep Control	Enable/Disable the beeper

3. Once the appropriate parameter has been highlighted, follow the instructions below.

## Set Auto Power Off

1. Press the  and  buttons to set the auto power off timer between 1 and 60 minutes. To disable the auto power off function, set the timer to "0".

**Note:** The default auto power off time is set to 30 minutes.

2. Press the  and  buttons to confirm selection and skip to the next applicable parameter.

**Note:** At any time, press the **ESC** button to exit the setup mode and resume normal operation.

*continued...*

## *Adjust the LCD Brightness Level*

1. Press the ◀ and ▶ buttons to set the display's brightness level between 10 and 100%.

Brightness level can also be adjusted in 10, 25, 50, 75 and 100% increments by simply pressing the ☀ button.

2. Press the ▲ and ▼ buttons to confirm selection and skip to the next applicable parameter.

**Note:** At any time, press the **ESC** button to exit the setup mode and resume normal operation.

## *Select the Temperature Unit of Measure*

1. Press the ◀ and ▶ buttons to select between °F and °C.
2. Press the ▲ and ▼ buttons to confirm selection and skip to the next applicable parameter.

**Note:** At any time, press the **ESC** button to exit the setup mode and resume normal operation.

## *Enable/Disable Remote Control Commands*

1. Press the ◀ and ▶ buttons to select between ON (enabled) or OFF (disabled). (See the *Remote Control Commands* section for additional details.)
2. Press the ▲ and ▼ buttons to confirm selection and skip to the next applicable parameter.

**Note:** At any time, press the **ESC** button to exit the setup mode and resume normal operation.

## *Enable/Disable the Beeper*

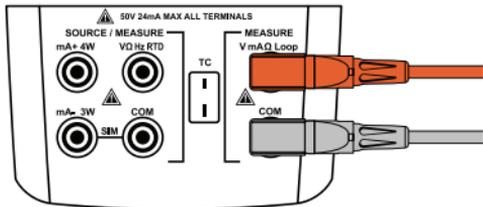
1. Press the ◀ and ▶ buttons to select between ON (enabled) or OFF (disabled).
2. Press the ▲ and ▼ buttons to confirm selection and skip to the next applicable parameter.

**Note:** At any time, press the **ESC** button to exit the setup mode and resume normal operation.

# Measurement Modes

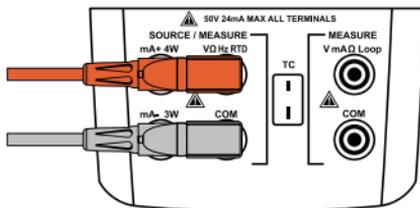
## Millivolt Measurement (Upper Display)

1. Press the **V mA LOOP** button to select millivolt measurement. **LOOP** should not be activated.
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



## Millivolt Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **V mA** button to select millivolt measurement.
3. Connect the leads as shown below and connect the tips to the equipment being tested.
4. The LCD will display the reading.



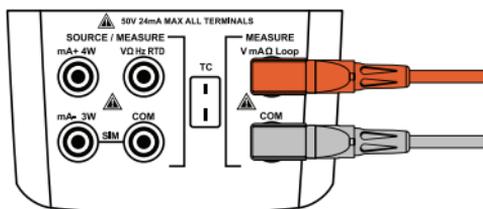
*continued...*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

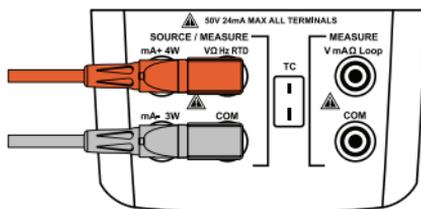
## Voltage Measurement (Upper Display)

1. Press the **V mA LOOP** button to select voltage measurement.
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



## Voltage Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **V mA** button to select voltage measurement.
3. Connect the leads as shown below and connect the tips to the equipment being tested.
4. The LCD will display the reading.



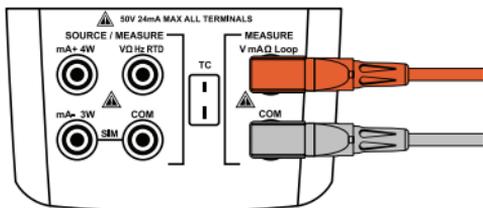
*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

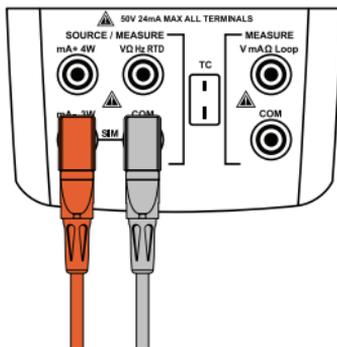
## MilliAmp Measurement (Upper Display)

1. Press the **V mA LOOP** button to select milliamp measurement.
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



## MilliAmp Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **V mA** button to select milliamp measurement.
3. Connect the leads as shown below and connect the tips to the equipment being tested.
4. The LCD will display the reading.



*continued...*

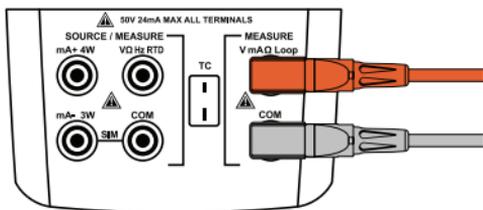
**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## Current Measurement with Loop Power (Upper Display)

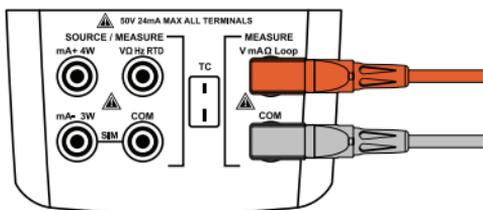
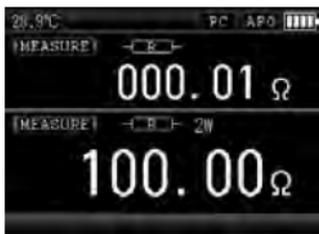
The loop power function activates a 24V supply in series with the current measuring circuit, allowing users to test a transmitter when it is disconnected from plant wiring.

1. Press the **V mA LOOP** button to select loop measurement.
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



## Resistance Measurement (Upper Display)

1. Press the  $\Omega$  button to select resistance measurement ( $\Omega$ ).
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



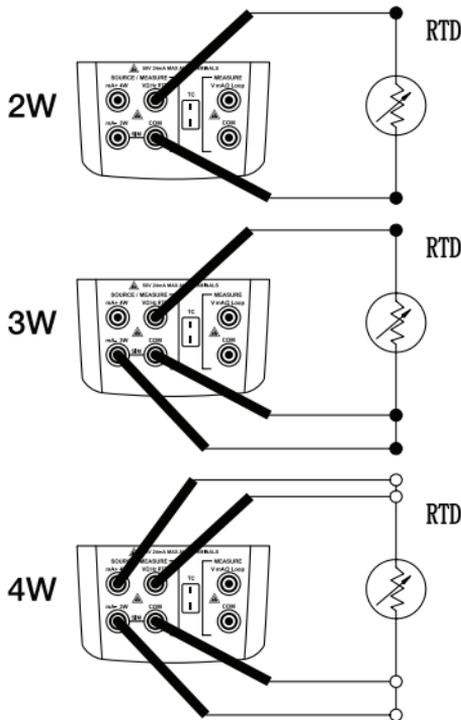
*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

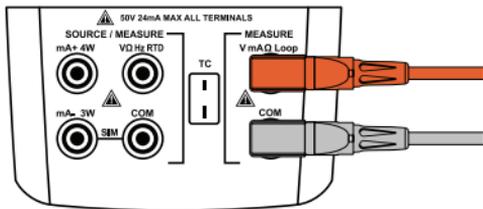
## Resistance Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **Hz Ω** button to select 2, 3 or 4-wire resistance measurement.
3. Lower display resistance measurement supports the following 2, 3 or 4-wire connections.



## Continuity Measurement (Upper Display)

1. Press the **Ω (•••)** button until continuity measurement (**•••**) is selected.
2. Connect the leads as shown below and connect the tips to the equipment being tested.
3. The LCD will display the reading.



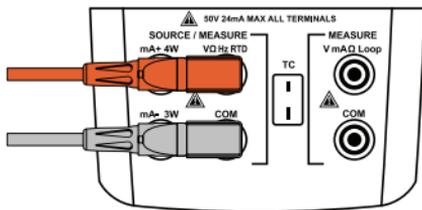
continued...

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

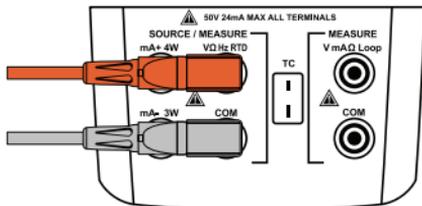
## Frequency Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **Hz Ω** button to select frequency measurement (**Hz**).
3. Connect the leads as shown below and connect the tips to the equipment being tested.
4. The LCD will display the reading.



## Pulse Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **PULSE** button to select pulse measurement.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



4. Press the **SETUP** button to start/stop pulse measurement.
5. When done, press the **ESC** button to reset/clear the current pulse count.

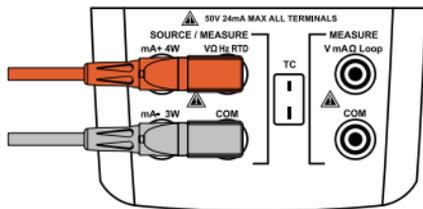
*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## Switch Quantity Measurement (Lower Display)

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **PULSE** button to select switch quantity measurement.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



**Note:** Minimum duration for an open/close test is 500ms.

## Thermocouple Measurement (Lower Display)

### Thermocouple Types Accepted

Type	Positive Lead Material	Positive Lead (H) Color		Negative Lead Material	Specified Range
		ANSI*	IEC**		
E	Chromel	Purple	Violet	Constantan	-328 to 1742°F (-200 to 950°C)
N	Ni-Cr-Si	Orange	Pink	Ni-Si-Mg	-328 to 2372°F (-200 to 1300°C)
J	Iron	White	Black	Constantan	-328 to 2192°F (-200 to 1200°C)
K	Chromel	Yellow	Green	Alumel	-328 to 2498°F (-200 to 1370°C)
T	Copper	Blue	Brown	Constantan	-328 to 752°F (-200 to 400°C)
B	Platinum (30% Rhodium)	Gray		Platinum (6% Rhodium)	1112 to 3272°F (600 to 1800°C)

*continued...*

**REED Instruments**

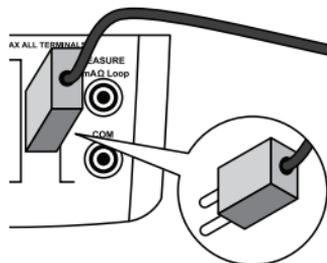
1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

Type	Positive Lead Material	Positive Lead (H) Color		Negative Lead Material	Specified Range
		ANSI*	IEC**		
R	Platinum (13% Rhodium)	Black	Orange	Platinum	-4 to 3182°F (-20 to 1750°C)
S	Platinum (10% Rhodium)				
L	Iron			Constantan	-328 to 1652°F (-200 to 900°C)
U	Copper				-328 to 752°F (-200 to 400°C)

\*American National Standards Institute (ANSI) device negative lead (L) is always red.

\*\*International Electrotechnical Commission (IEC) device negative lead (L) is always white.

1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **TC** button to select between R, S, K, E, J, T, N, B, L, U, XK and BP thermocouple measurement.
3. Connect the appropriate TC miniplug to the TC input/output terminal as shown on the right.
4. The LCD will display the reading.
5. If required, a user can manually adjust the cold junction compensation for thermocouples by pressing the **SETUP** button.



**Note:** To revert back to automatic cold junction compensation, press the **SETUP** button followed by the **ESC** button.

6. Press the ◀ or ▶ buttons to toggle through the adjustable values.
7. Press the ▲ or ▼ buttons to adjust the activated value.
8. Press the **SETUP** button to confirm selection and resume normal operation.

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

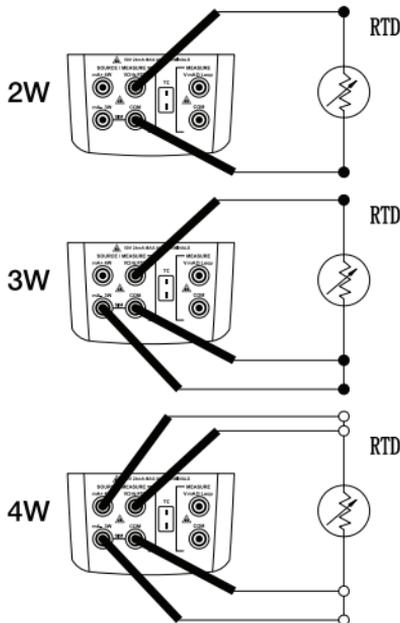
## RTD Measurement

### RTD Types Accepted

RTD Type	Ice Point ( $R_0$ )	Material	$\alpha$	Range
Pt100 (3926)	100 $\Omega$	Platinum	0.003926 $\Omega/^\circ\text{C}$	-328 to 1166 $^\circ\text{F}$ (-200 to 630 $^\circ\text{C}$ )
Pt100 (385)			0.00385 $\Omega/^\circ\text{C}$	-328 to 1472 $^\circ\text{F}$ (-200 to 800 $^\circ\text{C}$ )
Ni120 (672)	120 $\Omega$	Nickel	0.00672 $\Omega/^\circ\text{C}$	-112 to 500 $^\circ\text{F}$ (-80 to 260 $^\circ\text{C}$ )
Pt200 (385)	200 $\Omega$	Platinum	0.00385 $\Omega/^\circ\text{C}$	-328 to 1166 $^\circ\text{F}$ (-200 to 630 $^\circ\text{C}$ )
Pt500 (385)	500 $\Omega$			
Pt1000 (385)	1000 $\Omega$			
Pt100 (3916)	100 $\Omega$			

The Pt100 commonly used in U.S. industrial applications is Pt100 (3916),  $\alpha=0.003916\Omega/^\circ\text{C}$ . (Also designated as JIS curve.) The IEG standard RTD is the Pt100 (385),  $\alpha=0.00385\Omega/^\circ\text{C}$ .

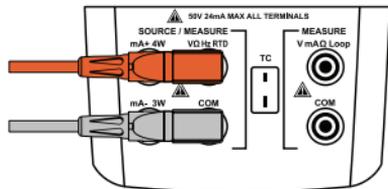
1. If the meter is in output mode (**SOURCE**), press the **MEAS** button to switch to measurement mode.
2. Press the **RTD** button to select between Pt100-385, Pt100-392, Pt100-JIS, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100 and Ni120 RTD measurement.
3. Connect the leads as shown on the right and connect the tips to the equipment being tested.
4. Press the **SETUP** button to toggle between 2, 3 or 4-wire connections.
5. Connect the RTD to the appropriate 2, 3 or 4-wire input terminals.
6. The LCD will display the reading.



# Source Modes (Lower Display)

## Millivolt Output

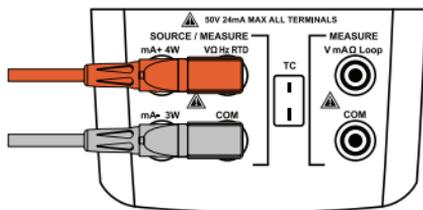
1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **V mA** button to select millivolt output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.
4. Press the ◀ or ▶ buttons to toggle through the adjustable output values.
5. Press the ▲ or ▼ buttons to adjust the activated output value.



**Note:** The meter outputs the corresponding millivolt value in real time whenever the output value is changed.

## Voltage Output

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **V mA** button to select voltage output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



4. Press the ◀ or ▶ buttons to toggle through the adjustable output values.
5. Press the ▲ or ▼ buttons to adjust the activated output value.

**Note:** The meter outputs the corresponding voltage value in real time whenever the output value is changed.

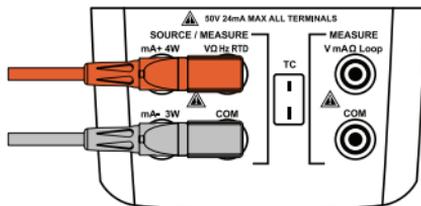
*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## Sourcing 4 to 20mA

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **V mA** button to select milliamp output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.

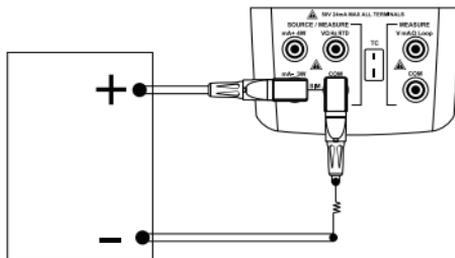


4. Press the ◀ or ▶ buttons to toggle through the adjustable output values.
5. Press the ▲ or ▼ buttons to adjust the activated output value.

**Note:** The meter outputs the corresponding milliamp value in real time whenever the output value is changed. If the output load is too high, the output value will flash and "LOAD" will appear on the LCD screen.

## Simulating a 4 to 20mA Transmitter

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **V mA** button to select simulator mode.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



*continued...*

**REED Instruments**

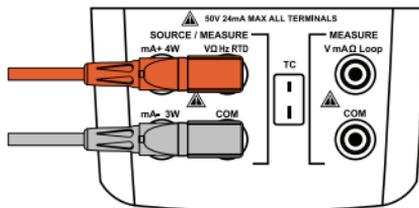
1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

4. Press the ◀ or ▶ buttons to toggle through the adjustable output values.
5. Press the ▲ or ▼ buttons to adjust the activated output value.

**Note:** The meter outputs the corresponding milliamp value in real time whenever the output value is changed. If the output load is too high, the output value will flash and "LOAD" will appear on the LCD screen.

## Resistance Output

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the Hz Ω button to select resistance output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



4. Press the ◀ or ▶ buttons to toggle through the adjustable output values.
5. Press the ▲ or ▼ buttons to adjust the activated output value.

**Note:** Excitation current is required for resistance output. If the meter displays "Exl HI", the excitation current from the device under test exceeds the limits of the R5850. If the meter displays "Exl LO", the excitation current from the device under test is below the limits of the R5850.

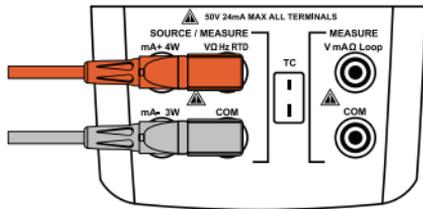
*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## Frequency Output

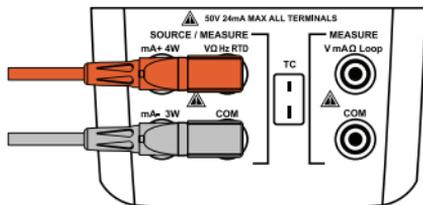
1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **Hz Ω** button to select frequency output (**Hz**).
3. Connect the leads as shown below and connect the tips to the equipment being tested.



4. Press the **RANGE** button to select between 110, 200, 2000Hz and 110kHz.
5. To manually adjust the selected ranges, press the ◀ or ▶ buttons to toggle through the adjustable output values and press the ▲ or ▼ buttons to adjust the activated output value.
6. Press the **SETUP** button to manually enter the frequency amplitude (Voltage Peak).
7. Press the ◀ or ▶ buttons to toggle through the adjustable values.
8. Press the ▲ or ▼ buttons to adjust the activated value.
9. Press the **ESC** button to cancel the manual adjustment.

## Pulse Output

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **PULSE** button to select pulse output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



*continued...*

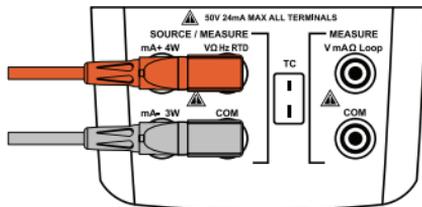
**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

4. Press the **RANGE** button to select between the default 100Hz, 1 and 10kHz ranges.
5. To manually adjust the selected ranges, press the ◀ or ▶ buttons to toggle through the adjustable output values and press the ▲ or ▼ buttons to adjust the activated output value.
6. Press the **SETUP** button to set the number of pulses.
7. Press the ◀ or ▶ buttons to toggle through the adjustable values.
8. Press the ▲ or ▼ buttons to adjust the activated value.
9. Press the **SETUP** button to confirm the selected number of pulses and to manually enter the frequency amplitude (Voltage Peak).
10. Press the ◀ or ▶ buttons to toggle through the adjustable values.
11. Press the ▲ or ▼ buttons to adjust the activated value.
12. Press the **SETUP** button to confirm selections and start outputting at the preset frequency and amplitude.

### Switch Quantity Output

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **PULSE** button to select switch quantity output.
3. Connect the leads as shown below and connect the tips to the equipment being tested.



4. Press the **RANGE** button to select between the default 100Hz, 1 and 10kHz ranges.
5. To manually adjust the selected ranges, press the ◀ or ▶ buttons to toggle through the adjustable output values and press the ▲ or ▼ buttons to adjust the activated output value.

**Note:** The meter outputs the corresponding frequency value in real time whenever the output value is changed.

*continued...*

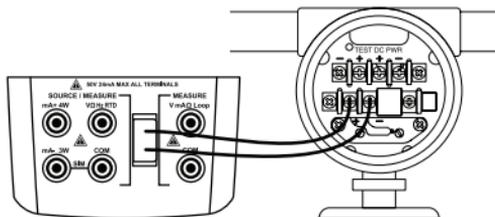
**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## Thermocouple Output

The meter supports simulating temperature output of following thermocouples: R, S, K, E, J, T, N, B, L, U, XK and BP.

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **TC** button to select the applicable thermocouple output.
3. Connect the appropriate TC miniplug to the TC input/output terminal and connect the tips to the equipment being tested as shown below.



4. To set the required output value, press the ◀ or ▶ buttons to toggle through the adjustable values and press the ▲ or ▼ buttons to adjust the activated value.
5. If required, a user can manually adjust the cold junction compensation for thermocouples by pressing the **SETUP** button.

**Note:** To revert back to automatic cold junction compensation, press the **SETUP** button followed by the **ESC** button.

6. Press the ◀ or ▶ buttons to toggle through the adjustable values.
7. Press the ▲ or ▼ buttons to adjust the activated value.
8. Press the **SETUP** button to confirm selection and resume normal operation.

*continued...*

**REED Instruments**

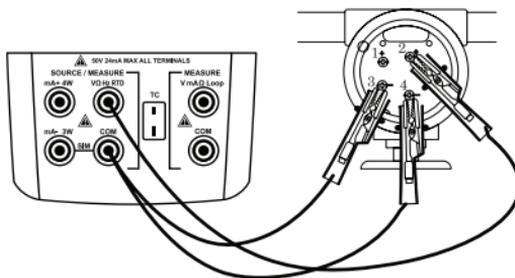
1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

## RTD Output

1. If the meter is in measurement mode (**MEASURE**), press the **SOURCE** button to switch to source mode.
2. Press the **RTD** button to select between Pt100-385, Pt100-392, Pt100-JIS, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100 and Ni120 RTD output.
3. Connect the RTD to the appropriate 2-wire input terminals and connect the tips to the equipment being tested as shown below.



**Note:** Use the 3W and 4W terminals for measurement only, not for simulation. The calibrator simulates a 2-wire RTD at its front panel. To connect to a 3-wire or 4-wire transmitter, use the stacking cables to provide the extra wires as shown below.



**Note:** If the meter displays "Exl HI", the excitation current from the device under test exceeds the limits of the R5850. If the meter displays "Exl LO", the excitation current from the device under test is below the limits of the R5850.

*continued...*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

## Stepping the Output

Stepping operation and percentage display can be used after the values of 0% and 100% are set. Some values of the meter have been set by default and are listed below.

Output Function		0% Value	100% Value
Voltage		0V	10V
Millivolt		0mV	100mV
Current		4mA	20mA
Resistance	400Ω	0Ω	400Ω
	4000Ω	0Ω	4000Ω
	40KΩ	0Ω	40,000Ω
Frequency	200Hz	0Hz	200Hz
	2000Hz	200Hz	2000Hz
	20kHz	2kHz	20kHz

Thermocouples		
Type	0% Value	100% Value
R	32°F (0°C)	3212.6°F (1767°C)
S		
K	-328°F (-200°C)	2501.6°F (1372°C)
E		1832°F (1000°C)
J		2192°F (1200°C)
T	-418°F (-250°C)	752°F (400°C)
B	1112°F (600°C)	3308°F (1820°C)
L	-328°F (-200°C)	1652°F (900°C)
U		752°F (400°C)
XK		1472°F (800°C)
BP		4532°F (2500°C)

RTDs		
Type	0% Value	100% Value
Pt100-385	-328°F (-200°C)	1562°F (850°C)
Pt100-392		1166°F (630°C)
Pt200-385		
Pt100-JIS		
Pt500-385		
Pt1000-385		
Cu10	-148°F (-100°C)	500°F (260°C)
Cu50	-58°F (-50°C)	302°F (150°C)
Cu100		
Ni120	-112°F (-80°C)	500°F (260°C)

*continued...*

**REED Instruments**

1-877-849-2127 | info@reedinstruments.com | www.reedinstruments.com

1. While the meter is in output mode, press the **0%**, **100%**, **▲ 25%** or **▼ 25%** buttons to quickly output the value of the corresponding percentage of the current output function.
2. To manually set the output value of the corresponding percentage for both 0% and 100%, press the **◀** or **▶** buttons to toggle through the adjustable values and press the **▲** or **▼** buttons to adjust the activated value.
3. Press and hold the applicable percentage button until the buzzer beeps to save the current output value as the new 0% or 100% value.

**Note:**

- 100% value must be greater than 0% value.
- Use the **▲ 25%** or **▼ 25%** buttons to step the output value up or down in 25% increments.

### *Auto Ramping the Output*

Auto ramping while in the applicable output function highlighted above, gives the ability to continuously apply a varying stimulus from the calibrator to a transmitter, while hands remain free to test the response of the transmitter.

When the **▲M▶** button is pressed, the calibrator produces a continuously repeating 0% to 100% to 0% ramp in one of three ramp waveforms:

 45 second smooth ramp

 20 second smooth ramp

 25% step ramp, pausing for 5 seconds at each step

**Note:** Press any key to exit the ramping output function.

## Remote Control Commands

The R5850 offers the ability to control the calibrator remotely from a PC running a terminal emulator program. The remote control commands give access to all capabilities of the calibrator with the exception of pressure measurement. (See the *Enable/Disable Remote Control Commands* section for additional details.) The calibrator will initialize with its remote port enabled. The baud rate of the serial port is 115,200bps. The communication protocol sheet is available for download by visiting [www.REEDInstruments.com](http://www.REEDInstruments.com).

## Charging the Battery

1. Connect the R5850 into a wall outlet using the included wall charger with USB-C cable to charge the Ni-MH battery.
2. Charge the meter until the battery indicator appears full and remove the charging cable when completed.

## Applications

- Testing loop-powered isolators and two-wire transmitters.
- Verifying and calibrating processes involving mA instrumentation.

## Accessories and Replacement Parts

- **TP-01** Type K Beaded Wire Probe
- **R1000** Safety Test Lead Set
- **R1020** Fused Test Lead Set
- **R2950** Type K Immersion Probe
- **R2940** Type K Air/Gas Probe
- **R2930** Type K Right Angle Surface Probe
- **R2920** Type K Surface Probe
- **R2960** Type K Needle Tip Probe
- **R1050-KIT2** Deluxe Safety Test Lead Kit
- **R8888** Medium Hard Carrying Case

Don't see your part listed here? For a complete list of all accessories and replacement parts visit your product page on [www.REEDinstruments.com](http://www.REEDinstruments.com).

## Product Care

To keep your instrument in good working order we recommend the following:

- Store your product in a clean, dry place.
- Charge the battery as needed.
- If your instrument isn't being used for a period of one month or longer please remove the battery.
- Clean your product and accessories with biodegradable cleaner. Do not spray the cleaner directly on the instrument. Use on external parts only.

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

## Product Warranty

REED Instruments guarantees this instrument to be free of defects in material or workmanship for a period of two (2) years from date of shipment. During the warranty period, REED Instruments will repair or replace, at no charge, products or parts of a product that proves to be defective because of improper material or workmanship, under normal use and maintenance. REED Instruments total liability is limited to repair or replacement of the product. REED Instruments shall not be liable for damages to goods, property, or persons due to improper use or through attempts to utilize the instrument under conditions which exceed the designed capabilities. In order to begin the warranty service process, please contact us by phone at 1-877-849-2127 or by email at [info@REEDInstruments.com](mailto:info@REEDInstruments.com) to discuss the claim and determine the appropriate steps to process the warranty.

## Product Disposal and Recycling



Please follow local laws and regulations when disposing or recycling your instrument. Your product contains electronic components and must be disposed of separately from standard waste products.

## Product Support

If you have any questions on your product, please contact your authorized REED distributor or REED Instruments Customer Service by phone at 1-877-849-2127 or by email at [info@REEDInstruments.com](mailto:info@REEDInstruments.com).

Please visit [www.REEDInstruments.com](http://www.REEDInstruments.com) for the most up-to-date manuals, datasheets, product guides and software.

*Product specifications subject to change without notice.  
All rights reserved. Any unauthorized copying or reproduction of this manual is strictly prohibited without prior written permission from REED Instruments.*

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

# REED INSTRUMENTS

## TEST & MEASURE WITH CONFIDENCE



Over 200 portable test and  
measurement instruments

Access our  
Product Catalog



**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

# REED INSTRUMENTS

TEMPERATURE  
& HUMIDITY



SOUND



MOISTURE



AIR VELOCITY



ELECTRICAL



**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)