

**FLUKE®**

**726**

Multifunction Process Calibrator

**Product Overview**

PN 2441588

September 2005

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Fluke Corporation  
P.O. Box 9090  
Everett, WA 98206-9090  
U.S.A.

Fluke Europe B.V.  
P.O. Box 1186  
5602 BD Eindhoven  
The Netherlands

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# ***Multifunction Process Calibrator***

## ***Introduction***

The Fluke 726 Multifunction Process Calibrator (referred to as “the Calibrator”) is a handheld, battery-operated instrument that measures and sources electrical and physical parameters. See Table 1.

In addition to the functions in Table 1, the Calibrator also has the following features and functions:

- A split-screen display. The upper display allows users to measure volts, current, and pressure only. The lower display allows the user to measure and source volts, current, pressure, resistance temperature detectors, thermocouples, frequency, and ohms.
- A thermocouple (TC) input/output terminal and internal isothermal block with automatic reference-junction temperature compensation.
- Stores and recalls setups.
- Manual and automatic stepping and ramping.
- Stores and recalls calibration screens.
- Control the Calibrator remotely from a PC running a terminal emulator program.

## ***Accessing the Users Manual***

The 726 Users Manual is available on the 725/726 CD included with the Calibrator.

## ***Contacting Fluke***

To order accessories, receive operating assistance, or locate the nearest Fluke distributor or Service Center, call:

USA: 1-888-44-FLUKE (1-888-443-5853)

Canada: 1-800-36-FLUKE (1-800-363-5853)

Europe: +31 402-675-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-446-5500

USA Service: 1-888-99-FLUKE (1-888-993-5853)

Or, visit Fluke's Web site at [www.fluke.com](http://www.fluke.com).

To register your product, visit [register.fluke.com](http://register.fluke.com)

Table 1. Summary of Source and Measure Functions

Function	Measure	Source
dc V	0 V to 30 V	0 V to 20 V
dc mA	0 to 24 mA	0 to 24 mA
Frequency	2 CPM to 15 kHz	2 CPM to 15 kHz
Resistance	0 $\Omega$ to 4000 $\Omega$	5 $\Omega$ to 4000 $\Omega$
Thermocouple	Types E, J, K, T, B, R, S, L, U, N, C, XK, BP	
RTD (Resistance- Temperature Detector)	Pt100 $\Omega$ (385) Pt100 $\Omega$ (3926) Pt100 $\Omega$ (3916) Pt200 $\Omega$ (385) Pt500 $\Omega$ (385) Pt1000 $\Omega$ (385) Ni120 (672) CU10	
Pressure	29 modules ranging from 1.0 in. H <sub>2</sub> O to 10,000 psi	
Pulse	1-100,000 Frequency Max 10 kHz	1-10,000 Frequency Range 2 CPM to 10 kHz
Other functions	Loop supply, HART resistor, pressure switch test, save screen, step, ramp, memory, cold junction compensation	

### **Standard Equipment**

If the Calibrator is damaged or something is missing, contact the place of purchase immediately. To order replacement parts, see Table 5. The items listed below are included with the Calibrator.

- TL75 test leads
- AC72 alligator clips
- Stackable alligator clip test leads
- *726 Product Overview*
- *725/726 CD-ROM*
- 4 AA Batteries (installed)

### **Safety Information**

The Calibrator is designed in accordance with CAN/CSA-C22.2 NO. 61010-1-04, UL 61010-1, and ISA 82.02.01

#### **Warning**

**To avoid possible electric shock or personal injury, use the Calibrator only as specified in this manual, otherwise the protection provided by the Calibrator may be impaired.**

A **Warning** identifies conditions and actions that pose hazard(s) to the user. A **Caution** identifies conditions and actions that may damage the Calibrator or the equipment under test.

**⚠ ⚠ Warning**

To avoid possible electric shock or personal injury:

- Use the Calibrator only as described in the Users Manual or the protection provided by the Calibrator may be impaired.
- Do not apply more than the rated voltage, as marked on the Calibrator, between the terminals, or between any terminal and earth ground (30 V 24 mA max all terminals).
- Before each use, verify the Calibrator's operation by measuring a known voltage.
- Follow all equipment safety procedures.
- Use the proper terminals, mode, and range for the measuring or sourcing application.
- 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. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Select the proper function and range for the measurement.
- 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 lead continuity. Replace damaged test leads before using the Calibrator.
- When using the probes, keep your 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 the test leads, disconnect the live test lead first.
- 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.
- When using a pressure module, make sure the process pressure line is shut off and depressurized before connecting it or disconnecting it from the pressure module.
- Use only 4 AA batteries, properly installed in the Calibrator case, to power the Calibrator.
- Disconnect test leads before changing to another measure or source function.
- When servicing the Calibrator, use only specified replacement parts.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator (🔋) appears.
- Turn off circuit power before connecting the Calibrator mA and COM terminals in the circuit. Place Calibrator in series with the circuit.
- Do not allow water into the case.

### ⚠ Caution












To avoid possible damage to the Calibrator or to equipment under test:

- Disconnect the power and discharge all high-voltage capacitors before testing resistance or continuity.
- Use the proper input jacks, function, and range for the measurement or sourcing application.

### Symbols

Symbols used on the Calibrator and in this manual are explained in Table 2.

**Table 2. International Symbols**

	AC - Alternating current		Double insulated
	DC - Direct current		Battery
	Earth ground		Risk of danger. Important information. See Manual. Precedes Warning.
	Pressure		Power ON/OFF
	Conforms to European Union directives		Hazardous Voltage. Precedes Warning.
	Conforms to Canadian Standards Association directives.		

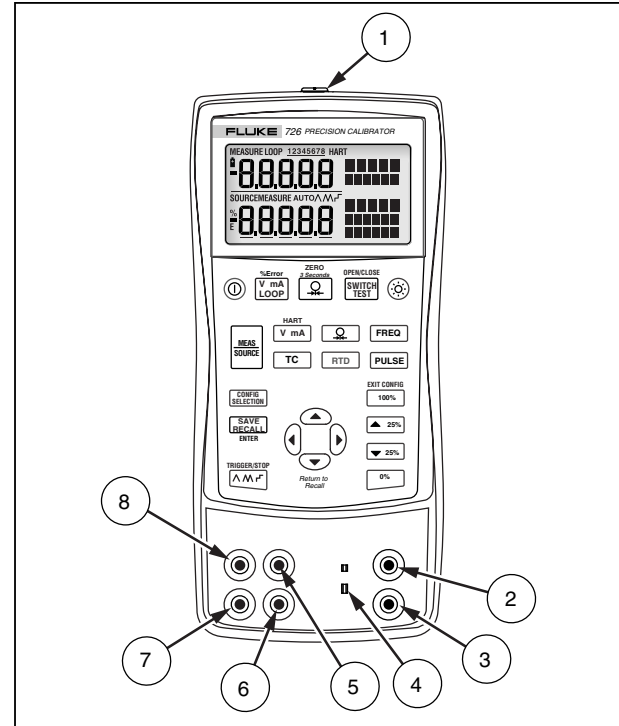
## Getting Acquainted with the Calibrator

### Input and Output Terminals

Figure 1 shows the Calibrator input and output terminals. Table 3 explains their use.

**Table 3. Input/Output Terminals and Connectors**

No	Name	Description
①	Pressure module connector/serial connector	Connects the Calibrator to a pressure module or to a PC for a remote control serial connection.
②, ③	MEASURE V, mA terminals	Input terminals for measuring voltage, current, supplying loop power, HART resistance, switch test options.
④	Thermocouple (TC) input/output	Terminal for measuring or simulating thermocouples. This terminal accepts a miniature polarized thermocouple plug with flat, in-line blades spaced 7.9 mm (0.312 in) center to center.
⑤, ⑥	SOURCE/MEASURE V, RTD, Pulse, Hz, $\Omega$ terminals	Terminals for sourcing or measuring voltage, resistance, pulse, frequency, and RTDs.
⑦, ⑧	SOURCE/MEASURE mA terminals, 3W, 4W	Terminals for sourcing and measuring current and performing 3 W and 4 W RTD measurements. HART resistor option in mA mode.

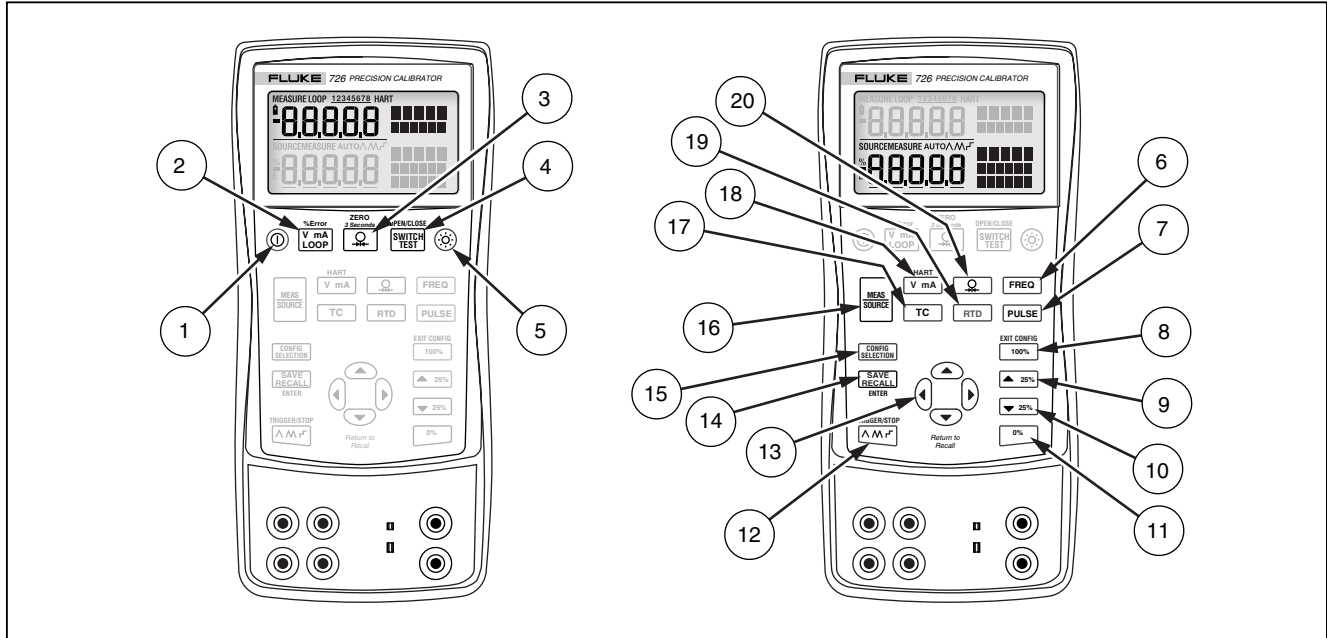


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**Figure 1. Input/Output Terminals and Connectors**

**Keys**












Figure 2 shows the Calibrator keys and Table 4 explains their use.












**Figure 2. Keys**

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Table 4. Key Functions

No	Name	Description
①		Turns the power on or off.
②	%Error 	Toggles voltage, mA, or Loop Power and % Error measurement functions in the upper display.
③	ZERO 3 Seconds 	Selects the pressure measurement function in the upper display. Repeated pushes cycle through the different pressure units. Zeros pressure when held for 3 seconds.
④	OPEN/CLOSE 	Activates the switch test.
⑤		Turns backlight on or off.
⑥		Selects frequency sourcing or measurement.
⑦		Selects pulse sourcing or measurement.
⑧	EXIT CONFIG 	Recalls a source value from memory corresponding to 100 % of span and sets it as the source value. Press and hold to store the source value as the 100 % value. Exits Configuration Menu.
⑨		Increments output by 25 % of span.
⑩		Decrements output by 25 % of span.
⑪		Recalls from memory a source value corresponding to 0 % of span and sets it as the source value. Press and hold to store the source value as the 0 % value. Press and hold when powering up to identify the firmware version. The firmware version is shown in the upper display for about 1 second after initialization.

**Table 4. Key Functions (cont.)**

No	Name	Description
⑫	<b>TRIGGER/STOP</b> 	Cycles through : ^ Slow repeating 0 % - 100 % - 0 % ramp M Fast repeating 0 % - 100 % - 0 % ramp ▭ Repeating 0 % - 100 % - 0 % ramp in 25 % steps Used for the pulse train and totalizer functions.
⑬	 <i>Return to Recall</i>	Increases or decreases the source level. Cycles through the 2-, 3-, and 4-wire selections. Moves through the memory locations of Calibrator setups. Moves through the configuration menus.
⑭	 <b>ENTER</b>	Saves and recalls setups & data. ENTER is used in the configuration menus.
⑮		Used to enter and navigate the configuration menus.
⑯		Cycles the Calibrator through MEASURE and SOURCE modes in the lower display.
⑰		Selects TC (thermocouple) measurement and sourcing function in the lower display. Repeated pushes cycle through the thermocouple types.
⑱	<b>HART</b> 	Toggles between voltage, mA sourcing, or mA simulate functions in the lower display. Inserts a 250 Ω resistor when in mA.
⑲		Selects RTD (resistance temperature detector) measurement and sourcing function in lower display. Repeated pushes cycle through the RTD types. Selects resistance mode.
⑳		Selects the pressure measurement and sourcing function. Repeated pushes cycle through the different pressure units.

### Display

Figure 3 shows the elements of a typical display.

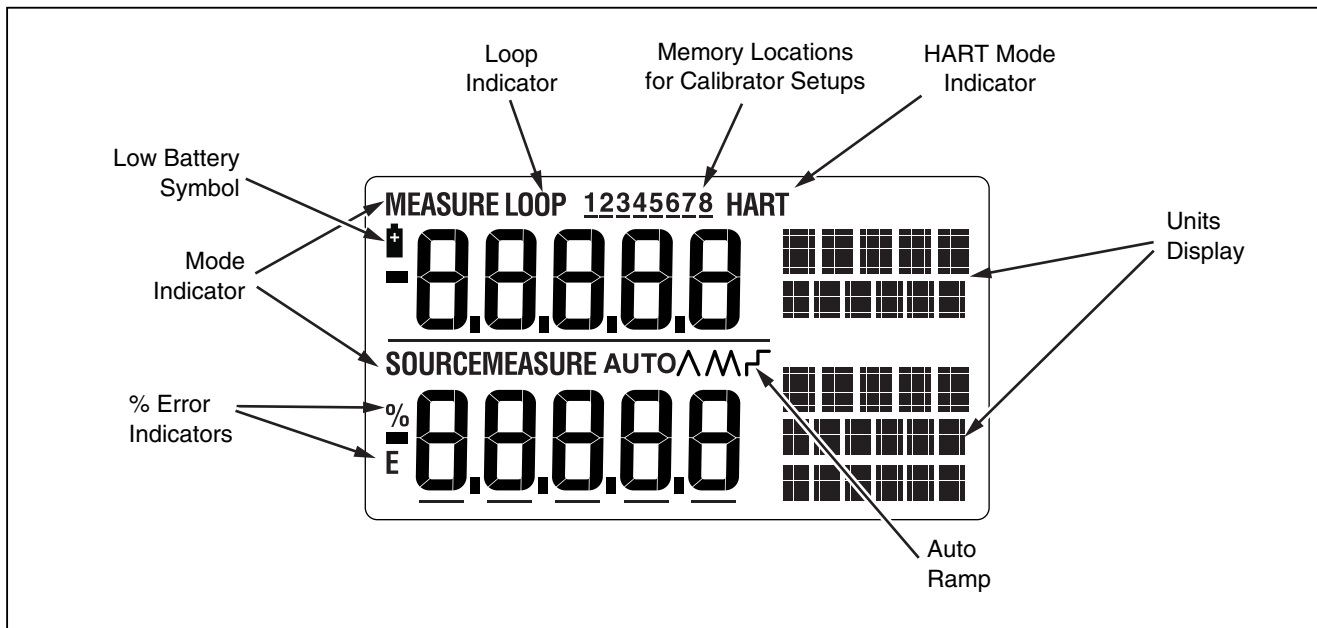


Figure 3. Elements of a Typical Display

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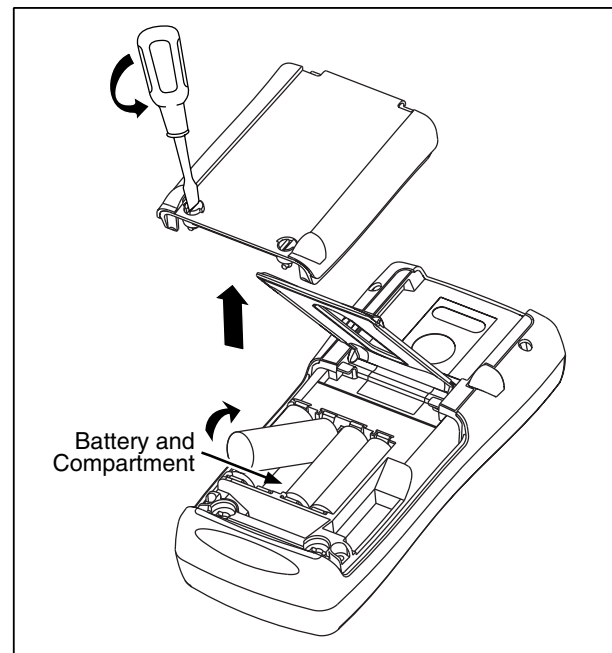
## Maintenance

### Replacing the Batteries

#### Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (+) appears.

Figure 4 shows you how to replace the batteries.



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Figure 4. Replacing the Batteries

### **Cleaning the Calibrator**

#### **⚠ Caution**

**To avoid damaging the plastic lens and case, do not use solvents or abrasive cleansers.**

Clean the Calibrator and pressure modules with a soft cloth dampened with water or water and mild soap.

### **Service Center Calibration or Repair**

Calibration, repairs, or servicing not covered in this manual should be performed only by qualified service personnel. If the Calibrator fails, check the batteries first, and replace them if needed.

To locate an authorized service center, refer to “Contacting Fluke” at the beginning of the manual.

### **Replacement Parts**

Table 5 lists the part number of each replaceable part. Refer to Figure 5.

**Table 5. Replacement Parts**

<b>Item</b>	<b>Description</b>	<b>PN</b>	<b>Qty.</b>
1	AA alkaline batteries	376756	4
2	Case screws	832246	4
3	Battery door	664250	1
4	Accessory mount	658424	1
5	Tilt stand	659026	1
6	Battery door 1/4-turn fasteners	948609	2
7	TL75 series test leads	855742	1
8	Test lead, red	688051	1
	Test lead, black	688066	1
9	<i>726 Product Overview Manual</i>	2441588	1
10	AC72 alligator clip, red	1670641	1
	AC72 alligator clip, black	1670652	1
11	<i>725/726 CD ROM, contains User Manual</i>	1549615	1

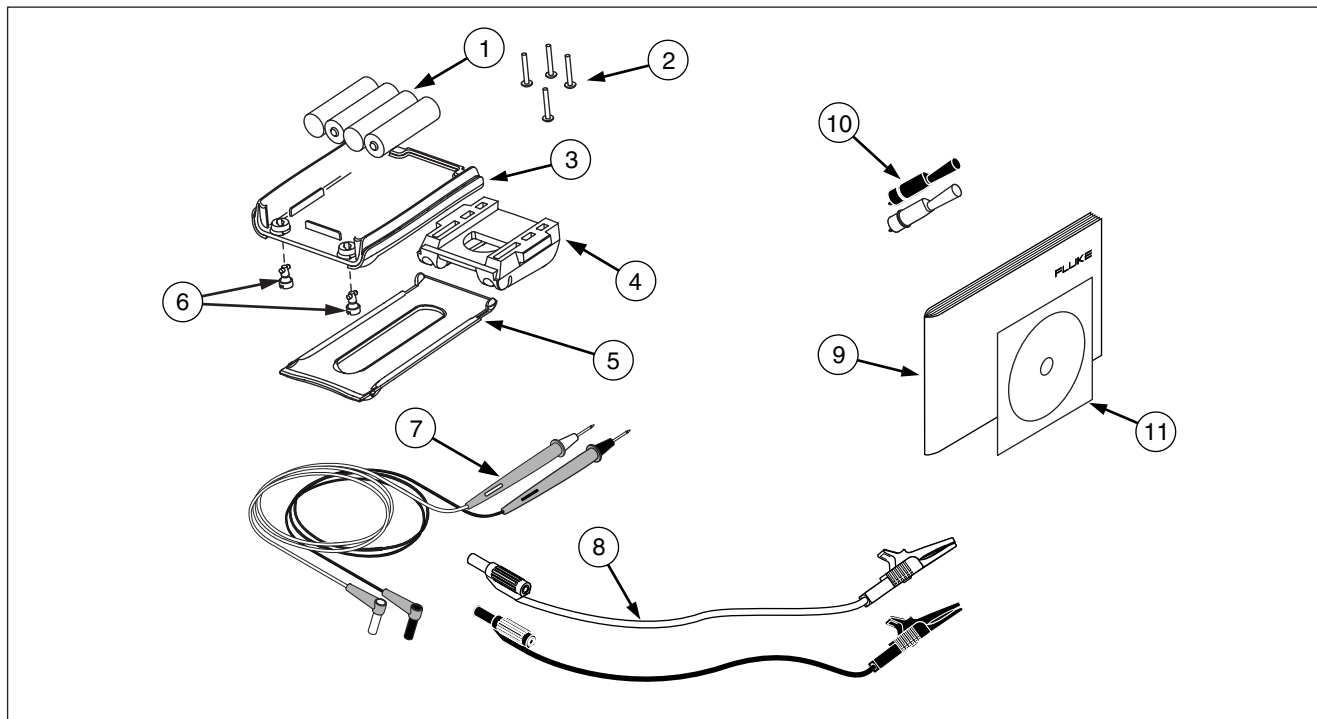


Figure 5. Replacement Parts

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## Specifications

Specifications are based on a one year calibration cycle and apply from +18 °C to +28 °C unless stated otherwise. All specifications assume a five-minute warmup period.

### DC Voltage Measurement and Source

Range	Minimum	Maximum	Accuracy, (% of Reading + Floor)
30 V (upper display)	0.000	30.000	0.010 % + 2 mV
20 V (lower display)	0.000	20.000	0.010 % + 2 mV
20 V (Source)	0.000	20.000	0.010 % + 2 mV
100 mV (Source)	0.000	100.000	0.010 % + 10 $\mu$ V
90 mV (Read)	0.000	90.000	0.010 % + 10 $\mu$ V

Maximum current output in voltage ranges is 1 mA with an output impedance of  $\leq 1 \Omega$

### DC mA Measurement and Source

Range	Minimum	Maximum	Accuracy, (% of Reading + Floor)
mA Read (Upper Display)	0.000	24.000	0.010 % + 2 $\mu$ A
mA Read (Lower Display)	0.000	24.000	0.010 % + 2 $\mu$ A
mA Source	0.000	24.000	0.010 % + 2 $\mu$ A

Maximum load on, mA source is 1 k $\Omega$ . With the HART resistor on, maximum load is 750  $\Omega$ .  
Voltage input range on simulate mode is 5 to 30 V

**Ohms Measurement**

Ohms Range	Minimum	Maximum	Accuracy (% of Reading + Floor)
Ohms Read (low)	0.00	400.00	0.015 % + 0.05 Ω
Ohms Read (high)	401.0	4000.0	0.015 % + 0.5 Ω

**Ohms Source**

Ohms Range	Minimum	Maximum	Excitation Current from Measurement Device	Accuracy (% of Reading + Floor)
Ohms Source (low)	5.0	400.0	0.1 to 0.5 mA	0.015 % + 0.1 Ω
	5.0	400.0	0.5 to 3 mA	0.015 % + 0.05 Ω
Ohms Source (high)	400	1500	0.05 to 0.8 mA	0.015 % + 0.5 Ω
	1500	4000	0.05 to 0.4 mA	0.015 % + 0.5 Ω

Unit is compatible with smart transmitters and PLCs.  
Frequency response is ≤ 5 mS

**Frequency Measurement**

Range	Minimum	Maximum	Accuracy (% of Reading + Floor)
CPM Read	2.0	1000.0	0.05 % + 0.1 CPM
Hz Read	1.0	1000.0	0.05 % + 0.1 Hz
KHz Read	1.00	15.00	0.05 % + 0.01 KHz

**Frequency Source**

Range	Minimum	Maximum	Accuracy
CPM Source	2.0	1000	0.05 %
Hz Source	1.0	1000.0	0.05 %
KHz Source	1.0	10.00	0.25 %
	10.00	15.00	0.50 %

**Temperature, Thermocouples**

Type	Minimum	Maximum	CJC ON Accuracy	CJC OFF Accuracy
J	-210	0.0	0.6	0.4
	0.0	800	0.4	0.2
	800	1200	0.5	0.3
K	-200	0.0	0.8	0.6
	0.0	1000	0.5	0.3
	1000	1372	0.7	0.5
T	-250	0.0	0.8	0.6
	0.0	400	0.4	0.2
E	-250	-100	0.8	0.6
	-100	1000	0.4	0.4
R	-20	0.0	2.0	1.8
	0.0	1767	1.4	1.2

CJC error outside of  $23 \pm 5$  °C is 0.05 °C / °C

**Multifunction Process Calibrator**  
Specifications

Type	Minimum	Maximum	CJC ON Accuracy	CJC OFF Accuracy
S	-20	0.0	2.0	1.8
	0.0	1767	1.4	1.2
B	600	800	1.4	1.2
	800	1000	1.5	1.3
	1000	1820	1.7	1.5
C	0.0	1000	0.8	0.6
	1000	2316	2.5	2.3
L	-200	0.0	0.45	0.25
	0.0	900	0.4	0.2
U	-200	0.0	0.7	0.5
	0.0	600	0.45	0.25
N	-200	0.0	1.0	0.8
	0.0	1300	0.6	0.4
XK	-200	800	0.4	0.2
BP	0.0	800	1.1	0.9
	800	2500	2.3	2.1
			<b>Range</b>	<b>Accuracy</b>
Thermocouple in mV read			-10 °C to 75 °C	0.015 % + 10 μV (% of Reading + Floor)
Thermocouple in mV source			-10 °C to 75 °C	0.015 % + 10 μV (% of Reading + Floor)
Maximum current output in voltage ranges is 1 mA with an output impedance of $\leq 1 \Omega$				

**RTD Accuracy (Read and Source) (ITS-90)**

Range	Minimum	Maximum	Accuracy
Ni120 (672)	-80.00	260.00	0.15
Pt100 (385)	-200.00	100.00	0.15
	100.00	300.00	0.25
	300.00	600.00	0.35
	600.00	800.00	0.45
Pt100 (3926)	-200.00	100.00	0.15
	100.00	300.00	0.25
	300.00	630.00	0.35
Pt100 (3916)	-200.00	100.00	0.15
	100.00	300.00	0.25
	300.00	630.00	0.35
Pt200 (385)	-200.00	100.00	0.75
	100.00	300.00	0.85
	300.00	630.00	0.95
Pt500 (385)	-200.00	100.00	0.35
	100.00	300.00	0.45
	300.00	630.00	0.55
Pt1000 (385)	-200.00	100.00	0.15
	100.00	300.00	0.25
	300.00	630.00	0.35
CU10	-10.00	250.00	1.8
<p>Notes: Read Accuracy is based on 4-wire input. For 3-wire input, add <math>\pm 0.05 \Omega</math> assuming all three RTD leads are matched.  Source Accuracy is based on 0.5 to 3.0 mA excitation current (0.1 mA for pt1000 range)</p>			

**Loop Power Supply**

Voltage: 24 V  
Maximum current: 22 mA  
Short circuit protected.

**Pulse Read and Pulse Source**

Pulse	Min	Max	Accuracy	Frequency
Source	1	10,000	1 Count	2 CPM to 10 kHz
Read		100,000		

**Pressure Measurement**

Range	Resolution	Accuracy	Units	Mode
Determined by pressure module	5 digits	Determined by pressure module	psi, inH <sub>2</sub> O@4 °C, inH <sub>2</sub> O@20 °C, kPa, cm H <sub>2</sub> O@4 °C, cmH <sub>2</sub> O@20 °C, bar, mbar, kg/cm <sub>2</sub> , mmHg, inHg	Pushing [Ω] for 3 seconds stores present pressure value as an offset and subtracts it from the displayed value

**General Specifications**

Operating temperature	-10 °C to 50 °C
Storage temperature	- 20 °C to 70 °C
Stability	± 0.005 % of range/°C outside of 23 ± 5 °C
Operating altitude	3000 meters above mean sea level
Relative Humidity (% RH operating without condensation)	90 % (10 to 30 °C) 75 % (30 to 40 °C) 45 % (40 to 50 °C) 35 % (50 to 55 °C) uncontrolled < 10 °C
Vibration	Random, 2 g, 5 to 500 Hz
Safety	EN50082-1:1992 and EN55022: 1994 Class B Criteria A or B CSA C22.2 No 1010.1:1992
Power requirements	4 AA alkaline batteries
Protection Class	Pollution Degree II
Size	96 x 200 x 47 mm. (3.75 x 7.9 x 1.86 in)
Weight	650 gm (1 lb, 7 oz)