

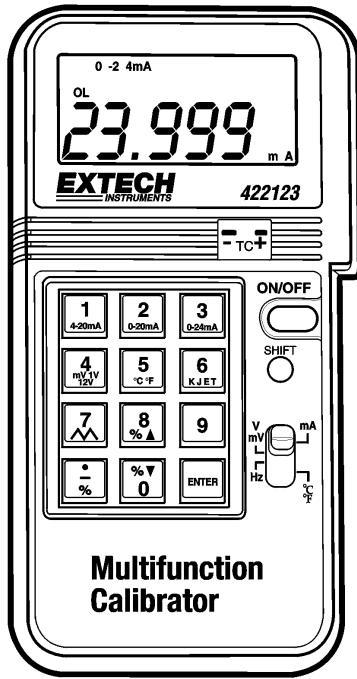
User's Manual

**EXTECH**<sup>®</sup>  
**INSTRUMENTS**

A FLIR COMPANY

**Precision Multifunction Calibrator**

**Model 422123**



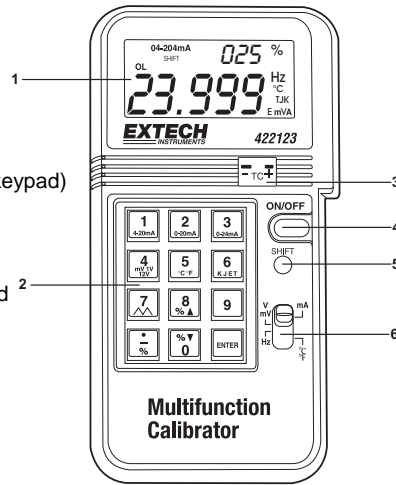
## Introduction

Congratulations on your purchase of the Extech 422123 Precision Multifunction Calibrator. This device can source mA, mV, V, Temperature (°C/°F) and Frequency. This device also offers STEP and AUTO RAMP features. Careful use of this meter will provide years of reliable service.

## Meter Description

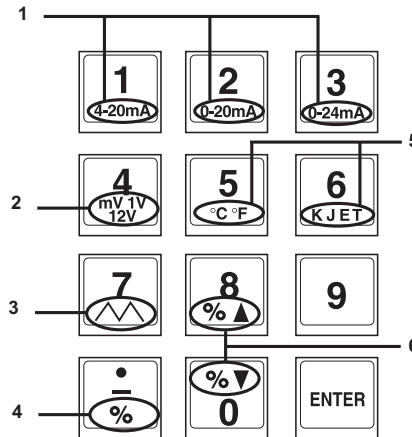
1. 5-digit LCD display
2. Numeric and Function Keypad
3. Thermocouple input jack
4. Power ON/OFF key
5. SHIFT button (activates 2<sup>nd</sup> functions on keypad)
6. Function Switch

**NOTE:** The battery compartment, tilt stand, and AC Adapter/External Battery Pack input jack are located on the rear of the meter.



## Keypad Function Commands

1. Select output range for current mode
2. Select output range for voltage mode
3. Automatic Ramp Function (current and voltage only).
4. Select output in % (current and voltage only). Also the "-" key for negative values. Also the decimal point.
5. Select temperature units and thermocouple type.
6. Step function up and down (current and voltage only).



## Operation

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### Powering the meter

1. Select a means of powering the unit (9V battery, external pack, or optional AC adapter). The 9V battery compartment is located on the rear (bottom) of the meter secured by one Phillips head screw. The AC adapter and the External Battery Pack plug into the DC12V jack located on the back of the meter just above the tilt stand. The Battery Pack holds six 1.5V 'AA' batteries. The optional AC Adapter is recommended for heavy usage.
2. Press the red **ON/OFF** button to turn the meter ON.
3. Wait until the STANDBY display extinguishes before using the meter.
4. To turn the meter OFF, press the red **ON/OFF** button again.

Note: The 422123 calibrator will begin to output the desired signal after the user presses ENTER or immediately after the fifth digit has been entered.

### DC Milliamp Outputs (4 to 20, 0 to 20, and 0 to 24mA)

1. Ensure that the meter's test leads are not shorted or connected to any devices.
2. Slide the function switch to the **mA** position and wait for the STANDBY display to extinguish.
3. Connect the meter's red (positive) and black (negative) test leads to the device or circuit under calibration. Use banana-to-alligator leads if necessary.
4. Select the desired mA output range by pressing the **SHIFT** button and then one of the current output keys:
  - 4-20mA output**
  - 0-20mA output**
  - 0-24mA output**
5. Enter a mA current output using the numeric keys (for example, press '5') then **ENTER** to output 5mA or press **5.0000**. Note that the 5-digit LCD can only accept 5 digits.
6. If the circuit under calibration is open or if the load that the meter is driving is greater than 1000 $\Omega$ , the meter will display the **OL** (overload) alarm warning and will emit a series of beeps.

### DC Voltage Output (0 to 1V, 0 to 12V, 0 to 100mV)

1. Ensure that the meter's test leads are not shorted or connected to any devices.
2. Slide the function switch to the '**V, mV**' position and wait for STANDBY to extinguish.
3. Connect the meter's red (positive) and black (negative) test leads to the device or circuit under test. Use alligator clips if necessary.
4. Select the desired output range by pressing the **SHIFT** button and then the voltage range key (**mV 1V 12V**) until the range is selected. The following meter displays (on left) correspond to the ranges shown at right:

**00.000 V: 0 to 12.000V range**

**0.0000 V: 0 to 1.0000V range**

**000.00 mV: 0 to 100.00mV range**

5. Once the proper range is selected, press the **SHIFT** button again.
6. Enter an output voltage value using the numeric keys (for example, in the 100mV range, press '50') then **ENTER**. Keep in mind that the maximum number of digits that can be entered is 5.
7. If the circuit under calibration is shorted, the meter will display the **OL** (overload) alarm warning and will emit a series of beeps.

### Temperature Output (Type K, J, E, T Thermocouple Simulations)

1. Slide the function switch to the '**°C/°F**' position and wait for the STANDBY display to extinguish.
2. Connect the thermocouple connection cable to the meter's TC output (the jack is located just above the ON/OFF switch). 'K' and 'J' type thermocouples are supplied.
3. Connect the other end of the thermocouple cable to the device under calibration.
4. Select the thermocouple type to simulate by pressing the **SHIFT** button and then the '**6/KJET**' key until the desired type appears on the right side of the LCD (Type K, J, E, or T).
5. After selecting the type press the **SHIFT** button again.
6. Type a temperature output value using the numeric keypad and then press **ENTER**. Note there is a 4-digit limit. To type a negative temperature value, press the **minus** key first, then enter the desired output temperature.
7. A signal will be sent to the device under calibration (a panel meter, for example) simulating a thermocouple.
8. Press the **SHIFT** key then the '**°F°C**' key to select the correct unit of measure.

**NOTE:** Connect the thermocouple connecting cable to the meter and the device under calibration well in advance of use (20 minutes or so) to acclimate the devices to the ambient temperature. This will ensure optimal precision.

### Frequency Output (1k $\Omega$ min. load)

1. Ensure that the meter's test leads are not shorted or connected to any devices.
2. Slide the function switch to the '**Hz**' position and wait for STANDBY to extinguish.
3. Connect the meter's red (positive) and black (negative) test leads to the device or circuit under calibration. Use the banana-alligator clip leads if necessary.
4. Enter the desired frequency using the numeric keypad. Note that the top (smaller) LCD digits are a continuation of the main LCD digits string; this provides the full display resolution required.
5. All frequencies below 125Hz are available in 1 Hz steps. Selected frequencies from 125 to 62,500 Hz are available per the list in the Appendix table at end of manual.

## Advanced Functions

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### Programming an Output in Percent (Current and Voltage Outputs Only)

Output values can also be programmed in percent. For example, a 4 to 20mA output can be programmed as follows: 0% = 4mA, 50% = 12mA, and 100% = 20mA. The main LCD digits will reflect the actual output while the top (smaller) digits will display the percentage. Follow these steps to output a signal in percent:

1. Setup a test as described earlier for a current or voltage output.
2. Press the **SHIFT** button so that the word SHIFT appears on the LCD.
3. Press the % key.
4. Enter a percentage from 0 to 100% (1% resolution) using the numeric keys.
5. Press the **ENTER** key.
6. The current or voltage signal will be output from the meter.
7. 0% corresponds to the lowest value in the range ('4mA' for 4 to 20mA, '0mV' for 0 to 100mV, for example.) while 100% corresponds to the highest value in the output range ('20mA' for 4 to 20mA range, '100mV' for 0 to 100mV range). All percentages in between will be linear to the voltage or current ranges.
8. Refer to the list below for the 1% step value for each range:

<b>4 to 20mA:</b>	<b>1% = 0.16mA</b>
<b>0 to 20mA:</b>	<b>1% = 0.2mA</b>
<b>0 to 24mA:</b>	<b>1% = 0.24mA</b>
<b>0 to 100mV:</b>	<b>1% = 1mV</b>
<b>0 to 1V:</b>	<b>1% = 0.01V</b>
<b>0 to 12V:</b>	<b>1% = 0.12V</b>

### Step Mode (Current and Voltage Outputs Only)

This feature allows the user to step up and down through the output range in programmed steps as follows:

1. Setup a test as described earlier for a current or voltage output.
2. Press the **SHIFT** key and then the % key.
3. Enter a percentage (1 to 100%) using the numeric keys. This percentage will represent the size of each step. Press the **ENTER** key when complete.
4. Now each time the '**8 % ▲**' key is pressed, the output signal will be increased by the percentage programmed (in the previous step). Press the '**0 % ▼**' key to step the output down by the percentage programmed.
5. For example, for a 4 to 20mA output type and a step percentage of 25%, the following steps are possible:

<b>0% = 4mA</b>
<b>25% = 8mA</b>
<b>50% = 12mA</b>
<b>75% = 16mA</b>
<b>100% = 20mA</b>

### **Automatic Ramp Function (Current and Voltage Outputs Only)**

The Auto Ramp feature adjusts the meter's output from 0 to 100% →100% to 0% →0 to 100%, and so on. The top (smaller) LCD displays the percent output while the main LCD digits display the actual signal output.

1. Setup a test as described earlier for a current or voltage output.
2. Press the **SHIFT** key and then the **RAMP 7** key.
3. The output signal will now ramp from 0 to 100% →100% to 0% →0 to 100%, etc.
4. Press the **RAMP 7** key to pause/resume the ramp.
5. Press the **SHIFT** button to exit this mode and return to normal operation.

Note: Each 1% step has a time interval of 0.08 seconds; therefore it takes 8 seconds to ramp from 0 to 100%.

## ***Maintenance***

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### **9V Battery Replacement**

Open the battery compartment on the back of the meter by removing the Phillips head screw and battery compartment cover. Replace the battery and secure the battery compartment.

### **Six 1.5V 'AA' External Battery Replacement**

Open the battery pack by the Velcro flap and slide the battery tray out. Replace the six batteries observing polarity.

### **Meter Cleaning**

Periodically wipe the meter case with a damp cloth. Do not use abrasives or solvents to clean the meter.

## Specifications

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<b>Display</b>	5 digit multifunction LCD
<b>Output (source) Ranges, Resolution, and Accuracy</b>	
<u>DC Current</u>	4 to 20.000mA, 0 to 20.000mA, 0 to 24.000mA Accuracy for all mA ranges: $\pm (0.025\% + 3 \text{ digits})$
<u>DC Voltage</u>	0 to 100.00mV; 0 to 1.0000V; 0 to 12.000V; Accuracy for all voltage ranges: $\pm (0.05\% + 3 \text{ digits})$
<u>Type K Temperature</u>	-328 to -148°F (-200 to -100°C); Accuracy: $\pm 3.6^\circ\text{F}$ ( $2.0^\circ\text{C}$ ) -148 to 32°F (-100 to 0°C); Accuracy: $\pm 2.0^\circ\text{F}$ ( $1.1^\circ\text{C}$ ) 32 to 2400°F (0 to 1370°C); Accuracy: $\pm 1.5^\circ\text{F}$ ( $0.8^\circ\text{C}$ )
<u>Type J Temperature</u>	-148 to 32°F (-100 to 0°C); Accuracy: $\pm 1.6^\circ\text{F}$ ( $0.9^\circ\text{C}$ ) 32 to 1400°F (0 to 760°C); Accuracy: $\pm 1.2^\circ\text{F}$ ( $0.7^\circ\text{C}$ )
<u>Type E Temperature</u>	-148 to 32°F (-100 to 0°C); Accuracy: $\pm 1.6^\circ\text{F}$ ( $0.9^\circ\text{C}$ ) 32 to 1292°F (0 to 700°C); Accuracy: $\pm 1.2^\circ\text{F}$ ( $0.7^\circ\text{C}$ )
<u>Type T Temperature</u>	-328 to 32°F (-200 to 0°C); Accuracy: $\pm 1.8^\circ\text{F}$ ( $1.0^\circ\text{C}$ ) 32 to 752°F (0 to 400°C); Accuracy: $\pm 1.5^\circ\text{F}$ ( $0.8^\circ\text{C}$ )
<u>Frequency</u>	1 to 125 Hz; Accuracy: $\pm 0.04\text{Hz}$ 126 Hz to 62,500 Hz; Accuracy: $\pm (0.01\% + 0.04\text{Hz})$
Accuracy note: All published accuracies are 'of reading'. Meter must be warmed up for 20 minutes before use for optimum accuracy.	
<b>Power supply</b>	9V battery, external battery pack (6 x 1.5V 'AA'), or optional AC adapter;
<b>Power Consumption</b>	60 to 180mA
<b>Operating Conditions</b>	32 to 122°F (0 to 50°C); 85% RH max.
<b>Storage Conditions</b>	-4 to 140°F (-20 to 60°C); 85% RH max.
<b>Dimensions</b>	3.46 x 6.61 x 1.03" (88 x 168 x 26mm)
<b>Weight</b>	11.63 oz. (330g)

## Appendix - Frequency Output Table

All frequencies below 125Hz (inclusive) are available in 1 Hz steps. However, only specific frequencies above 126 (inclusive) are available. Refer to the Table below.

126.00	127.03	128.07	129.13	130.20	131.30	132.41	133.54
134.12	135.28	136.46	137.06	138.27	139.50	140.13	141.40
142.04	143.34	144.00	145.34	146.02	147.40	148.10	149.52
150.24	151.69	152.43	153.18	154.70	155.47	156.25	157.03
158.62	159.43	160.25	161.08	162.76	163.61	164.47	165.34
166.22	167.11	168.01	169.83	170.76	171.70	172.65	173.61
174.58	175.56	176.55	177.55	178.57	179.59	180.63	181.68
182.74	183.82	184.91	186.01	187.12	188.25	189.39	190.54
191.71	192.90	194.09	195.31	196.54	197.78	199.04	200.32
201.61	202.92	204.24	205.59	206.95	208.33	209.73	211.14
212.58	214.04	215.51	217.01	218.53	220.07	221.63	223.21
224.82	226.44	228.10	229.77	231.48	233.20	234.96	236.74
238.54	240.38	242.24	244.14	246.06	248.01	250.00	252.01
254.06	256.14	258.26	260.41	262.60	264.83	267.09	269.39
271.73	274.12	276.54	279.01	281.53	284.09	286.69	289.35
292.05	294.81	297.61	300.48	303.39	306.37	309.40	312.50
315.65	318.87	322.16	325.52	328.94	332.44	336.02	339.67
343.40	347.22	351.12	355.11	359.19	363.37	367.64	372.02
376.50	381.09	385.80	390.62	395.56	400.64	405.84	411.18
416.66	422.29	428.08	434.02	440.14	446.42	452.89	459.55
466.41	473.48	480.76	488.28	490.19	492.12	494.07	496.03
498.00	500.00	502.00	504.03	506.07	508.13	510.20	512.29
514.40	516.52	518.67	520.83	523.01	525.21	527.42	529.66
531.91	534.18	536.48	538.79	541.12	543.47	545.85	548.24
550.66	553.00	555.55	558.03	560.53	563.06	565.61	568.18
570.77	573.39	576.03	578.70	581.39	584.11	586.85	589.62
592.41	595.23	598.08	600.96	603.86	606.79	609.75	612.74
615.76	618.81	621.89	625.00	628.14	631.31	634.51	637.75
641.02	644.32	647.66	651.04	654.45	657.89	661.37	664.89
668.44	672.04	675.67	679.34	683.06	686.81	690.60	694.44
698.32	702.24	706.21	710.22	714.28	718.39	722.54	726.74
730.99	735.29	739.64	744.04	748.50	753.01	757.57	762.19
766.87	771.60	776.39	781.25	786.16	791.13	796.17	801.28
806.45	811.68	816.99	822.36	827.81	833.33	838.92	844.59
850.34	856.16	862.06	868.05	874.12	880.28	886.52	892.85
899.28	905.79	912.40	919.11	925.92	932.83	939.84	946.96
954.19	961.53	968.99	976.56	984.12	992.06		
1000.00	1008.06	1016.26	1024.59	1033.05	1041.66	1050.42	1059.32
1068.37	1077.58	1086.95	1096.49	1106.19	1116.07	1126.12	1136.36
1146.78	1157.58	1168.22	1179.24	1190.47	1201.92	1213.59	1225.49
1237.62	1250.00	1262.62	1275.51	1288.65	1302.08	1315.78	1329.78
1344.08	1358.69	1373.62	1388.88	1404.49	1420.45	1436.78	1453.48
1470.58	1488.09	1506.02	1524.39	1543.20	1562.50	1582.27	1602.56
1623.37	1644.73	1666.66	1689.18	1712.32	1736.11	1760.56	1785.71
1811.59	1838.23	1865.67	1893.93	1923.07	1953.12	1960.78	1968.50
1976.28	1984.12	1992.03	2000.00	2008.03	2016.12	2024.29	2032.52
2040.81	2049.18	2057.61	2066.11	2074.68	2083.33	2092.05	2100.84



2109.70	2118.64	2127.65	2136.75	2145.92	2155.17	2164.50	2173.91
2183.40	2192.98	2202.64	2212.38	2222.22	2232.14	2242.15	2252.25
2262.44	2272.72	2283.10	2293.57	2304.14	2314.81	2325.58	2336.44
2347.41	2358.49	2369.66	2380.95	2392.34	2403.84	2415.45	2427.18
2538.07	2450.98	2463.05	2475.24	2487.56	2500.00	2512.56	2525.25
2438.07	2551.02	2564.10	2577.31	2590.67	2604.16	2617.80	2631.57
2645.50	2659.57	2673.79	2688.17	2702.70	2717.39	2732.24	2747.25
2762.43	2777.77	2793.29	2808.98	2824.85	2840.90	2857.14	2873.56
2890.17	2906.97	2923.97	2941.17	2958.57	2976.19	2994.01	3012.04
3030.30	3048.78	3067.48	3086.41	3105.59	3125.00	3144.65	3164.55
3184.71	3205.12	3225.80	3246.75	3267.97	3289.47	3311.25	3333.33
3355.70	3378.37	3401.36	3424.65	3448.27	3472.22	3496.50	3521.12
3546.09	3571.42	3597.12	3623.18	3649.63	3676.47	3703.70	3731.34
3759.39	3787.87	3816.79	3846.15	3875.96	3906.25	3937.00	3968.25
4000.00	4032.25	4065.04	4098.36	4132.23	4166.66	4201.68	4237.28
4273.50	4310.34	4347.82	4385.96	4424.77	4464.28	4504.50	4545.45
4587.15	4629.62	4672.89	4716.98	4761.90	4807.69	4854.36	4901.96
4950.49	5000.00	5050.50	5102.04	5154.63	5208.33	5263.15	5319.14
5376.34	5434.78	5494.50	5555.55	5617.97	5681.81	5747.12	5813.95
5882.35	5952.38	6024.09	6097.56	6172.83	6250.00	6329.11	6410.25
6493.50	6578.94	6666.66	6756.75	6849.31	6944.44	7042.25	7142.85
7246.37	7352.94	7462.68	7575.75	7692.30	7812.50	7936.50	8064.51
8196.72	8333.33	8474.57	8620.68	8771.92	8928.57	9090.90	9159.25
9433.96	9615.38	9803.92					
10000.00	10204.08	10416.66	10638.29	10869.56	11111.11	11363.63	11627.90
11904.76	12195.12	12500.00	12821.51	13157.89	13513.51	13888.88	14285.71
14705.88	15151.51	15625.00	16129.03	16666.66	17241.37	17857.14	18518.51
19230.76	20000.00	20833.33	21739.13	22727.27	23809.52	25000.00	26315.78
27777.77	29411.76	31250.00	33333.33	35714.28	38461.53	41666.66	45454.54
50000.00	55555.55	62500.00					

## Warranty

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**EXTECH INSTRUMENTS CORPORATION (a FLIR company)** warrants this instrument to be free of defects in parts and workmanship for **one year** from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website [www.extech.com](http://www.extech.com) for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

## Calibration and Repair Services

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Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Service Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.



### Support line (781) 890-7440

Technical support: Extension 200; E-mail: [support@extech.com](mailto:support@extech.com)

Repair & Returns: Extension 210; E-mail: [repair@extech.com](mailto:repair@extech.com)

### Product specifications subject to change without notice

For the latest version of this User's Guide, Software updates, and other up-to-the-minute product information, visit our website: [www.extech.com](http://www.extech.com)

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