

User's Guide

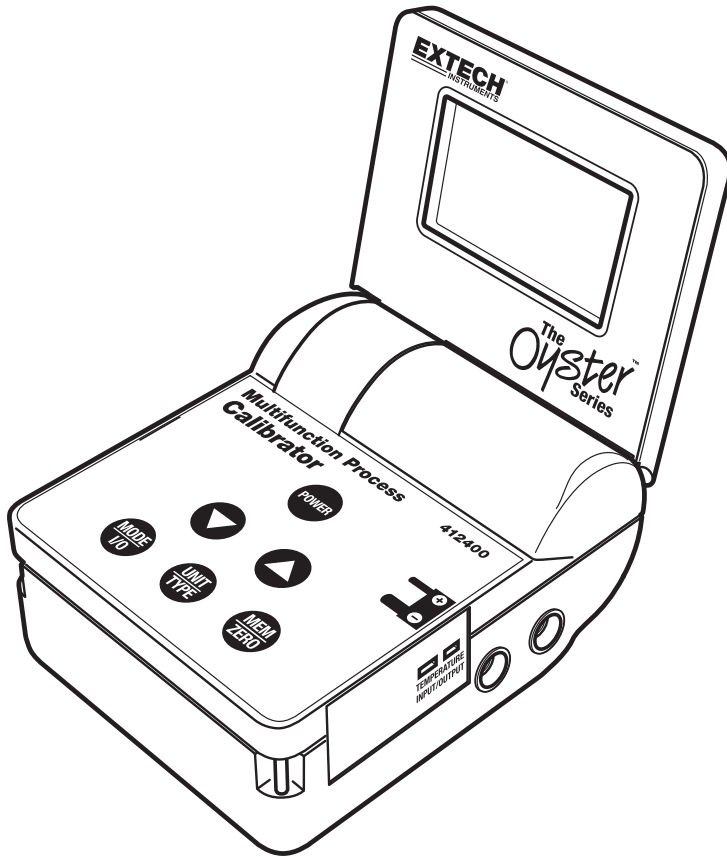
EXTECH[®]
INSTRUMENTS
A FLIR COMPANY

Model 412400
Multifunction Process Calibrator

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1-800-517-8431

99 Washington Street
Melrose, MA 02176
Phone 781-665-1400
Toll Free 1-800-517-8431

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Introduction

Congratulations on your purchase of the Extech Model 412400 Process Calibrator. The Model 412400 can Measure or Source Current, Voltage, and Thermocouple Temperature signals. In SOURCE/MEASURE mode, the meter can also Power and Measure simultaneously with 24Vdc loop power.

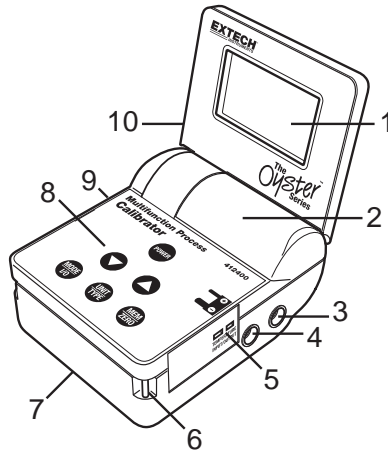
The calibrator's five (5) memory locations for each calibration function (which are also user programmable) can be used to provide stepped outputs automatically. In automatic mode, the output steps can be programmed to run continuously or in single-shot mode.

The Oyster Series meters employ a convenient flip up display with neck-strap (lanyard) for hands-free operation and run on battery power or from an AC adaptor.

This instrument is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

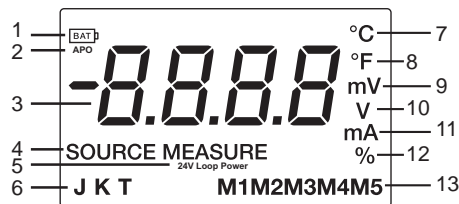
Meter Description

1. LCD display
2. Lanyard storage compartment
3. Positive test lead banana jack (red)
4. Negative test lead banana jack (black)
5. Thermocouple Input / Output jack
6. Lanyard posts (one on each side)
7. Battery compartment (bottom)
8. Keypad
9. AC adaptor jack
10. Flip up display



Display Description

1. Low battery icon
2. Auto Power Off icon
3. Numerical representation of measured, sourced, or stored signal value (also used to display mnemonics for programming)
4. SOURCE or MEASURE mode status icon
5. Loop power indicator
6. Thermocouple types
7. Temperature unit of measure (Celsius)
8. Temperature unit of measure (Fahrenheit)
9. Millivolt unit of measure
10. Voltage unit of measure
11. Milliamp unit of measure
12. Per cent
13. Five memory locations



Operation

POWER BUTTON AND AUTO POWER OFF FEATURE

1. Use the POWER button to turn the unit ON or OFF. When the unit is switched on, a short self-test will display after which the LCD will stabilize.
2. This meter is powered by six (6) 'AA' 1.5V batteries or by an AC adaptor.
3. When the battery symbol appears on the upper left-hand corner of the LCD display, or if the instrument does not switch on with a press of the POWER button, replace the batteries. Low battery power may cause inaccurate readings and erratic meter operation.
4. This instrument is equipped with Auto Power OFF which turns the meter off after 10 minutes of inactivity. To toggle this feature off and on, press and hold the POWER button (starting with the meter ON) until the **APO** icon is on or off.:

MEASURE MODE

1. Press the POWER button. The meter will turn on in the MEASURE mode and in the function last used.
2. Press and release the MODE I/O button to change to the function desired (Temperature, Voltage, Current or Current with 24V Loop Power).
3. Press the UNIT TYPE button to select the current units (mA, %) or temperature units (°C, °F). Voltage is autoranging.
4. In the temperature function, press and hold the UNIT TYPE button to change the thermocouple type (J, K, T).
5. Connect the signal to be measured to the input jacks for current and voltage or the mini-connector for temperature.
6. Read the measured value in the display

INPUT ZERO

An input zero is performed when the meter is first turned on. The zero can also be performed manually at any time (with or without an input signal connected)

1. In the MEASURE mode, press and release the MEM/ZERO button.
2. The units icon will flash and after a few seconds the meter will return to normal operation.

MEASUREMENT OVER-RANGE and UNDER-RANGE INDICATION

In the Voltage and Current functions, measured signals above or below the specified ranges will be indicated by "HHHH" for above range and "LLLL" for below range.

In the Temperature function, OPEN will be displayed if the measured signal is outside of the specified range or a thermocouple is not inserted into the temperature jack.

SOURCE MODE

1. Press the POWER button. The meter will turn on in the MEASURE mode and in the function last used.
2. Press and release the MODE I/O button to change the function desired (Temperature, Voltage, or Current)
3. Press and hold the MODE I/O button until SOURCE appears in the display.
4. Press the UNIT TYPE button to select the current units (mA, %) or temperature units (°C, °F). Voltage is autoranging.
5. Adjust the output using the ▲ ▼ buttons
 - Press the ▲ button once to increase the value in one-digit steps.
 - Press and hold the ▲ button to increase the value in ten-digit steps.
 - Press and hold the ▲ button > 2 sec and then press the ▼ to increase the value in 100 digit steps
 - To decrease the value, use the ▼ button as described above.
6. In the Current function, the -25% to 125% output range corresponds to the 0 to 24mA output range.

% Display	-25%	0%	25%	50%	75%	100%	125%
mA output	0mA	4mA	8mA	12mA	16mA	20mA	24mA

NOTE: The “SOURCE” icon will blink until the output level has stabilized. The most common cause for the “SOURCE” icon to continue blinking is that the load impedance is too high in the current mode or too low in the voltage mode.

MEMORY (MEM) BUTTON

The calibrator has five (5) memory locations for each function for stepped calibration. Default output values are noted below. The memory locations/output values can be selected manually, or the series of five values can be stepped automatically for the voltage and current functions. For the temperature function, only manual stepping is available.

The default values initially stored in the memory locations can be modified by the user. Once changed, the modified value will be held until manually changed again.

MANUAL Sourcing from stored memory values

1. Select the Source mode
2. Press the MEM button. The M1 icon (memory location 1) will appear in the display and the value stored in that location will be displayed and sourced.
3. Subsequent presses of the MEM button will step through the five memory locations.

AUTOMATIC Sourcing from stored memory values (Voltage/Current modes only)

1. Select the Source mode
2. Press and hold the UNIT-TYPE button until 'StPC' (continuous stepping) or 'StPS' (single shot stepping) appears on the LCD.
3. In Single Shot mode (StPS), the meter will automatically step through all of the memory locations (M1 through M5 and then M5 through M1) and then automatically stop. Each step is held for 10 seconds.
4. In Continuous mode (StPC), the meter runs through the same sequence as in Single Shot mode except the sequence repeats indefinitely until the user aborts the test by pressing the UNIT-TYPE key.
5. When the sequence ends, either continuous or single shot, the meter will briefly display 'END' and then return to the standby mode.

Storing values into memory

1. Select and display a memory location (M1 to M5)
2. Use the ▲ ▼ buttons to adjust the display to the desired source value. Speed scrolling is explained earlier.
3. Press and HOLD the MEM button for > 2 seconds.
4. The Memory location number will flash for several seconds while the value is being stored. When the flashing stops, the value is stored.
5. The displayed value will now be stored in the displayed memory location.

Default Memory Values

Five common source values are pre-programmed for each mode and stored in the Calibrator's memory; the user can replace these values as needed; refer to the Table below:

Default Memory Values					
	M1	M2	M3	M4	M5
mV, V	0mV	2.50V	5.00V	7.50V	10.00V
mA	4mA	8mA	12mA	16mA	20mA
%	0%	25%	50%	75%	100%
Temperature	M1	M2	M3	M4	M5
Type J / K (°F)	32°	212°	932°	1382°	1832°
Type J / K (°C)	0°	100°	500°	750°	1000°
Type T (°F)	32°	212°	392°	572°	752°
Type T (°C)	0°	100°	200°	300°	400°

Note: If **ERR** displays in place of a stored memory value, the value is outside the specified range of the instrument. Select another value that is within the specified range.

Battery Replacement

When the battery symbol appears on the upper left-hand corner of the LCD, or if the unit does not switch on when the POWER button is pressed, replace the six (6) 'AA' 1.5V batteries.

1. The battery compartment is located on the bottom of the instrument
2. Remove the screw that secures the battery compartment cover
3. Slide the battery compartment cover off of the instrument
4. Replace the batteries observing polarity
5. Replace the compartment cover and the screw

Specifications

General Specifications

Display	9999 count LCD
Meter Power	Six (6) 1.5V 'AA' batteries or AC adaptor
Auto Power OFF	Meter automatically powers off after 10 minutes of inactivity (can be disabled)
Current output capability	24mA @ 1000 ohms
Loop Power	24Vdc (1000 ohm max. load)
Accessories Supplied	Batteries, AC adaptor, Calibration cable, and User Guide
Battery Life	Approximately 7 hours @ 24mA output with 1000 ohm load
Power Supply	9V DC @ 1A, 5.4 mm, center positive/barrel negative
Operating Temperature	41°F to 104°F (5°C to 40°C)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Operating Humidity	Max 80% up to 87°F (31°C) decreasing linearly to 50% at 104°F (40°C)
Storage Humidity	<80%
Operating Altitude	7000ft. (2000meters) maximum.
Dimensions	3.8 x 4.7 x 1.8" (96 x 118 x 45mm) folded
Weight	12 oz. (340g)

Specifications Voltage/Current

Mode	Function	Range	Resolution	Accuracy
Measure	Voltage	0 to 20.00V	1mV to 1999mV 10mV thereafter	±(0.075% of rdg + 1d) or ± 3 digits Whichever is greater
	Current	0.00 to 50.00mA	0.01mA	
	%	-25% to +230%	0.1%	
Mode	Function	Range	Resolution	Accuracy
Source	Voltage	0 to 10.00V	1mV to 1999mV 10mV thereafter	±(0.075% of rdg + 1d) or ± 3 digits Whichever is greater
	Current	0.00 to 24.00mA	0.01mA	
	%	-25.0 to 125.0%	0.1%	

Specifications Temperature

Mode	Function	Range	Resolution	Accuracy
Source & Measure	Type J	-58 to 1830°F -50 to 1000°C	0.1° < 1000° 1.0° ≥ 1000°	±(0.15% rdg + 1.8°F/ 1°C)
	Type K	-58 to 2498°F -50 to 1370°C		
	Type T	-184 to 752°F -120 to 400°C		