

# Quick Start Guide

## Model 372 AC Resistance Bridge and Temperature Controller



## Safety Precautions

Observe these general safety precautions during all phases of instrument operation, service, and repair. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended instrument use. Lake Shore Cryotronics, Inc. assumes no liability for Customer failure to comply with these requirements.

The Model 372 protects the operator and surrounding area from electric shock or burn, mechanical hazards, excessive temperature, and spread of fire from the instrument. Environmental conditions outside of the conditions below may pose a hazard to the operator and surrounding area.

- Indoor use
- Altitude to 2000 m
- Temperature for safe operation: 5 °C to 40 °C
- Maximum relative humidity: 80% for temperature up to 31 °C decreasing linearly to 50% at 40 °C
- Power supply voltage fluctuations not to exceed  $\pm 10\%$  of the nominal voltage
- Overvoltage category II
- Pollution degree 2

### Ground the Instrument

To minimize shock hazard, the instrument is equipped with a 3-conductor AC power cable. Plug the power cable into an approved 3-contact electrical outlet or use a 3-contact adapter with the grounding wire (green) firmly connected

to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet Underwriters Laboratories (UL) and International Electrotechnical Commission (IEC) safety standards.

### Ventilation

The instrument has ventilation holes in its top and side covers. Do not block these holes when the instrument is operating.

### Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

### Keep Away from Live Circuits

Operating personnel must not remove instrument covers. Refer component replacement and internal adjustments to qualified maintenance personnel. Do not replace components with power cable connected. To avoid injuries, always disconnect power and discharge circuits before touching them.

### Do Not Substitute Parts or Modify Instrument

Do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to an authorized Lake Shore Cryotronics, Inc. representative for service and repair to ensure that safety features are maintained.

### Cleaning

Do not submerge instrument. Clean only with a damp cloth and mild detergent. Exterior only.

### Desktop Installation

When installing the instrument in a desktop environment, ensure it is mounted on a flat, level surface.

### Improper Use

If the instrument is used in a manner that is not specified by Lake Shore, the safety protections provided by the instrument are no longer guaranteed, and may be impaired.

## Introduction

Congratulations on purchasing the world's most advanced ultra-low temperature controller.

This guide provides basic information for getting started with your AC resistance bridge and temperature controller. For further documentation and information, please see <http://www.lakeshore.com/372>.

### Items included with the Model 372 AC resistance bridge and temperature controller:

- Model 372 instrument
- Model 372 user's manual
- Line power cord
- 3 sensor input mating connectors, 6-pin DIN
- Terminal block mating connector, 6-pin terminal block, for relays 1 and 2
- Terminal block mating connector, 7-pin terminal block, for heater and analog outputs

## Unpacking

1. Inspect shipping containers for external damage before opening them.
2. Photograph any container that has significant damage before opening it.
3. Inspect all items for both visible and hidden damage that occurred during shipment. If there is visible damage to the contents, contact the shipping company and Lake Shore immediately  
  
NOTE: Procedures vary slightly with shipping companies. Keep all damaged shipping materials and contents until instructed to either return or discard them.
4. Open the shipping container and keep the container and shipping materials until all contents have been accounted for.
5. Check off each item on the packing list as it is unpacked.
6. Verify that the accessory kit contains the correct items.

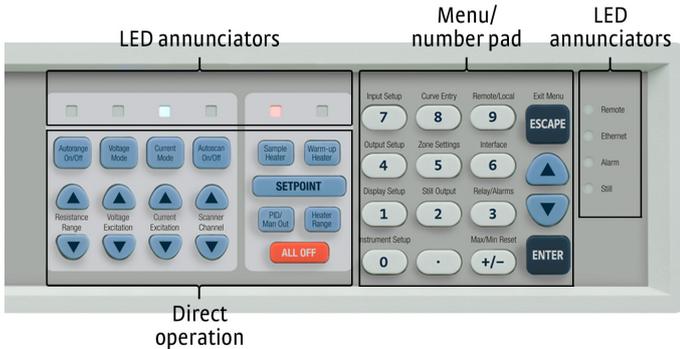
**Optional.** If you ordered a Model 3726 or Model 3708 scanner, it may be shipped separately.

## Front panel



### Keypad operation

See Chapter 4 of the Model 372 user's manual for detailed descriptions of each key.



## Rear panel



The rear panel consists of:

1. Scanner control connector
2. Measurement input connectors
3. Control input connector
4. Diagnostic monitor output connector
5. Reference output connector
6. Sample heater, warm-up heater and analog output terminal block connector
7. Relays 1 and 2 terminal block connector
8. RJ-45 Ethernet interface
9. USB type-B port
10. IEEE-488 interface
11. Line input assembly

## Placement

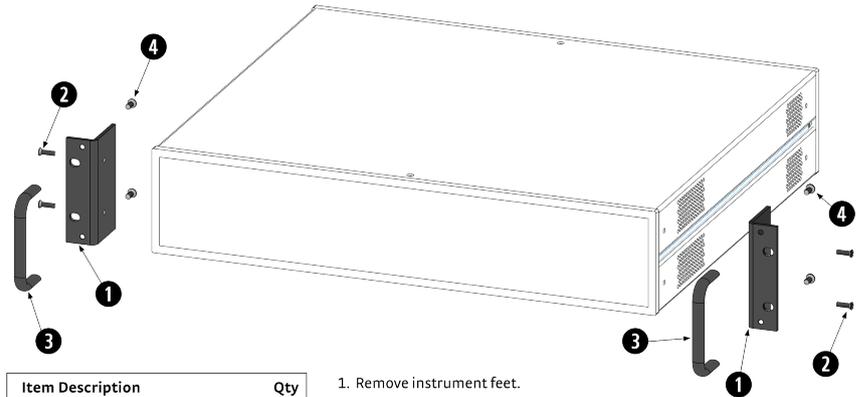
The Model 372 is an out-of-the-box benchtop instrument with adjustable benchtop legs to tilt the instrument up slightly for an improved viewing angle.



## Rack mounting

The Model 372 can be installed in an instrumentation rack using the optional Lake Shore RM-1 rack mount kit. See <http://www.lakeshore.com/rack-kit/> for full details.

**NOTE:** Ensure that there is 1 in (25 mm) clearance on both sides of the instrument after rack mounting.



Item Description	Qty
❶ Rack mount ear	2
❷ Screw, 6-32×0.5 in FHM Phillips	4
❸ Rack handles	2
❹ Screw, 8-32×0.38 in FHM Phillips	4

1. Remove instrument feet.
2. Rest the instrument on its face on a flat surface.
3. Remove the front screws from the sides of the instrument and retain for future use, if the rack kit is ever removed.
4. Use the supplied 6-32 screws ❷ to attach the rack mount ears to the sides of the instrument.
5. Use the supplied 8-32 screws ❹ to attach the rack handles ❸ to the rack mount ears ❶.

## Startup

The steps that follow will take you through basic operation of the Model 372. This is just the beginning of what is possible with the Model 372, but is a good introduction to the unit.

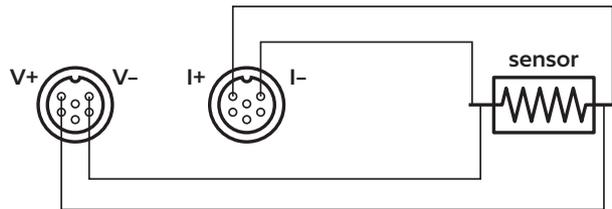
### Basic temperature operation

1. Make the following connections to the Model 372:

a. Power connection using the supplied power cord.

**NOTE:** Do not turn on the unit until all other connections are made.

b. Sensor connection to the measurement input. This can be a complex step; if this is the first time you have wired a sensor to either a Model 370 or 372, please see section 3.5 of the Model 372 user's manual.



This process will be different depending on whether a scanner is also to be used with the instrument. For guidance on using this additional device, please see section 3.6 of the Model 372 user's manual. The rest of these steps assume that the sensor is connected directly to the Model 372, though notes will be made when something will be different in the case of having a scanner connected.

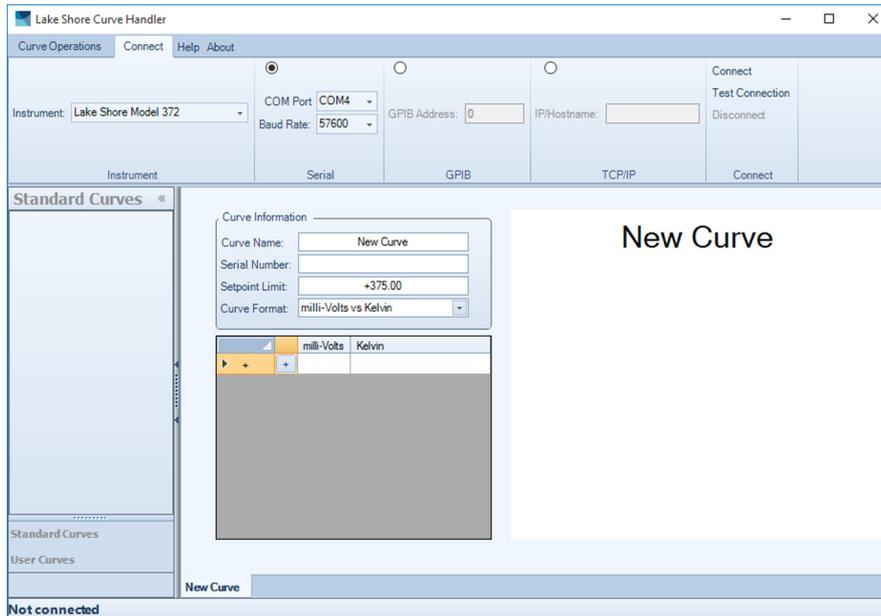
- c. Communications connection to your PC using one of the three different methods available (USB, Ethernet, GPIB). For this example, USB is used as the connection method.



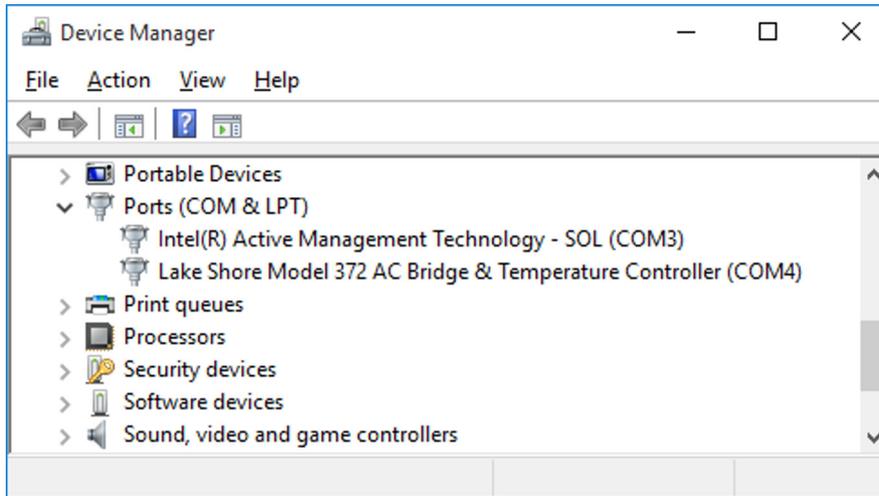
2. Turn on the Model 372 using the power switch on the back of the instrument. The default settings will display a resistance reading for the sensor that you have connected. Even if the sensor is at room temperature, you should see a logical resistance reading. If not, check your connections and begin troubleshooting until a logical reading is displayed. In the example below, a 10.009 k $\Omega$  sensor reading is shown.



- To convert this resistance measurement to Kelvin, run the Curve Handler program found at [www.lakeshore.com/products/pages/curvehandler.aspx](http://www.lakeshore.com/products/pages/curvehandler.aspx). Curve Handler can also be found on the Model 372's web server that can be accessed when connecting to the instrument via Ethernet (see section 6.4 of the Model 372 user's manual for details on making this connection). The USB connection will show up as a virtual COM port on your PC. Select the appropriate COM port from the drop-down menu and click **Connect**.

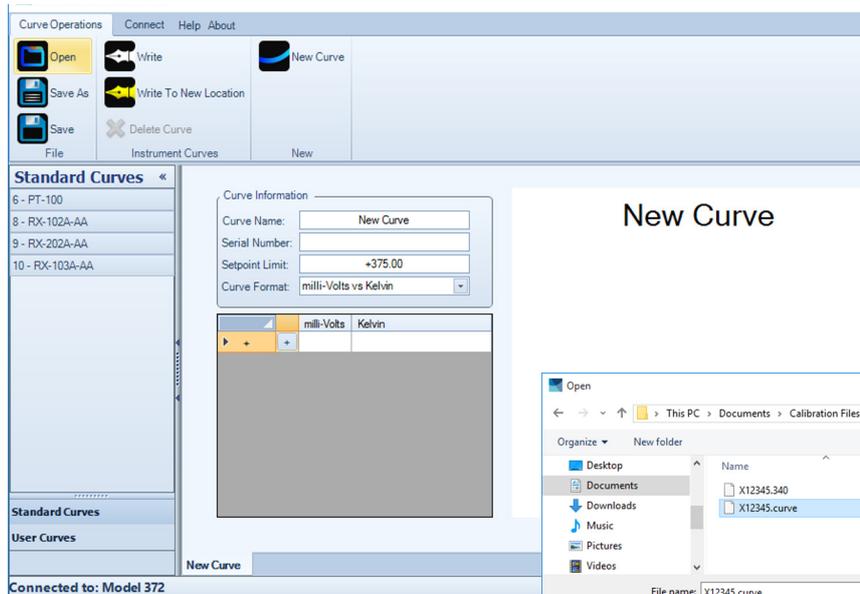


4. If you are not able to connect, make sure you have the correct COM port selected. You can do this by checking Device Manager:



If you are unable to see the Model 372 in this view, you may need to install the USB driver that can be found on the Lake Shore Software web page: <http://www.lakeshore.com/software/>.

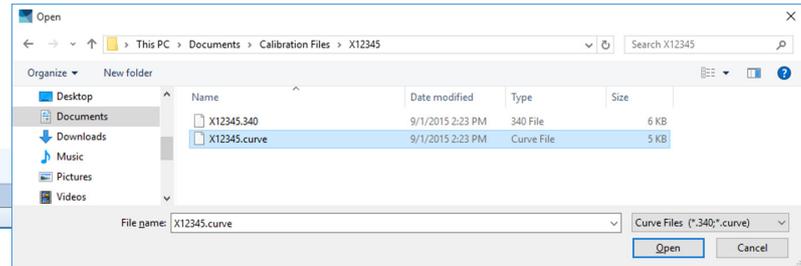
5. Load the sensor calibration file that matches the connected sensor by clicking the **Open** button and navigating to the appropriate file.



## New Curve

These calibration files can be found on the USB drive that was sent with the sensor, or downloaded from <http://cal.lakeshore.com>.

The Model 372 supports both .340 and .curve file formats, with .curve being the more modern format.



6. Once the curve is loaded, rename the curve (if desired), then click **Write To New Location** to store this curve on the Model 372.

The screenshot shows the 'Lake Shore Curve Handler' application window. The 'Write To New Location' button is highlighted in the 'Write' menu. The 'User Curves' panel on the left shows a list of curves. The main area displays a table of data for curve 'CX-1010-X12345' and a graph of Ohms vs Kelvin (Spline).

	Ohms	Kelvin	Curvature
1	30.221	330.058	1.93253
2	30.4472	326.06	1.85384
3	30.7962	320.077	1.73245
4	31.0997	315.047	1.63961
5	31.4113	310.039	1.54976
6	32.0627	300.047	1.38838
7	32.7577	290.037	1.24519
8	33.4971	280.049	1.11692

7. Click **OK** to store this curve on the instrument. You can store more curves in other locations, if needed.

The 'Select Curve' dialog box is shown, with a dropdown menu displaying '21 - User Curve'. The 'OK' button is highlighted with a dashed border.

8. Now that your sensor curve is loaded onto the Model 372, press the **Input Setup** (7) button and select Channel 01 (Measurement Input) to enter the configuration screen for the main measurement input. If you have a scanner connected between the Model 372 and sensor, you will see other options than what is displayed here.
9. Scroll down to Curve and select the curve that you just loaded onto the instrument.

```
Input Setup:
  Select Input:  A:  Input A
                [0] Channel 01
```

```
Input Setup: 1: Channel 01
Input Enabled: Enabled
Autorange:    Off
Change Pause: 3 s
              [0] None
Filter:       On
Filter Time:  3 s
Filter Window: 10 %
```

```
Input Setup: 1: Channel 01
Curve:      None
            06 PT-100
            08 RX-102A-AA
            09 RX-202A-AA
            10 RX-103A-AA
            [0] User Defined
```

10. Scroll down to Preferred Units and switch this setting to Kelvin. This step instructs the instrument to use the assigned curve to display an equivalent temperature reading, instead of the resistance measurement.



11. Press **Escape** to go back to the main screen, which will now display a temperature reading. You will notice that the resistance reading is still visible, displayed as Impedance on the right side of the screen. For more information, please see section 2.5.3 of the Model 372 user's manual.



This is just the beginning of what is possible with the Model 372, other activities include:

- Excitation Adjustment: see section 4.4 of Model 372 user's manual.
- Heater Setup: see sections 3.7 and 3.8 of the Model 372 user's manual.
- Display Customization: see section 4.3 of the Model 372 user's manual.
- Closed-loop Temperature Control: see section 4.6 of the Model 372 user's manual.

## Ethernet Utilities

When connecting the Model 372 via Ethernet, several utilities are available on the Model 372's embedded web server. Just type the IP address for the Model 372 into your browser to access these utilities.

See Chapter 6 of the Model 372 user's manual for further information on these utilities.

### Embedded Curve Handler™

The Embedded Curve Handler™ utility is provided for uploading temperature curve files to the Model 372. The utility is also capable of reading curves from the Model 372 and writing them to a file for storage, or manipulation in a third party program. The Embedded Curve Handler™ supports standard Lake Shore temperature curve files in the “.340” file format, and the Microsoft Excel® “.xls” (Excel® 97 through 2003) file format. Curve files are provided with calibrated sensors purchased from Lake Shore in the “.340” file format.

### Embedded Chart Recorder

The embedded chart recorder utility is provided to allow users to easily acquire and chart data from the Model 372. The chart recorder utility can simultaneously chart and log any combination of sensor readings, control setpoints, and heater output data from the Model 372. A basic user interface is also provided for changing control parameters on the fly while acquiring data, allowing many basic experiments to be performed without ever having to write any custom software. Log files are stored in the Microsoft Excel® “.xls” format for easy data manipulation. Free utilities are available online for converting .xls files to comma separated plain text files (.csv) if Microsoft Excel is not available.

## Contacting Lake Shore

The Lake Shore Technical Support Department is staffed Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. EST, excluding holidays and company shut down days: <https://www.lakeshore.com/support/>.

The Lake Shore Forum is also a great place to look for solutions, to post issues, and to share successes: <https://forums.lakeshore.com/>.

For further documentation and information, please see <http://www.lakeshore.com/372>

### Lake Shore Technical Support

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