OMRON

Infrared Thermosensor
ES1-N-series

# Data Acquisition Software ES1-TOOLS

## Operation Manual

ES1-L□-N
ES1-L□L-N



H234-E1-02

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# Introduction

This manual describes the operating procedures of ES1-TOOL Data Acquisition Software.
Keep this manual in a safe place where it will be available for reference during operation.
You can download the PDF file of the manual from your OMRON website.
(http://www.ia.omron.com)
When you use the ES1-TOOLS, refer also to the instruction manual for the ES1-N-series Infrared thermosensors.

## Special Information

Special information in this manual is classified as follows:

**Precautions for Correct Use**

Precautions on what to do and what not to do to ensure proper operation and performance.

**Additional Information**

Additional information to read as required.
This information is provided to increase understanding or make operation easier.

## Version of Windows in operating

This manual indicates operating in Windows 7. When operating in a different version, procedures is different.

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# Precautions for Safe Use

- In addition to this manual, also refer to the Instruction Manual (CODE: I2006391000 - 3200717651 - GZ0000492904) for the Infrared Thermosensor.

# Precautions for Correct Use

- Use the ES1-TOOLS only on the specified operating system. The ES1-TOOLS may malfunction on other operating systems.
- Do not use the ES1-TOOLS near motors, power lines, or other sources of electrical noise. Noise may enter on communications cables, possibly causing malfunctions.
- Do not run any other software applications while you are using the ES1-TOOLS. Doing so may cause communications errors may occur.

# System Requirements

- This software functions on personal computers or tablets installed with either the 32-bit or 64-bit version of Windows 7, Windows 8, Windows 8.1, and Windows 10.
- At least 1 GB of hard disk space is required to install this software.
- A screen resolution of at least 1280 dots × 800 dots (100% scaling ratio) is recommended.

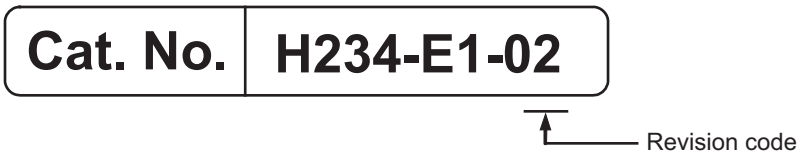
# Related Instructions Manual

The following instructions manual is related to the ES1-N-series Infrared Thermosensors. Use this manual for reference.

| Manual Number | Name | Description |
|---|---|---|
| CODE: I2006391000 - 3200717651 - GZ0000492904 | ES1-L□-N, ES1-L□L-N Infrared Thermosensor Instruction Manual | Describes the operating and handling procedures of the ES1-N-series Infrared Thermosensors. |

# Revision History

A manual revision code appears on the front and back covers of the manual.




| Revision code | Date | Revised content |
|---|---|---|
| 01 | July 2017 | Original production |
| 02 | October 2019 | • Obtained the catalog number.<br>• Corrected mistakes. |

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## Introduction



## Section 1 Outline

## Section 2 Preparation



## Section 3 Basic Operation



## Section 4 Device Setup Mode

## Section 5 Data Acquisition Mode



## Section 6 Specifications

# 1 Outline

ES1-TOOLS Data Acquisition Software is a dedicated software for the infrared thermosensor ES1-N-series.
When installed on a computer that is connected to the ES1-TOOLS via USB, this software is used to view and change ES1-TOOLS settings, verify operation, and acquire data.

# 2 Preparation

## 2-1 Installation

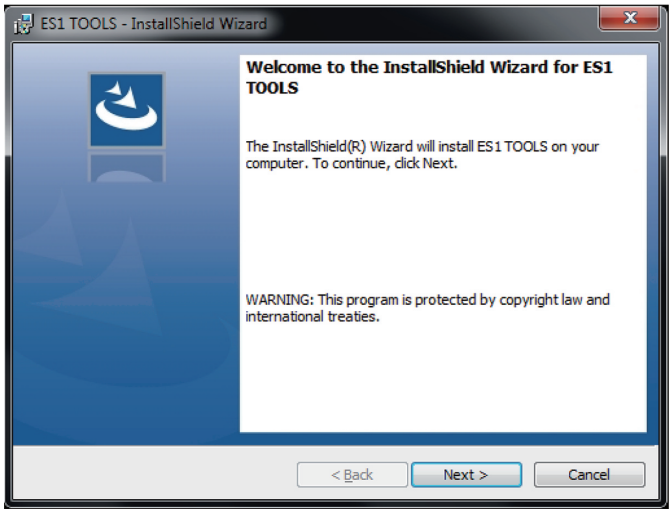


### Procedure

1. Access the OMRON download website (http//www.ia.omron.com/).
2. Download and unzip either the 32bit.zip file or 64bit.zip file that contains the ES1-TOOLS Data Acquisition Software.

   Download the 32-bit version of the software when using 32-bit Windows. Download the 64-bit version of the software if using 64-bit Windows.
   A folder named 32bit or 64bit will be created after the file is unzipped.
3. Double-click the Setup.exe file in the 32bit folder or 64bit folder to start the installation.

   ES1-TOOLS shortcut icon is created at the desktop.
   ES1-TOOLS is added under the OMRON folder in Start Menu.



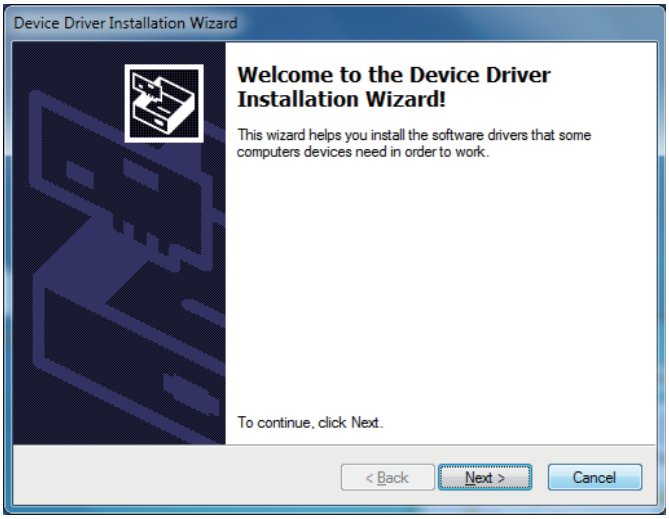

4. Click Finish to complete the installation.

# 2-2 Virtual COM Port Driver Installation

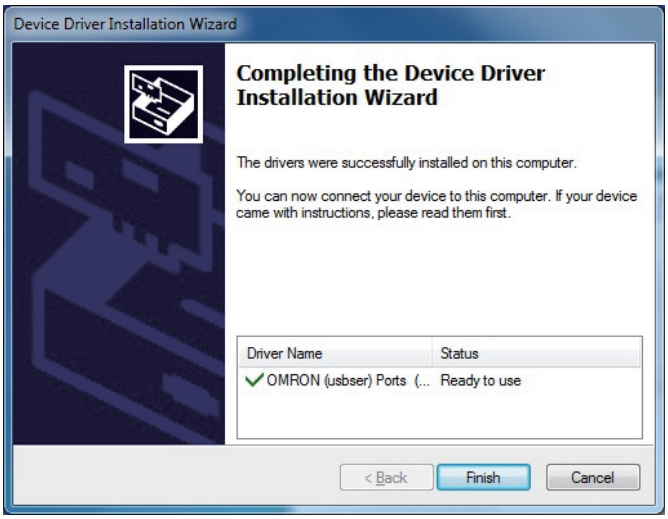
## Procedure

1. Access the OMRON download website (http//www.ia.omron.com/).
2. Download and unzip the driver.zip file that contains the ES1-N-series virtual COM port driver.

   A folder named driver will be created after the file is unzipped.
3. Double-click the Setup.exe file in the driver folder to start the installation.




The following dialog box is displayed if the driver is installed normally.




4. Click the **Finish** Button to complete the installation.

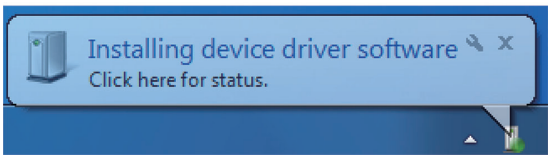
# 2-3 Connecting ES1-N-series

Connect the ES1-N-series Infrared Thermosensors to a Computer with a USB cable. Up to the eight sensors can be connected.
The devices can be operated by the USB bus power, eliminating the need to connect an external power supply.
However, multiple ES1-N-series or other USB devices are connected to USB hub causes power shortage. Use a self-powered USB hub that takes external power supply (e.g. AC power).

**Precautions for Correct Use**

When operated by USB bus power only, performing the current output test is not available. If you need to perform the current output test, also connect an external power supply.

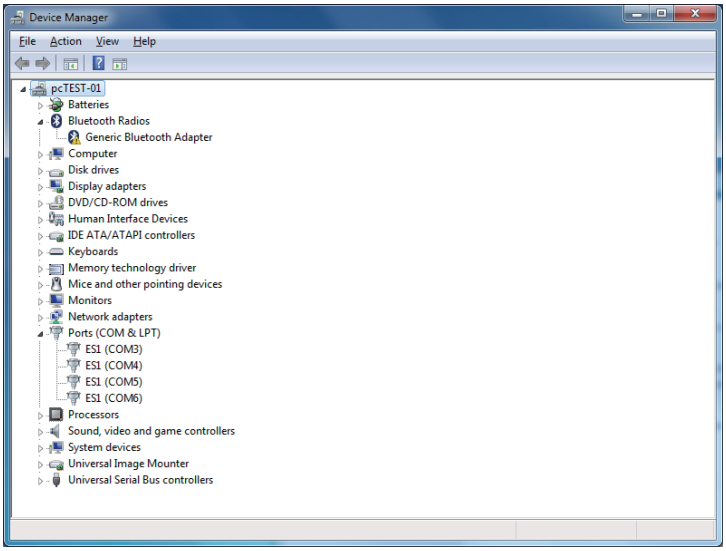
The following dialog box is sometimes displayed to confirm the connection with a ES1-N-series after you install the ES1-TOOLS. (This dialog box sometimes does not appear.)




The ES1-N-series connection status can be checked in Windows Device Manager.

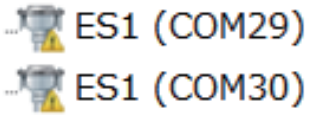
- **Windows 7 procedure**

  Open the Control Panel from the Windows Start Menu and then select Ports (COM & LPT) from the Device Manager.
  The following figure shows a system configuration in which four ES1-N devices are connected to COM ports 3 to 6.



**Precautions for Correct Use**

- The COM port number depends on the customer environment.
- If the ⚠ icon appears next to the ES1 device as illustrated in the figure below, or the connected ES1-N-series does not appear in device manager, wait a few moments and check the connection status again.



# 3 Basic Operation

## 3-1 Program startup

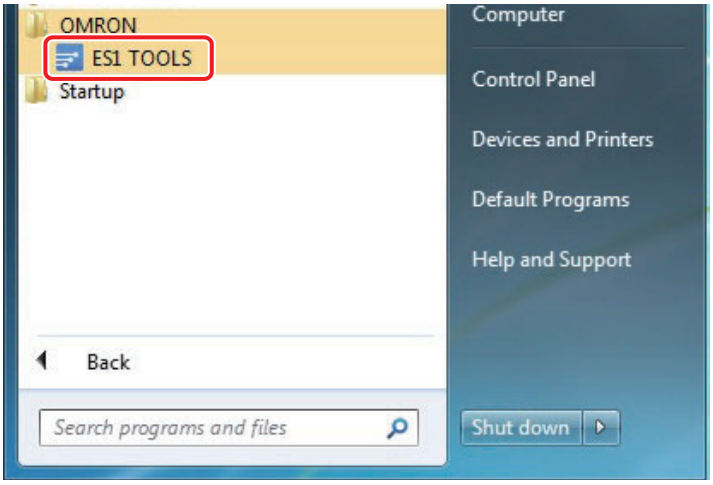


### Starting from the desktop

Double-click [ES1-TOOLS] icon.

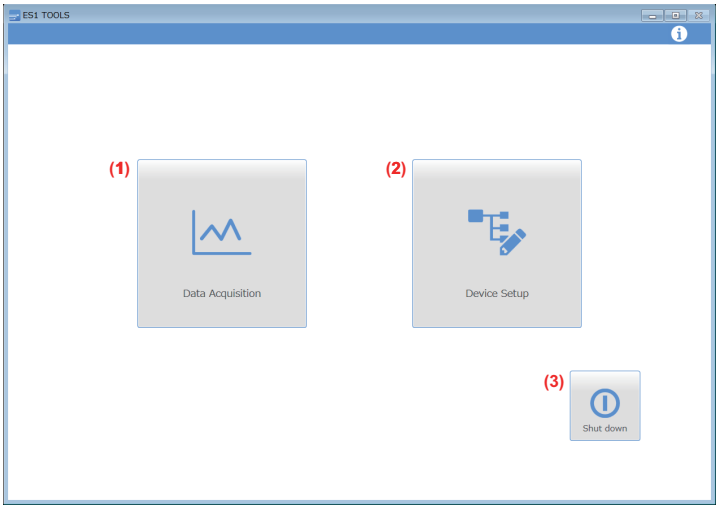

### Starting from the Start Menu

- **Windows 7 procedure**
  Select [ES1-TOOLS] under the [OMRON] folder.



# 3-2 Mode selection

Starting the programs displays the Mode Selection Window.




## ● List of Mode Selection Window Buttons

| Number | Button name | Description |
|---|---|---|
| (1) | Data Acquisition | Click the **Data Acquistition** Button to the data acquisition mode and displays the Data Acquisition Window.<br>The data acquisition mode acquires temperature data. |
| (2) | Device Setup | Click the **Device Setup** Button to the device setup mode and displays the Device Setup Window.<br>The device setup mode can view and change the device setting and verify operation. |
| (3) | Shut down | Click the **Shut down** Button closes the Mode Selection Window. |

# 3-3 ES1-TOOLS setup - Device setup mode



Click the **Device Setup** Button in the Mode Selection Window to open the Device Setup Window.

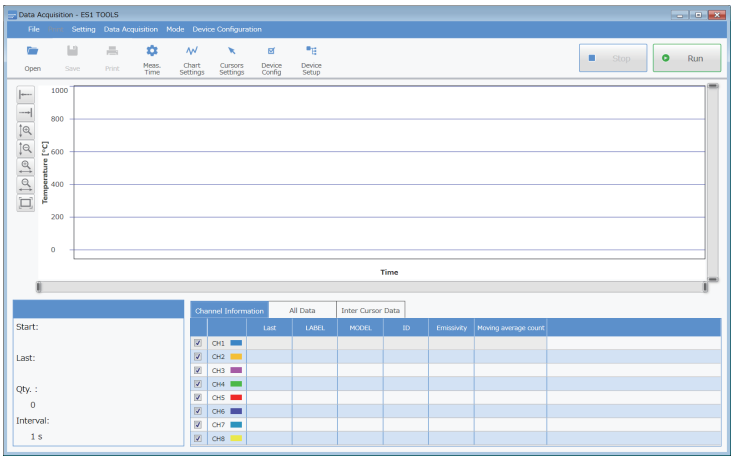

The following operations can be performed at the Device Setup Window.
Refer to *Device Setup Mode* on page 4-1 for more information.

- View and change labels and IDs
- View and change settings
- Emissivity automatic adjustment
- Read and display temperature measurement results in chart format
- Current output test

Click  in the upper-right corner of the Window to return to the Mode Selection Window.

# 3-4 Temperature data acquisition - Data acquisition mode

Click the **Data Acquisition Button** in the Mode Selection Window to open the Data Acquisition Window.




Temperature data can be acquired from up to eight ES1-N-series devices, and measurement results can be saved or loaded in the Data Acquisition Window.
Saved data can be loaded into the software. The scale of displays and cursor position can also be changed.
Refer to *Data Acquisition Mode* on page 5-1 for more information.
Click  in the upper-right corner of the Window to return to the Mode Selection Window.

# 3-5 Exiting the program

Select Exit from the File Menu in either the Device Setup Window or the Data Acquisition Window to close ES1-TOOLS.

# 4 Device Setup Mode

# 4-1 Device selection

## Single ES1-N-series device connected to a Computer

The ES1-N-series label, ID, settings values, and temperature measurement results appear in the Device Setup Panel.

## Multiple ES1-N-series devices connected to a Computer

Labels and IDs of connected ES1-N-series devices appear in the Device Selection Panel.
Selecting and clicking on a device changes the background color to blue and displays the label, ID, settings values, and temperature measurement results in the Device Setup Panel.


**Additional Information**

- Channel numbers (CH) are assigned in order of device IDs.
- If a connected ES1-N-series device does not appear in Device Selection Panel, return to the Mode Selection Window and reconnect the ES1-N-series device, and then select the Device Setup Mode again.

# 4-2 Viewing and changing labels, IDs, and settings

## Viewing Labels, IDs, and settings

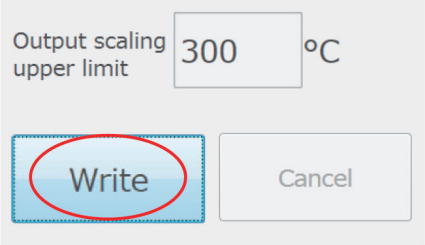
Select a device to display the label, ID, and settings in the device setup panel.
Refer to *4-1 Device selection* on page 4-1 for more information.

## Changing labels, IDs, and settings

### ● Procedure

**1** Select a device in the device selection panel, and click the **Edit** Button in the device setup panel.

The background color of input fields changes to white indicating that settings can be edited.
The **Edit** Button changes to the **Write** Button.




**2** Change the values in the input fields as desired and then click the **Write** button.

Settings for the selected device are updated.
Click the **Cancel** Button to discard any value and text changes. The original settings for the selected ES1-N-series device appear in the device setup panel.

## Details of the selected device

### ● Labels and IDs

Labels and IDs are text strings used to identify devices.
These text strings can be up to 30 single-byte alpha-numeric characters in length.
As the initial value of Labels are configured with the product model name, and IDs are configured with a sequence number from "#0001" to "#9999".
Channel numbers used in the device setup mode and the data acquisition mode are assigned in order of device IDs.

### ● Emissivity setting

The emissivity setting must be set in alignment with the emissivity of the object to reduce measurement error.
The emissivity setting can be configured up to three decimal points.
The configurable range is between 0.100 to 1.999. The default setting is 0.950.
Emissivity auto-configuration can be used when the temperature of the object can be clarified.
Refer to *4-3 Emissivity automatic adjustment* on page 4-4 for more information.

**Additional Information**

The default setting 0.950, which is appropriate for rubber plastic, paper, glass, ceramics, foods and various painted surface, is effective enough for accurate temperature measurements.

## ● Moving average count setting

The configurable range is between 1 and 1000.

The default setting is below.

- ES1-LP3-N/ES1-LP10-N, ES1-LW50-N/ES1-LW50L-N: 10 times (0.2 s)
- ES1-LW100-N/ES1-LW100L-N: 50 times (1.0 s)

The ES1-N-series device calculates temperature and updates current output repeatedly ever 0.02 seconds.

As such, the moving average count is for one second when the moving average count setting is set to 50.

The moving average count applies to both current output and USB temperature data.

Increasing the moving average count setting reduces the output fluctuation width, but slows the response speed.

## ● Current output scaling (Output scaling lower/upper limit)

Output scaling lower limit of current output is equivalent to 4 mA, and the output scaling upper limit of current output is equivalent to 20 mA.

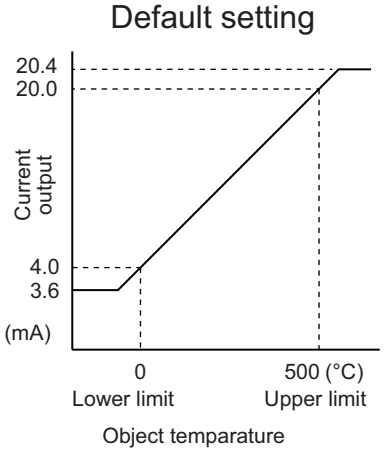
Values can be configured up to one decimal point.

**Precautions for Correct Use**

Even if the settings are within the allowed setting range, the difference between the output scaling lower limit and upper limit settings cannot be less than 10°C.

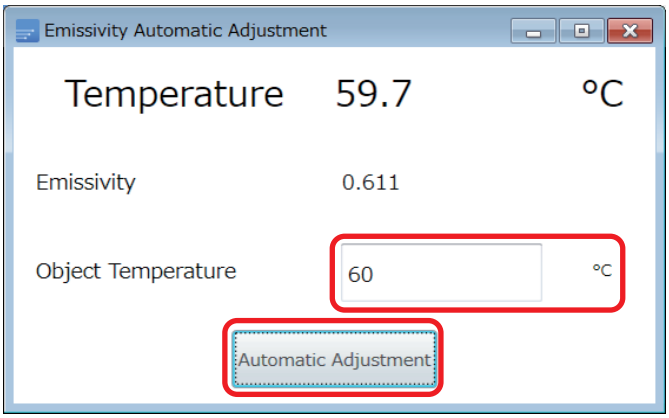
The following table describes the configurable ranges and default settings.

| Model | Setting Ranges | Default setting |
|---|---|---|
| ES1-LP3-N/ES1-LP10-N<br>ES1-LW50-N/ES1-LW50L-N | -50°C to 500°C | Output scaling lower limit: 0°C<br>Output scaling upper limit: 500°C |
| ES1-LW100-N/ES1-LW100L-N | -50°C to 1000°C | |



# 4-3 Emissivity automatic adjustment

Click the **Emissivity Automatic Adjustment** Button in the device setup panel to display the Emissivity Automatic Adjustment Window.




## Operating Procedure

***1*** As illustrated in the figure, enter the target temperature in the Object Temperature field and then click the **Automatic Adjustment** Button.

The Emissivity automatic adjustment process starts.
The Emissivity automatic adjustment process takes four to five seconds to update the emissivity setting of the ES1-N-series device.
The Emissivity automatic adjustment process is canceled in the following scenarios.

- The difference in temperature between the ES1-N-series device and the object is less than 20°C.
- The temperature of the object is unstable.
- The temperature of the ES1-N-series device is unstable.

# 4-4 Saving and loading settings

Settings that were edited on a computer can be saved as XML files.

## Operating Procedure

1 Click the **Write** Button in the device setup panel, click the **Save** Button and then specify the file name and storage location.

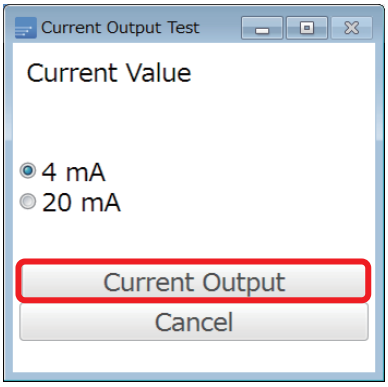
Click the **Open** Button to load the settings saved on a computer. Select the folder and file name to load and update the settings into the software.

# 4-5 Reading and displaying temperature measurement results in chart format

Temperature measurement results read from the ES1-N-series device can be displayed in numerical and chart format.
The temperature axis (vertical axis) on charts represents the current output range. Refer to *Current output scaling (Output scaling lower/upper limit)* on page 4-3.)
The scale of the time axis (horizontal axis) is in minutes and seconds.
The chart window can accommodate time axes of up to three minutes in length before the chart needs to be scrolled.

# 4-6 Current output test

Click the **Current Output Test** Button in the Device Select Panel to display the Current Output Test Window.




**Additional Information**

The current output of 4 to 20 mA adjusted with the infrared thermosensors contain in the following errors.

- Measurement error of an ammeter used for current output adjustment
- Temperature error due to ambient temperature difference between the during current output adjustment environment and the user operating environment
- Conversion error during digital processing

In addition, the devices such as temperature controllers that are 4 to 20 mA as the output destinations have measurement errors.
You can cancel the display error on the devices such as the temperature controller by adjusting 4 mA at the zero point and 20 mA at the span of the ES1-N-series infrared thermosensors using the ES1-TOOLS.

## Operating Procedure

***1*** Click the **Current Output** Button.

Current selected with radio button is output.
The **Current Output** Button changes to the **Stop Current Output** Button.
Click the **Stop Current Output** Button to stop the current output test and return to normal operation.
Click the **Cancel** Button to return to normal operation even during testing and close the Current Output Test Window.

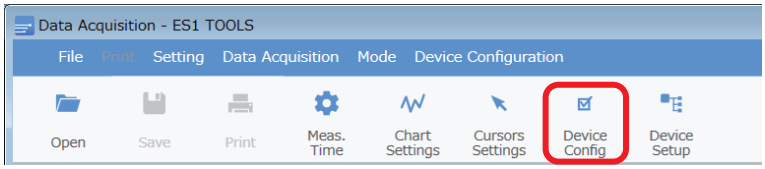
# 5 Data Acquisition Mode

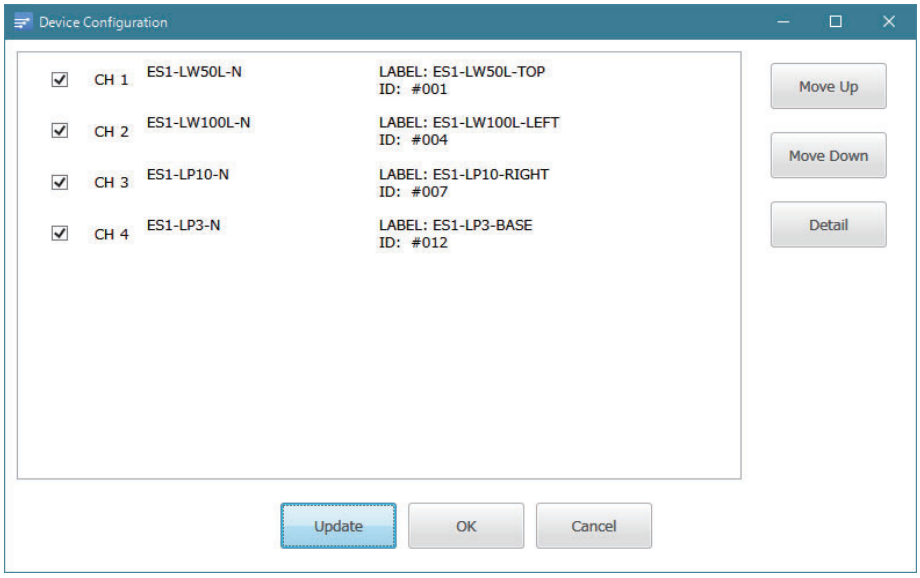
# 5-1 Preparation for measurements

## Device configuration

### ● Operating procedure

**1** Click the **Device Config** Button in the Data Acquisition Window to display the Device Configuration Window.




The last connection state appears.
Click the **Update** Button to display the latest state of connections in order of device IDs.

**2** Click the check boxes to select the device for use in the measurement.

Use the **Move Up** and **Move Down** Buttons to change channel assignments.

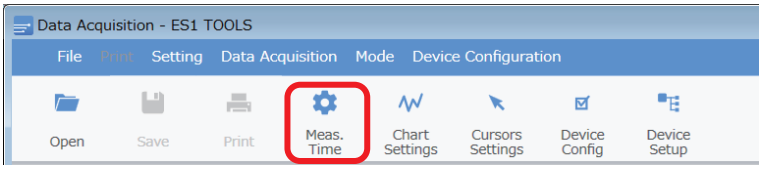
**3** Click the **OK** Button to close the Device Configuration Window.

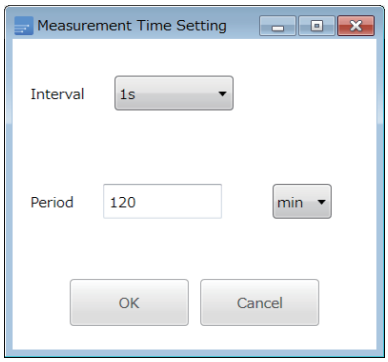
The Data Acquisition Window is updated with the selected device.
Click the **Cancel** Button to discard device selection and channel assignments and close the Device Configuration Window.

## Measurement time settings

### ● Operating procedure

**1** Click the **Meas. Time** Button in the Data Acquisition Window to display the Device Configuration Window.



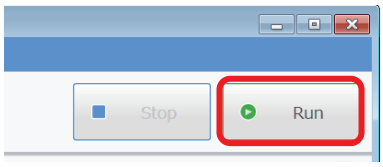

**2** Set the measurement interval and measurement period.

Select Interval by selecting from 1, 2, 5, 10, 20, 30 seconds (s) and 1, 2, 5, 10 minutes (m).
Configure Period by selecting a unit of measure and entering an integer value.
Period cannot be configured with a value that would result in a value exceeding 10000 if divided by the measurement interval.

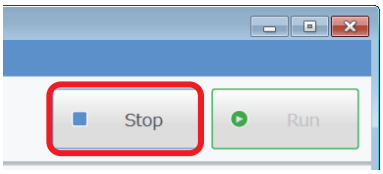
**3** Click the **OK** Button to close the Measurement Time Settings Window.

# 5-2 Starting and stopping measurements

Click the **Run** Button in the Data Acquisition Window to start measurement.




The measurement stops when the **Stop** Button is clicked or after the measurement is finished.



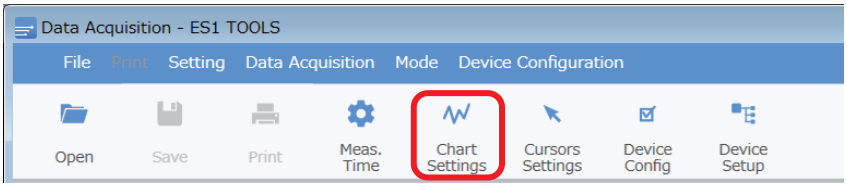

**Precautions for Correct Use**

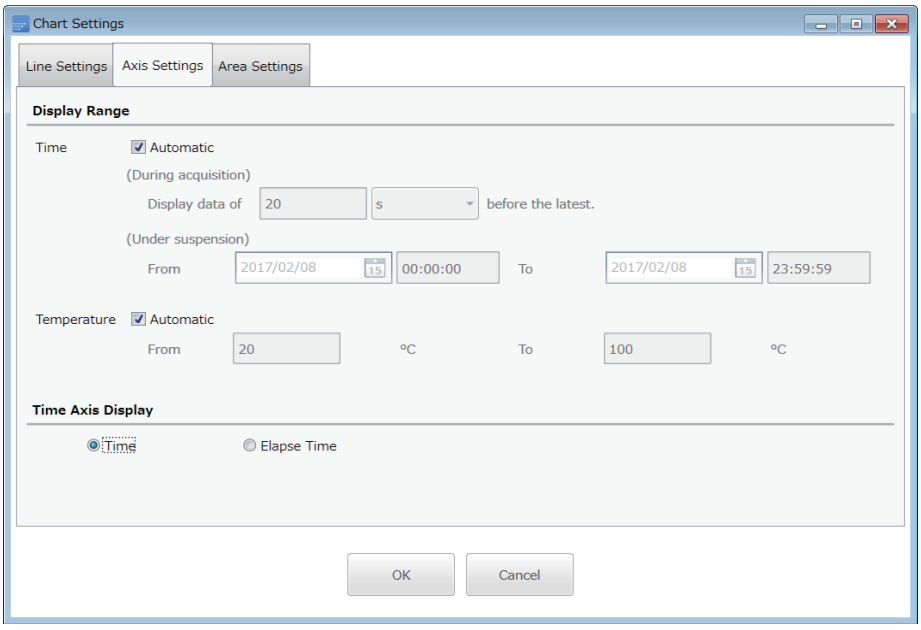
- When the USB cable is disconnected during the measurement, the measurement stops with error message.
- If the connection of the device is changed, reconnect the USB cable and operate the device configuration procedure again. You can not click the **Run** Button until the latest state of connections is displayed on the Device Configuration Window. (Refer to *Device configuration* on page 5-1.)

# 5-3 Settings

## Chart settings

Chart settings including the temperature axis and time axis scales, chart colors, and line types can be changed at any time before, during, or after the measuring process.
Click the **Chart Settings** Button to open the Chart Settings Window.

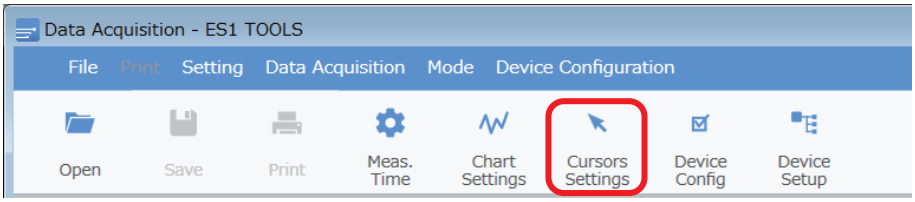


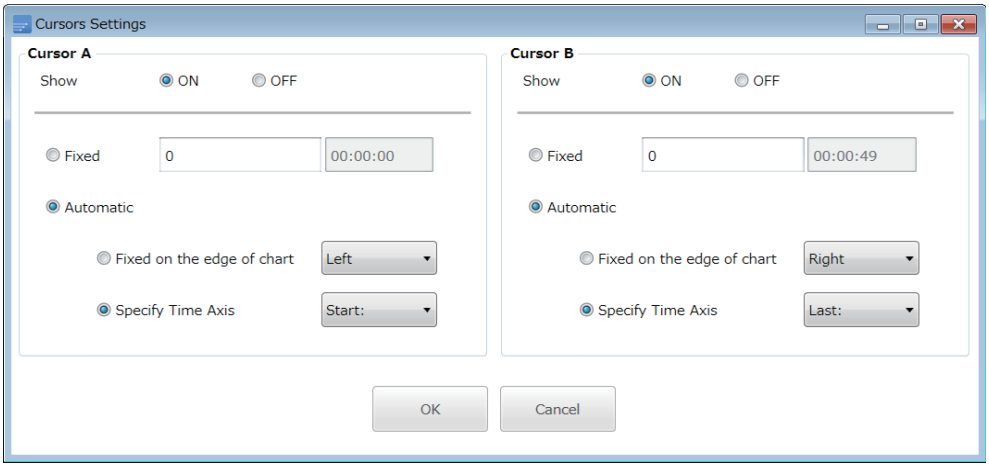




| Tab name | Setting item |
|---|---|
| Line Settings | Line colors and line types of charts |
| Axis Settings | Background colors, peripheral colors, and grid colors of charts |
| Area Settings | Time and temperature axis settings for charts |

## Cursors settings

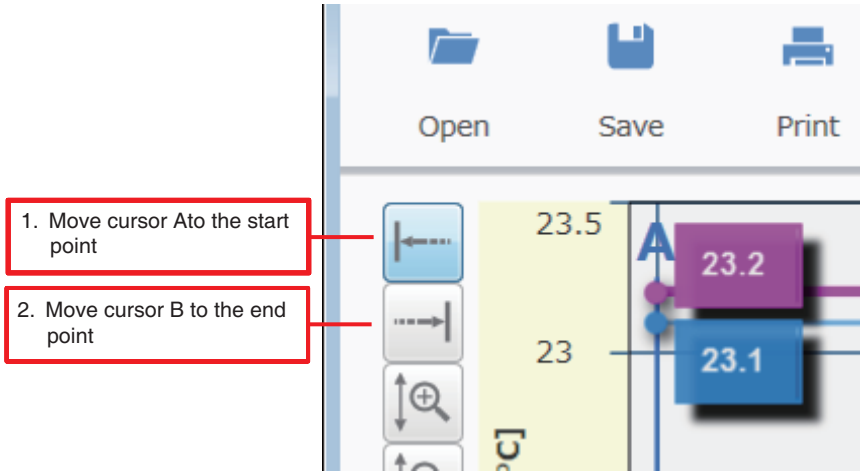
Click the **Cursors Settings** Button in the Data Acquisition Window to the Cursors Settings Window. The Cursors Settings Window is used to show and hide cursors A and B and set the display position.



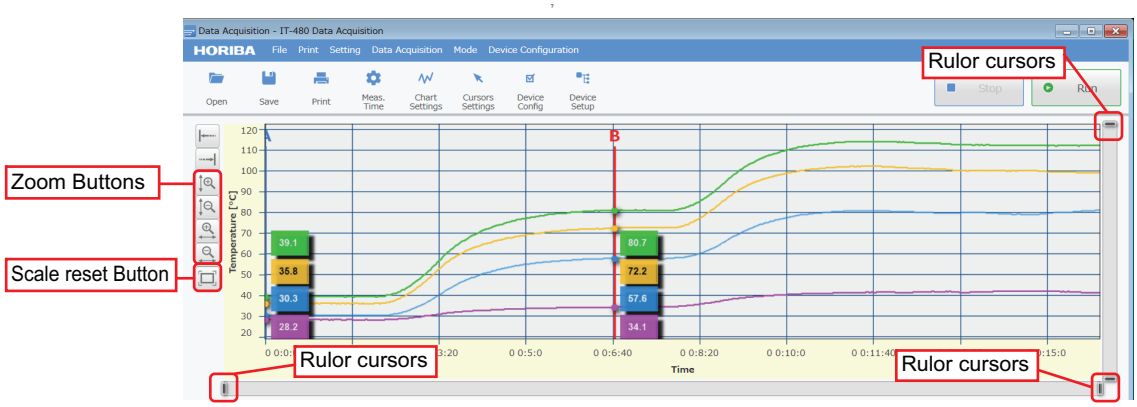

Use a mouse to drag the cursor on the chart or click the **Move Cursor** Button to move the cursor.

- Click the Button labeled as 1 in the figure to move cursor A to the start time of measurements.
- Click the Button labeled as 2 in the figure to move cursor B to the end position of the data.



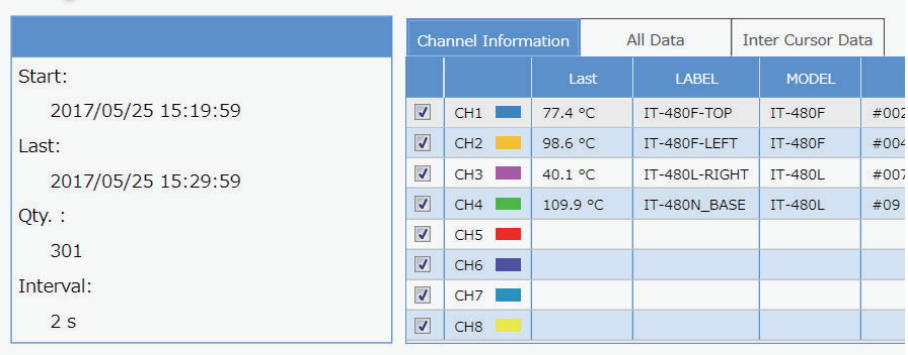
## Changing the display scale of charts

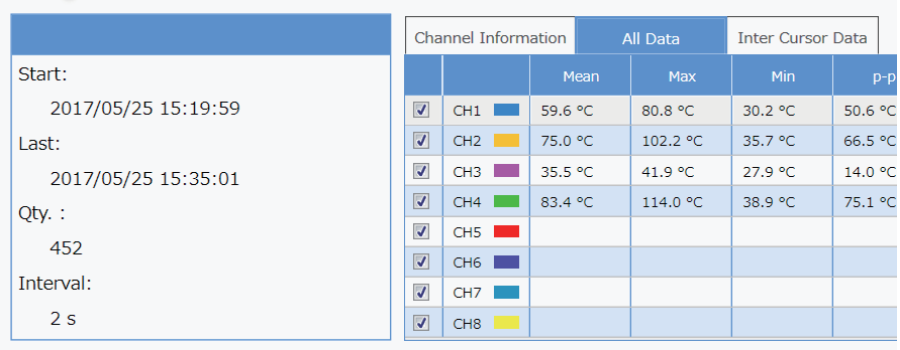
Click the **Zoom** Buttons or drag the ruler cursors to change the display scale of the time and temperature axes in the chart.
Click the **Scale reset** Button to reset the display scale in the chart.

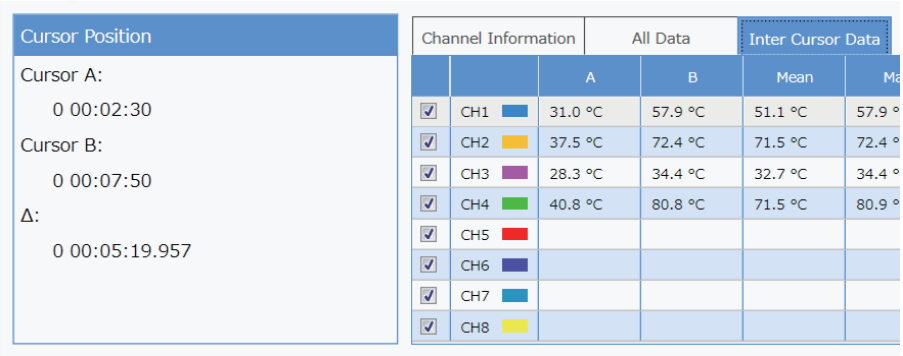


## Displaying channel information, all data, and inter cursor data

Channel information, all data, and inter cursor data appear in the lower half of the Data Acquisition Window. The display of channel information, all data, and inter cursor data is changed via their corresponding tabs.




| Tab name | Display item |
|---|---|
| Channel Information | Label, models, and settings of the device connected to each channel |
| All Data | Minimum, maximum, and average values of all data of each channel from measure start to finish |
| Inter Cursor Data | Minimum, maximum, and average values of each channel for the range between cursors A and B |

### ● Changing font sizes

Moving the cursor over and right-clicking the mouse on any value displayed in each tabs. Font sizes can be changed by selecting a font size option from this list.

# 5-4 Saving and loading data

## Saving and loading measurement results

Measurement results can be saved in the proprietary format of this software (extension: .itb ) or exported as CSV file or Excel file.

### ● Saving in the proprietary format

- Select Save from the File Menu
- Click the **Save** Button

### ● Exporting data as CSV file or Excel file

- Select Export (CSV/Excel) from the File Menu

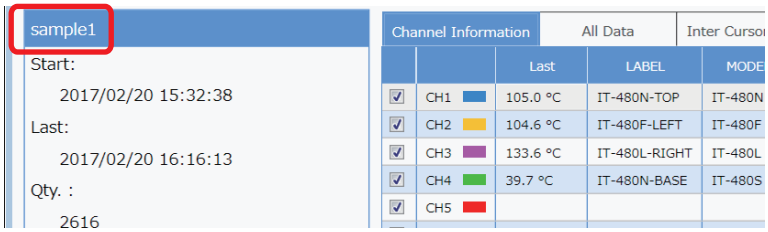
### ● Loading files save in the proprietary format (.itb extension)

- Select Open from the File Menu
- Click the **Open** Button

### ● Display of file names

When measurement data is saved or a measurement data file is opened, the file name appears to the left side of the Channel Information and All Data tabs.

The following figure shows an example in which measurement data were saved to a file named "sample1".




## Saving and loading measuring conditions

Measuring time settings files have an extension of "itc".

### ● Saving in the proprietary format

Select **Save Measuring Time Settings** from the File Menu.

### ● Saving in the proprietary format

Select **Open Measuring Time Settings Files** from the File Menu.

# 6 Specifications

| Item | Minimum | Maximum | Remarks |
|---|---|---|---|
| Number of connected devices | 1 | 8 | --- |
| Data acquisition cycle | 1 second | 10 minutes | Available options:<br>1, 2, 5, 10, 20, and 30 seconds<br>1, 2, 5, and 10 minutes |
| Number of retrievable data | --- | 10,000 data | Per channel |
| Measuring time | --- | 100,000 minutes<br>equivalent to 69.4 days | 10-minute data retrieval cycle |

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