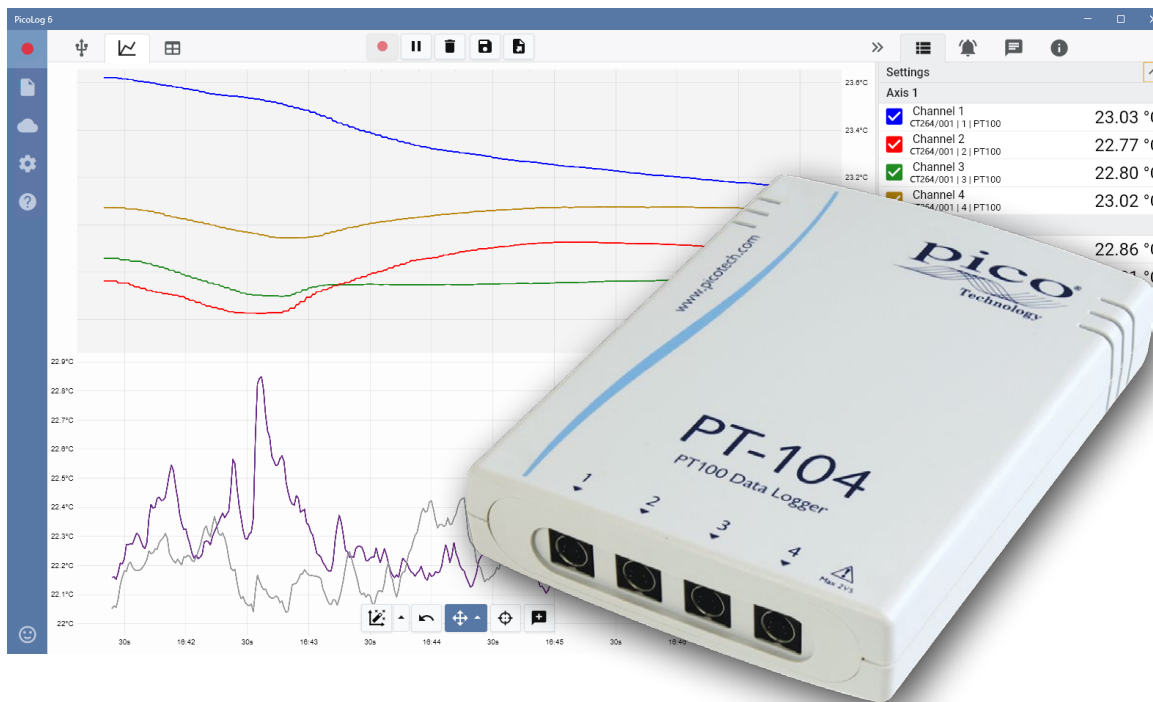# PT-104 Data Logger
High-accuracy platinum resistance data logger

The ultimate in **resolution** and **accuracy**

0.001 °C   **0.015 °C**

Measures and records up to 4 platinum resistance thermometers

Also measures voltage and resistance

Free PicoLog Cloud® and PicoSDK® software

USB interface ensures easy installation

Ethernet interface for remote operation

Powered by USB port or Power-over-Ethernet (PoE)

Multiple units can be run on a single PC

PT-104 PRT Data Logger

Flexible: measures temperatures with either PT100 or PT1000 sensors, as well as resistance and voltage.

Adaptable: can measure and record temperatures ranging from −200 to +800 °C.

Stable: Instead of voltage references, which tend to drift with temperature, the PT-104 uses high-precision reference resistors for improved stability.

Expandable: Use up to 20 units simultaneously on one PC.

The ultimate in portability

With both USB and Ethernet interfaces the PT-104 can be used in a variety of situations. If you need a portable solution that can be used at various locations and is fast to set up and use, simply connect your laptop to the PT-104 by USB. Need to monitor a situation over a period of hours or days, or from a remote location? Plug your PT-104 into a spare port on your network and then access it remotely either from your LAN or over the internet (using Power over Ethernet (PoE) technology means that you don't even need a separate power supply).

Ethernet connectivity is only supported in PicoLog under Windows operating systems.
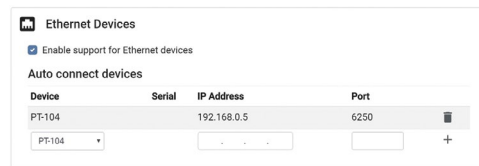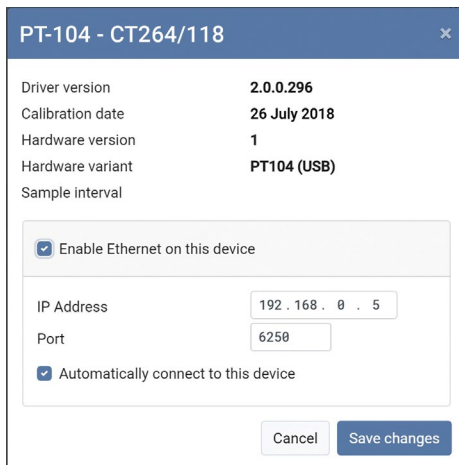
Accuracy and resolution

Although accurate temperature sensors are widely available, it has been difficult to take advantage of them due to errors caused by the measuring device. The PT-104 however, is inherently accurate due to its innovative design. Rather than relying on voltage references (which tend to be temperature sensitive) it uses 'reference' resistors which are extremely stable (low temperature coefficient and drift). The exact value of each resistor is stored in an EEPROM to provide the ultimate in accuracy (yearly recalibration is recommended). A high-performance 24-bit ADC is used to achieve the 0.001 °C resolution.

Mini-DIN sockets (4)

Rear panel connections and indicators

A: Ethernet port

B: USB port

C: Ethernet Data indicator

D: Ethernet Link indicator

E: Power/Status indicator

Front panel connections

4 x mini-DIN sockets for the connection of compatible platinum resistance thermometers or the optional screw terminal adaptor.

Temperature

The PT-104 measures temperature using platinum resistance thermometers (PRTs). Both common industry standards (PT100 and PT1000) are supported. The unit is compatible with two, three and four-wire sensors (four-wire PT100 sensors are recommended for best accuracy). A wide range of PT100 sensors are available for use with your PT-104.

Resistance

When measuring resistance, the PT-104 uses a four-wire circuit to give the greatest possible accuracy. Two resistance ranges are available (0 to 375 Ω and 0 to 10 kΩ). The unit is calibrated for 0 to 375 Ω so this range should be used for best accuracy.

Voltage

For voltage measurements, each input connector can be treated as a differential input with ground, or two single-ended inputs. Both inputs must be zero volts or above, though it does not matter which input has the higher voltage.

Two voltage ranges are available (0 to 115 mV and 0 to 2500 mV). For the most accurate measurements use the 0 to 2500 mV range.

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PicoLog Cloud software – straightforward from the start

PicoLog is a complete data acquisition software package for the PT-104 data logger, and is compatible with Windows, macOS, Linux and Raspberry Pi OS. With its clear and user-friendly layout, ideal for use with a mouse or a touchscreen, PicoLog allows you to set up the logger and start recording with just a few clicks of the mouse, whatever your level of data logging experience. Set up simple or advanced acquisitions quickly, and record, view and analyze your data with ease.

Device settings, Graph and Table
Easily set up and adjust acquisition and math channels on one or more data loggers and check their status at a glance. You can also select **Graph** view to see live data trend lines and **Table** view to see data in tabular form in real-time.

Capture controls
Separate **Record**, **Pause** and **Reset** buttons make it harder to press any of them by mistake.

Save and Export options
Copy your graph to the clipboard, save it as a PDF, export the raw data to a CSV file, or save the data and configuration as a robust .picolog database file.

Alarms
Set up alarms to alert you to a range of events. Alarms can take the form of sounds, visual notifications, graph annotations and more.

Notes & annotations
Add notes about the dataset as a whole or annotations about particular points on the graph.
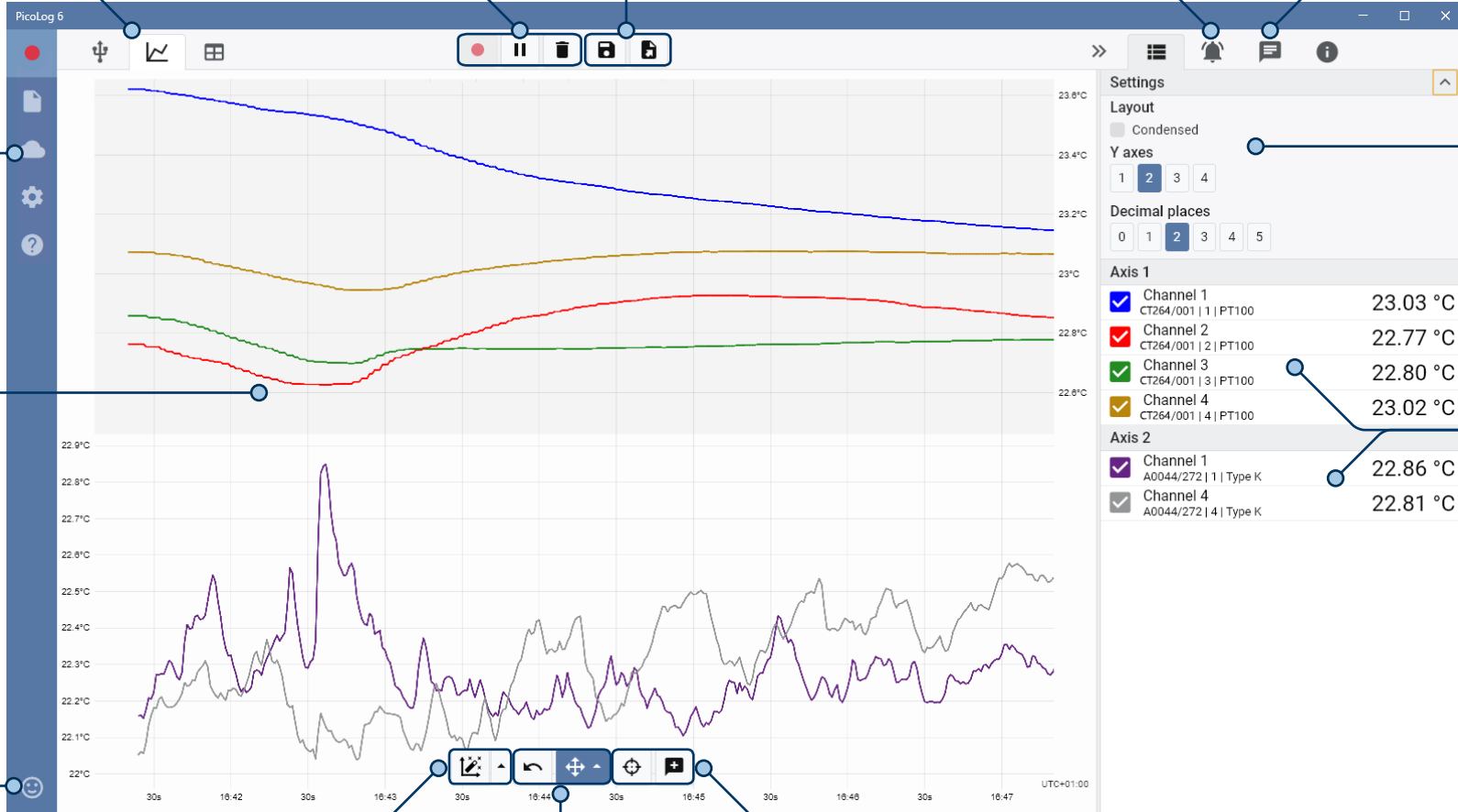
Cloud captures
Share your data for remote viewing.

Graph view
Display your data in real time, as it is collected, on up to four independent Y axes simultaneously: set them up by dragging and dropping the entries in the **Channels & Axes** panel on the right.

Give instant feedback
We want to hear from you! Click here to contact Pico with your comments.

Pullout information panel
Manage your channel and axis settings, alarms, notes and capture information in this easy-to-read layout. Close the panel to make more room for the capture graph, and reopen it at any time.

Multiple devices
Log data on up to 20 devices at the same time. Here, two separate data loggers are in use: a PT-104 platinum resistance thermometer logger and a TC-08 temperature data logger.

Data view
Display all the data collected so far or keep the graph scale the same and pan along as new samples appear.

Pan and zoom controls
Zoom in, zoom out, zoom to a selection or pan through the data with these tools. If you make a mistake, just click **Undo**.

Cursors and annotations
Use cursors to highlight the data value and time at any point on the graph, or click **Add annotation** to mark that point with a text note.

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Introducing PicoLog Cloud

Building on the proven design of PicoLog 6, PicoLog Cloud is a free upgrade that introduces many great features, expanding the capabilities of your Pico data logger. Whether you're an established user or a newcomer, you will benefit from the following new additions:

- Live captures streamed directly to the new PicoLog Cloud
- Secure and reliable storage
- Viewing of live and saved captures from a remote computer running PicoLog Cloud, anywhere in the world
- Viewing of live and saved captures on any device (smart phone, tablet, PC) using an internet browser
- Free PicoLog Cloud account
- Compatibility with all current USB PicoLog loggers and PicoScope real-time oscilloscopes
- Straightforward setup with no network settings changes
- Continuous capture with or without network connection
- Source clients for Windows, Linux, macOS and Raspberry Pi OS

Stream live captures directly to the new PicoLog Cloud

In this update to PicoLog data logging software, your Pico data logger or oscilloscope not only captures to a local disk, but can now stream the capture directly to a secure online Cloud store. Did we mention our new cloud service is completely **free** for all new and existing customers?

This new major feature stays true to our vision of creating a data logging application with a simple user interface, and is equally straightforward for use by technical or non-technical users.

PicoLog Cloud is fundamentally the same application as before, but with enhancements to send the live capture data directly to your remote PicoLog Cloud space, and in addition view saved captures stored in the Cloud.

Secure and reliable cloud captures

Security is at the top of the priority list with PicoLog Cloud, and we use the latest and greatest security techniques and processes to ensure your online data and credentials stay safe. To achieve this, PicoLog Cloud employs an Identity Management Platform to manage the login authentication process, keeping your identity anonymized and your data captures safely yours.

In everyday terms, this means you log in with your email and password from one of the following email account providers: Microsoft, Apple or Google. If you don't have an account with one of those, you can create an anonymized account with another email address. To add an extra layer of security, make sure to use an email account that offers 2FA (two-factor authentication)

PicoLog Cloud storage is hosted on another industry-standard service known for excellent reliability and global access: Microsoft Azure. It means you can rely on quality of service (uptime) and multiple server locations back up your data against a server outage.

View live and saved captures anywhere in the world

Plugged into your PC or laptop, Pico's instruments have been harnessing the power of your computer's screen, processor, hard disk, keyboard and mouse for over three decades. But what if you can't be in the same room, factory, city or even country as your data-capturing equipment?

Now, PicoLog Cloud opens a window into your loggers and data, allowing other PCs to view and export your data from anywhere in the world. Of course, those PCs must be signed into your secure, personal PicoLog Cloud account to view any of your captures, live or saved.

To keep things simple and avoid making unwanted changes to a live capture, only the host PicoLog Cloud app can change the capture settings.

PicoLog Cloud®

Can I view captures on my smartphone or tablet?

PicoLog 6 has always been based on a framework that uses Chromium (Google's open-source browser) and Java, meaning it is already "browser ready".

It couldn't be easier to use! Navigate to the URL picolog.app in any browser and log into your PicoLog Cloud account. This gives you instant and secure access to all your live and saved Cloud captures on any internet-connected smart device, anywhere in the world. Some browsers such as Google Chrome and Microsoft Edge make it possible to "install" PicoLog Cloud as a PWA (progressive web app), so it will be available on your home screen or desktop and work like a regular app.
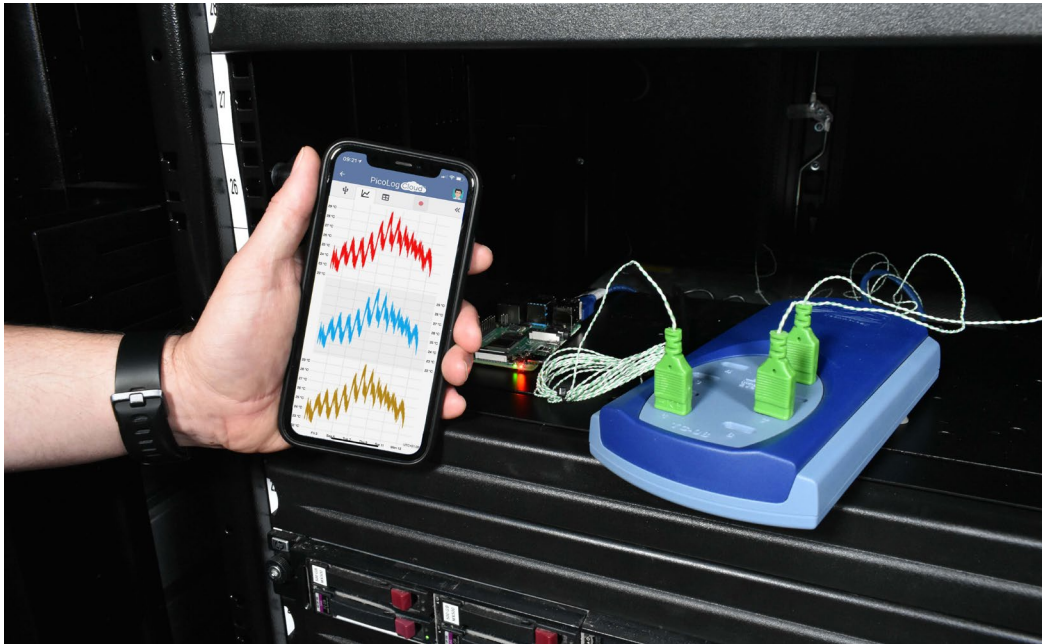
Continuous capture, with or without network connection

Should your host PC lose network connection during a capture, PicoLog Cloud instantly switches to use the PC's own hard drive until the network connection is restored. Any missing data is promptly synchronized back to the Cloud.

As always, PicoLog 6 in local capture mode is compatible with all PicoLog data loggers and all PicoScope real-time oscilloscopes (with a sample rate limit of 1 kS/s). PicoLog Cloud is compatible with the same instruments, except that the sample rate is limited to 1 S/s per channel.

Stream live Cloud capture data to your application with an API

Transferring captured data from a data logger software application to a third-party application while the capture is running has been one of the longest outstanding customer feature requests, and had been very difficult to implement until now. With PicoLog Cloud data residing on a server, we've developed a simple server-side API that allows programmers to request the live data in batches which is returned in a human- and database-readable ASCII format.

This feature is particularly useful to users who want to add extra functionality such as emailing alarms or captures, adding logger data to existing databases, or displaying data in a different way: fill tanks, percentage bars, throttle gauges, large numerical displays and so on!

Once the Cloud capture is set up and acquiring data, you enable public sharing for that capture to generate an unsearchable URL containing a unique ID for that capture on the PicoLog.app server. The API contains just two calls:

- Basic setup, channel IDs, last recorded value and channel names.
- Request a block of capture data with start and end time parameters for the specified channel(s)

The API is server-side and sends raw data to your custom application or database, so no special software needs to be installed. Almost all relevant programming languages can call the API URL, and simple code examples are available.

Although PicoLog Cloud is limited to 30-day captures in Cloud capture mode before it overwrites the oldest data, you can use this API to transfer and back up your data to a local or online database of your own.
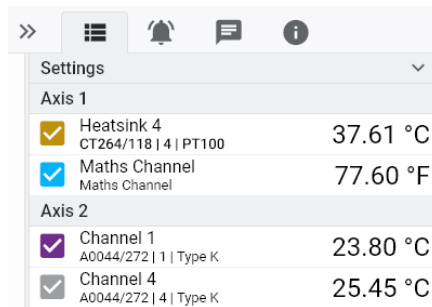
PicoLog Cloud capture specifications

- No limit to the number of stored captures
- Sample rate up to 1 S/s per channel in cloud mode
- Maximum capture duration is 30 days
- Capture can be set to continuous overwrite or stop after set duration
- Multiple host PicoLog Cloud captures can be used simultaneously on one user account
- View all your devices and captures from one place
- Remote clients can export into CSV, PDF and HDF5 files from live and saved captures

Math channels

Sometimes you need to use data from one or more measurement channels to graph and record a calculated parameter. You can use the PicoLog equation editor to set up simple math channels such as A−B or more complex functions such as log, sqrt, abs, round, min, max, mean and median.
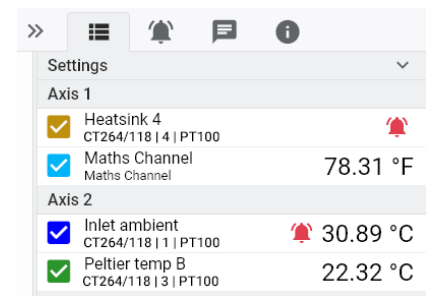
PicoLog treats math channels like any other channel, so you can still set alarms and annotate them.

Intuitive logger and channel setup

The **Devices** view lets you set up a multichannel acquisition system in a simple way, with the option to use multiple different Pico data loggers simultaneously. PicoLog shows you an image of each connected device, so you can quickly and easily enable or disable channels and set up their properties.

On the right, you can see the device setup including two data loggers, a PT-104 and TC-08.

Alarms

In PicoLog, you can set up alarms to alert you to various events. These can be as simple or as complex as you like: alarms can trigger on a signal threshold or disconnection of the data logger, or you can set up a logic expression of your own. Alarms can play sounds, display visual alerts, run applications or mark when the event occurred on the graph.

Robust file format

At the heart of PicoLog is the file system, which stores live capture data directly to a robust database, rather than to a single file that is vulnerable to corruption and data loss. If the computer is shut down and rebooted, PicoLog will only lose the data during the outage – saving resumes when you restart the software.

This file system also means that the size of the dataset you can capture is virtually unlimited – the only restriction is the size of your computer's hard disk!

The .picolog file format is compatible across all operating systems, and there is no need to set up a file to save to before the capture is complete. You can also save mid-capture if you wish to share the data collected so far. Since anyone can download and install PicoLog for free, you can easily share saved data with co-workers, customers and suppliers for offline post-analysis.

PicoSDK®

Pico's software development kit, PicoSDK, is available free of charge and allows you to write your own software and interface to third-party software packages.

Pico also maintains repositories of example code on GitHub, showing how to use PicoSDK with software packages such as Microsoft Excel, National Instruments LabVIEW and MathWorks MATLAB, or with programming languages including C, C++, C# and Visual Basic .NET.

PicoSDK and the *PT-104 Programmer's Guide* are available to download.

Try the PicoLog software today!

PicoLog's built-in demo mode allows you to try out the full functionality of the software with a choice of virtual devices and simulated live data. You also can use PicoLog to view previously saved data, even with no device connected. Visit www.picotech.com/downloads and select **PicoLog Data Loggers** to get your copy.

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Specifications

Input/output			
Type	Temperature	Resistance	Voltage
Sensor	PT100, PT1000	n/a	n/a
Range	−200 to +800 °C	0 to 375 Ω 0 to 10 kΩ	0 to 115 mV 0 to 2.5 V
Accuracy (unit at 23 ±2 °C)	0.015 °C + 0.01% of reading	50 ppm at 100 Ω	0.4%
Temperature coefficient	5 ppm/°C	5 ppm/°C	100 ppm/°C
RMS noise with filter	0.01 °C	10 ppm	10 ppm
Resolution	0.001 °C	1 µΩ	0.156 µV
Overload protection	±30 V		
Number of inputs	4		
Converter resolution	24 bits		
Conversion time	720 ms per channel		
Input connectors	4-pin mini-DIN		
Input impedance			> 1 MΩ
Environmental			
Operating environment **Temperature range** **Humidity range**	0 to 70 °C (20 to 30 °C for quoted accuracy) 20 to 90 %RH, non-condensing		
Storage environment **Temperature range** **Humidity**	−20 to +80 °C 5 to 95 %RH, non−condensing		
Physical properties			
Dimensions	184 x 135 x 36 mm (approx 5.31 x 7.24 x 1.42 in)		
Weight	350 g (approx 12.3 oz)		
General			
Software	PicoLog Cloud, PicoSDK Example code		
PicoLog user interface languages	English, French, Italian, German, Spanish, Chinese, Japanese, Korean, Russian		
PC requirements (PicoLog Cloud app)	Windows, macOS, Linux or Raspberry Pi OS. For supported OS versions, see PicoLog 6 Release Notes. Hardware as required by the operating system.		
PC requirements (viewer)	Any device with internet access, a web browser and a screen		
Additional hardware (supplied)	USB 2.0 cable, Ethernet cable, user manuals		
PC interface	USB 2.0 full speed (USB 1.1 and 3.1 compatible) and Ethernet		
Power requirements	Powered from USB port or power over Ethernet compatible port		

Compliance	European EMC and LVD standards FCC Rules Part 15 Class A RoHS compliant
Warranty	5 years

## Compatible platinum resistance thermometers

Pico Technology offers a range of platinum resistance thermometers (PRTs) for use with the PT-104. The PT-104 is compatible with all standard PT100 and PT1000 PRTs, which offer high accuracy, resolution and stability.

Order code	Model	Temperature	Accuracy	Cable length	Material
SE017	PT100 air probe	−75 to +250 °C	±0.15 °C @ 0 °C Class A	1 m	Stainless steel probe, PVC cable
SE018	PT100 air probe	−60 to +500 °C	±0.3 °C @ 0 °C Class B	1 m	Stainless steel probe, PVC cable
SE012	PT100 probe 1/10 DIN accuracy	−50 to +250 °C	±0.03 °C @ 0 °C 1/10-DIN	2 m	Stainless steel probe, PTFE cable
SE011	PT100 general purpose probe	−30 to +350 °C	±0.15 °C @ 0 °C Class A	2 m	Stainless steel probe, PVC cable
SE016	PT100 heavy duty probe	−60 to +500 °C	±0.3 °C @ 0 °C Class B	1 m	Stainless steel probe, PVC cable
SE041	PT100 high-temperature stainless steel braided cable probe	−60 to +500 °C	±0.3 °C @ 0 °C Class B	2 m	Wire-wound sensor, four-core nickel conductors insulated in high-temperature fiberglass with stainless steel overbraid
SE014	PT100 immersion probe	−75 to +250 °C	±0.15 °C @ 0 °C Class A	1 m	Stainless steel probe, PVC cable
SE015	PT100 insertion probe	−75 to +250 °C	±0.15 °C @ 0 °C Class A	1 m	Stainless steel probe, PVC cable
SE019	PT100 low cost probe	−75 to +260 °C	±0.15 °C @ 0 °C Class A	1 m	Stainless steel probe, PVC cable

Also measures voltage and resistance

The optional PT-104 screw terminal adaptor (order code PP660 plugs into one channel on the data logger and has a set of four screw terminals, allowing you to connect wire-ended PRT sensors and custom circuits with voltage or resistance outputs to the data logger without any need for soldering. The four screw terminals allow for wire sizes of 2.5 mm^2 solid, 1.5 mm^2 stranded and 14-22 AWG with a maximum input range of 0 to 2.5 V.
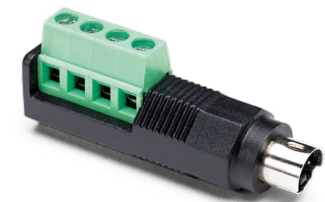
Ordering information

Order code	Product name	Description
PP682	PT-104 Platinum Resistance Data Logger	Four-channel temperature, resistance and voltage measuring data logger

Optional accessories

Order code	Product name	Description
PP660	Screw terminal adaptor for PT-104	Connection accessory for PT-104
MI106	USB 2.0 cable, 1.8 m**	Replacement Pico blue USB 2.0 cable, 1.8 m
TA268	USB 2.0 cable, 0.5 m**	Pico blue USB 2.0 cable, 0.5 m
CC006	Calibration certificate for RTD loggers	Calibration service offered by Pico on its resistance temperature detector data loggers.

**   Pico blue USB cables are designed and built specifically for use with Pico Technology oscilloscopes and data loggers in order to minimize voltage drop and noise. Take care to use your PT-104 data logger with Pico blue USB cables only.