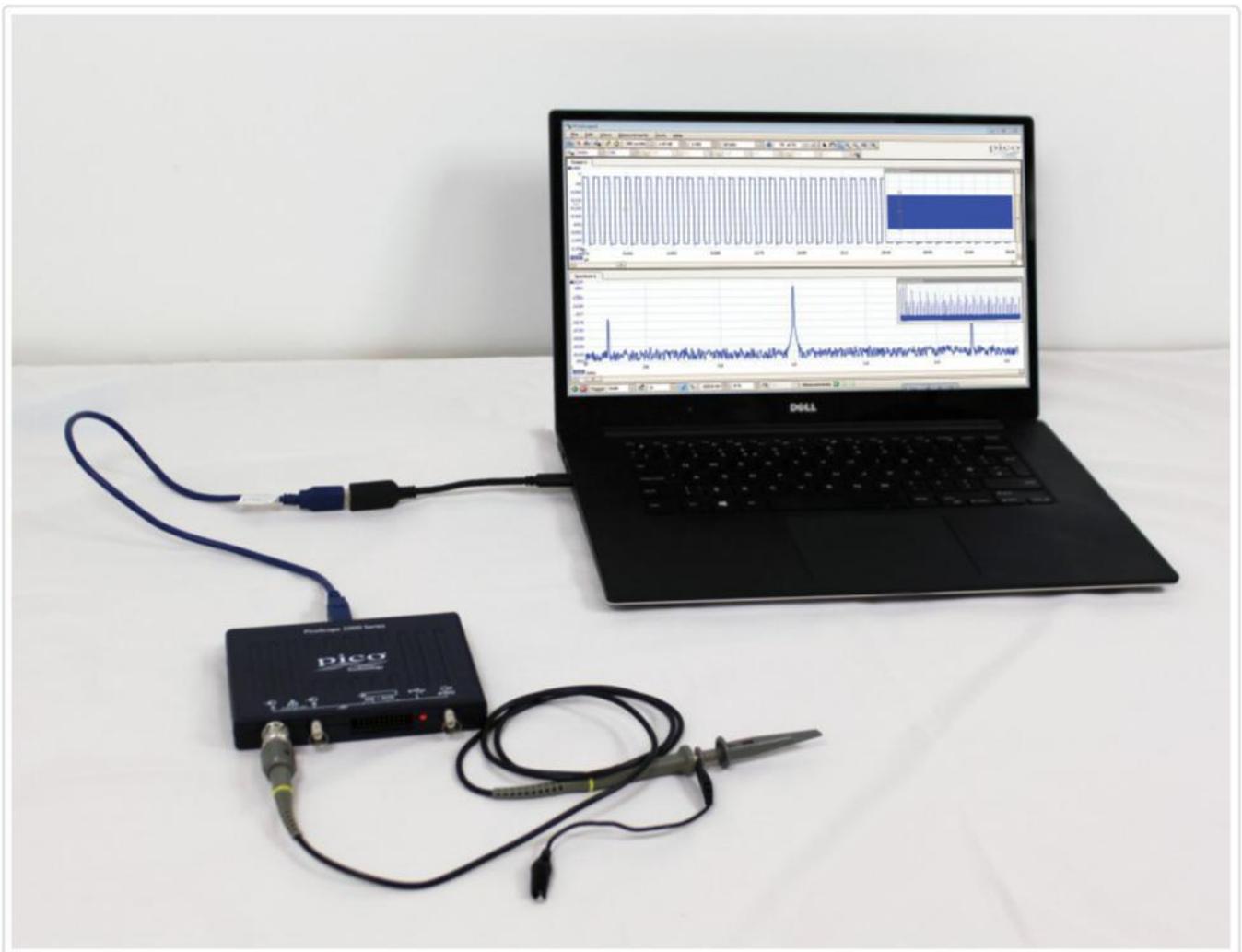# Will my Pico oscilloscope or data logger work with a USB Type-C port?

Yes! You can use any Pico oscilloscope or data logger with a USB Type-C port. Connect it using the Pico blue USB cable supplied with the oscilloscope, in conjunction with a Pico TA285 USB Type-C to Standard-A (female) adaptor (/accessories/miscellaneous/usb-type-c-adaptor).

PicoScope connected to USB Type-C using a TA285 adaptor

PicoScope 2208B connected to USB Type-C

Not all adaptors and cables are born equal!

During our testing, we observed that manufacturers of cables and adaptors are incorrectly shorting the cable shield to the Ground for Power Return line at both ends to ensure line resistance is kept low and the 3 A current rating is achievable. This presents our instruments with challenges. Shorting the screen and Ground for Power Return at both ends will create a small potential (due to current flow down the cable) between the ground of the PC port and the scope BNC. This means measuring something that is related to the port ground may show a voltage offset. That's why, here at Pico Technology, we have tested and specified an adaptor for use with our PicoScopes to ensure its quality is maintainable and measurement integrity is preserved. This is also why you MUST use the supplied Pico blue USB cable which is NOT shorted screen to ground at both ends.

USB Communication protocol improvements

When the the latest version of the USB communication standard, USB 3.1, arrived quietly in 2013, superseding USB 3.0, it was more of a rebranding exercise to open the door to future variations including multi-lane data lines. USB 3.0 is practically equivalent to USB 3.1 Gen 1, both having a maximum throughput of 5 Gb/s, known as SuperSpeed (SS). A faster USB 3.1 Gen 2 is also now available with double the data rate of 10 Gb/s, known as SuperSpeed Plus (SS+).

Room for improvement with USB connectors and cables

While USB 3.0/3.1 defined the much-needed improvements to the data transfer rates of the USB standard, it then became necessary to reconsider the physical attributes of the connectors and power delivery. Existing and legacy USB connections from the host to USB device are available in a bewildering array of end to end plug combinations including Standard-A and B connectors, Mini-A and B, Micro-A and B, and most recently Type-C. All are available for USB 2.0 and USB 3.1 communication standards, although not all support SuperSpeed (SS) and SuperSpeed Plus (SS+) communications.

USB 2.0 and 3.1 connector types

USB Type-C: what is all the hype about?

The future for Type-C is all about decluttering our desks and, if you have as many devices as we do, our lives too! By combining charging, SS+ data and power in one cable, Type-C promises to be the ONLY interface cable and connector you'll ever need for phones, monitors, laptops and peripherals, seriously simplifying interfacing and power connectivity. It is compact enough to nurture the trend of consumer electronics miniaturization while maintaining some robustness for industrial use. At the moment, however, it must be said that we are a long way from Type-C becoming the only cable/connector solution on our desks. For now we will want to connect our legacy USB devices to Type-C ports, so expect to see a glut of adaptors on the market.

Type-C does not define a communication or protocol standard. It is purely a physical cable/connector standard.

TA285 USB Type-C to Type-A adaptor

Key advantages of USB Type-C

USB Type-C cables have the following significant advantages over their predecessors:

- Type-C uses the same reversible connector on both ends of the cable, minimizing user confusion for plug and cable orientation.
- The Type-C connector is a new design. It is slim and robust at the same time, replacing the need for the three form factors: Standard, Mini and Micro USB connectors.

- The minimum acceptable standard for Type-C cables is to support devices drawing a minimum of 3 A. This is a big improvement over the 500 mA from USB 2.0 and 900 mA from USB 3.1. Electronically marked cables can support up to 5 A.
- Type-C based device detection includes support for legacy connections (backward compatible with USB 2.0 and 3.1).
- Type-C ecosystems can support fully compliant Type-C devices up to 100 W using USB PD (power delivery).

Within the standard, some key terminology has changed. For example, the definitions of Host and Device have changed to Downward Facing Port (DFP) and Upward Facing Port (UFP) respectively, supporting new features such as device detection and interface configuration but also removing the confusion of cable direction and connector type from the USB ecosystem.

USB Type-C power options

All Type-C cables and connectors must be designed to carry 20 V at 3 A. Type-C also supports Power Delivery (USB PD) for USB device powering up to 100 W and independent USB-based communications. USB PD uses the CC (configuration channel) line to manage power delivery. With USB PD, supply voltage is configurable up to 20 V. PD will not supply more than 3 A without identifying the cable electronically after a PD device has requested power.

Note: USB powered PicoScopes work fine with any Type-C port, regardless of USB PD compatibility.

Table 1: USB power specifications and options:

Mode of operation	Nominal voltage	Maximum current	Notes
USB 2.0	5 V	500 mA	Default current, based on definitions in the base specifications
USB 3.1	5 V	900 mA	Default current, based on definitions in the base specifications
USB BC 1.2	5 V	Up to 1.5 A	Legacy charging
USB Type-C Current @ 1.5 A	5 V	1.5 A	Supports higher power devices
USB Type-C Current @ 3.0 A	5 V	3 A	Supports higher power devices
USB PD	Configurable up to 20 V	Configurable up to 5 A	Directional control and power level management

If you have any questions about using a PicoScope with a USB Type-C port, contact support@picotech.com (mailto:support@picotech.com?subject=Type-C) for assistance.