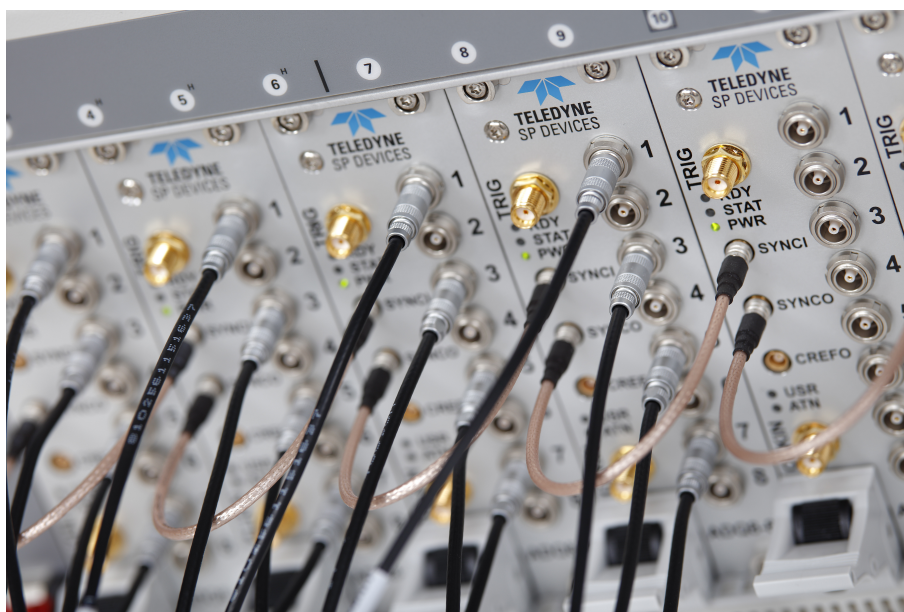


# ADQ

## Quick Start Guide for Windows



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## 1 Introduction

Congratulations on having purchased a Teledyne SP Devices digitizer product. To get the most out of the digitizer we recommend that you read the documentation set carefully.

### Disclaimers and Safety



**Caution!**

Ground the antistatic package before removing the device from the package. Electrostatic discharge may damage the card. Be sure to ground yourself by touching the grounded frame and avoid touching any components on the card.



**Caution!**

Before connecting any equipment to the digitizer, please check the absolute maximum ratings in the digitizer data sheet to assure that the connected equipment cannot damage the digitizer.

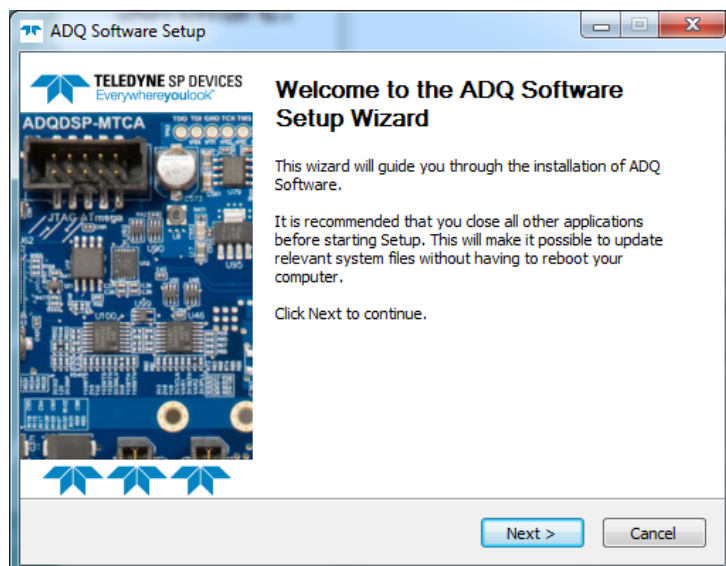
## 2 Installing the Software

To install the software development kit (SDK), run TSPD-SDK-installer\_rXYZAB.exe (where XYZAB denotes the version number of the SDK) found on the USB flash drive delivered with the digitizer. This will install all software, including drivers, and add shortcuts to the start menu.

### ! Important

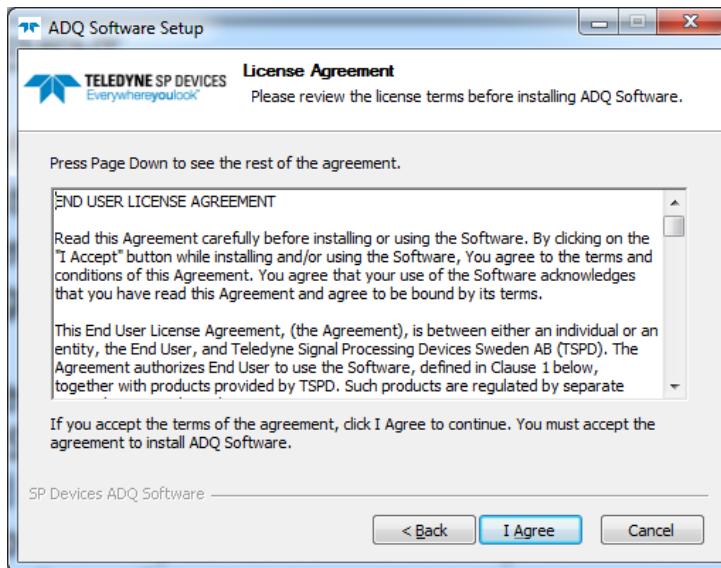
Make sure the digitizer is connected to the host computer before you begin the installation process.

1. The screen below is shown when the installer is started.

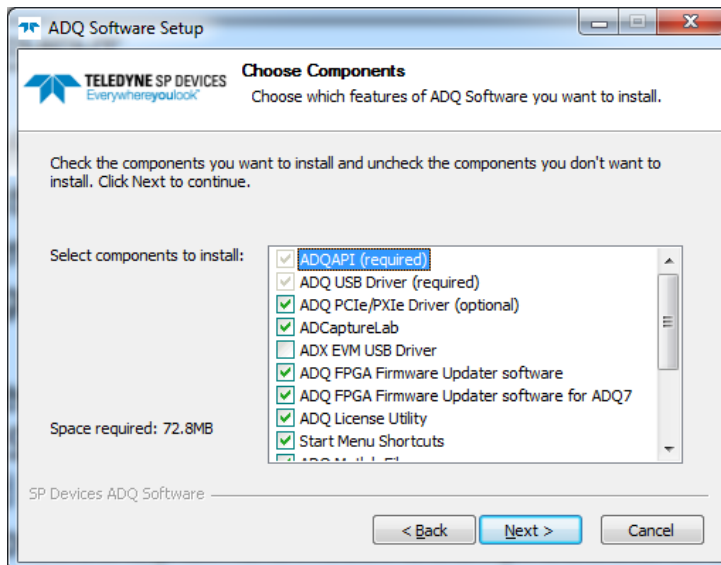


2. Press *Next* to continue.

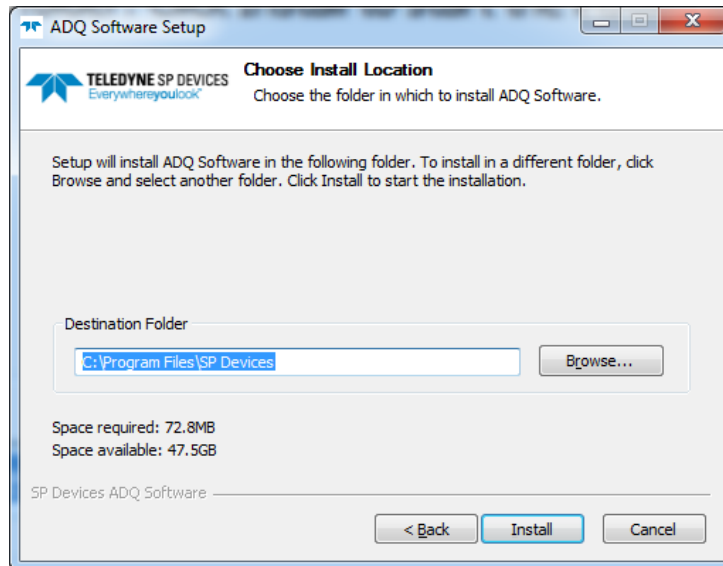
3. Read the license agreement, and then press *I Agree* to continue.



4. Choose the components to be installed, and then press *Next*. We recommend installing all the preselected components.



5. Accept or change the installation directory (using the *Browse* button), then press *Install* to start the installation.



## ADQAPI

The ADQAPI is the application programming interface (API) used by the host computer to communicate with the digitizer. The API functions are detailed in the ADQAPI reference guide [1] and general usage is documented in the ADQAPI user guide [2]. There are two different interfaces available: a C interface and a C++ interface. Most programming languages, e.g. Python, have a foreign function interface granting the ability to call functions from C dynamic link libraries directly, making this the more general interface of the two.

For Matlab, .NET, and Labview, the installer provides tailored interfaces for accessing the API. However, please note that only a subset of the full functionality is available via these interfaces.

## Digitizer Studio

Digitizer Studio is an easy-to-use stand-alone program which allows for configuration and operation of ADQ digitizers from Teledyne SP Devices. The application is able to collect and plot data, and to calculate key performance metrics such as SNR and SFDR. Collected data can be stored on disk for later use, e.g. to compare measurements. The application exists for diagnostic purposes and to simplify the process of getting started with the digitizer. Digitizer Studio is also a stand-alone measurement instrument application.

Please note that to reach the full potential of the digitizer in a real-time application, the SDK is recommended since only a subset of the digitizer's full functionality is controllable from Digitizer Studio. Refer to the datasheet of Digitizer Studio [3] for supported hardware, firmware and operating systems. For more information, see the Digitizer Studio user guide [4].

### Note

Firmware options FWATD and FWPD have separate GUIs.



### 3 Connecting the Digitizer to the Host Computer

After the SDK has been installed, it is time to connect your digitizer to the host computer. The connection procedure depends on the form-factor.

#### USB

For USB units you need:

- A main power supply, 12 V (delivered together with the digitizer)
- A USB cable (delivered together with the digitizer)
- A host computer with a USB port (USB 2.0 or later)

Connect the digitizer to the power supply and to the host computer.

#### PXIe

For PXIe units you need a host computer with a free PXIe or cPCIe slot. With the host computer powered off, plug in the digitizer. Power on the host computer.

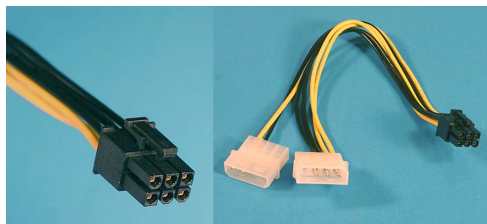
#### MTCA

For a MTCA unit you need a host computer with an available MTCA slot. With the host computer powered off, plug in the digitizer. Power on the host computer.

#### PCIe

For PCIe units you need:

- A host computer with an available PCIe slot
- A PCIe 6-pin power connector like the one below. Please note that an adapter may be required for some systems. The adapter can be purchased from a computer accessory supplier.



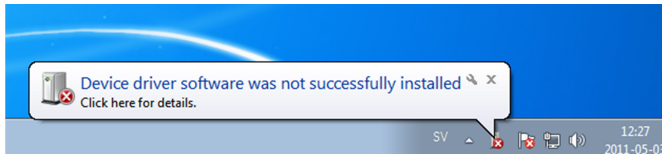
With the host computer powered off, plug in the digitizer and connect the power cable. Make sure that the digitizer is mechanically supported by screws through the front panel. Power on the host computer.

### Manual Installation of Drivers

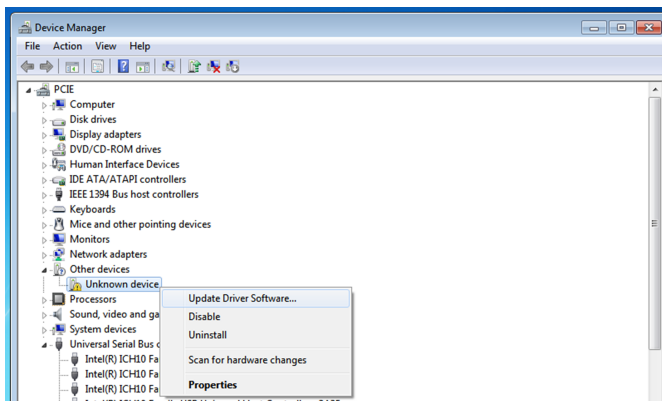
With a Windows operating system, the driver for the digitizer is installed automatically when running TSPD-SDK-installer\_rXYZAB.exe. Manual installation is only needed if the automatic installation fails. The driver installation is similar for all supported Windows operating systems. Below is an example

of installing the drivers for an ADQ14 (USB) on Windows 7. There may be minor differences between different product types and interfaces.

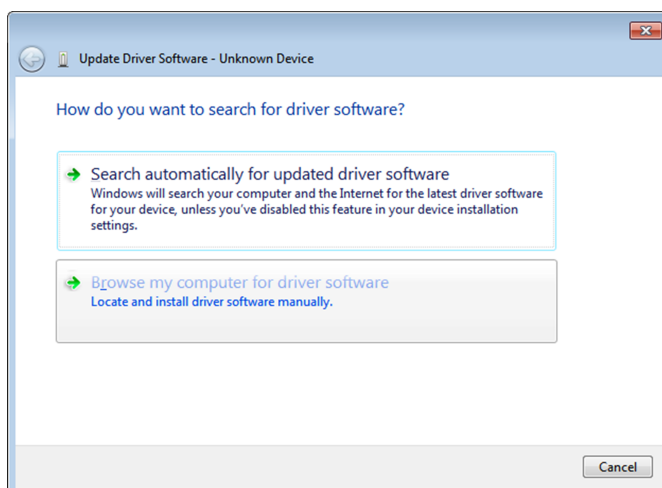
1. Power on the digitizer and connect the USB cable between the digitizer and the host computer. The message below will be shown.



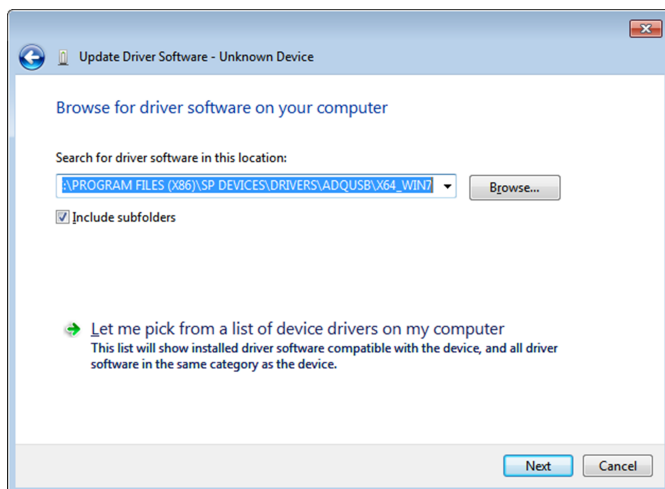
2. Open the Device Manager by typing *Device Manager* in the search field of the start menu.



3. Locate and right click on the *Unknown device*. Select *Update Driver Software*.



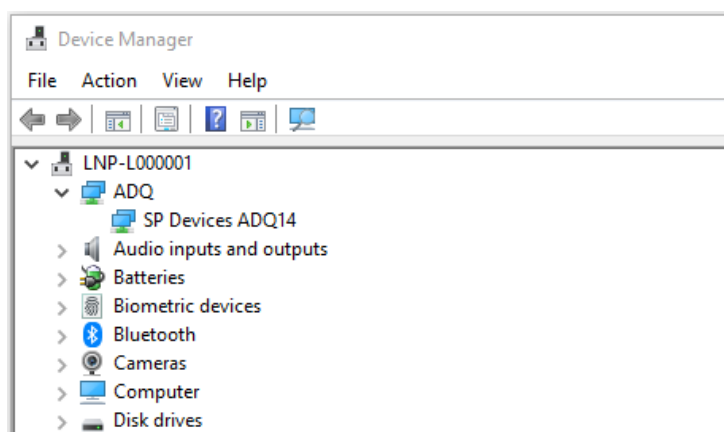
4. Select *Browse my computer for driver software*.



5. Press *Browse* and select `Drivers\\ADQUSB\\X64_WIN7` in the installation directory, then press *Next*.

#### Note

If you are running a 32-bit version of Windows, select `Drivers\\ADQUSB\\x86_win7` instead.



6. Your ADQ digitizer will now appear in the device manager.

## PXIe Front Panel



<b>RDY</b>	<p>Solid amber light indicates that the device has been armed and is waiting for triggers.</p> <p>Pulsing amber light indicates that the unit is currently in its boot loader state, waiting to be booted by software running on the host computer.</p>
<b>STA/STAT</b>	<p>Blinking red light in combination with PWR LED off indicates that the device has overheated and partially powered down to prevent damage.</p> <p>(Only ADQ412) Solid red light indicates the device is waiting for PLL lock, this state persists until drivers and software have connected to the card.</p> <p>(Only ADQ412) Short flashes of red light indicate the device is calibrating after startup or that the sample frequency is changing.</p>
<b>PWR</b>	<p>Solid green light indicates power and status OK.</p>

## MTCA Front Panel



### Note

The LEDs are labeled according to the AMC.0 standard.

### Important

Hot Swap is only supported on Linux.

<b>LED 1</b>	Provides feedback on <i>failures</i> and <i>out of service</i> status. Solid red light if an error is detected.
<b>LED 2</b>	Provides <i>in service</i> status. Solid green light while the digitizer is operational.
<b>BLUE LED</b>	Provides feedback on the Hot Swap state of the digitizer.
	<b>Solid</b> —safe to disconnect the digitizer.
	<b>Blinking</b> —wait before disconnecting the digitizer.
	<b>Off</b> —the digitizer is operational and <i>unsafe</i> for extraction. Pull hot swap pin gently to activate indicator.

## 4 Using the Digitizer

To introduce you to the interface for our digitizers: the ADQAPI, there are source code examples provided in the installation directory, by default

```
C:\Program Files\SP Devices
```

The installation directory is specified in step 5 in the installation process (Section 2). This is also the location of the available GUIs<sup>1</sup>. We recommended you to browse through the contents of this directory to get an overview of the available example code.

### Note

Please note that there are different source code examples for different products and firmwares.

```
<Path to installation directory>/
```

```
└─ SP Devices/
    └─ C_examples/
    └─ Cpp_examples/
    └─ CSharp_examples/
    └─ Matlab_examples/
    └─ Python_examples/
    └─ VisualBasic_examples/
```

It is also helpful to familiarize yourself with the documentation for your specific product. Which documents to read depend on which firmware your digitizer is running. Refer to p. 10 for an overview of the available resources. Additional documentation is available on our [web site](https://www.spdevices.com/documentation)<sup>2</sup>.

## References

- [1] Teledyne Signal Processing Devices Sweden AB, *14-1351 ADQAPI Reference Guide*. Technical Manual.
- [2] Teledyne Signal Processing Devices Sweden AB, *08-0214 ADQAPI User Guide*. Technical Manual.
- [3] Teledyne Signal Processing Devices Sweden AB, *20-2381 Digitizer Studio Datasheet*. Technical Specification.
- [4] Teledyne Signal Processing Devices Sweden AB, *20-2382 Digitizer Studio User Guide*. Technical Manual.

<sup>1</sup>GUIs for FWATD and FWPD have separate installers.

<sup>2</sup><https://www.spdevices.com/documentation>



## Common resources

Resource	Description
UG 13-1130	Describes how to manage firmware files.
UG 08-0214	The ADQAPI user guide
RG 14-1351	The ADQAPI reference guide, documents the functions in the ADQAPI.

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