

Break-Out Box for the Pico

Installation Guide



Document Revision 2.3

February 24, 2019

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Installation Guide

Break-Out Box

Connector Accessory for Tecella's Pico

This installation guide describes how to install, configure, and use the optional Break-Out Box accessory for the Pico. Tecella's Pico is a full-featured, USB-powered, low-noise patch clamp amplifier with an integrated digitizer and headstage. The passive Break-Out Box allows the Pico to be used by external multifunction data acquisition (DAQ) systems as well as to control external peripherals. The Break-Out Box has 13 signal-labeled BNC inputs for connecting to the extended I/O channels of a Pico.

The Break-Out Box has the following features:

- Shielded Connector Block with BNC connectors for the Pico
- 13 BNC connectors for I/O connection
 - 2 BNC connectors for analog input connection
 - 3 BNC connectors for analog output connection
 - 4 BNC connectors for digital input connection
 - 3 with control switches
 - 4 BNC connectors for digital output connection
- Direct coupled signals (Vcmd input with 20 k Ω in series)
- Signal-labeled BNC connectors for easy connectivity
- A Mini-HDMI connector that connects to Tecella's Pico
- A high quality Mini-HDMI cable

What You Need to Get Started

To set up and use your Break-Out Box, you need the following:

- Pico (www.tecella.com)
- Break-Out Box
- High quality Mini-HDMI cable (Type C)
- Break-Out Box Installation Guide
- High quality BNC cables

Installing the Break-Out Box

Connect the Mini-HDMI cable to the Pico I/O port and to the Break-Out Box.

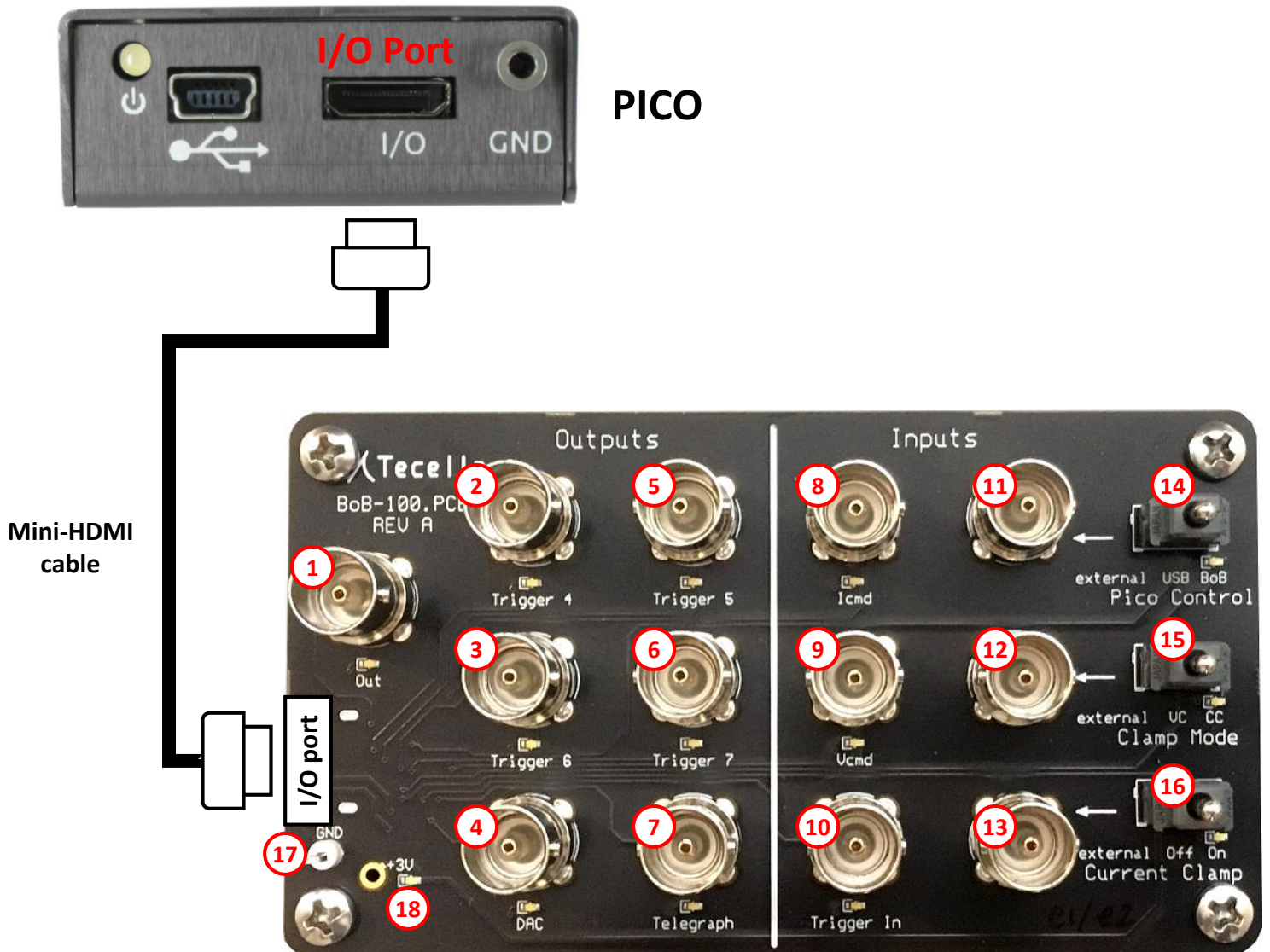


Figure 1. Break Out Box Front Panel

1	Amplifier Output
2	Trigger Out 4
3	Trigger Out 6
4	Utility DAC Output
5	Trigger Out 5
6	Trigger Out 7

7	Gain Telegraph
8	External Icmd Input
9	External Vcmd Input
10	Trigger In
11	Enable/Disable BoB inputs (BNC)
12	Clamp Mode (BNC)

13	Iclamp or I=0 (BNC)
14	Enable/Disable BoB inputs (Switch)
15	Clamp Mode (Switch)
16	Iclamp or I=0 (Switch)
17	Ground Test Point
18	+2.5V Indicator

To connect the Break-Out Box to your Pico, complete the following steps.

Caution: Do not connect the Break-Out Box to any device other than Tecella's Pico. Doing so can damage the Break-Out Box, and all devices connected to it. Tecella is not liable for damage resulting from such connections.

1. Connect the Break-Out Box to your Pico using an appropriate Mini-HDMI cable.
2. Insert one Mini-HDMI connector into Pico's I/O port. The I/O port can be found next to the USB port.
3. Insert the remaining Mini-HDMI connector into the I/O port of the Break-Out Box. This I/O port can be found at the side of the Break-Out Box, see **Figure 1**.
4. Launch Tecella's TecellaLab acquisition software, WinWCP (University of Strathclyde), jClamp (SciSoft Company) or any additional 3rd party software, confirm that your Pico is recognized, and configure your device settings. Refer to www.tecella.com for more information.
5. Connect BNC cables to the BNC connectors of interest on the front panel. Please see **Figure 1** and **Table 1**.
6. Connect the BNC cables to the appropriate port of your external DAQ system.

Caution: Do not connect input voltages greater than the specified values in Table 1 to the Break-Out Box and consult the Pico device specifications for more information. Input voltages greater than the specified values can damage the Break-Out Box, and all devices connected to it. Overvoltage can also cause an electric shock hazard for the operator. Tecella is not liable for damage or injury resulting from misuse.

7. Connect signals to the BNC connectors as described in **Table 1**.

Caution: The Break-Out Box provides no additional protection such as fuses against overvoltage or short circuits. Consult the Pico device specifications (www.tecella.com).

Applications

- Controlling external devices via Pico's integrated digitizer
- Monitoring the analog Output e.g. with an oscilloscope
- Interfacing Pico to 3rd Party Digitizers
- etc.

Connecting Analog and Digital I/O Signals

Table 1. I/O signals on the Break-Out Box.

All signal voltages are with respect to ground. The shielding of all BNC connectors is connected to the Pico's system ground. The signal direction (Input or Output) is seen from the perspective of the Pico. Digital logic levels are 0 V for LOW and 3.3 V for HIGH. Digital logic is 3.3 V, but all digital inputs are 5 V tolerant. Consult the Pico device specifications for more information or visit www.tecella.com.

	Direction	Signal Name	Description			Label	Figure 1
Analog	Input	Icmd Input	External Icmd. Input range is +5V to -5V. Icmd translation: ± 2.5 nA Range: 1 pA/mV ± 25 nA Range: 11 pA/mV			Icmd	8
		Vcmd Input	External Vcmd. Input range is +10V to -10V. Damping ratio: 40:1 (± 10 V input translates to ± 250 mV)			Vcmd	9
	Output	Utility DAC Output	Output range of 0V to 5V (rail-to-rail). 10-bit resolution. Signal to control external peripherals.			DAC	4
		Amplifier Output	Monitor amplifier's output with an external peripheral, such as an oscilloscope or a data acquisition system (DAQ).			Out	1
		Gain Telegraph	Analog signal to telegraph Gain to external DAQ.			Telegraph	7
			Output Voltage in V	Configuration	Configuration		
			Voltage Clamp (Vclamp)	0	10 M Ω		
0.5	100 M Ω						
1	1 G Ω						
1.5	3 G Ω						
Current Clamp (Iclamp)	2	10 G Ω					
	2.5	1x					
	3	10x					
Digital	Input	Enable/Disable BoB inputs to control the Pico	Switch 14	Right: Enable BoB inputs to control the Pico Center: Disable Bob inputs Left: Use BNC 11 signal to enable/disable BoB		Pico Control	14 (Switch), 11 (BNC)
			BNC 11	LOW: Enable BoB inputs to control the Pico HIGH or Floating: Disable BoB inputs			
		Vclamp Or Iclamp/I=0	Switch 15	Right: Current Clamp or I=0 (Voltage Follower) Center: Voltage Clamp Left: Use BNC 12 signal to select the mode		Clamp Mode	15 (Switch), 12 (BNC)
			BNC 12	LOW or Floating: Voltage Clamp HIGH: Current Clamp or I=0 (Voltage Follower)			
		Iclamp Or I=0	Switch 16	Right: Current Clamp (Iclamp) Center: I=0 (Voltage Follower) Left: Use BNC 13 signal to select Iclamp or I=0		Current Clamp	16 (Switch), 13 (BNC)
			BNC 13	LOW or Floating: I=0 (Voltage Follower) HIGH: Current Clamp (Iclamp)			
		Trigger In	Used to start protocols in TecellaLab (Active High).			Trigger In	10
Output	Trigger Outs	TecellaLab	Digital signals to control external peripherals. Outputs 0 V for LOW and 3.3 V for HIGH. Trigger Outs (Digital Outs) only work in "Version 1 GUI" of TecellaLab.				
	Trigger Out 4	Digital Out 4				Trigger 4	2
	Trigger Out 5	Digital Out 5				Trigger 5	5
	Trigger Out 6	Digital Out 6				Trigger 6	3
	Trigger Out 7	Digital Out 7				Trigger 7	6

Physical

Dimensions.....	11.5 cm × 6.4 cm × 4.8 cm 4.5 inch × 2.5 inch × 1.9 inch
Weight.....	200 g (without cable) 7 oz (without cable)
I/O connector.....	Mini-HDMI (Type C)
BNC connectors.....	13

Environment

Operating temperature.....	0 °C to 50 °C
Storage temperature.....	-10 °C to 60 °C
Relative humidity.....	5 % to 70 %, noncondensing

Environmental Management

Tecella is committed to designing and manufacturing products in an environmentally responsible manner. Tecella recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment, but also to our customers. This page contains the environmental regulations and directives with which Tecella complies.

Waste Electrical and Electronic Equipment



EU Customers. The crossed out wheeled bin symbol is used to indicate that the product must not be treated as general household waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health, which could otherwise be caused by incorrect waste handling of this product.

RoHS (Restriction of Hazardous Substances)

The European Directive 2002/95/EC restricts the use of hazardous materials in the manufacture of various types of electronic and electrical equipment. Tecella declares that, to its knowledge as of the date of this document, the Break-Out Box conforms to the requirements of this directive. This declaration is based on Tecella's understanding of the requirements of the RoHS directive and knowledge of the materials that go into its products. Tecella bases its knowledge on information provided by third-party suppliers and makes no representation or warranty as to the accuracy of such information. Tecella continues to take steps to obtain accurate information from suppliers but has not conducted destructive testing or chemical analysis on incoming materials to verify material composition.