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enabling technologies for Life Science

EZ Patch quick guide

<u>Programmable Digital Output</u>

This short guide illustrates how setup and configure a programmable TTL-compatible digital output signal from ePatch amplifier.
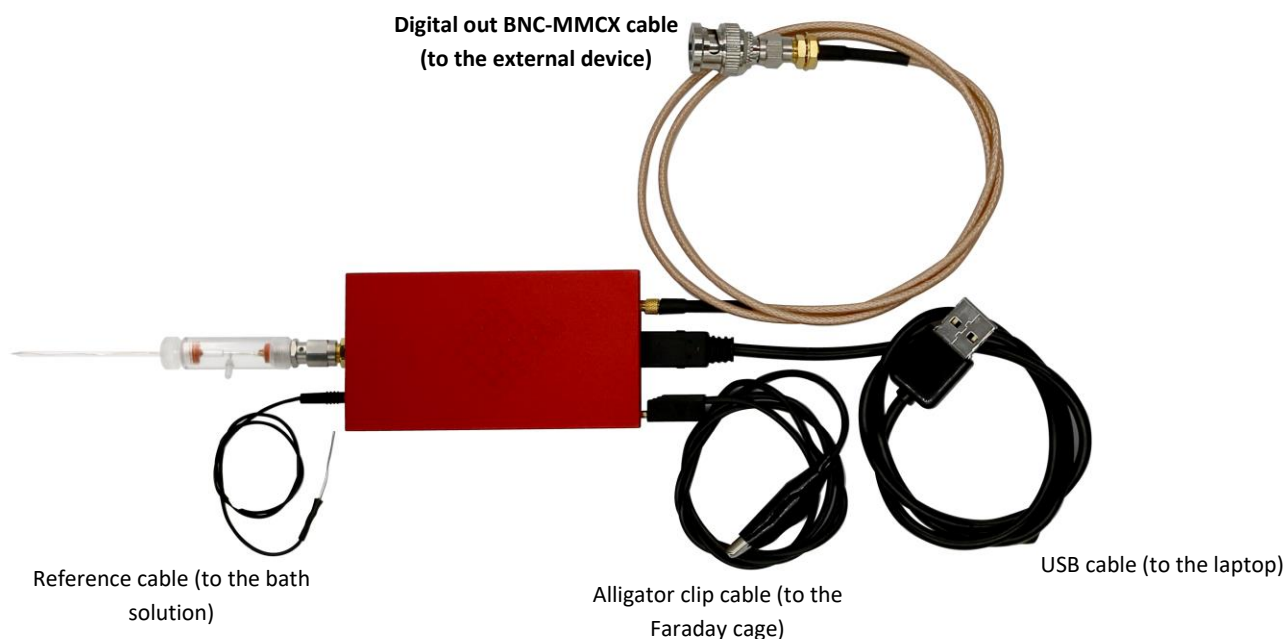
**Digital out BNC-MMCX cable
(to the external device)**

Reference cable (to the bath solution)

Alligator clip cable (to the Faraday cage)

USB cable (to the laptop)

Figure 1: connection scheme of ePatch amplifier

Digital output connection in ePatch amplifier

ePatch amplifier embeds one TTL-compatible digital output port located on the back side (Fig. 2) which enables the control of other instruments, such as perfusion systems, lamps, stimulators etc.
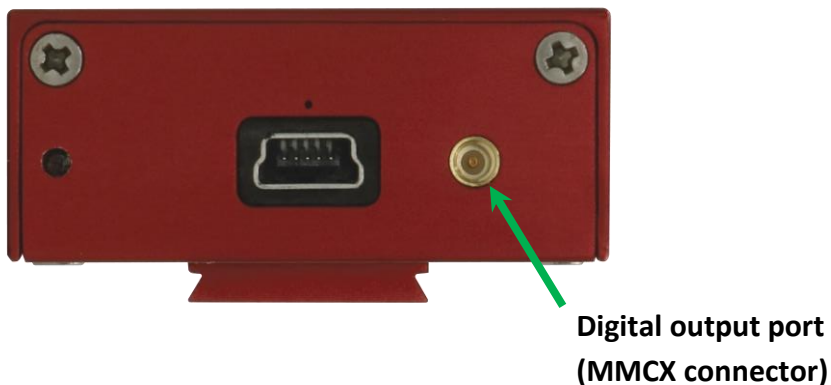

**Digital output port
(MMCX connector)**

Figure 2: Digital output port on the back side of ePatch

Use the provided BNC-MMCX (Fig. 3) to connect the ePatch amplifier to the input (BNC) port of the external instrument you need to control. Follow the connection scheme shown in Figure 1.
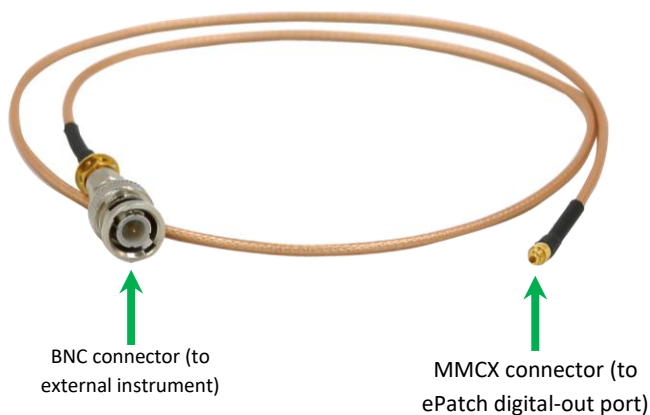

BNC connector (to
external instrument)

MMCX connector (to
ePatch digital-out port)

Figure 3: BNC-MMCX cable provided with ePatch

Configure the digital output signal in EZPatch software

After connecting ePatch to the external device, you can proceed to couple the rising and falling edge of the TTL output signal to any voltage-clamp or current-clamp protocol using EZ-Patch software. The rising and falling edges can be set-up using a cursor based approach already described either in the "Online Analyses" guide or in the corresponding video guide. Please note that the TTL signal must be coupled to a stimulus (voltage or current) protocol; in other words, the TTL signal cannot be delivered without running a voltage- or current-clamp protocol.

Open the "**protocol editor**" using the dedicated button ![icon] and add two new cursors to the displayed waveform preview (activate the "manage cursor" tool and double click within the waveform preview) (Fig. 4). Then, right click to one of two cursors to get access to its properties panel (Fig. 4) where you can find the **digital output settings**. Assign either a rising (+ 5 V) or a falling edge (0 V) to a cursor to set up the control of an external device. Use the dropdown menu of the "sweeps" option to couple the digital out signal only to a defined sweep of the protocol.

Please note that the maximum number of rising and falling edges that can be set per protocol is 20. For example, if you set a rising and a falling edge in each sweep, the signal will be delivered only for the first 10 sweeps.
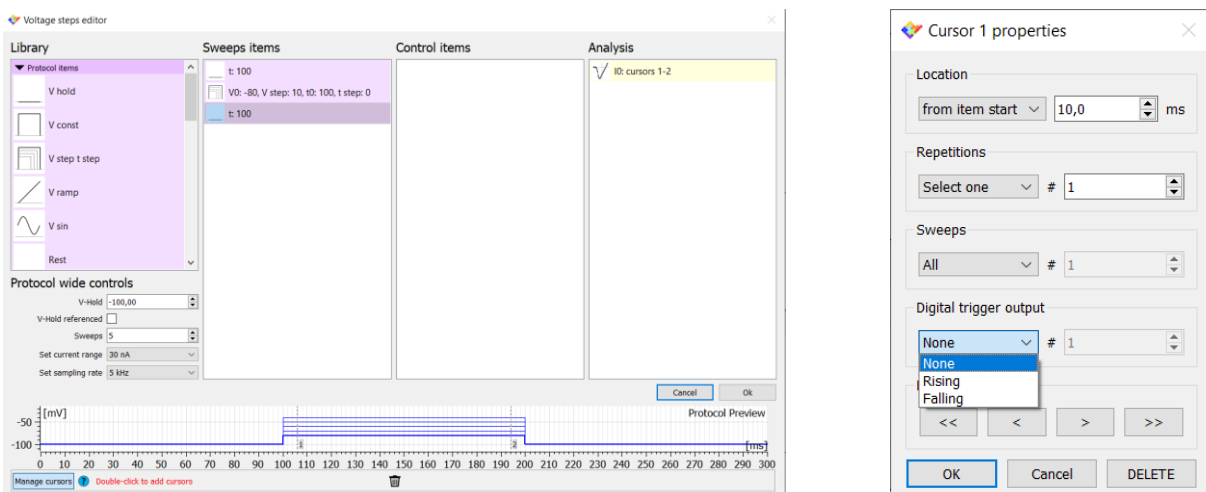

Figure 4: Protocol editor (left) and cursor properties panel in EZPatch software (right).