



TIB 14S

Optically Insulated Digital Trigger Interface



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make new discoveries...**

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- optically insulated digital outputs
- manual and software control
- boost electronics facilitates switching of magnetic valves

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TIB 14S

Optically Insulated Digital Trigger Interface

Introduction

Experimental setups have to be increasingly flexible nowadays. More parameters than ever need to be acquired or altered simultaneously during data acquisition. Controlling bath perfusion or synchronizing video imaging systems with data acquisition are standard routines in many laboratories today. The TIB 14S is fully supported by the HEKA software, enabling the simultaneous control of numerous devices, such as magnetic valves, shutters, stimulators, etc. within one software application. The open collector outputs can optionally carry three different voltages which, in contrast to other digital I/O boards, obligates the use of additional hardware to drive external devices.

The TIB 14S is a digital output trigger interface to be used with a fully computer controlled patch clamp amplifier EPC 9, EPC 10 or EPC 10 USB, with a fully computer controlled potentiostat/galvanostat PG 300 or PG 300 USB, which all have an AD/DA converter interface built-in or with a standalone interface ITC-16, LIH 1600 or LIH 8+8. The TIB 14S provides your system with 14 TTL outputs and 14 open collector power outputs which will enable you to control several devices, directly from your software.

Applications

Triggering external devices such as perfusion systems, video imaging systems, flash lamps, stimulators, shutters etc.

Controlling magnetic valves directly. A valve bank can be directly connected to the TIB 14S without the need of a separate controller with power supply.

Features



Selection of the TIB 14S front view showing a BNC connector, the LED and the switch

PIN number	SIGNAL
1	TRIGGER-0
2	TRIGGER-1
3	TRIGGER-2
4	TRIGGER-3
5	TRIGGER-4
6	TRIGGER-5
7	TRIGGER-6
8	TRIGGER-7
9	TRIGGER-8
10	TRIGGER-9
11	TRIGGER-10
12	TRIGGER-11
13	TRIGGER-12
14	TRIGGER-13
15	GND (ground)
16	6V
17	GND (ground)
18	12V
19	GND (ground)
20	24V
21	6V BOOST
22	12V BOOST
23	GND (ground)
24	24V BOOST
25	GND (ground)

Trigger Out Pin Assignment

Optically Insulated Outputs

The opto coupled output avoids ground loops in the setup which often is the reason for artifacts and increasing noise level during the measurement.

BNC Output Connectors

Provides 14 TTL trigger lines with BNC connectors at the front panel of the TIB 14S. The TTL output (+5V) switches the output with a max current of 20mA.

Manual Control

14 three-position switches allow manual control of each individual trigger line. Middle position: off (TTL low), Upper position: permanent on (TTL high), Lower position: Pulse mode – transient on; generates a TTL high signal while the switch is pressed down.

Status LED

Each trigger command is indicated by a LED and activates both, TTL output and a open collector output.

TTL high – LED on, TTL low – LED off

Trigger Out Connector

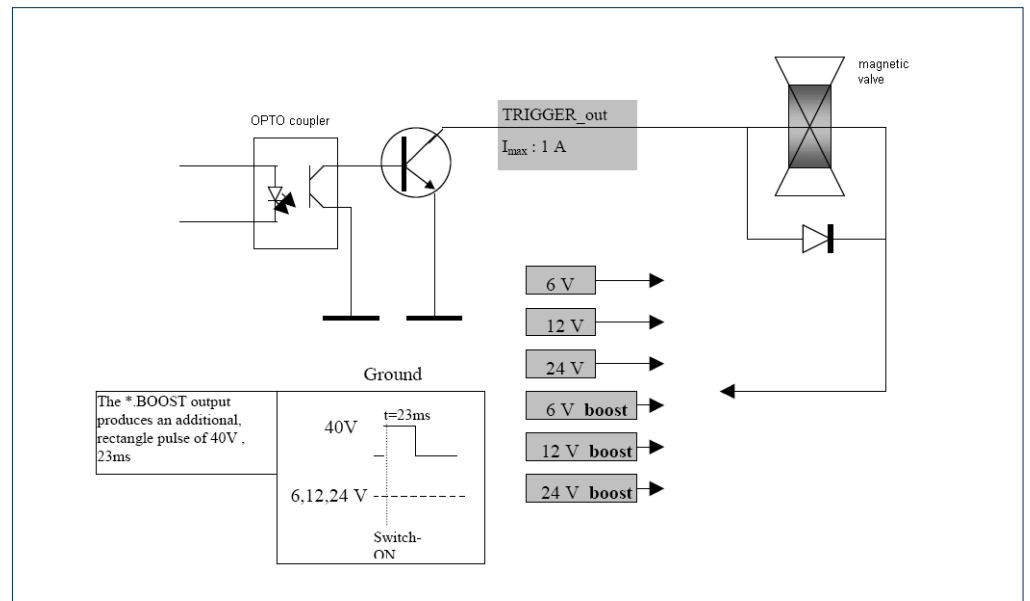
For custom cabling of external devices all 14 trigger lines and the 6 open collector outputs are available at a 25-pin sub-d connector at the rear of the TIB 14S.



Trigger Out Connector

Driving Magnetic Valves and Boost Mode

The advantage of the open collector output is the possibility to connect magnetic valves with various voltages. The open collector output switches the ground line with a max. output current of 1A. In order to facilitate the valve switching we alternatively provide boosted collector outputs which raise the voltage after the switch for 23ms to 40V before remaining on the 6, 12, or 24V.

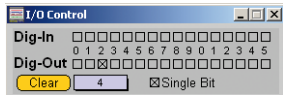




TIB 14S Optically Insulated Digital Trigger Interface

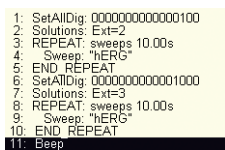
Software Control Options

The software PATCHMASTER, POTMASTER, and CHARTMASTER provide three means of controlling the trigger lines of the TIB 14S:



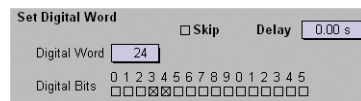
I/O Control

In the I/O Control window the state of a trigger line (single bit) can be easily set by mouse click. A complete digital word (several trigger lines) can be set by either selecting several bits or typing in the equivalent number.

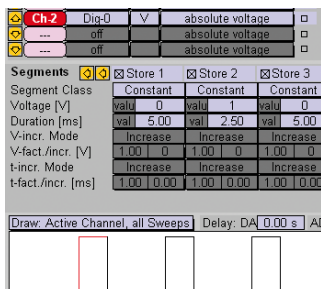


Protocol Editor

The Protocol Editor allows to automate and standardize experimental procedures. In such a protocol the digital trigger lines can be set with e.g. the Set Digital Word event.



In the example protocol the trigger line 2 will be set to high (line 1). This trigger channel is connected with a magnetic valve which allows to perfuse solution number 2 when open. During perfusion of solution number 2 hERG currents are recorded every 10 seconds (line 3 to 5) for some time before valve 2 is closed and valve number 3 is opened (line 6). In line 7 the external solution index is set to 3 followed by the recording of hERG currents.



Pulse Generator

In case the digital lines have to be switched during recording of a data sweep, multiple trigger channels can be defined in the DA section of the Pulse Generator. For each trigger channel a separate timing pattern can be created with multiple segments. With the help of our sophisticated Duplicate function and the global pgf-parameters trains of trigger events can be easily created and modified. The digital output channels are tightly synchronized with the analog output channels.

Compatibility Chart

The following combinations software and devices are supported:

Software	PATCHMASTER, POTMASTER or CHARTMASTER	
Patch Clamp Amplifier / Potentiostat	EPC 7, PG 400, PG 500, or other telegraphing amplifiers	
		EPC 9, EPC 10, EPC 10 USB, PG 300, or PG 300USB
Interface Board		
	ITC-16, LIH 1600, or LIH 8+8	
Trigger Interface	TIB 14S	

Technical Specifications

Digital Out Channels

TIB 14S offers up to 14 trigger outputs

Front panel connectors

14 BNC connectors with TTL level outputs (+5V, max. 20mA) are available. The state of the trigger outputs is indicated by LED's.

Front panel control

14 three-position switch allow manual control of the trigger lines. Middle position: off (TTL low), Upper position: permanent on (TTL high), Lower position: Pulse mode - transient on

Rear panel connectors

- DIGITAL IN (ITC-16) connector to connect the EPC 9, EPC 10, EPC 10 USB patch clamp amplifiers, PG 300, PG 300 USB potentiostats/galvanostats or the ITC-16, LIH 1600 or LIH 8+8 acquisition interfaces directly.
- DIGITAL IN (CIO-DIO) connector to connect the CIODIO interface card.
- TRIGGER OUT open collector outputs to control up to 14 devices; three different power voltages are built-in: 6 V; 12 V; 24 V in square wave or boosted output. Maximum current output: 1 A. The TTL output and the open collector output are switched in parallel.

Attention:

For switching a magnetic valve it is absolutely necessary to mount a protection diode. The protection diode (mounted anti-parallel, directly at the valve) avoids spikes during the measurement and protects the output transistor of the TIB14S interface.

Dimensions (D x W x H)

(25.0 x 48.3 x 9.0) cm / (9.8 x 19.0 x 3.5) inch

Weight

5.8 kg / 12.6 lbs

Power requirements

~115 V or ~230 V, selectable at the rear
maximum power consumption 55 W



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