



***INSTRUCTIONS FOR THE CONNECTION OF
TEC-03X-CW TO PCI-1200, BPS-4 or BPS-8
AND
HARDWARE CONFIGURATION OF CELLWORKS***

TURBO TEC-03X-CW Supplement to USER Manual

VERSION 1.4
npi 2001

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1. TEC-03X-CW amplifier with the software package CellWorks

1.1. Hardware connections

In order to use the TEC-03X-CW with the software package CellWorks and to control a perfusion system, the hardware must be connected as shown in Figure 1.

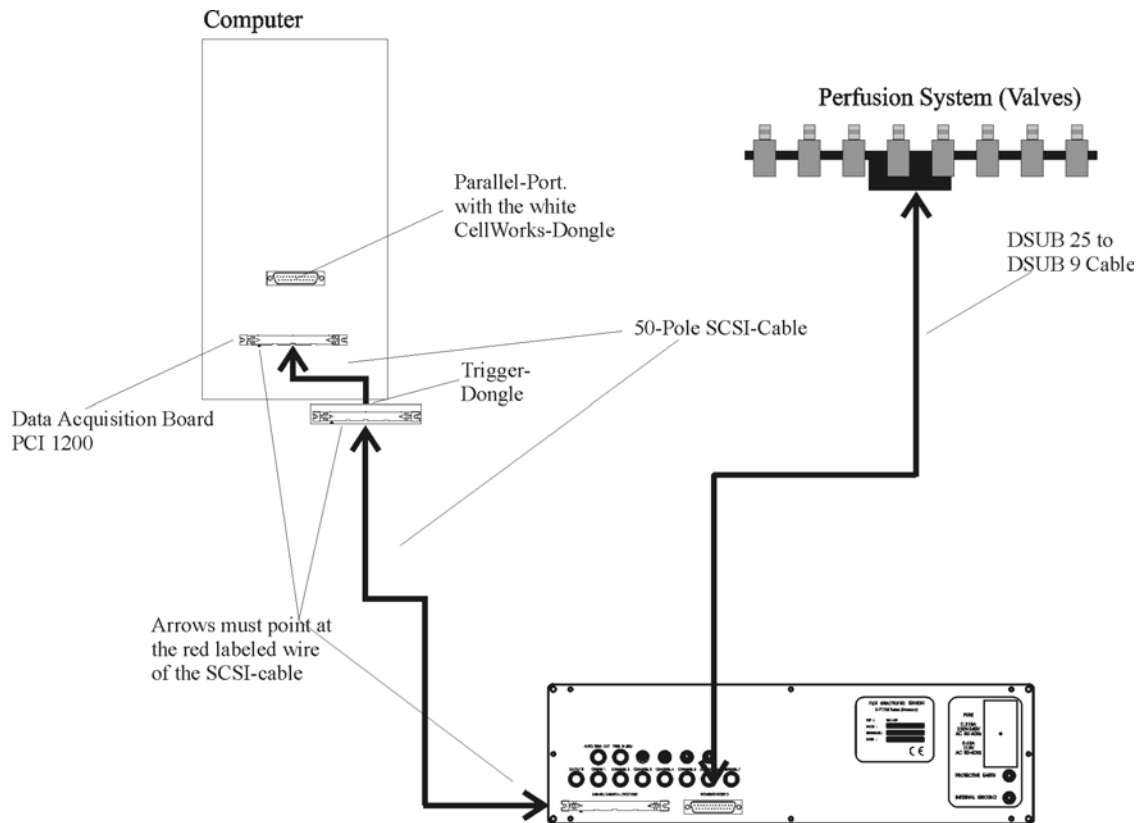


Figure 1: hardware connection for using TEC-03X-CW with CellWorks and for controlling the perfusion system BPS 8 (4) or any other system that uses digital power lines

1.2. Signals from the PCI-1200 board available at the TEC-03X-CW rear panel:

Analog inputs (Ai):

Ai2..Ai7 (labeled CHANNEL 2 - CHANNEL 7 at the rear panel of TEC-03-CW)

Note: Ai0 and Ai1 are not available at the rear panel of the TEC-03X-CW. This lines are used to record voltage- and current signals from the amplifier.

Analog outputs (DAC):

DAC0 labeled OUTPUT 0 at the rear panel of TEC-03X-CW

DAC1 labeled OUTPUT 1 at the rear panel of TEC-03X-CW

Important: These signals are generated from the NI board and OUTPUT 0 (DAC0) is connected additionally to the command input port. If you unintentionally connect a signal to DAC0, this signal will be added to the value of the command input signal for the TEC-03X-CW generated by CellWorks.

Trigger signals:

AUTO. TRIG. OUT (TTL signal) steps from 0V to +5V if a pulse routine (or snapshot) in CellWorks is activated. This signal indicates that CellWorks is waiting for a trigger signal before starting pulses and recording.

TRIG. IN (TTL) (TTL signal) for connecting an external TTL voltage signal. If a pulse protocol has been started in CellWorks (in default configuration) the software waits for a trigger to start and this trigger has to be connected here.

Important: The BNC connectors AUTO. TRIG. OUT and TRIG. IN (TTL) must be linked together if you want to start a pulse routine automatically after the double clicking in the CellWorks Execution module.

1.3. Hardware configuration in the CellWorks hardware module

The hardware is configured in the CellWorks hardware editor. The screenshots (Figure 2 to Figure 5) show the settings in the hardware editor module. The parameters shown in this screenshot are necessary to control the TEC-03X CW and optionally, the perfusion system.

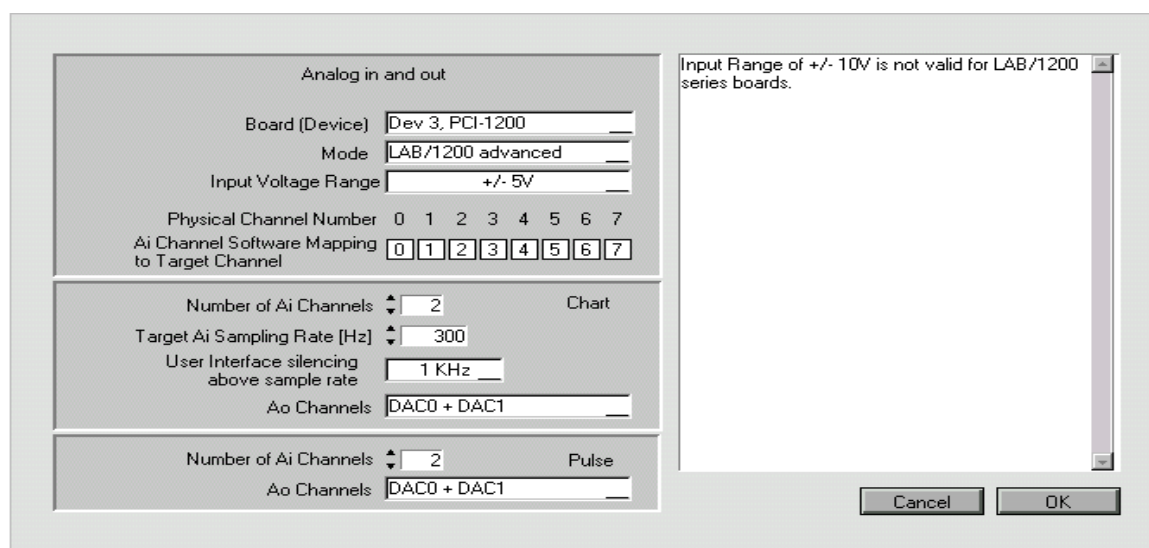


Figure 2: hardware module settings in the subeditor: **Analog in and out**

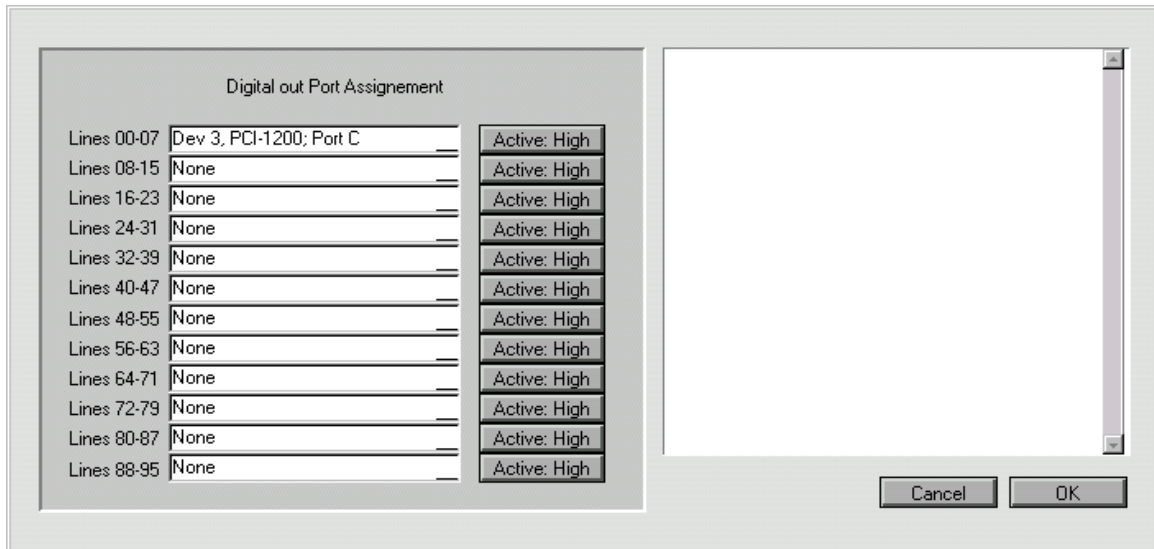


Figure 3: hardware module settings in the subeditor: **Digital out Port Assignment**

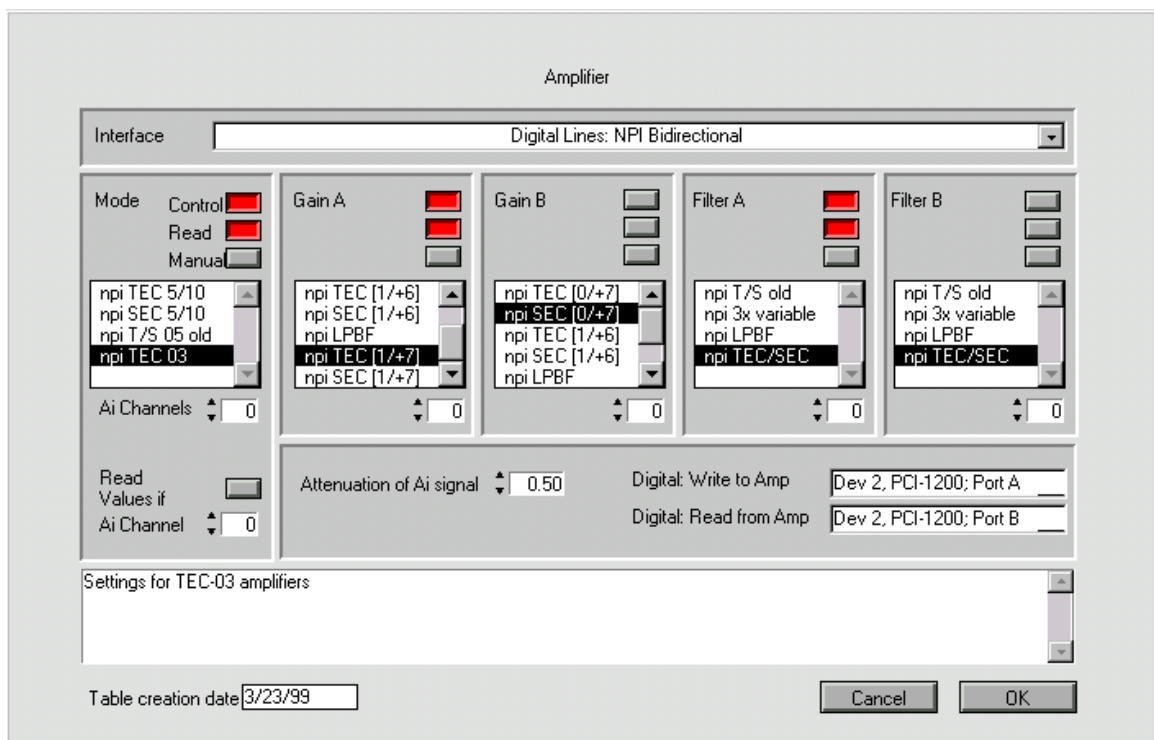


Figure 4: hardware module settings in the subeditor: **Amplifier**. These settings are necessary to read from and to control the amplifier TEC-03CW

2. Signal scaling

The signal scaling is configured in the CellWorks setup module. Figure 5 shows the correct settings for a TEC-03X-CW.

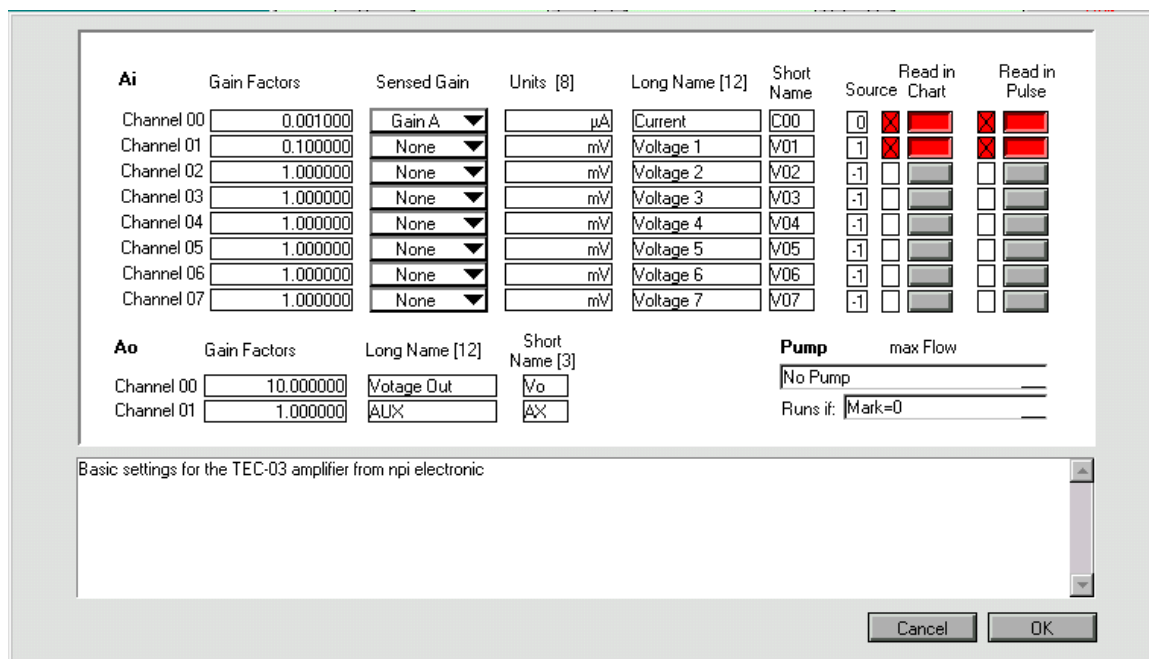


Figure 5: setup module settings for scaling analog input (Ai) and analog output (Ao) signals

Note: These are only basic settings for using the TEC-03X-CW amplifier with the software package CellWorks 5.1 and the PCI-1200. Advanced settings are available and described in the CellWorks Short Manual.

2.1. Signals from CellWorks, overview

Signal from CellWorks	Rear Panel of the TEC-03X-CW
Analog input 0 (Ai0)	Current from amplifier (CURRENT OUTPUT)
Analog input 1 (Ai1)	Voltage from amplifier (POTENTIAL OUTPUT PEL)
Analog input 2 (Ai2) – Analog input 5 (Ai5)	Located at the TEC-03X-CW rear panel and labeled CHANNEL 2 – CHANNEL 5
Analog output 0 (DAC0)	Used for COMMAND INPUT and is additionally linked to a BNC connector (OUTPUT 0) at the rear Panel of the TEC-03X-CW
Analog output 1 (DAC1)	Linked to a BNC connector at the rear panel and labeled with OUTPUT 1
Automatic trigger output (AUTO.TRIG. OUT)	Steps from 0V to +5V if a pulse routine (or snapshot) in CellWorks is activated. For using the automatic trigger mode this connector must be linked to the trigger input connector.
Trigger input (TRIG. IN (TTL))	This TTL input is used to trigger the system. A signal step from 0V to +5V is required to trigger the system. For using the automatic trigger mode this connector must be linked to the trigger input connector.

3. Basic settings overview

Location in CellWorks	Parameter name	Values/settings
hardware module, sub editor: Analog in and out	Board (Device)	PCI-1200
	Mode	LAB/1200 advanced
	Input Voltage Range	+/- 5V
	Ai Channel Software Mapping to target channel	From left to right: 0, 1, 2, ..., 7
	Chart: Number of Ai Channels	2
	Chart: Target Ai Sampling Rate [Hz]	300
	Chart: User Interface silencing above sample rate	1 kHz
	Pulse: Number of Ai Channels	2
	Ao Channels	DAC0 + DAC1
hardware module, sub editor Digital out Port Assignment	Lines 00-07	PCI-1200; Port C
	Line 08- 95	None
hardware module, sub editor: Amplifier	Interface	Digital Lines: npi bidirectional
	Mode	Control and Read button on (red) Manual off (gray), npi TEC 3, Ai Channel 0
	Gain A	Control and Read button on (red) Manual off (gray), npi TEC [1/+7], Ai Channel 0
	Filter A	Control and Read button on (red) Manual off (gray), npi TEC/SEC, Ai Channel 0
	Gain B	All buttons off, Ai Channel 0
	Filter B	All buttons off, Ai Channel 0
	Attenuation of Ai signal	0.5
	Digital: Write to Amp	PCI-1200; Port A
	Digital: Read from Amp	PCI-1200, Port B
setup module, sub editor: Software Gain Factors etc	Ai Channel 00	Gain Factor: 0.001, Sensed Gain: Gain A, Units [8] μ A, Long Name [12]: Current
	Ai Channel 01	Gain Factor 0.1, Sensed Gain: None, Units [8]: mV, Long Name[12]: Voltage
	Ao Channel 00	Gain Factor: 10, Long Name [12] Voltage Out, Short Name [3]: Vo
	Ao Channel 01	Gain Factor 1, Long Name [12]: AUX, Short Name [3]: AX