

Operating Electronics for Spectral Sensors and Linear Image Arrays

Remote-Controlling of Interface- Electronics and Spectrometer-Systems

Technical Note

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Technology for Spectroscopy

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1 Introduction

To remote control device performance, digital inputs and/or the trigger input are integrated into the interface electronics as well as the spectrometer systems. When receiving a certain signal at one of these ports, a predefined event is actuated.

The tec5 electronics offers two different ways of remote controlling:

w Remote controlling via digital inputs

The first option is remote controlling by means of the digital inputs. This is managed by software and provides the possibility not only to do sample-measurements, but also e.g. dark-current or calibration measurements. However, a delay of up to some ms between receiving the signal and the start of the measurement has to be taken into account; the delay depends on the processor load.

w External triggering

The second option is the use of the hardware-trigger, which has the advantage to actuate the event in real-time without any delay.

When using a system, the trigger-signals are transmitted to the electronic via the 9-pin DSUB connector. This connector is located on the back-panel of the system with USB-electronics; for PCI-electronics it is located next to the 40-pin connector on the PCI-board. For electronics please refer to the related documentation which can be found on the provided Info CD.

2 Remote Controlling by Means of Digital Inputs

Two digital inputs are available for this type of remote controlling, which is especially useful for applications which do not require real-time measurements. An advantage is that the software is ready with its entire functional range, independently from the remote control. Thus, measurements can also be initiated manually. To do so TTL signals (+5V) are used. The digital input is grounded when the release button is not pushed, this is taken care of by the internal circuitry, realized by means of a 10 k Ω resistor. The actual status is always defined. In the following the wiring diagrams for digital remote controlling based on one or two digital inputs, are shown.

One Digital Input

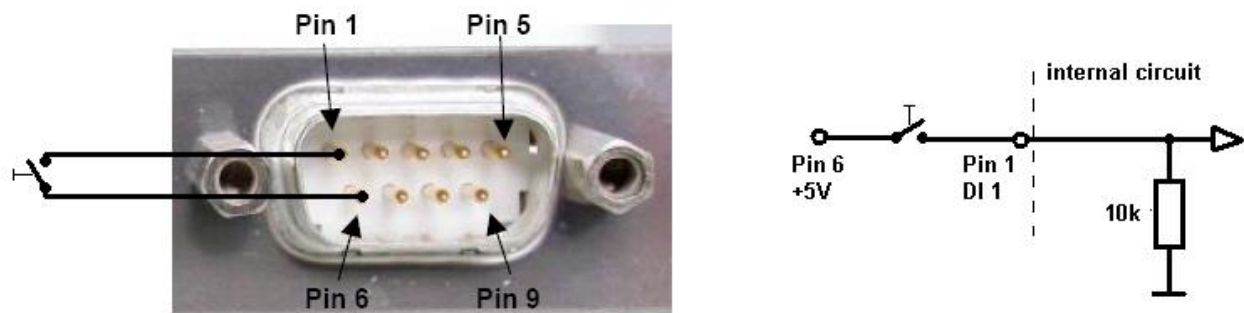


Figure 1: Remote control with one digital input

By applying a +5V signal (TTL-signal) to the digital input (DI1) at pin 1, the measurement is initiated. A simple way to realize this is to connect pin 1 (DI19) and pin 6 (+5V-Out) by a pushbutton.

Two Digital Inputs

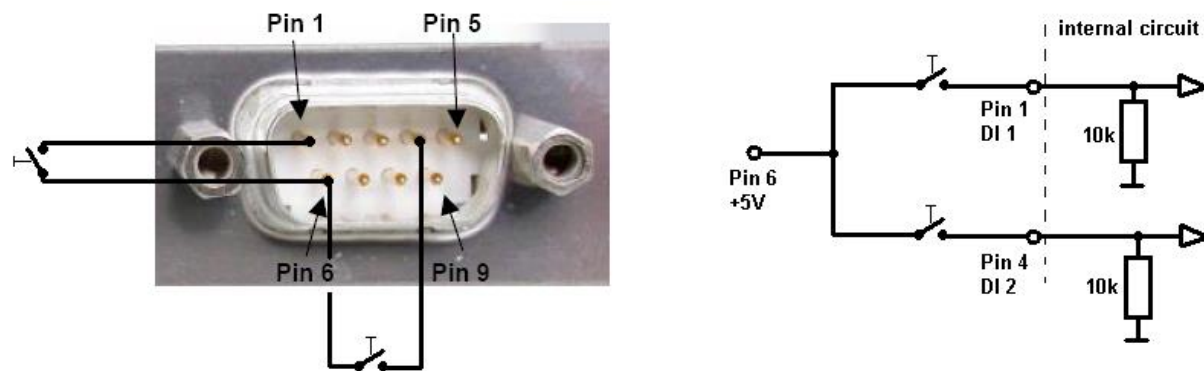


Figure 2: Remote control with two digital inputs

In principle remote controlling with two digital inputs is an upgrade of remote controlling with one digital input. Pin 4 (DI2) is already grounded by means of an internal $10\text{k}\Omega$ resistor. By applying +5V to pin 4 (DI2), or connecting pin 4 (DI2) and pin 6 (+5V-Out) by a push button, a measurement is started. In that way e.g. the trigger event at DI1 can initiate a dark-current measurement and the trigger event at DI2 can initiate a sample measurement. The allocation of the respective functions to the digital inputs is done via the software (please refer to chapter 4.3.12 “Remote Control” of the MultiSpec Pro manual).

3 Hardware Triggering

By means of the hardware-trigger, the measurements can be performed closely linked timewise to the trigger-signal. It is especially suitable for measurements requiring accurate timing. For PCI electronics the jitter (time delay between the trigger event and the data scan) is virtual 0, for USB electronics it averages to $100 \pm 50\mu\text{s}$. However, without changing the operating mode, this type of triggering can only be initiated by applying a real signal, not by software.

In the figure shown below, a trigger signal is applied as soon as the sample to be measured interrupts the light gate. Now the sample is in the correct position and a measurement is initiated by remote control. Especially in case the products have varying distances between each other, it is a good possibility to ensure that 100% of the samples are measured.

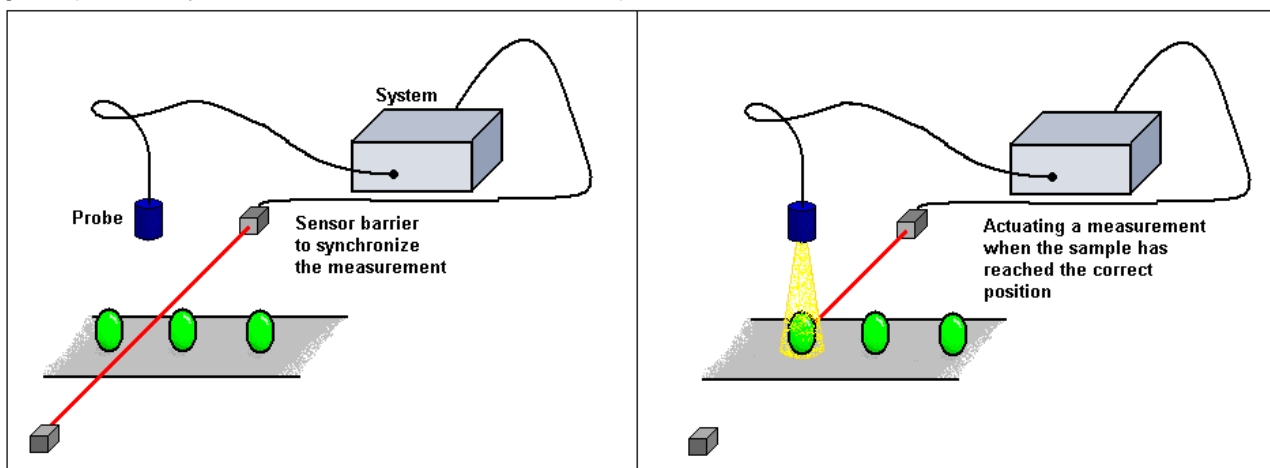


Figure 3: Synchronizing the measurements by means of a sensor barrier

For testing purposes of the external triggering, a frequency synthesizer can be connected with pin 3 (Ext_Trig) and pin 9 (GND). By means of the command "Get Spectra", the hardware is prepared for the external triggering. All further activities are solely controlled by the hardware in real-time and are independent of the processor work load. For this purpose different triggered sensor operating modes are available, which are described in detail in the technical note „Overview – Sensor Operating Modes“.

4 Note

The digital input source has to be set from „DIN 36/40 pin“ to „DSUB“ in case of triggering a system using the software MultiSpec Pro. This menu item can be found under "Operating Electronics /Options Setup". The DIN 36/40 pin connector can be used alternatively to the DSUB for triggering PCI electronics, however this connector is not accessible for the outside.

