TDC Demo Software

Manual

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User Manual for the
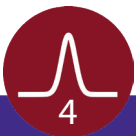TDC Demo Software
Manual Version 2.2
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2 Requirements

2.1 Hardware Requirements

The read-out of the TDC is done with a standard PC via USB3.0. For the PC the following minimum system requirements are highly recommended:

- Processor: Quad Core

- RAM: 4GB

- Windows 7 or higher

- USB (no front panel connector)

2.2 Software Installation

The delivery packages of the Surface Concept TDCs include a storage medium with hardware drivers and the TDC Demo software. Connect the storage medium to your PC and install the software package as described in the Software Installation Manual.

2.3 Description of User Interface

All operation functions of the TDC for data readout are encapsulated in the dynamic linked library "SCTDC1.dll". Data processing and presentation must be realized by the end-user if not using the TDC_Demo stand-alone software. The User-Interface of the SCTDC1.dll is described in detail in the file "index.html" in the software developers folder on the storage medium.

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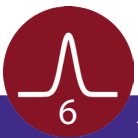
3 TDC Demo Software

3.1 Getting Started

3.1.1 The Main User Interface

Start the stand-alone software by executing the file "tdcDemo.exe" in the software folder of the TDC Demo. The software opens up with the main user interface (see **Figure 1**). It enables access to all important measurement parameters of the TDC.
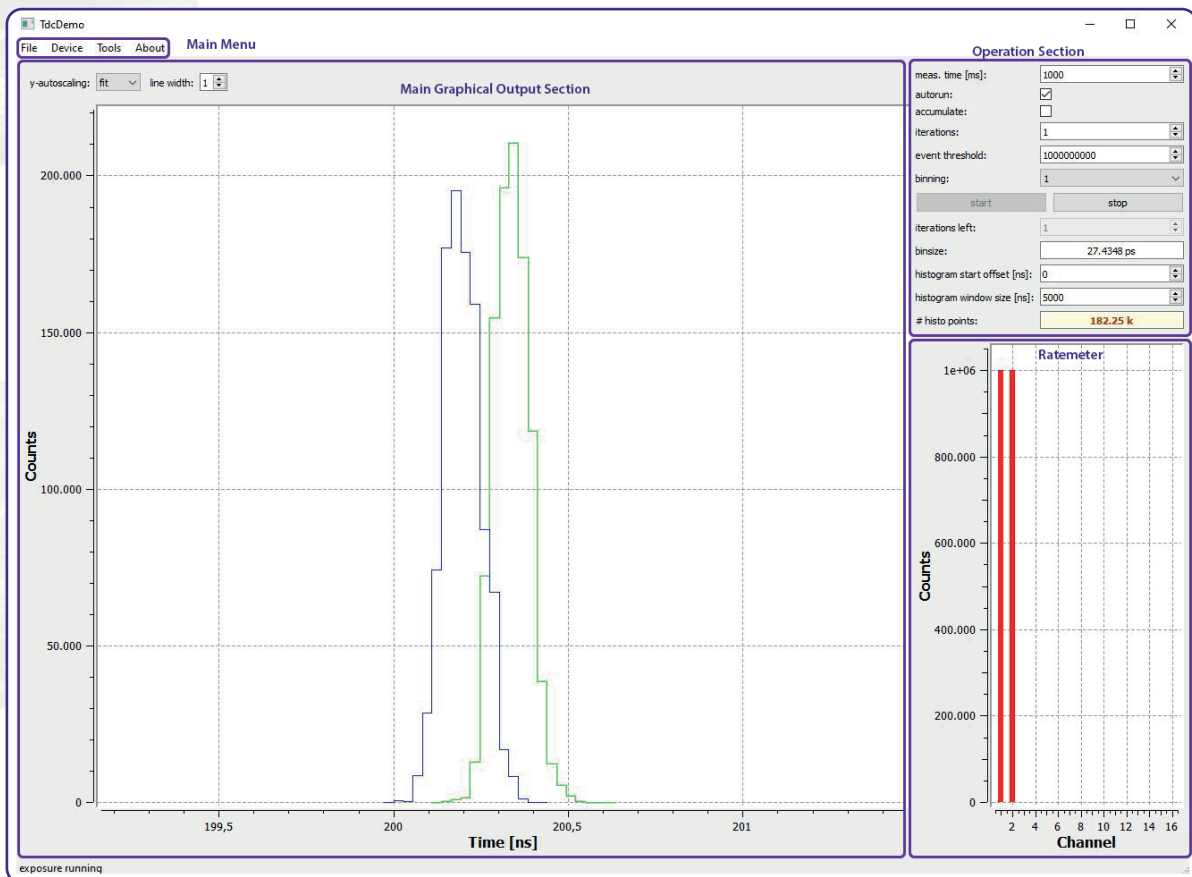

Figure 1: Main user interface of TDC Demo software.
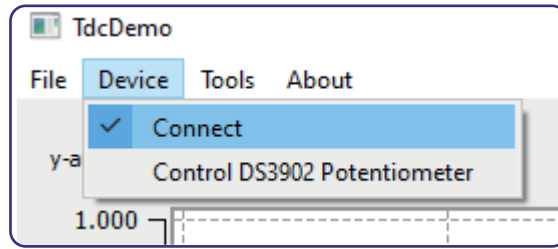
3.1.2 Device de-/initialization

Figure 2: Hardware connection.

Before a measurement can be started, the software has to connect to the TDC. This is done by selecting "Connect" in the "Device" section of the main menu at the upper left corner of the main user interface (see **Figure 2**).

After device initialisation the term „connect" is marked. The status is also stated in the bottom left corner with the words "Device is initialized".

Device deinitialization is made in exact the same way, by clicking "Connect" in the "Device" section again. The successful deinitialization is stated in the bottom left corner with the words "Device is de-initialized".

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Note
It won't be possible to start any measurement as long as the TDC has not been connected.
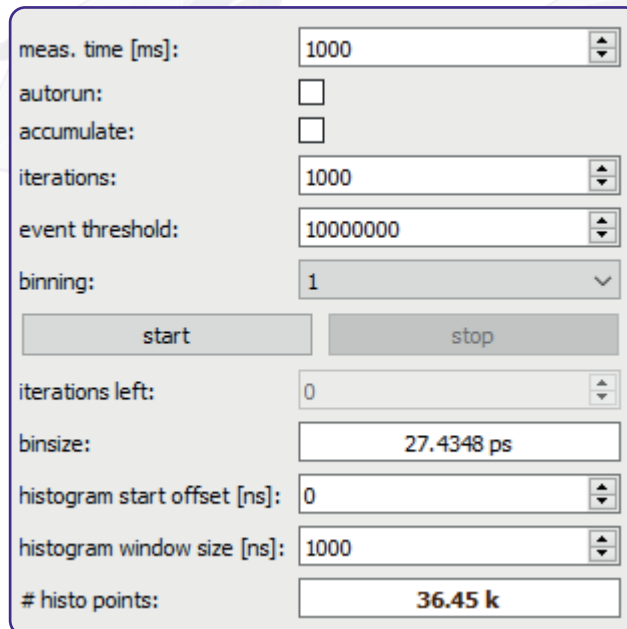
3.1.3 Start of a Measurement

Figure 3: Operation section of main user interface.

To start a measurement just press the button "start" in the operation section of the right side of the main user interface (see **Figure 3**).

The measurement is performed with the parameters as defined in the operation section (like measurement time, bin size or histogram window size). The results are plotted in form of 1D time histograms in the main graphical output section, while the whole integrated count rate is shown in the ratemeter in form of a bar chart (see **Figure 1**).
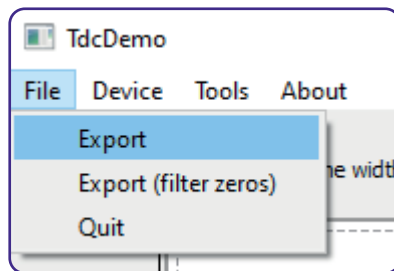
3.1.4 Saving of Results

Figure 4: Data export.

To save the results of a measurement selecting "Export" or "Export (filter zeros)" in the "File" section of the main menu (see **Figure 4**).

The "Export" function saves the 1D time histogram in form of an ascii file (.txt ending) for each TDC stop channel separately. The file names are made up by the main name entered during saving + a channel number extension (e.g. measurement1_ch0.txt, measurement1_ch1.txt , when channels 1 and 2 have been used during the measurement). In addition the output of the ratemeter is saved in another separate ascii file named by the main name entered during saving + "rates" as extension (e.g. measurement1_rates. txt).

The "Export" function saves all entries for all time bins independent if they are zero or not. The "Export (filter zeros)" saves the same data, but ignores all entries which are zero, to keep the size of the ascii file small, when saving large histograms.

3.1.5 Closing the Software

To close the software select "Quit" in the "File" section of the main menu (see **Figure 4**). It is not necessary to de-initialize the device before. This is done automatically when closing the software.
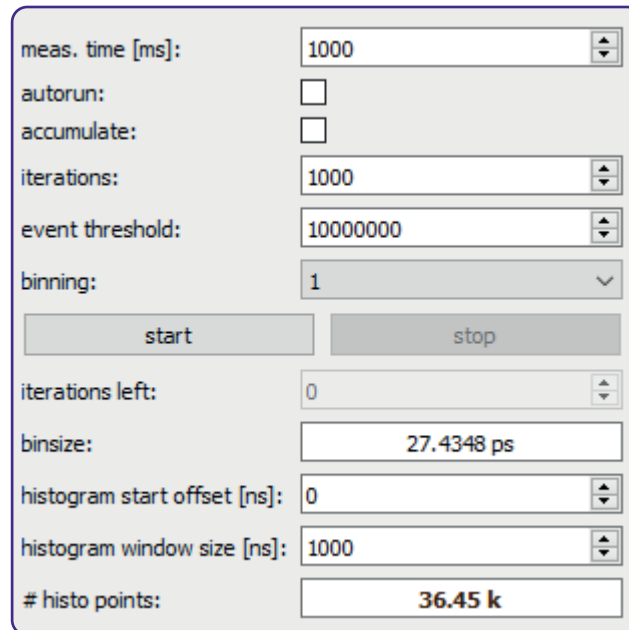
3.2 Measurement Parameter Definition

Figure 5: Operation section of main user interface.

The operation section of the main user interface holds several parameters to define a measurement:

meas. time [ms] Here the measurement or accumulation time is defined. This is the time interval for which the TDC is accumulating results. This time is not directly connected to the measurement range of the TDC only in such a way, that it is limiting the measurement range in the measurement range extension mode (as the measurement range cannot be longer than the measurement time).

autorun If switched on, a new measurement is started with the same measurement conditions automatically after the previous one has ended. The results are shown in the main graphical output section and in the ratemeter. Previous results are deleted and overwritten. The results are displayed until the next measurement has been finished.

accumulate If switched on, results of several subsequent measurements are accumulated together. The accumulated results are updated and displayed each time a measurement has been finished. This functionality works best when autorun mode is switched on.

iterations This parameter defines the number of subsequent measurements which are accumulated when accumulate is activated. After accumulating the given number of iterations, the measurement stops automatically. This works best in combination with the autorun mode. This parameter works in parallel with the event threshold parameter. Whatever condition is fulfilled first (iteration or event threshold) will stop the measurement.

event threshold   This parameter works similar to the iteration parameter, but instead of accumulating a number of measurements, measurements are accumulated until the defined number of events have been accumulated. This works best in combination with the autrun mode. This parameter works in parallel with the iteration parameter. Whatever condition is fullfilled first (iteration or event threshold) will stop the measurement.

binning   Defines the software binning in time.

iterations left   Displays the number of iterations which still have to be taken, when iterations has been set.

binsize   Shows the current bin size of the measurement. It basic bin size depends on the specific TDC and it adapts to the selected binning.

histogram start offset [ns]   Defines an offset for the 1D histogram. Only results which fall into the defined histogram size and offset will be displayed in the main graphical output section. All other results will be neglected. This does not effect the total count rate shown in the ratemeter.

histogram window size [ns]   Defines the size of the 1D histogram. Only results which fall into the defined histogram size and offset will be displayed in the main graphical output section. All other results will be neglected. This does not effect the total count rate shown in the ratemeter.

 # histo points   States the total number of histogram points within the 1D time histogram. This number depends on the histogram size and the bin size. The size of each single histo point is a 64bit number. Therefore the number of histo points also indicate the memory size for the 1D time histogram, which will be assigned when starting a measurement.
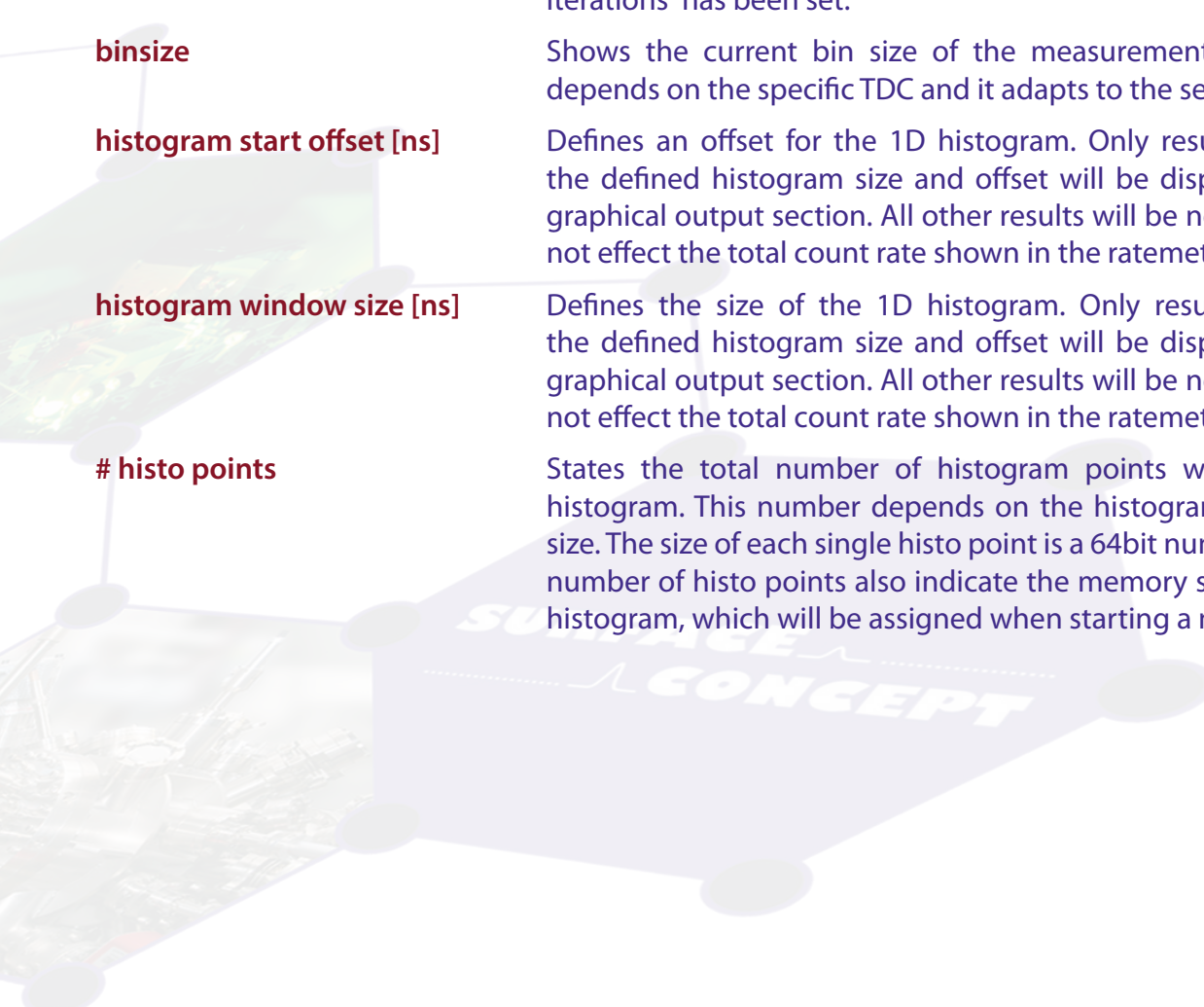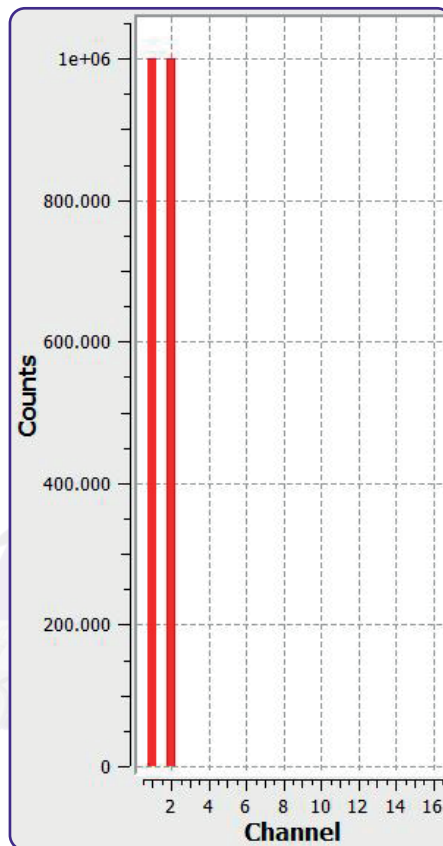
3.3 The Ratemeter Display

Figure 6: Ratemeter display.

Beside the display of 1D time histograms, the TDC Demo software also displays the number of total measured events per TDC channel during one measurement. Those event numbers are displayed in the ratemeter display in form of a of a bar chart (see **Figure 6**) and are primarily meant for a quick and rough estimation of the total rates of the single TDC channels.

The rate numbers displayed in the ratemeter are independently provided directly by the TDC at the end of each measurement. They are not effected by the parameters of histogram start offset and histogram window size, as those boundary conditions are software parameter which will be applied on the incoming TDC events within the software, but not on the ratemeter numbers.

When data are saved (see **Chapter 3.1.4**), the output of the ratemeter is saved in another separate ascii file named by the main name entered during saving + "rates" as extension (e.g. measurement1_rates.txt).

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Note

Depending on the settings of histogram start offset and histogram window size, it can occur that no results in the 1D time histogram are displayed. Still it may be that results displayed in the ratemeter, as those numbers are not effected by the parameters of histogram start offset and histogram window size.

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