

TFT-FOS

Technobis Fibre Technologies
Fibre Optic Sensing



Deminsys

Software Manual – User Manual Addition

Thank you for purchasing the Deminsys product. This instruction manual has been prepared for users of the Deminsys. To ensure correct use, please read this manual carefully before using these products.

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- The contents of this manual are subject to change without notice
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- Read the instruction manuals for any other products that you are using with this product (a computer or other peripheral equipment)
- If the product is used in a manner not specified by the manufacturer, the protection provided in the product may be impaired.

Notes, Notices and Cautions



NOTE: A NOTE indicates important information that helps you make better use of your computer.



NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.



CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

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1 OVERVIEW

1.1 Deminsys



Deminsys, the world's fastest multi sensor / multi-channel FBG interrogator, identifies four channels with typically 8 sensors per channel. The system is especially developed for the interrogation of signals up to 20 kHz for each sensor and the sample frequency is independent of the number of sensors. The system is self-calibrating meaning it can be coupled to pre-installed fibres in any construction. A trade-off between the number of FBG's per fibre, sample frequency or the dynamic range gives the customer a more flexible interrogator.

[For more information on how the Deminsys operates please read the User Manual which is shipped with the Deminsys Package.](#)

1.2 Commands and Data

[For more information on how the command and acquisition structure of the Deminsys read the appendices C and D of the User Manual which is shipped with the Deminsys Package.](#)

In general Deminsys is operated through so-called TLV commands using a TCP Telnet interface. Once set data acquisition can be started. Data is acquired and broadcasted to the host using a UDP connection. During acquisition sending commands other than and the stop-acquisition command is not recommended.

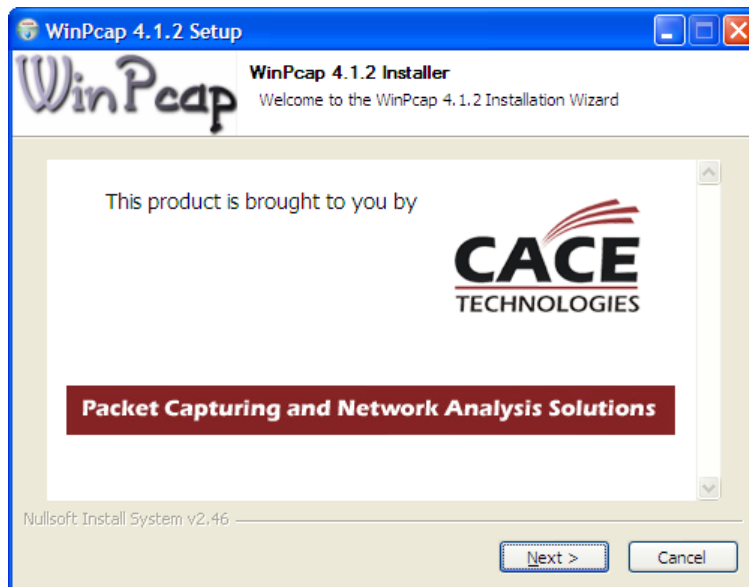
2 GETTING STARTED

2.1 PC Requirements

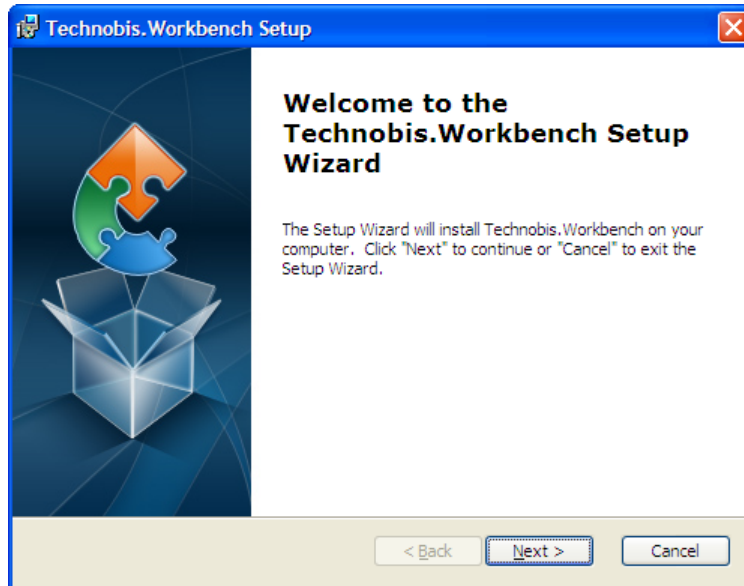
Parameter	Requirements	Unit
CPU	Dual Core 3.2	GHz
Resolution	1024 x 768	Pixels
Memory	2	Gbytes
Operating System	Windows XP/Vista/7 (32+64 bit)	

2.2 Installing the Deminsys software

1. Locate the source of the installation files on disk or network.
2. Start '**WinPcap_4_1_2.exe**' to install the low-level communication drivers.



3. Follow the default instructions on the installation wizard screens.
4. Start '**Technobis.Workbench.msi**' by double-clicking the filename.



5. Follow the default instructions on the installation wizard screens.
The wizard may indicate that the .NET Framework 4.0 is not installed on your PC. If so, execute the file '**dotNetFx40_Client_x86_x64.exe**' from the **\support** folder. Follow the default instructions in the installation wizard.
Once installed, execute the file '**Technobis.Workbench.msi**' once more to finish installing the Deminsys software.
6. Once all is installed two shortcuts have been placed in the Start menu in the '**Technobis**' folder: '**Acquisition**' and '**Converter**'.

2.3 Connecting to Deminsys

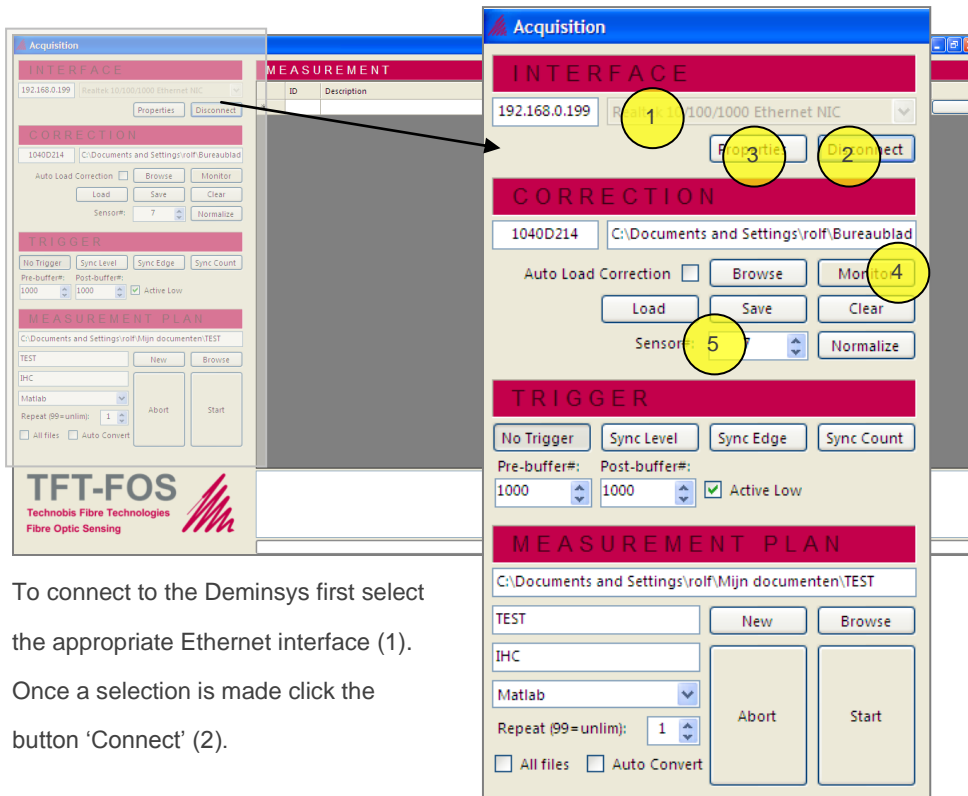
Once the software is installed it provides two executables:

- Acquisition Tool (Acquisition.exe)
- Converter Tool (Converter.exe)

Obviously the Acquisition Tool (**AT**) is used to connect to the Deminsys and start acquiring data. The Converter Tool (**CT**) is used to offline convert raw data files stored on disk during acquisition. The **AT** does allow conversion as well but only during the execution of a measurement plan.

For more information on how to connect the host PC to the Deminsys read the Deminsys User Manual.

To connect to the Deminsys start the **AT**. Within a second or two the following screen appears (see next page).



To connect to the Deminsys first select the appropriate Ethernet interface (1). Once a selection is made click the button 'Connect' (2).

2.3.1 Sensor Monitor

Before actually connecting the Deminsys to this application, the button 'Properties (3) can be used to modify Deminsys parameters. This interface allows manual setting of Deminsys parameters and even starts the acquisition sequence.

To immediately see the sensors connected to the Deminsys click button 'Monitor' (4, image above).



As demonstrated in the image above the lower section of the screen shows the sensors as detected on the CCD line array in the Deminsys. The working principle of Deminsys is to detected high accurate shifts of these peaks which relate to strain picked up with FBG sensors in the optical fibre.

The graph shows three indicators:

1. Detected sensors peaks on the CCD line array (green series).
2. Sensor output value (purple series) in passing time. The sensor of which the data is presented can be changed by selecting a different sensor index (5).
3. The value of the sync-signal (blue series) in passing time.

The label at the lower right of the screen shows the average sensor value taken over 100 samples. For performance reasons the graph is updated at a much lower rate than the maximum sample rate of Deminsys. Regardless of the Deminsys sample rate the graph is updated each 50 ms. Depending on the CPU speed this rate can be lower. It is this moment that sensor output is taken for averaging as displayed in the label.

2.3.2 Correction files

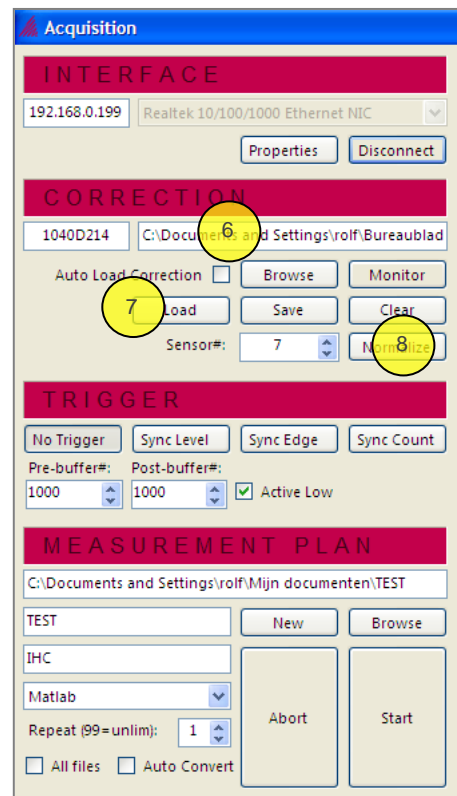
The Deminsys is a measurement instrument that has a software based correction feature. Each Deminsys has its own correction file based on its serial number. This correction file is in XML format and can be placed in any arbitrary location, i.e. '1040D214.xml'. This location however is to be set in the Path-field (6). Once set the correction file can be loaded, saved and cleared (7). Setting the check allows auto loading the correction files.

Normally Deminsys provides the so-called 'center of gravity' data. This value represents a highly accurate position of a light spot projection on the CCD line array.

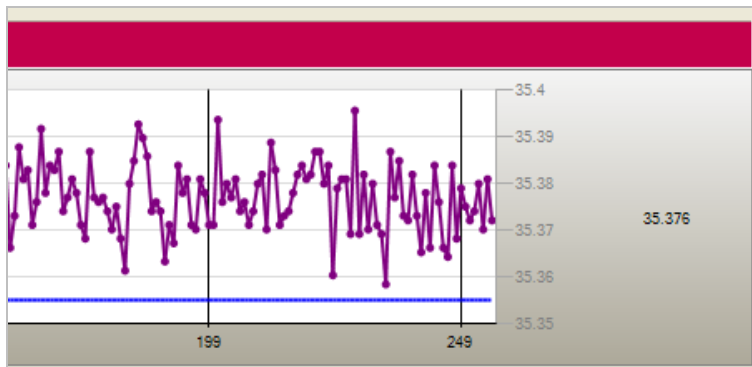
A movement of this position relates to the occurring strain in that fibre. For convenience and interpretation it is often desired to receive strain data instead of 'center of gravity data'. The relation between strain and this 'center of gravity' data is proportional and defined by the following formula:

$$f(x) = ax + b$$

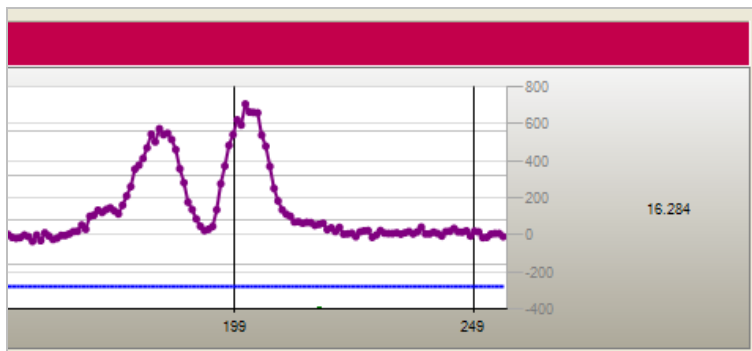
In which: f(x) = strain
x = position
a = gain
b = offset



During calibration of each Deminsys the correction file is filled with lookup tables and parameters to determine the gain factor for each sensor.



The offset however is not set yet. Since fibres and their FBG sensors are interchangeable for each Deminsys channel they may require to be normalized each time they are to be used for acquisition. Once a sensor is moved from one channel to the other another offset is to be applied.



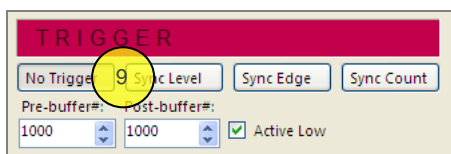
Using the button 'Normalize' (8, previous page) allows the user to automatically set the right offset value for the sensor selected at (5). Remember to save the correction file if you wish to restore these offset values later on.

3 USING THE SOFTWARE

3.1 Acquire Data

3.1.1 Triggering

The Deminsys provides a feature to time-synchronize measurements with external processes through a sync-signal input.



The Acquisition Tool allows four triggering schemes:

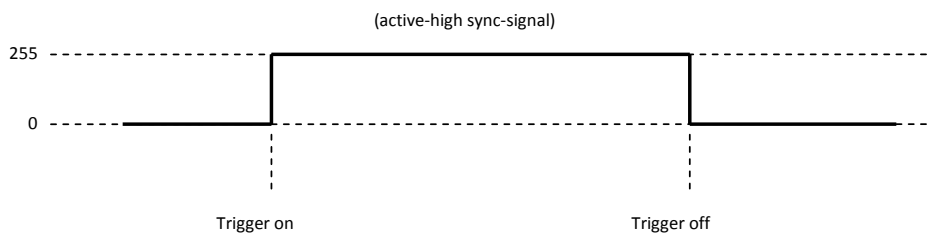
1. No Trigger
2. Sync Level
3. Sync Edge
4. Sync Count

3.1.1.1 No Trigger

Using 'No Trigger' as option allows a measurement to be manually started and stopped without any limit. During this time the measurements are stored on disk in standard binary format.

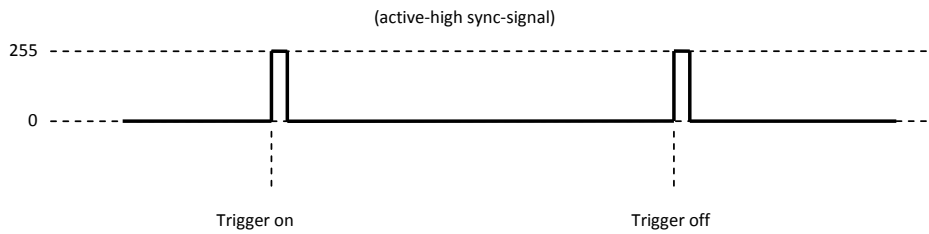
3.1.1.2 Sync Level

The 'Sync Level' option allows a measurement to be started when a sync signal is received and remains at its signal level. During that time measurements are stored on disk in standard binary format. When the signal drops (or rises with an active-low signal) the measurement is stopped.



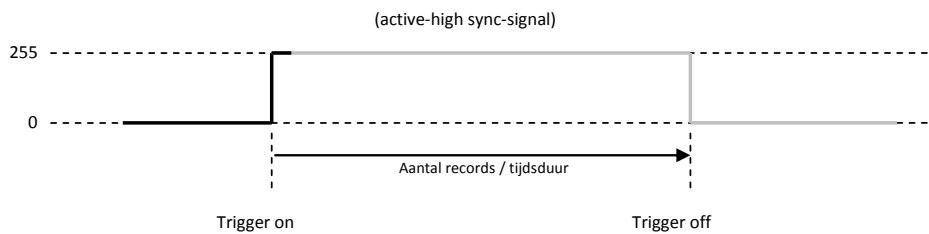
3.1.1.3 Sync Edge

The 'Sync Edge' option allows a measurement to be started when a rising edge (or falling for active-low) is detected. As soon as a similar edge is detected the measurement is stopped. Again during measurements the data is stored on disk in standard binary format.



3.1.1.4 Sync Count

The 'Sync Count' option allows a measurement to be started when a rising edge (or falling for active low) or high-(or low-) level is detected. The measurement ends when a certain number of records have been recorded and stored (Post-buffer count).



3.1.1.5 Pre-buffer

The pre-buffer indicates the number of samples to store in a queue-buffer. This buffer will constantly contain the last number (pre-buffer count) of samples past. As soon as a trigger is received, this buffer is written to disk. Setting the value to '0' means turning off the Pre-buffer.

3.1.2 Measurement Plan

All measurements are managed within the context of a so-called 'Measurement Plan' (MP). A MP is defined by a storage location, a specific code, the file format in case the data is exported and an extra reference field intended for customer specific features that are activated on this reference. The number of measurements that should occur within a MP can be set at (11).

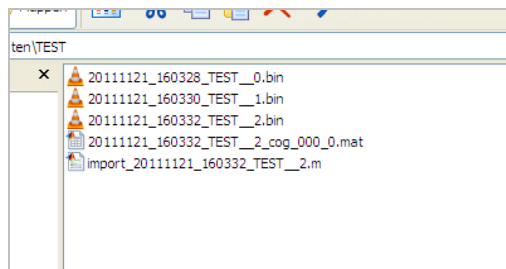
The screenshot shows the 'MEASUREMENT PLAN' dialog box. It has a title bar 'MEASUREMENT PLAN' and a text box for the storage location: 'C:\Documents and Settings\rolf\Mijn documenten\TEST'. Below this are two buttons: 'New' and 'Browse'. There are three input fields: 'TEST', 'IHC', and 'Matlab'. The 'Matlab' field has a dropdown arrow and is circled in yellow with the number '10'. Below these is a 'Repeat' field with a value of '11' and a dropdown arrow, also circled in yellow with the number '11'. At the bottom left are two checkboxes: 'All files' and 'Auto Convert'. On the right side are two large buttons: 'Abort' and 'Start'.

A **MP** is started or resumed using the button 'Start' and aborted with the button 'Abort'. Each time a single measurement is being executed its status is displayed in the list.

ID	Description	Status	Start	Duration	Convert	Open
0	20111121_155404_TEST_0	FINISHED	15:54:04	2.836	Convert	Open
1	20111121_155412_TEST_1	FINISHED	15:54:08	2.896	Convert	Open
2	20111121_155418_TEST_2	BUSY MEASURING...	15:54:18		Convert	Open
*						

For each single measurement a binary file is created with the measurement data stored in raw file format. The name of that file is shown as its description in the list (12). The first part of the name is the date, the second part is the time, the third part the 'Code' as entered at the **MP** definition and the last part is the index number of the measurement.

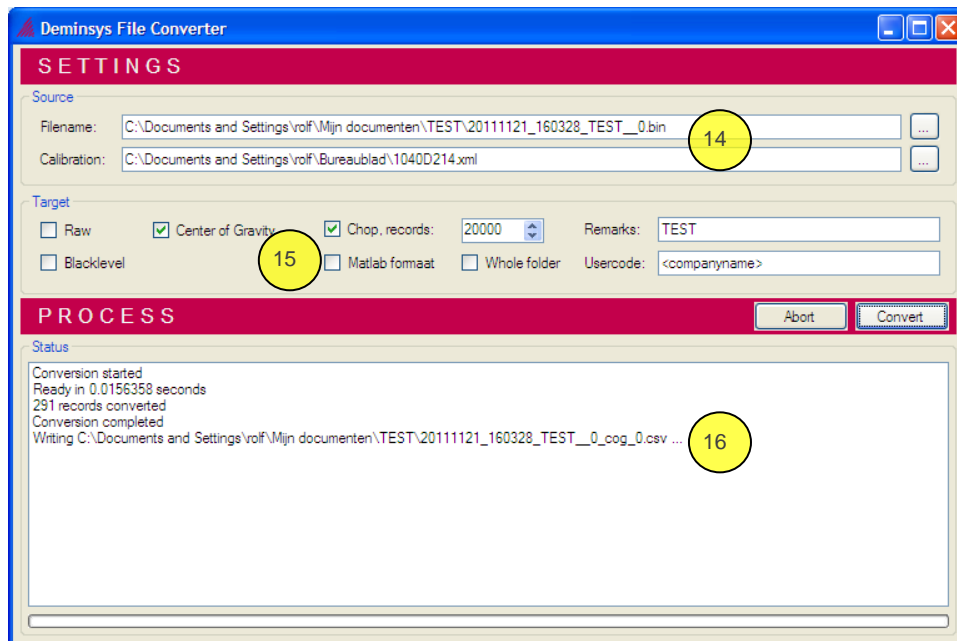
Once finished the measurement raw data file can be converted to the file format as indicated (10). The progress of this conversion is shown in a progress bar at the bottom of the screen. If a certain program is registered in windows capable of presenting the formatted data as converted the button 'Open' in each list item will execute that application having the data file as a parameter.



The conversion of the data uses the correction file as currently loaded. In its name the data is referred to as 'cog' which stands for '**center-of-gravity**'. When the correction gain and offset are applied however the output values are to be considered as strain and not '**center-of-gravity**'.

3.2 Convert Data

In case the raw binary data files have not been converted during execution of the **MP** the Converter Tool can be used.



Start with selecting the file to be converted and the correction file to be used (14). In the 'Target' section (15) the choice can be made to extract the Raw, Blacklevel or Center of Gravity data.

One should remember that the Deminsys can be set to acquire Raw and/or Blacklevel and/or Center of Gravity data. Converting a file to get Raw data can obviously only be successful if the binary data file contains that raw data in the first place.

Since converted data files tend to grow quite large - especially ASCII files – the files are chopped into smaller peaces. If this is the case the associated files are displayed in the list (16).