

NEWSON



CONtester



USER MANUAL

CONtester



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1 Introduction and General Overview

1.1 Introduction

In the automotive industry several demands are being set towards contacts, switches, relays, resistances,... Contact disturbance measurements and contact variations are to be recognized as such. At well-defined external values of temperature, frequency and acceleration a contact security must be given.

The CONtester™ is a very accurate modular measurement system to measure variations in impedance as a function of temperature, frequency and acceleration.

The contact disturbance measurement card „CT 2G-CD“ can measure contact disturbances from 100 nsec onwards, recognize and log them, under extreme values of temperature, frequency and acceleration. All measurements are loaded in log-files, and may be questioned by the user and shown as graphics or as an Excell-file, in order to be viewed, analysed and classified.

The contact variation measurement card „CT 2G-CV“ can measure contact variations from 1 µsec onwards, recognize and log them, under extreme values of temperature, frequency and acceleration. All measurements are loaded in log-files, and may be questioned by the user and shown as graphics or as an Excell-file, in order to be viewed, analysed and classified.

The communication between contact measurement cards and the PC is controlled by the CPU-card of the CONtester™ and runs over a galvanical isolated USB-interface.

The current, second-generation of CONtester™ features the latest state-of-the-art electronic components, and allows for 19 measurement locations.

Product highlights:

- Measuring contact disturbances from 100 ns onwards - Threshold resistance in the range of 1 - 600 Ohm.
- Measuring contact variation from 1µsec onwards – Resistance values between 10-350 mOhm and resistance variations between 3–25 mOhm.
- Communication with the PC over a galvanically isolated USB connection.
- Extensive software features.
- All measurements are made simultaneously and logged.
- "Hot plug" feature - it is possible to plug any measuring module in or out without disturbing the other measurements.
- Connection for K-element and accelerometer for logging temperature and acceleration.

The CONtester™ software consists of two parts - the controller software CONtester.exe, and the analysis software Viewer.exe. It is multilingual, available in English, German and Dutch.

CONtester.exe allows to:

- control the CONtester™ hardware through a user-friendly GUI;
- create measurement tests, including grouping of measurement cards, setting test parameters and defining logging stop conditions;
- supervise running tests - this is possible both in software and in hardware, using led indicators and an event viewer;
- personalize log files.

Data are stored per group in separate log files. They contain disturbances, variations, resistance, temperature and frequency. Simultaneous measurements and logging of different tests are possible.

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Viewer.exe allows to :

- create test reports and view them for analysis;
- create simple and understandable graphics of a contact's behaviour;
- personalize the graphics;
- export data to MS Office applications (Excel, Word).

1.2 Manufacturer

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1.3 This Manual

This user manual must be read before the measurement start.

- In chapter 2 the installation of the CONtester hardware is described.
- Chapter 3 focuses on the electrical specifications.
- Chapter 4 handles with the security procedures and EMC.
- In chapter 5 the CONtester program is explained.
- And chapter 6 finally explains the working of the Viewer software.

1.4 Version

Manual version (English): 4.1
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1.5 Contents of delivery

The delivery contains:

- CONtester apparatus with x contact disturbance modules and contact variation cards (x,y see delivery note)
- main power cable
- USB-cable
- Installation-CD
- 1 shorting plug

1.6 OS requirements

CONtester™ USB driver requires Windows XP or a later version of Windows. It supports both 32-bit and 64-bit Windows. The CONtester™ software is a Win32-bit application which can be installed on both both 32-bit and 64-bit Windows OS.



2 Installation of the CONtester-Hardware

2.1 General

In order to start CONtester™ follow these procedures:

1. Connect the main power cable to an earthen 230V supply.
2. Switch on the main power switch, located on the back of the CONtester.



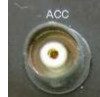
Pict 2-1: Backside of the CONtester with main power switch and security fuse

3. Connect the thermocouple type K with the temperature connection.



Pict 2-2: Connection for the thermocouple type K

4. Connect the accelerometer with the accelerometer connection.



Pict 2-3: Connection for the accelerometer

5. Start the PC.
6. Connect the USB-cable with the PC.



Pict 2-4: USB-Connector

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7. The PC will recognize the CONtester™ hardware as a new USB device. Install the USB driver from the installation CD by selecting the INF file located in the “Driver” directory of the installation CD. (See also **2.2 Installing USB drivers with 64-bit windows**)
8. Install the CONtester™ Software from the installation-CD. Run \Software\English\Setup.exe

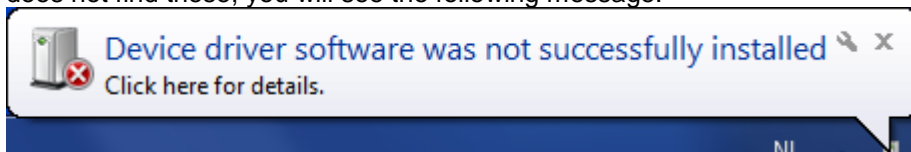
Installations-CD:

- \Software
 - \German
 - \English
 - \Dutch
- \Driver
- \Manual
 - \German
 - \English
 - \Dutch

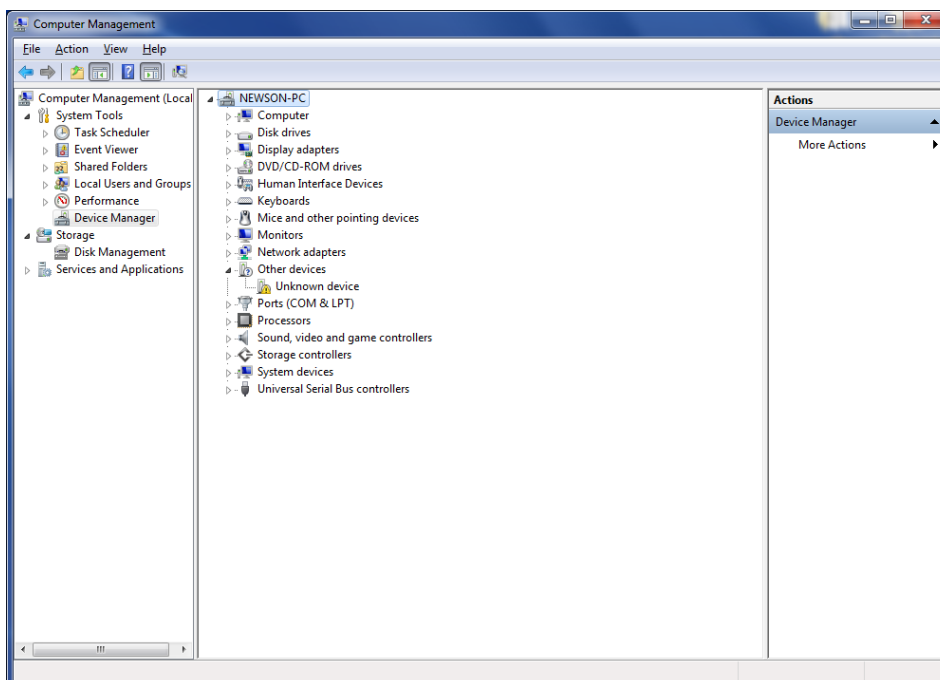
2.2 Installing USB drivers with 64-bit windows

2.2.1 Installing drivers with windows 7/Vista - 64bit

When CONtester™ hardware is plugged into Win7 it will try to find drivers automatically. Because it does not find these, you will see the following message.



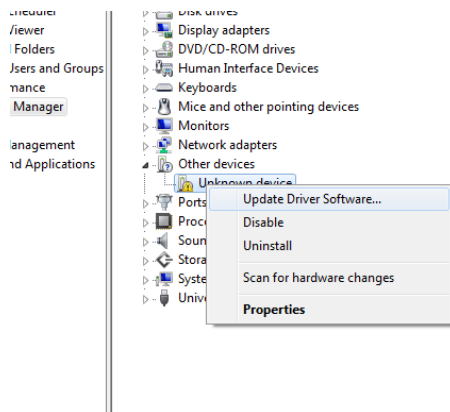
Make sure you are logged in to an administrator account. Go into **Start** and right-click on **Computers** and select **Manage**. This will bring the **Computer Management** window. Now on the left sidebar select **Device Manager** as shown in the screenshot below.



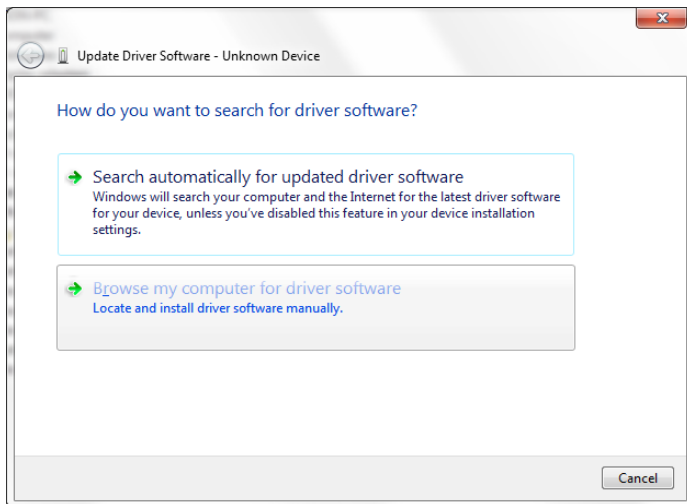
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Now, simply go to **Other devices** and right click on **Unknown device** and finally click **Update Driver Software** as shown in the screenshot below.

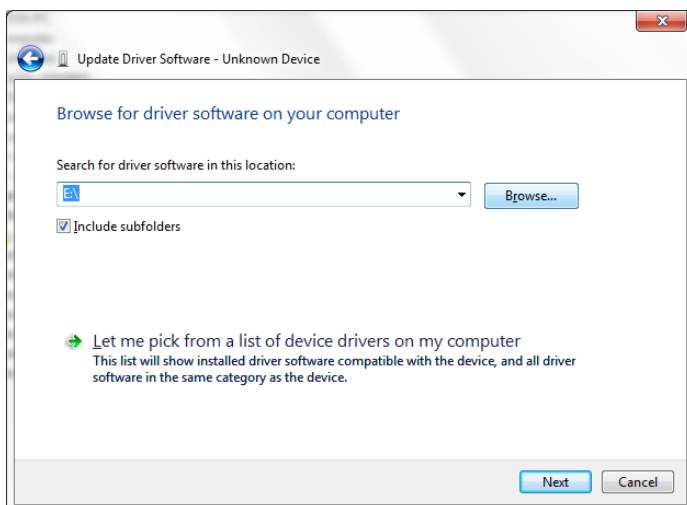


Once you are done. It will open a window like the one shown below.



Select **Browse my computer for driver software**, to install the USB driver that came with the installation package,

It will then open a window similar like the one shown below,

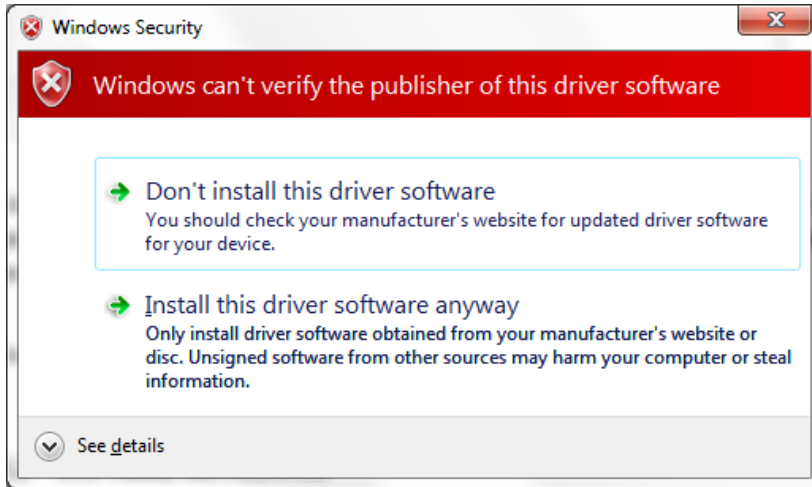


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Click **Browse** and locate your driver. Point to the “Driver” subdirectory of your Installation CD. Once it’s done, simply click **Next** and Windows 7 / Vista will start installing the driver.

During installation process Windows may popup a security window as shown below:



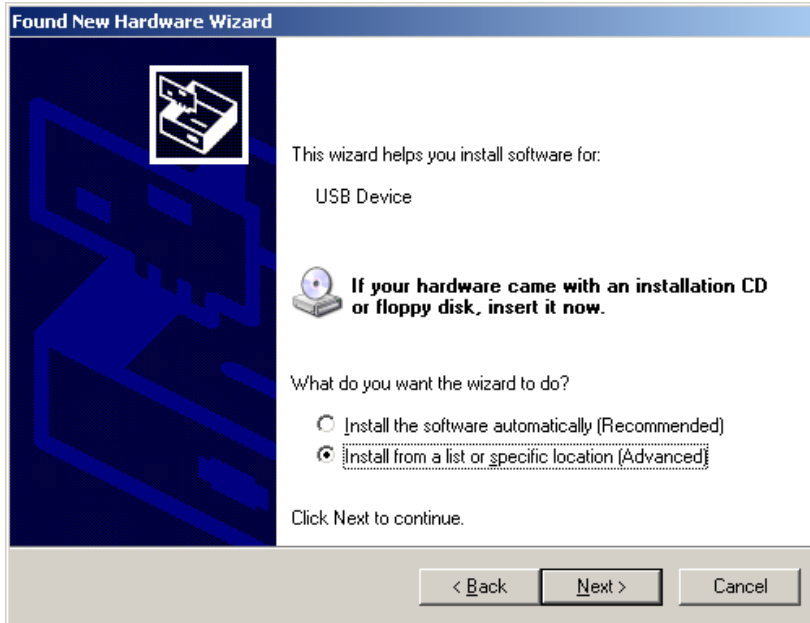
Click **Install this driver software anyway** to continue installation of the driver. Finally Windows should report that it successfully installed the driver software.

2.2.2 Installing drivers with windows XP - 64bit/32bit

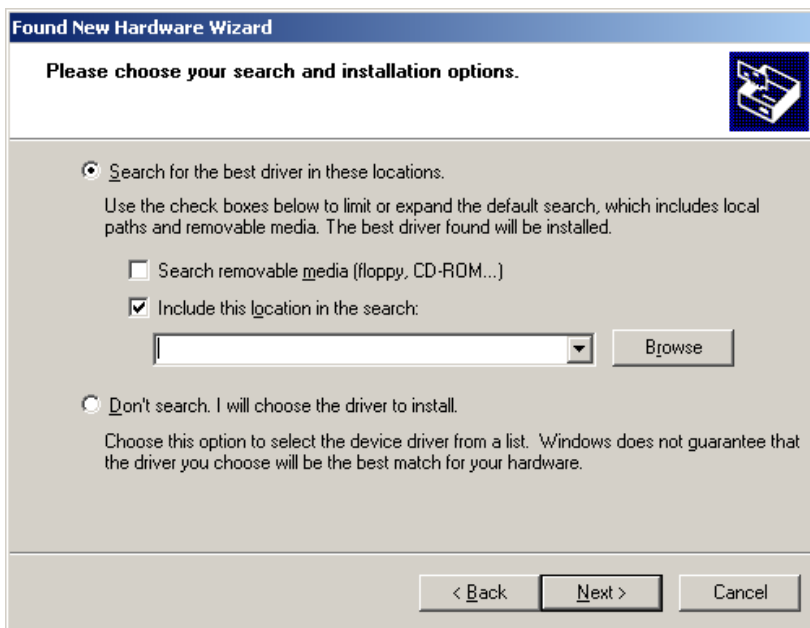
Log in with administrative rights in Windows XP. When the CONtester™ hardware is plugged into the computer, Windows will detect the newly added hardware and will display the **Found New Hardware Wizard** as shown below.



Select **No, not this time** to bypass searching the Windows Update Web site and click **Next**. A new window will appear. Choose **Install from a list or specific location** to enter the manual installation mode. Click **Next**.



When the **Please choose your search and installation options** window appears, select **Search for the best driver in these locations**. Verify that the item **Include this location in the search** is checked, click **Browse** and locate your driver. Inside the installation package the driver is located under \Driver.



When the Windows Logo testing dialog appears, click **Continue Anyway**.

Finally Windows should report that it successfully installed the driver software.

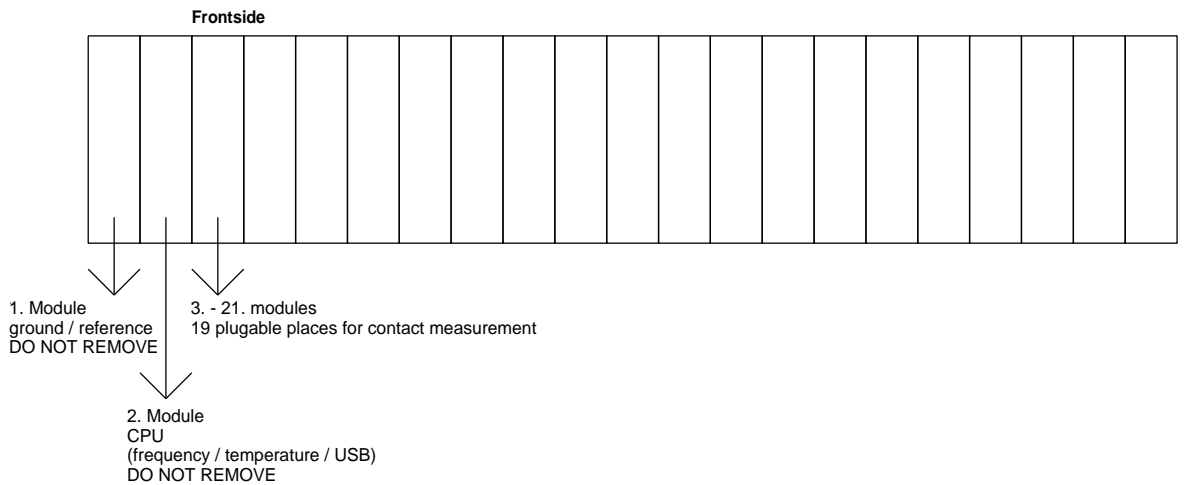


3 Electrical Specifications: Connections / LED Indications

3.1 Rack

On the backside of the CONtester the main connector, the fuse and the main switch are located. The main power supply has an input voltage range of 110 V~ - 230 V~; 50/60 Hz; 100 VA. The **fuse** may only be changed with a fuse of the following type: 250V F 3,15A, there are no other internal fuses provided.

!! The first and the second module on the left front side of the CONtester™ may not be removed !!



First module

The first module contains two standard 4-mm plugs.

- One is connected with the **internal logic reference**, the internal 0V (REF).
- The second is electrically connected with the **ground of the main power connector** (GND).
- It is recommended to connect the ground (GND) and the internal reference (REF) with the delivered shorting plug. Of course only when the earthing quality of the main power cable is OK. (see also 4 Security procedures + EMC).

This module may not be removed from the rack!

Second module

The second module is the **CPU card** with temperature measuring logic, frequency measuring logic and the USB communication port. **This module also may not be removed from the rack!**

3rd - 21th module

The remaining 19 places are plugable and are available for contact measurement. **The modules for contact measurement can be removed or replaced (hot-plugable).**



3.2 CPU card

The CPU module has the title "CPU" printed on the topside of the frontplate. The module has three (3) connectors and one status LED:

- a USB connector
- a thermocouple connector
- a BNC connector for the accelerometer.

3.2.1 USB – PC Interface

The CPU card controls the communication between the contact measurement cards and the PC. The communication between PC and CONtester is done by an isolated USB interface.

CONtester Connector Type:	USB-B
------------------------------	-------

Mating Connector Type:	Standard USB Cable
---------------------------	--------------------

Specifications:	Galvanic isolation	Yes
	Isolation voltage	Max. 2500 V
	ESD protection	12 kV
	Signal specifications	USB V2.0 Compliant Full Speed data rate (12Mbit/s)

3.2.2 BNC - Accelerometer

The frequency and acceleration measurement is done by connecting a 'low impedance voltage mode piezoelectric sensor' (accelerometer) to the BNC-connector. This sensor needs a constant current source and it outputs an AC signal added on the DC bias voltage.

- The amplitude of the output voltage swing is proportional to the acceleration.
- The frequency of the output voltage swing is equal to the vibration frequency.
- Accelerometer signals must be isolated from the ground.

CONtester Connector Type:	BNC Socket
------------------------------	------------

Mating Connector Type:	BNC Plug
---------------------------	----------

Specifications:	Galvanic isolation	No
	ESD protection	1 kV
	Overvoltage protection	Yes
	Output current	3.6 mA
	Voltage range	Min 0 V Max 25 V
	Sensitivity	Min 5 mV/g Max 1000 mV/g

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3.2.3 Miniature Thermocouple Plug

The temperature measurement is done by means of a K-thermocouple. This must be connected to the thermocouple connector. The hardware has a cold junction-compensation and the software calculates the temperature in degrees Celsius.

CONtester Connector Type:	Miniature thermocouple socket
---------------------------	-------------------------------

Mating Connector Type:	Miniature thermocouple plug
------------------------	-----------------------------

Specifications:	Thermocouple Type	K
	Galvanic isolation	No
	ESD protection	1 kV
	Overvoltage protection	Yes
	Differential input	Yes
	Cold junction compensation	Yes
	Temperature measuring range	Min -20°C Max +150°C

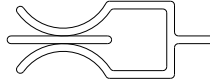
3.2.4 Status LED

Green	Power ON
-------	----------



3.3 Contact disturbance card

The contact disturbance module can be identified by its logo printed on the topside of the frontplate:

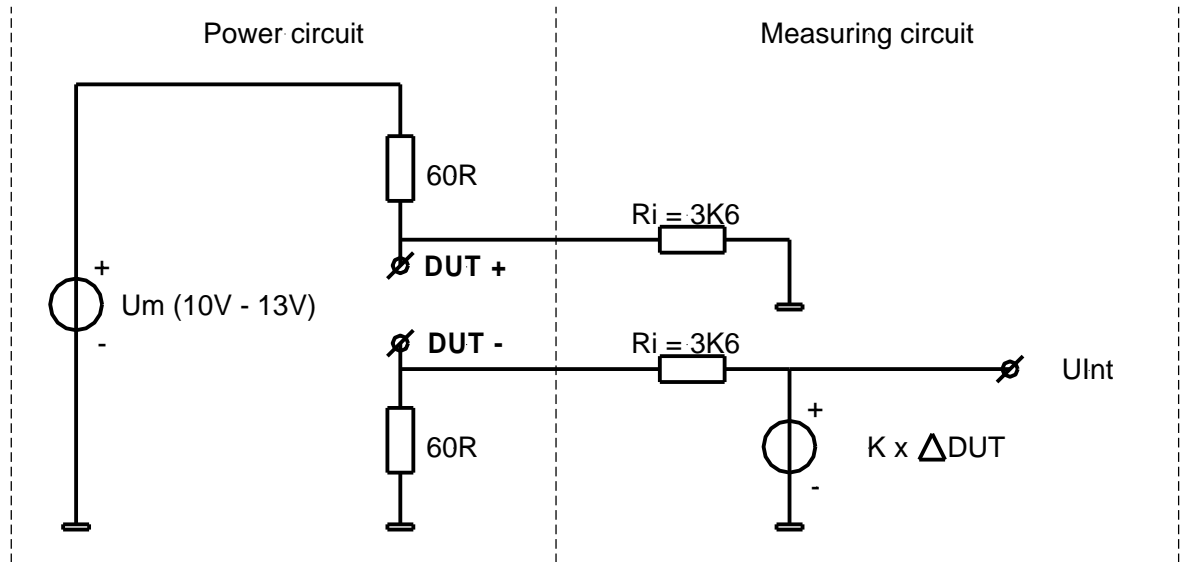


The module has three connectors and one status LED. Two standard 4-mm plugs for the measuring contact and a BNC connector to follow the measured signal by scope.

3.3.1 Contact

CONtester Connector Type:	Standard 4 mm socket	
Mating Connector Type:	Standard 4 mm plug	
Specifications:	Galvanic isolation	No
	ESD protection	1 kV
	Overtoltage protection	Yes
	Differential input	Yes
	Measuring voltage	Min 10 V Max 13 V
	Measured resistance value	Min 1 Ohm Max 600 Ohm
	Measured contact disturbance time	Min 100 ns Max 10 ms

Internal circuit:



U_m : Measuring voltage (10V – 13V)
 $60R$: $2 \times 60R = 120R$ serial resistance
 $DUT +$: Voltage on contact pin 1 (DUT = Device Under Test), **Positive!** Redconnector

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DUT -:	Voltage on contact pin 2 (DUT = D evice U nder T est), Negative! Black connector
Ri:	Internal resistance of measuring circuit = 3,6 kOhm
K:	Constant factor of amplifier = 0,385
UInt:	BNC connector to connect scope
ΔDUT:	(DUT+) - (DUT-)

The internal circuit is also printed on the measuring card frontplate. It is divided in two parts:

- the power circuit: The power circuit contains the measuring voltage which is adjustable by software. This voltage is loaded with 120-Ohm internal resistance in serial with the measuring contact.
- the measuring circuit: The measuring circuit contains an amplifier that has an equivalent circuit as the scheme above.

3.3.2 BNC - output

It is possible to measure the amplifier output by connecting a scope to the BNC output connector. Be aware of the load from the measuring circuit on the power circuit when interpreting the output voltage.


CONtester Connector Type:	BNC Socket
---------------------------	------------

Mating Connector Type:	BNC Plug
------------------------	----------

Specifications:	Galvanic isolation	No
	ESD protection	1 kV
	Overvoltage protection	Yes
	Output resistance	200 Ohm
	Output voltage	0,3846 x ΔDUT

3.3.3 Status LED



Depending on the selection or deselection of the "  " **button** (see "5.3.2 Globals") these LEDs show:

"status-LED" button is deselected

Green	This channel is OK.
Orange	This contact is disturbed or it's an open contact.
Red	The "maximum disturbance" (see "5.3.3 Settings") is reached during recording.

"status-LED" button is selected

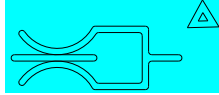
When the button is selected, the LEDs helps the user to find a certain channel:

Orange	This is the card of the chosen channel.
Red	These are cards that are grouped with the chosen channel.



3.4 Contact Variation Card

The contact variation card can be identified by its logo printed on the topside of the frontplate:

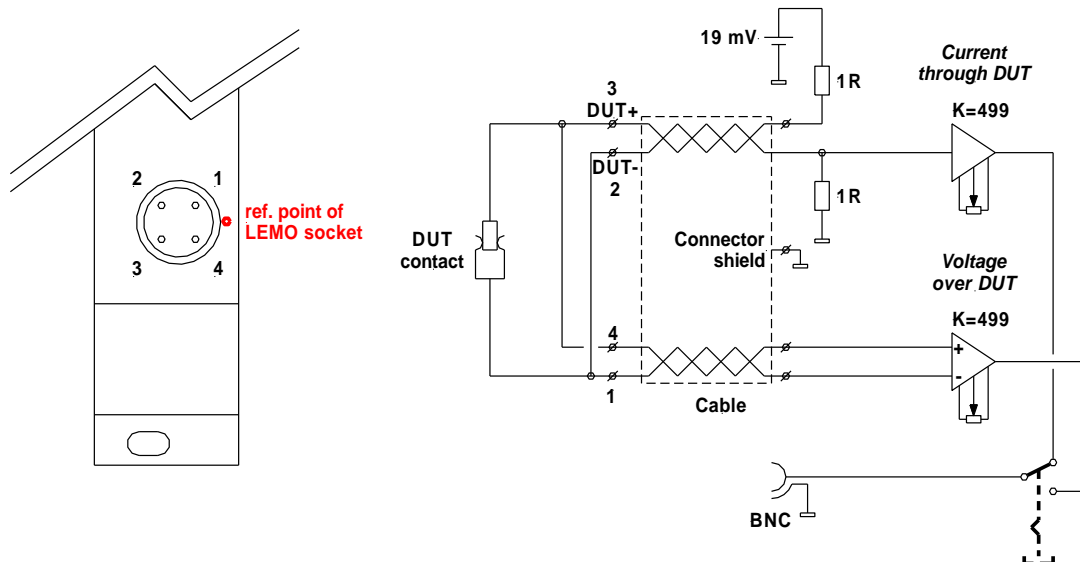


The card has two connectors, one switch, two amplifiers with offset-regulation and one status-LED:

- one connector (Manufacturer LEMO) to measure the contact DUT
- one BNC connector to trim the amplifiers
- one switch to measure on the BNC-output either the current through DUT or the voltage over DUT.

3.4.1 Contact

CONtester connector Type:	Connector LEMO Typ EPG.1B304.HLN	
Mating Connector Type:	Plug LEMO Typ FGG.1B.304.CLAD61-Z	
Properties:	Galvanic isolation	No
	ESD protection	1 kV
	Overtoltage protection	Yes
	Differential input	Yes
	Measuring voltage	19 mV
	Mean value of resistance	Min 10 mOhm Max 350 mOhm
	Resistance variation	Min. 3 mOhm Max 25 mOhm
	Resistance variation period	1µsec - 300msec



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3.4.2 BNC - Output

In order to trim the amplifiers with offset-regulation, the BNC-Output can be connected to a voltmeter.


CONtester Connector Type:	BNC Socket
---------------------------	------------

Mating Connector Type:	BNC Plug
------------------------	----------

Specifications:	Galvanic isolation	No
	ESD protection	1 kV
	Overvoltage protection	Yes
	Output resistance	200 Ohm
	Output <u>voltage</u>	Switch on V $= 499 \times \Delta DUT (= (DUT+) - (DUT-))$ $= 499 \times \text{Voltage over contact}$ Switch on I $= 499 \times \text{current through contact}$

3.4.3 Status LED



Depending on the selection or deselection of the "  " **button** (see "5.3.1 Module Tree") these LEDs show:

"status-LED" button is deselected

Green	This channel is OK.
Orange	A contact variation has been measured.
Red	The "maximum number of variations" (see "5.3.3 Settings") is reached during recording.

"status-LED" button is selected

When the button is selected, the LEDs helps the user to find a certain channel:

Orange	This is the card of the chosen channel.
Red	These are cards that are grouped with the chosen channel.

3.4.4 Calibration of current and voltage amplifier – contact variation card

- Each measurement card is calibrated before delivery of the system.
- The measurement card must be periodically controled, and if necessary newly calibrated.
- You may only calibrate when the measurement card is in regime (temperature) (i.e. CONtester is switched ON for minimum 1 hour).
- Make a short-connection between pin 1 and pin 4 of the measurement connector (LEMO) as close by the measurement card as possible.
- Leave pin 2 and pin 3 of the measurement connector open.
- Make a connection between the BNC-connector and an accurate voltmeter.
- Select with the switch the position 'I' or 'V' and regulate the resp. amplifiers in order to keep the measured voltage (BNC) lower than ± 1 mV.



4 Security procedures + EMC

The following security procedures must be explicitly read and followed before using the CONtester.

1. The first two modules (left side of the frontal view) **MAY NEVER BE REMOVED**:
2. To remove the modules for contact disturbance, or contact variation remove the screws and slide the module out of the housing by means of the **handle**.
3. When (a) module(s) from the CONtester is removed, either an other module or a blanc frontplate **MUST** be mounted on this place.
4. **Fuses must** be replaced by fuses of the **same** type.
5. Before **changing fuses**, the main (power) cable **MUST** be unplugged.
6. The main power cable **MUST** be plugged in an **earthed plug**.
7. The reference voltage (REF) is internally NOT connected to the ground (GND). It is recommended to earthen the reference externally.
If the earthing quality of the main power cable is OK, it is recommended to do this by connecting the ground (GND) and the internal reference (REF) with the delivered shorting plug.
8. The USB-connector is galvanic isolated.
9. The CONtester is built following the EMC-guidelines for electronic apparatus.



5 CONtester Software

5.1 General

With the CONtester.exe software the user controls the CONtester hardware.

5.2 Starting CONtester.exe

To start the program,

- double-click the **CONtester**-icon



- or select in Windows-Explorer the application file **CONtester.exe**

Name	Type
 CONtester.exe	Application

Remark

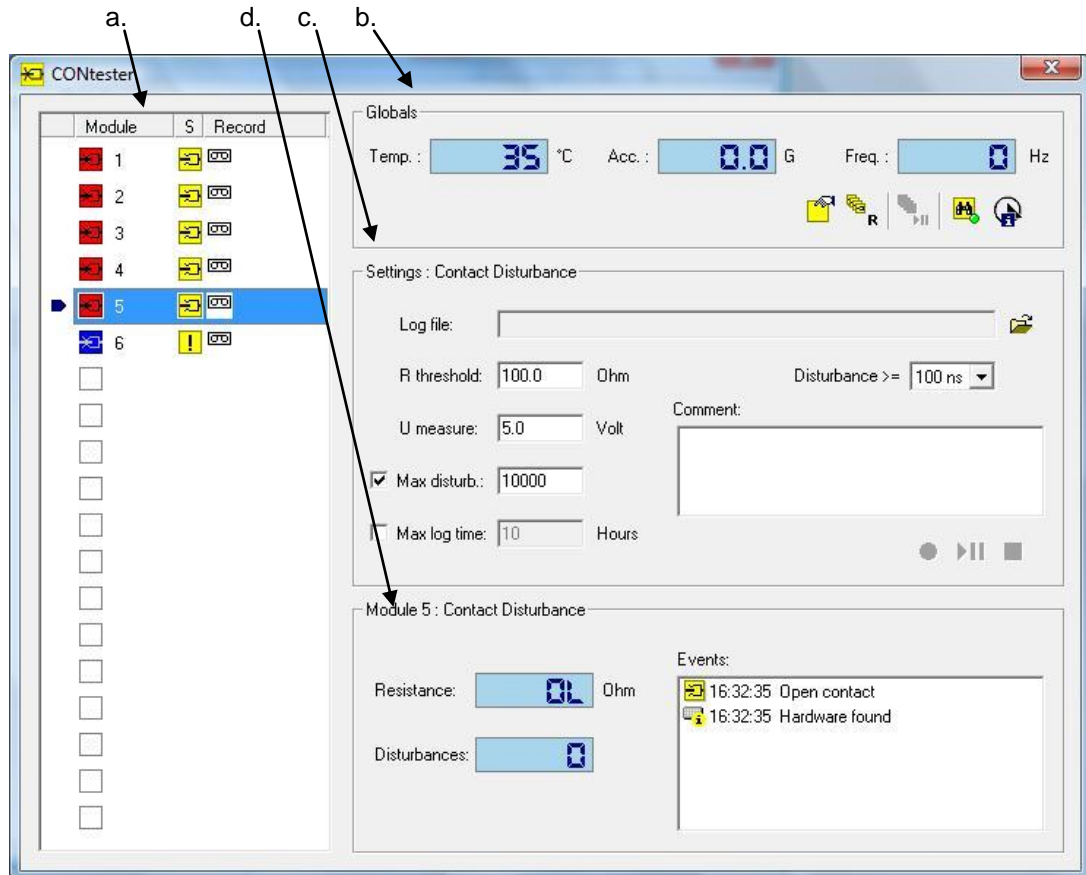
When the PC goes in sleep mode, the logging halts. After awakening again, the logging continues.



5.3 User Interface

The user interface is divided in 4 main parts:

- | | | |
|----|-------------------------|------------------------------------|
| a. | Module tree: | Overview of the different channels |
| b. | Globals: | Global information |
| c. | Settings: | Threshold values |
| d. | Measurements per module | |





5.3.1 Module Tree

In this tree all channels are represented by their number. The numbering starts from the first place for contact measurement, and runs from the left to the right.

- The **first column** indicates whether the channel is equipped with a measurement card or not.
 - 3 This (third) channel is equipped with a contact disturbance card.
 - 6 This (sixth) channel is equipped with a contact variation card.
 - empty This channel is not equipped with any contact card.

- The **second column** shows the channel number. In case several channels are grouped, a reference is made to the main channel (i.e. the channel where all information can be edited and where the recording is stated).
 - 4 < ... Channel 4 is grouped with other channel(s). Channel 4 is the main channel of this group.
 - 5 > 4 Channel 5 is grouped with other channel(s). Channel 4 is the main channel of this group.

- The **third column** shows the status of the channel. The status can be:
 - empty Contact card is absent.
 - Status OK.
 - contact disturbance:**
The contact card has measured some disturbances.
 - contact variation:**
The contact card has measured some variations.
 - contact disturbance:**
The resistance of the contact is higher then the threshold value or the contact is open.
 - contact variation:**
The resistance of the contact is higher than 350 mOhm.
 - The recording of the corresponding channel has stopped.

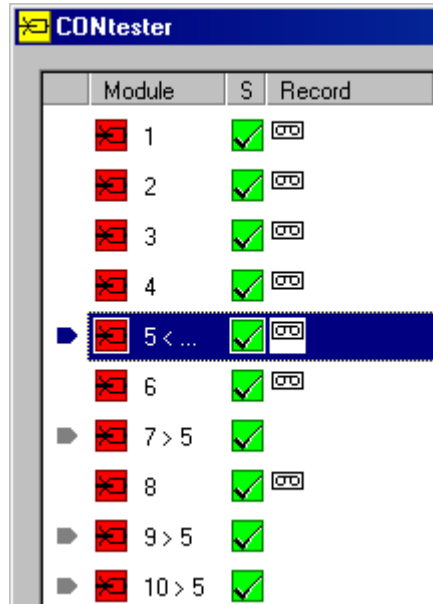
- The **fourth column** shows the recording status. This status can be:
 - This channel can be recorded.
 - 00:00:17 The recording of this channel is started. The recording time is shown.
 - 00:01:34 The recording of this channel is suspended.
 - leer This channel is empty or it is grouped with other channels. If it is grouped, the main channel contains the recording information.



Remark

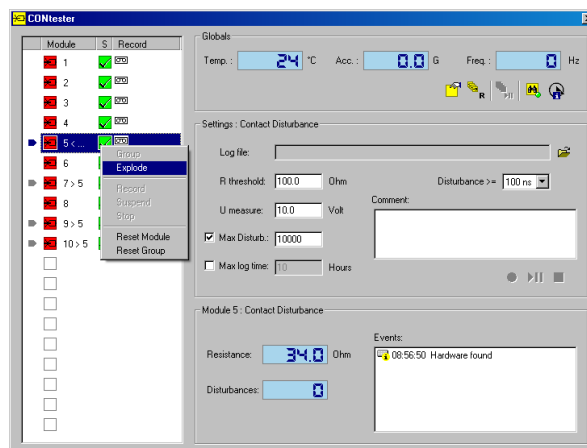
How to group cards/channels?

- First select the main channel in the tree view.
- Then press the **Ctrl** button while selecting one or more channels (with cards of the same type: contact disturbance or contact variation). This allows to multiselect channels.
- A blue arrow indicates the main channel.
- The other channels are indicated by a grey arrow. They all refer to the main channel.
- When the recording is started, all data from these grouped channels will be written into the logfile of the main channel.



And how to ungroup cards/channels?

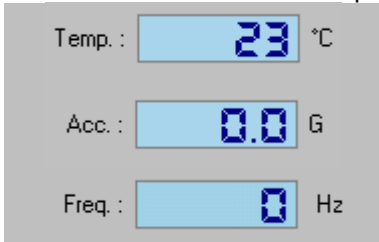
- Select one of the channels of the group in the tree view.
- Click on the right mouse button and select "Explode".





5.3.2 Globals

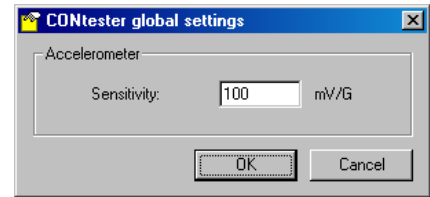
The actual values of the temperature, acceleration and frequency are shown.



The following global functions are possible:



Enter global settings of the accelerometer. The following edit box pops up:



Reset all channels. This means that all measurement views are reset.



Suspend/resume recording of all channels.



selected

The appropriate card is searched. It is indicated by means of the status-LED.

orange: This is the card of the chosen channel.
red: These are cards that are grouped with the chosen channel.



deselected

The status of the appropriate card/channel is shown.

contact disturbance:

- * green: Status OK
- * orange: Contact is disturbed or it's an open contact.
- * red: The "maximum disturbance" is reached.

contact variation:

- * green: Status OK
- * orange: contact variation is measured.
- * red: The "maximum variations" is reached.



Info CONtester^{IM}



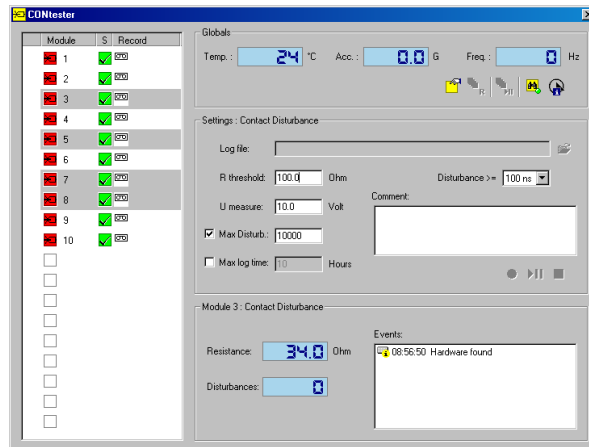
5.3.3 Settings

Settings are linked to a single channel. If different channels are grouped, the same settings are valid for all these grouped channels.

To start editing these settings, select the appropriate channel in the module tree and fill in the right values.

The user may also multiselect different channels, in order to edit the settings at the same time.

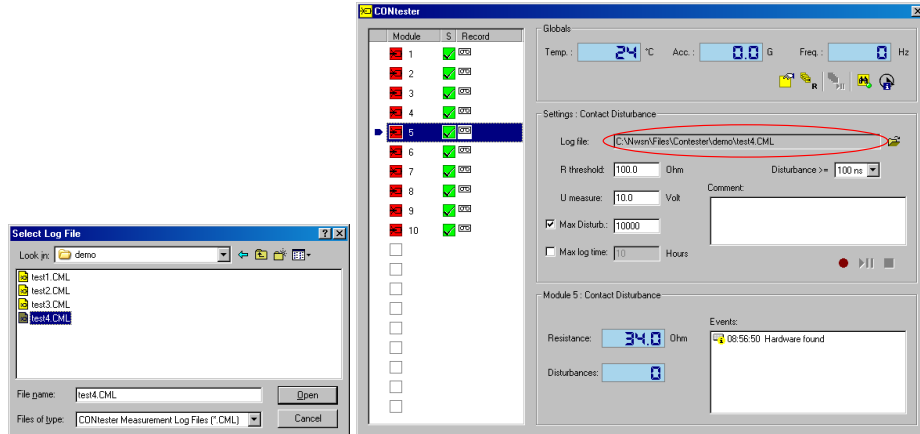
- Select one channel
- Keep the **CTRL**-key pressed
- And select the other channels.
- Then edit the values.





5.3.3.1 Log File

The recording can only start when a log-file has been selected. Select the file name of the log file or enter a new name. Use a Log file per channel or group of channels. All measurement values of this channel will be written within this file. Measurement values of channels of the same group will be written within one file. Measurement values of contact disturbances and contact variations can not be written within the same file.



When the chosen log-file has already been used, the following question is asked:



5.3.3.2 R threshold / ΔR threshold

Contact disturbance

Definition contact disturbance

When the measured resistance value exceeds the **R threshold** and drops back again under this value within a time period of 10 msec, it will be recognized as a contact disturbance.

Definition open contact

When the measured resistance value exceeds the **R threshold** and remains there for a period longer than 10 msec, it will be recognized as an open contact.

Value between 1 and 600 Ohm, limits included.

Decimals are expressed with a decimal point.

Contact variation

Definition contact variation

When the measured resistance variation exceeds the **ΔR threshold** and drops back again under this value within a time period of 300 msec, it will be recognized as a contact variation.

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Value between 3 and 25 mOhm, limits included. Decimals are not possible.

5.3.3.3 U measure

The measurement voltage for each separate contact disturbance card should be filled in. Value between 10 and 13 Volt, limits included.

The measurement voltage of a contact variation card cannot be changed, and is equal to 19 mV.

5.3.3.4 Max Disturb. / Max variations

The maximum number of disturbances/variations before the test is stopped. In case of a group, all channels must have exceed this value before the test is stopped. The actual number of disturbances/variations can be found in the Module Measurement View under "Disturbances" / "Variations".

5.3.3.5 Max Logtime

This indicates the timeframe during which the logging is done. Value between 1h and 65000h, limits included.

5.3.3.6 Disturbance >= / Variations >=

A disturbance is counted as such when the disturbance time is equal or larger than the indicated value.

A variation is counted as such when the variation time is equal to or larger than the indicated value.

5.3.3.7 Comment

Some comment per channel or group of channels can be added.

5.3.3.8 Recording

Start recording:

– Select the channel.

– Select the red button




or the right mouse button

Suspend or continue the recording:

– Select the channel.




– Select button "Suspend/Resume" 

Group Explode	Group Explode
Record	Record
Suspend	Resume
Stop	Stop
Reset Module	Reset Module
Reset Group	Reset Group

or the right mouse button

Stop the recording:

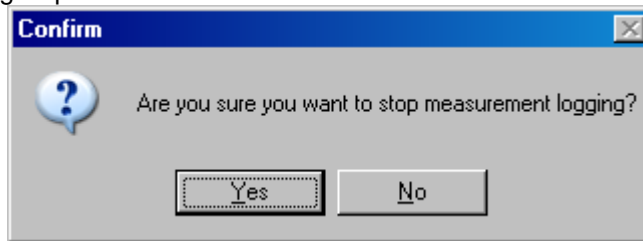
– Select the channel.

– Select the "stop" button 

Group Explode
Record
Suspend
Stop
Reset Module
Reset Group

or the right mouse button

– Confirm the stopping request.



Remark

The comments should be filled in before stopping.

- Clicking the right mouse button and selecting "Reset Module", resets the data of the chosen channel. It can be seen in the measurement view:
 - the counter of disturbances/variations is set on zero.
 - the event "Reset module" can be read.

5.3.4 Module Measurement View

5.3.4.1 Resistance

The actual resistance value (expressed in Ohm/mOhm) can be followed up here.

5.3.4.2 Disturbances/Variations

Disturbance counter:

The number of disturbances since the last 'reset module', is viewed here.



6 Viewer Software

6.1 General

With this software the log files created during testing can be viewed. Different graphic types are possible:

Contact disturbance

Disturbance Events

The number of disturbances is viewed in function of their duration time.

Disturbance-vs.-Frequency

The number of disturbances is viewed in relation to the frequency.

Disturbance-vs.-Temperature

The number of disturbances is viewed in relation to the temperature.

Disturbance-vs.-Time

The number of disturbances is viewed against the testing time.

Resistance-vs.-Time

The resistance values are viewed against the testing time.

Contact variation

Variation Events

The number of variations is viewed in function of their duration time.

Variation -vs.-Frequency

The number of variations is viewed in relation to the frequency.

Variation -vs.-Temperature

The number of variations is viewed in relation to the temperature.

Variation -vs.-Time

The number of variations is viewed against the testing time.

Resistance-vs.-Time

The resistance values are viewed against the testing time.

The user can export these graphics into MS Excel.

6.2 Starting Viewer.exe

To start the program,

- double-click the **Viewer**-icon



- or select in Windows-Explorer the application file **Viewer.exe**

Name	Type
Viewer.exe	Application

The functions that are possible within this program are explained in the following chapter.




6.3 Functions

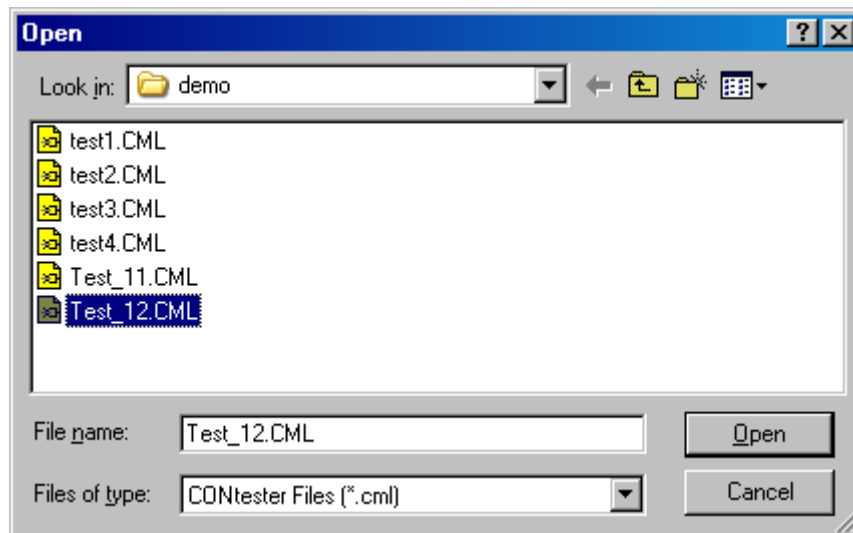
6.3.1 File



6.3.1.1 Open

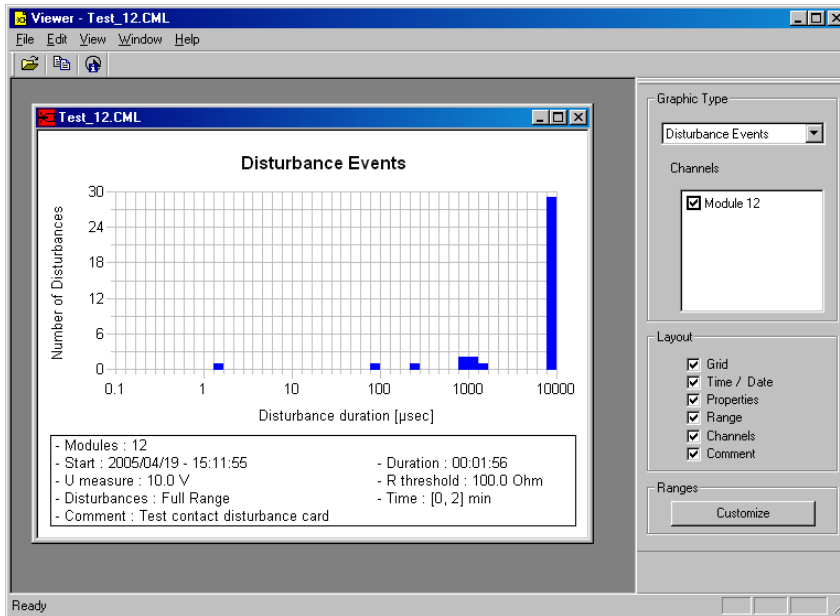
To open a CONtester-file created by the CONtester.exe,

- click the "Open" button 
- or select **File** → **Open**. In the Open dialog box, select the filename, and click Open. LOG-files usually have the extension .cml.
- or press **Ctrl** + **O** and select the right file.
- or select the document's filename from the File menu. The menu lists the four most recent files.





The following chart pops up:



6.3.1.2 Close

To close an opened file, select **File** → **Close**.

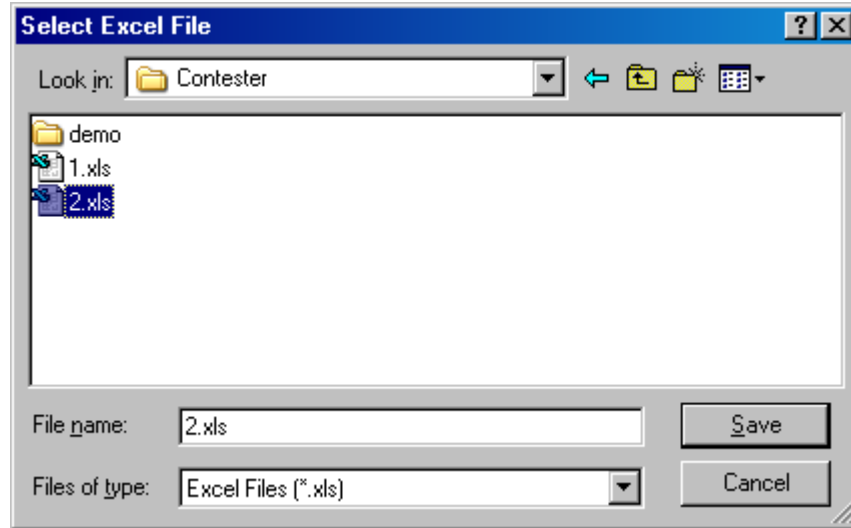
6.3.1.3 Recent File

The menu lists the four most recent files. By selecting one of them, this file will open immediately.

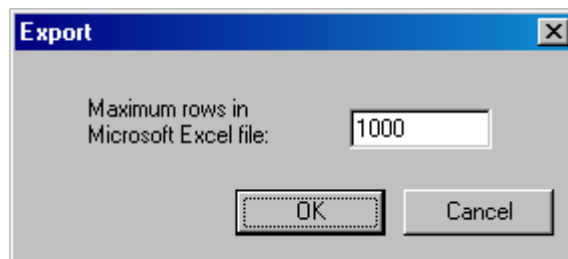


6.3.1.4 Export

The data from a CONtester file can be exported to an MS-Excel file. Therefore select **File** → **Export...**
 Select a file name or give a new file name.



As the data can be immense, the user must indicate the maximum number of data rows. The data is then grouped in time zones (equidistant).



MS Excel File

In the first tab page the global properties are written:

	A	B	C	D	E	F	G	H
1	Property	ValueString						
2	Date	2005/04/20						
3	Time	15:42:32						
4	Duration [s]	99						
5	Umeasure [V]	10.0						
6	Rthreshold [Ohm]	100.0						
7	SamplePeriod [s]	0.5						
8	Comment	Here comes your comment						
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

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The following tab pages contain the data of the different channels (if there were channels grouped). One channel is depicted on one tab page.

The screenshot shows an Excel spreadsheet with the following data:

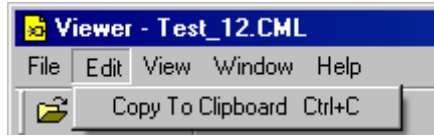
	A	B	C	D	E	F	G
1	Temperature	Acceleration	Frequency	Resistance	D_100ns_200ns	D_200ns_300ns	D_300ns_400ns
2	25	0	0	0,1	0	0	
3	25	0	0	0,1	0	0	
4	25	0	0	0,1	0	0	
5	25	0	0	0,1	0	0	
6	25	0	0	0,1	0	0	
7	25	0	0	0,1	0	0	
8	25	0	0	0,1	0	0	
9	25	0	0	0,1	0	0	
10	25	0	0	0,1	0	0	
11	25	0	0	0,1	0	0	
12	25	0	0	0,1	0	0	
13	25	0	0	0,1	0	0	
14	25	0	0	0,1	0	0	
15	25	0	0	0,1	0	0	
16	25	0	0	-1	0	0	
17	25	0	0	-1	0	0	
18	25	0	0	0,1	0	0	
19	25	0	0	0,1	0	0	
20	25	0	0	0,1	0	0	
21	25	0	0	0,1	0	0	

6.3.1.5 Exit

To exit the Viewer-program, select File → Exit.



6.3.2 Edit



6.3.2.1 Copy To Clipboard

The chosen graphical layout is copied to the Clipboard (Microsoft) and can be copied e.g. in a WORD-document by using **Ctrl** + **V**. On this way a nice report can be made of the test results - see also 6.4 Control bar.

Copying from this Viewer-program to the Clipboard can be done

- by selecting **File** → **Edit** → **Copy To Clipboard**.
- by clicking the appropriate button



- or by pressing **Ctrl** + **C**

6.3.3 View

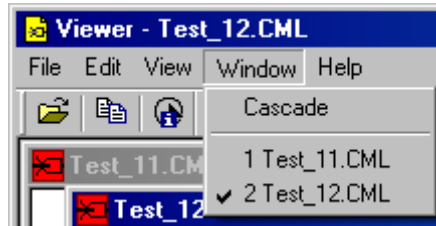


Each of these three bars can be made visible/invisible.

The screenshot shows the 'Viewer - group.CML' window. The main area displays a bar chart titled 'Disturbance Events' with 'Number of Disturbances' on the y-axis (0 to 50) and 'Disturbance duration [µsec]' on the x-axis (0.1 to 10000). A status bar at the bottom left shows 'Ready'. On the right, there are control panels for 'Graphic Type' (set to 'Disturbance Events'), 'Channels' (Module 2, 3, 4, 5 checked), 'Layout' (Grid, Time / Date, Properties, Range, Channels, Comment checked), and 'Ranges' (Customize button).



6.3.4 Window



Different opened files can be viewed at the same time.
A list is shown with all open files.

6.4 Control bar

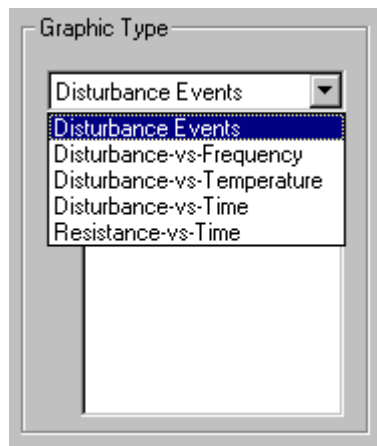
6.4.1 General

In order to make a report, the user must open the file with the logged data - see "6.3.1.1 Open".

6.4.2 Graphic Type

As well for contact disturbance as for contact variation different types of graphics can be shown. The user should select a graphic type, and should then indicate the channel for which channels the graphic must be created.

The following description is done for contact disturbance. However, for contact variation the description is similar.



At the bottom of each graphic type additional information can be read. The user can influence this information by adapting the layout properties - see 6.4.3 Layout.

- Channels : 2	- Duration : 00:00:35
- Start : 05/04/02 - 12:13:30	- R threshold : 100.0 Ohm
- U measure : 10.0 V	- Time : [0, 1] min
- Disturbances : [1000.0, 0L[μ s	
Here comes your comment	

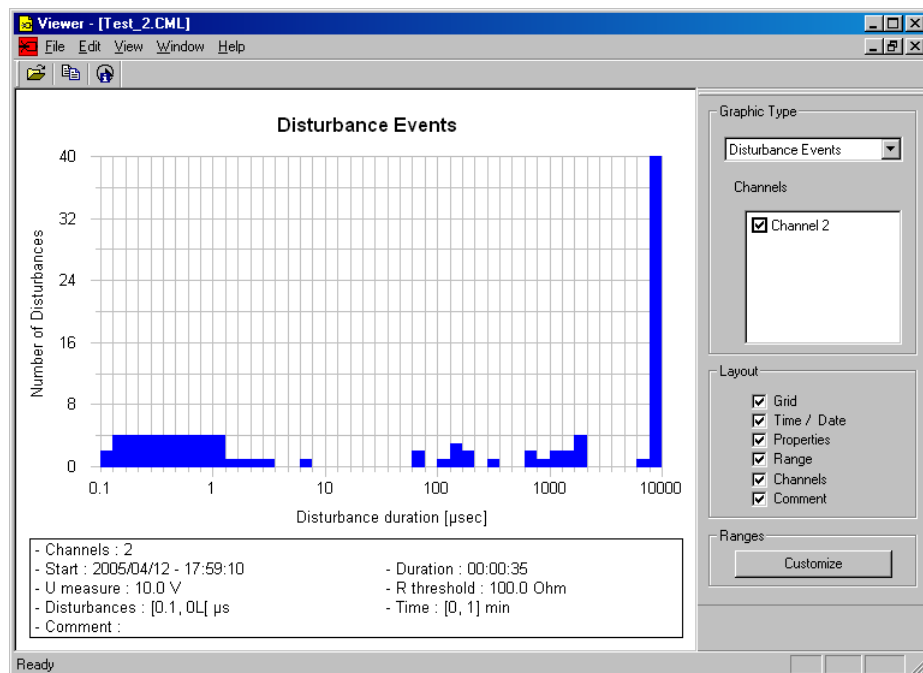


6.4.2.1 Disturbance Events

For a certain channel the number of disturbance events and their duration are measured. The disturbance duration is expressed in μsec and is divided non-linear.

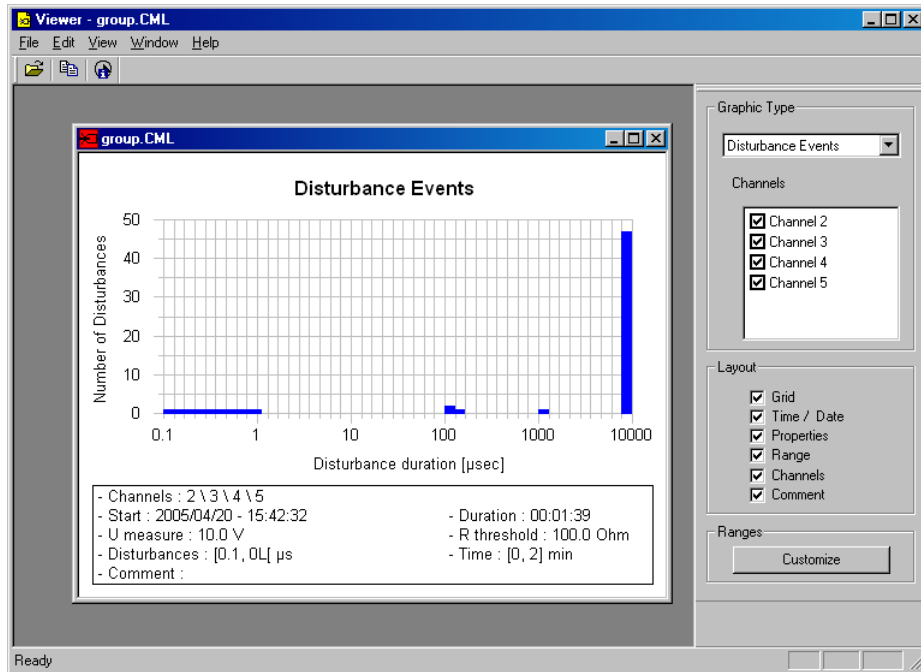
- From 0,1 till 1 μsec , the division is made per 0,1 μsec . The logging always starts from disturbances larger or equal than 0,1 μsec .
- From 1 till 10 μsec , the division is made per 1 μsec .
- From 10 till 100 μsec , the division is made per 10 μsec .
- From 100 till 1000 μsec , the division is made per 100 μsec .
- From 1000 till 10000 μsec , the division is made per 1000 μsec .

The following example illustrates the graphic.



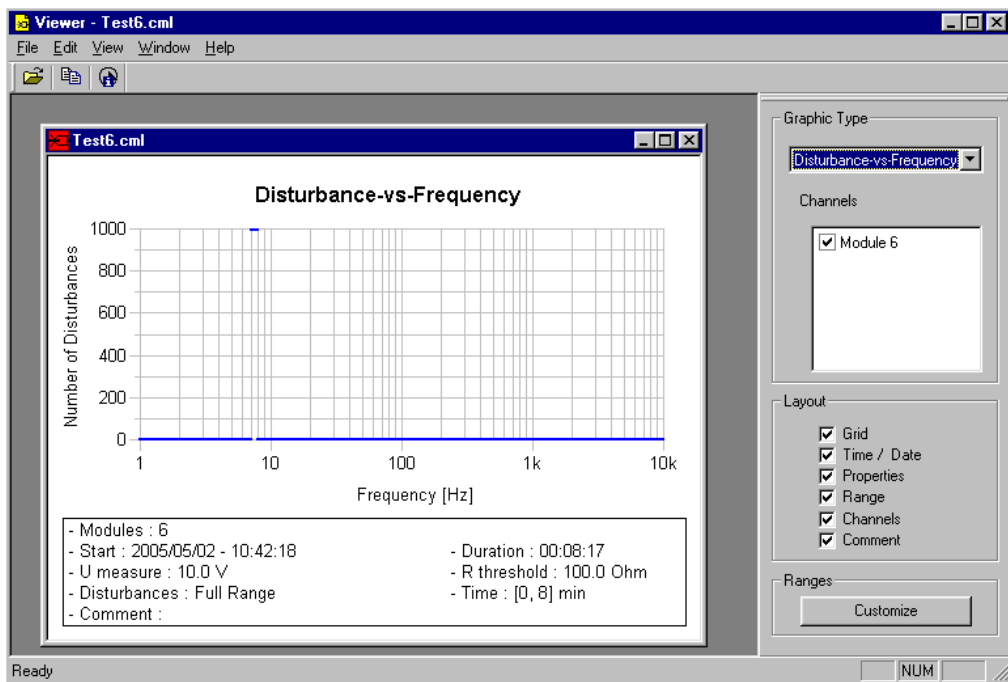
When the logfile was created for a group of channels, the user can opt to view the results from a single channel or from different channels which are added. He can therefore (de)select some channels.

The following figure shows the case where all grouped channels are represented.



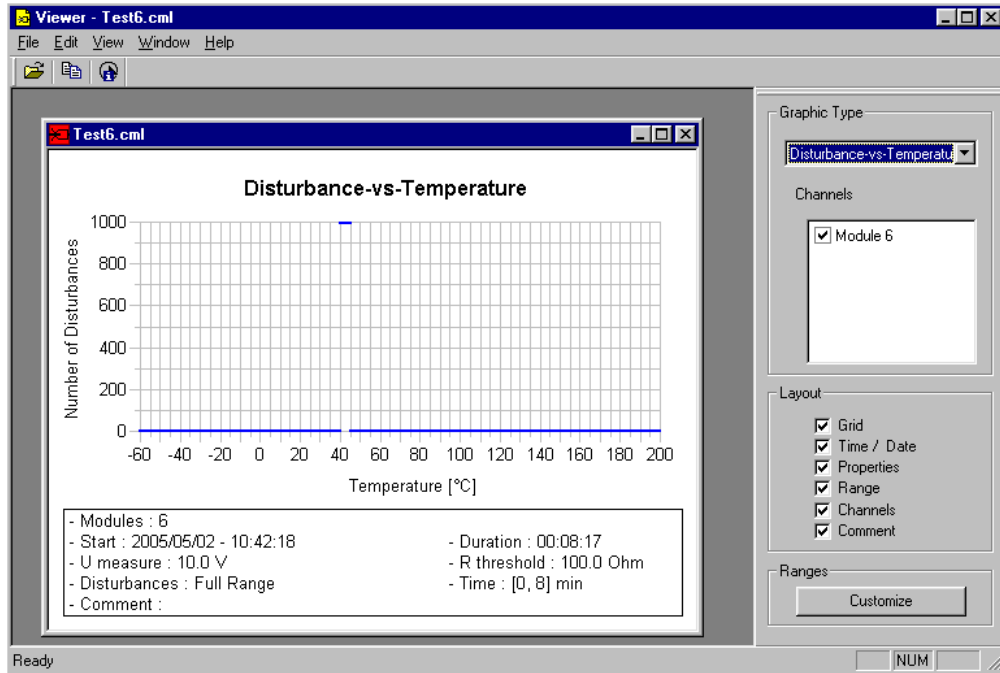
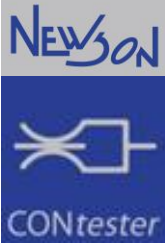
6.4.2.2 Disturbance - vs - Frequency

The frequency-axis is divided logarithmic. The number of disturbances are counted and shown per frequency zone.



6.4.2.3 Disturbance - vs - Temperature

The temperature axis is divided in zones of 5°. The number of disturbances are counted and added per temperature zone.

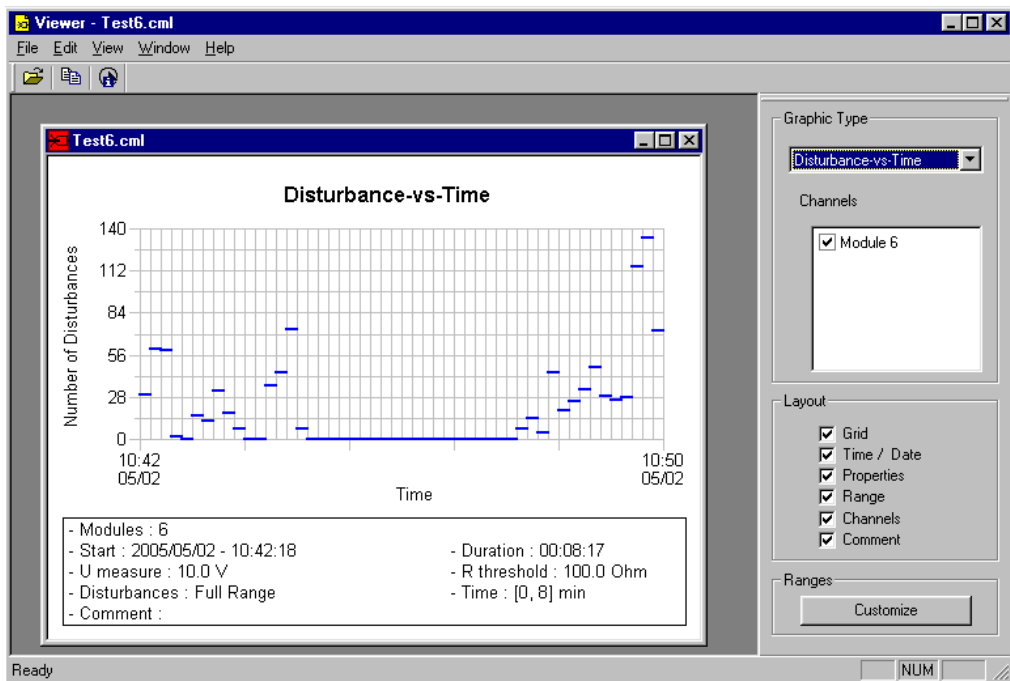


6.4.2.4 Disturbance - vs - Time

The time axis is divided in 50 periods. The number of disturbances for each of these periods is shown in this graphic.

Start and end are shown with date and time indication.

The following example illustrates the graphic.

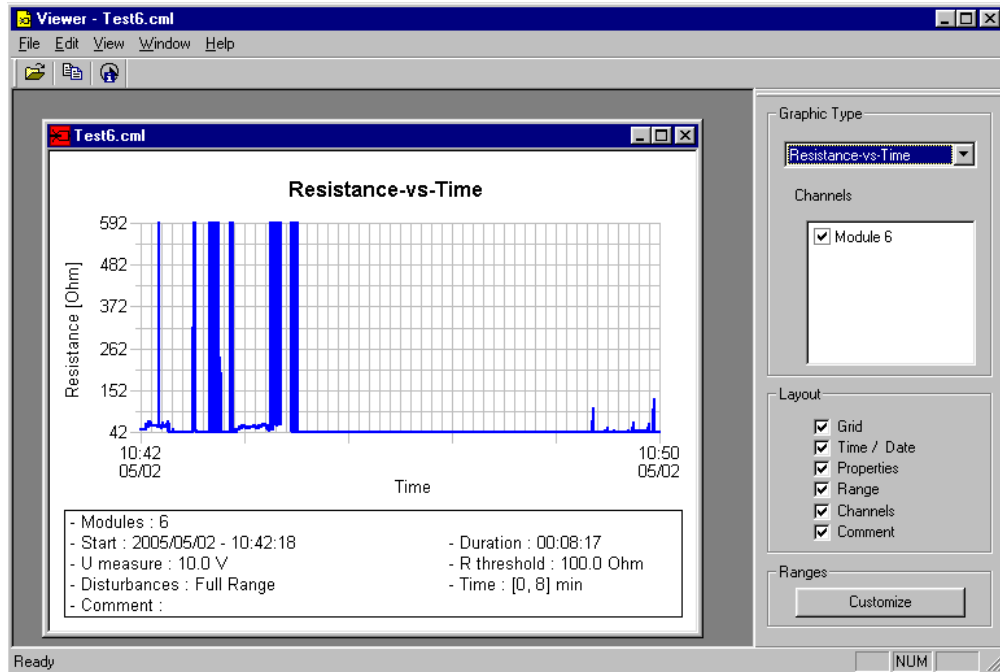




6.4.2.5 Resistance - vs - Time

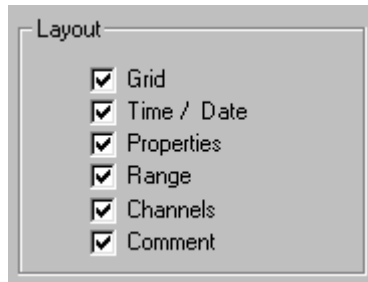
For this graphic only one channel can be viewed at the same moment. The momentaneous resistance value is shown against time.

The following example illustrates the graphic.



6.4.3 Layout

The graphics can be finetuned in their layout.



The following features can be made visible / invisible:

- a grid;
- start date and time together with the duration of the test;
- the values of the measurement voltage and the threshold resistance;
- the ranges (see further) that were chosen, as well for the disturbance duration as for the time zone;
- the channels of which the data was shown;
- the comment that was added by the user.

examples for the disturbance duration

[1,100[

all disturbances with a duration time equal to or larger than 1µsec and below 100µsec are shown



[1000,OL]

all disturbances with a duration time equal to or larger than 1000µsec until overload are shown
OL means Overload.

examples for the time zone

[10,1440]

all disturbances occurred 10 min or later after test start and stopped before 1440 min (24 h) after test start are shown

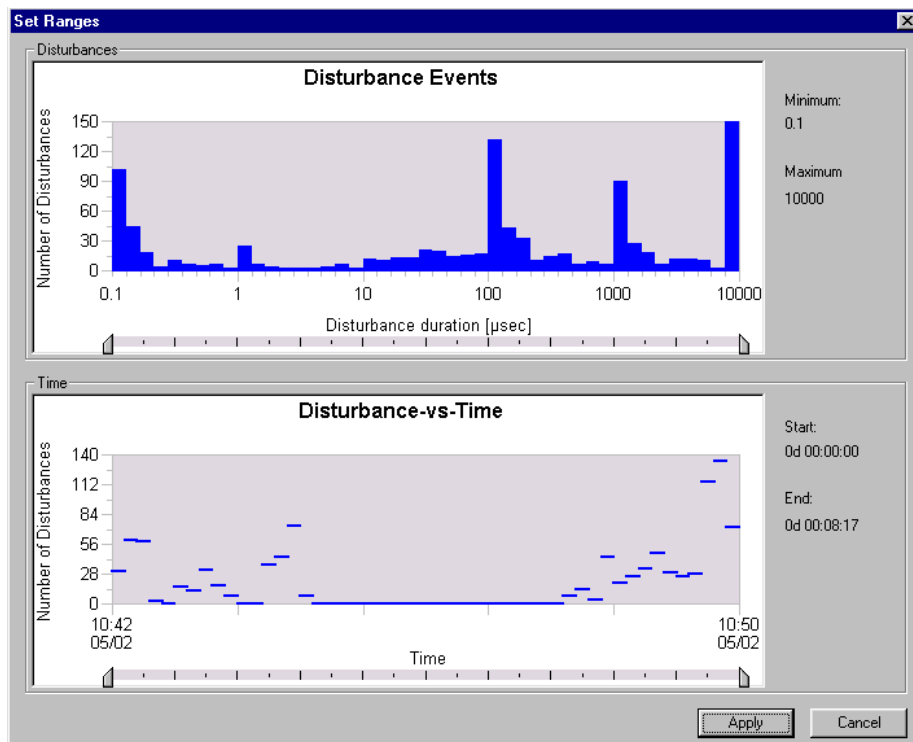
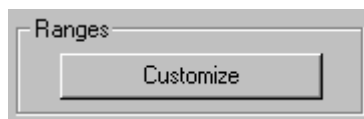
6.4.4 Ranges

To view the data, the following ranges can be adapted:

- the range of the disturbance durations
- the time range

How to adapt the ranges?

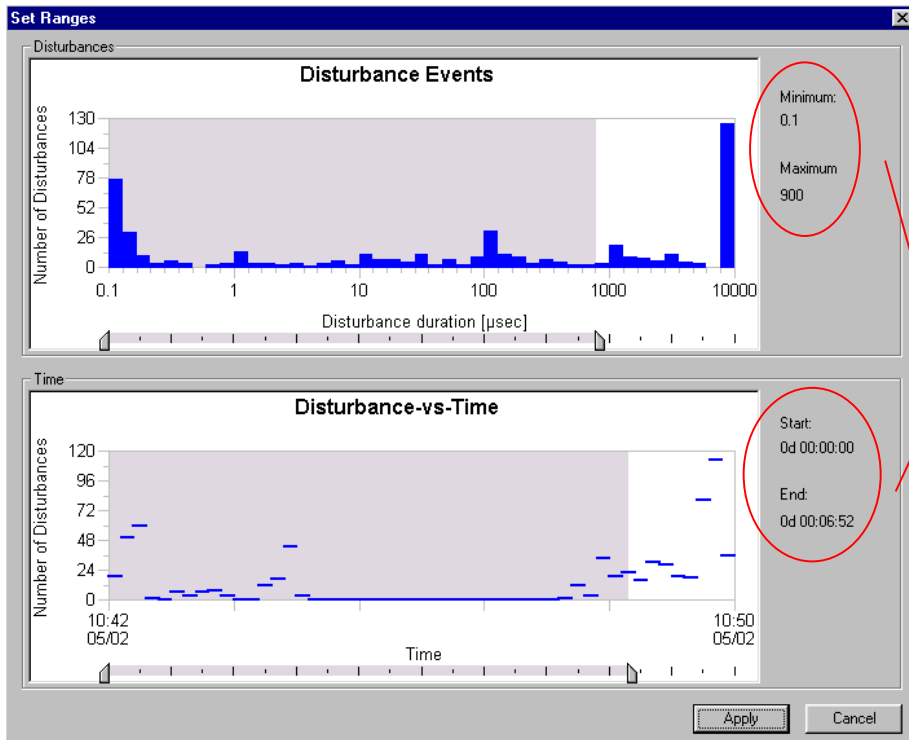
- click on "Customize"



- Both ranges are shown in the graphic view.
- To set the left side of the range: click with the mouse tip on the left ruler and move it to the desired value.
- To set the right side of the range: click with the mouse tip on the right ruler and move it to the desired value.
- The values that match with the rulers can be read at the right side.

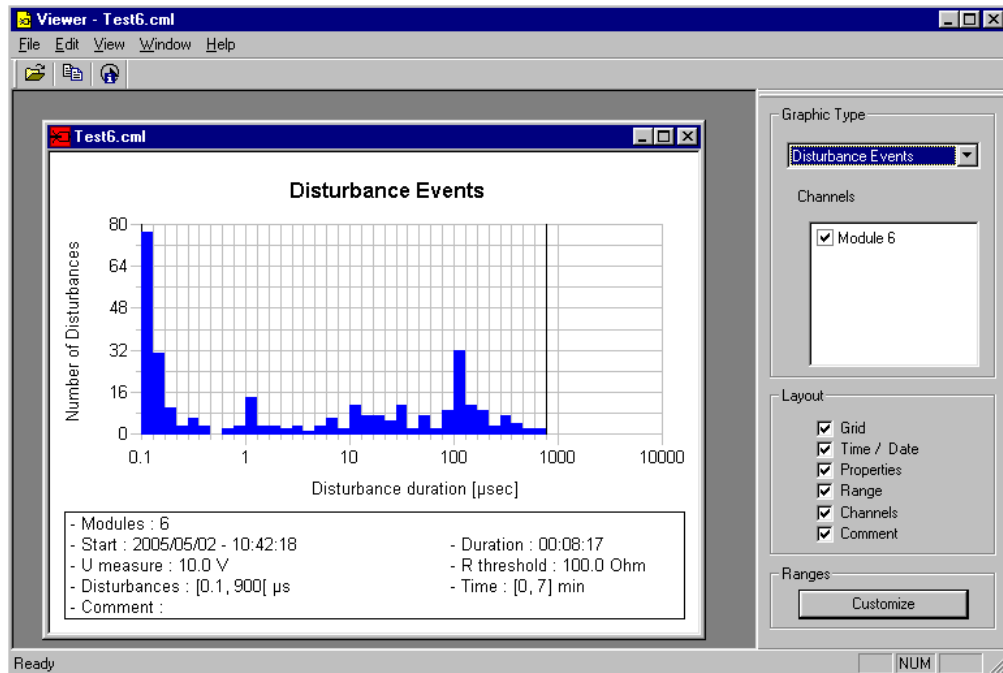
In the following example the range for the disturbance duration is changed.

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Ranges that fit with the rulers

When changing the ranges, the other graphics are adapted accordingly:





6.5 Format Description of the Data Files

The data-files (*.cml) can be interpreted by the user. The user may write software for himself in order to use or to show the data in another form. Therefore he should read the following format description:

The CONtester Measurement Log File (*.cml) is mainly built as follows:

File header
Data CPU (t_1)
Data contact disturbance/variation channel A (t_1)
Data contact disturbance/variation channel B (t_1)
...
Data CPU (t_2)
Data contact disturbance/variation channel A (t_2)
Data contact disturbance/variation channel B (t_2)
...
(Comment Block)

6.5.1 File Header

The file header consists of:

	CD	CV	Description
(short) File Descriptor	0x378c	0x378d	Contact disturbance log
(short) Blocksize	22	22	Size of file header in bytes
(short) U measure	10^{-1} Volt	mVolt	Measure voltage logged
(short) R threshold	10^{-1} Ohm	mOhm	Threshold resistance logged
(short) Sample period	ms	ms	Sampling period logged
(short) Year			Moment in time where the measurement was started.
(short) Month			
(short) Day			
(short) Hour			
(short) Minutes			
(short) Seconds			

6.5.2 Data Block

Two data blocks can be distinguished:

- the CPU data block
- the contact disturbance data block / contact variation data block

CPU data block

(short) ID [0xc000]	CPU block identifier
(short) Blocksize [10]	Size of data block in bytes
(short) Temperature	Temperature logged in 10^{-1} °C
(short) Frequency	Frequency logged in Hz
(short) Acceleration	Acceleration logged in 10^{-1} G



Contact disturbance data block / Contact variation data block

	CD	CV	Beschrijving
(short) ID*	0x80nn	0xa0nn	Contact disturbance block identifier / Contact variation block identifier
(short) Blocksize			Size of data block in bytes
(short) Resistance **	10 ⁻¹ Ohm	mOhm	Resistance logged
(short[]) Disturbances / variations ***	0xtedd	0xtedd	Disturbances/ variations

*: nn = channel number

** : Open contact when resistance -1

***: tedd = d disturbances/variations of t.10^e ns

6.5.3 Comment Block

The comment block consists of:

(short) ID [0x378b]	Comment block identifier
(short) Blocksize	Size of data block in bytes
(char[]) Data *	Character array

*: Character array terminated with one or two '\0' characters