Manual for Operation

T3SEQ Nemtest AMETEK

•) ICD.CONTROL

Software icd.control

For icd Version ≥ 8.0

- ISO 11452 part 4
- ISO 11452 part 5
- ISO 11452 part 8
- ISO 11452 part 10
- SAE J1113-4
- RTCA/DO-160
- MIL-STD-461
- IEC/EN 61000-4-6
- IEC/EN 61000-4-16
- various automotive manufacturer's specifications

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Copyright © 2024 AMETEK	CTS GmbH	All right reserved.
Foreword	Thank you for purcha	Specifications subject to change sing the icd.control software.
		escribes the software tool and contains useful information nd operating procedure of the device.
		ts precautions that must be taken during use and contains out the functions and operating procedure of the device.
	operation. After read	e, please read this manual thoroughly before beginning ng the manual, keep it in a convenient location for quick a question arises during operation.
	This manual contains diagram.	a selection of typical system setup with the correct wiring
	Further information a	bout the technical data, using and handling with the device nanual for these products.
	Generators offering	customized features are not explained in this manual. The for special tests are basically the same as for the standard
Notes	of continuing improve	nanual are subject to change without prior notice as a result ments to the instrument's performance and functions. The nanual may differ from those that actually appear on your
	accuracy of this cont	made in the preparation of this manual to ensure the ents. Should you have any questions or find any errors, epresentative or send an email.
		ng all or any part of the contents of this manual without the npany is strictly prohibited.
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		anual, the TM and ${ m I}{ m B}$ symbols do not accompany their registered trademark names.
Version	This manual is writte	o for icd.control Software version 8.0.0 and higher.

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1. Introduction

1.1 Preliminary Remarks

The icd.control software is operated under Microsoft Windows.

The manual describes as detailed as possible all the applications of the program that are available for the user. Due to the extensive variety, however, not all possibilities and options can be described in this manual. The program is subject to change.

Simulation mode as well as the example files included in the delivery allow user to get familiar with the software.

It is easy to make your first tests quickly with the **Standard Test**. The **Vector Test** is structured so it stands to your highest requirements on the most variable test-procedures. Let the icd.control test and monitor the immunity of your equipment through the **EVENT** function and automatic reduction of voltage testing according to predefined settings.

The software supports most serial-port and IEEE-bus measuring equipment.

1.2 General

This software is used for control of continuous wave generators. The software works in Windows 7, Windows 8 and Windows 10. The name **icd.control** originates from the English

"Immunity to Conducted Disturbances"

The software can produce a test, save it and generate reports. The recognition and registration of occurrences / events during tests on the sample (further EUT) can be done through the **Fail1**- and **Fail2**- connectors located in the back of the CWS equipment (NSG 4070 excluded), or with the help of external measuring equipment (**EVENT**). Activating of the buttons **Stop**, **Pause** and **EVENT** also produces occurrences/events during testing. All

Activating of the buttons **Stop**, **Pause** and **EVENT** also produces occurrences/events during testing. All occurrences are listed in the report with the topical parameters and can be provided with additional commentaries.

1.3 User Requirements

The user is expected to have an understanding and knowledge about EMC. Within the frame of this instruction manual no information is provided with regard to standard testing. Please refer to the relevant standard documents for detailed information.

1.4 Technical Requirements

The *icd.control* program has to be installed on an IBM compatible AT computer.

н.			
		Processor	Dual Core or better
	Memory	2 GByte at least	
	Hard disk	at least 500 MByte memory available	
		Windows™	Windows 7, Windows 8, Windows 10 (32/64 Bit)
		Interface	USB or IEEE 488 Interface card (National-Instruments).

Operating System	icd.control
Windows 7 (32 Bit)	Х
Windows 7 (64 Bit)	Х
Windows 8 (32 Bit)	Х
Windows 8 (64 Bit)	Х
Windows 10 (32 Bit)	Х
Windows 10 (64 Bit)	Х

1.5 Supported IEEE boards by the icd TEST software by AMETEK CTS

Single devices are usually operated via the serial interface whereas in configurations of several devices the parallel IEEE interface is used. Therefore, the computer has to be equipped with the corresponding interface board.

The following IEEE boards are supported by icd.control for Windows to control the EM TEST equipment:

Manufacturer	Device	icd.control
National Instruments	PCI-GPIB	Х
	PCMCIA-GPIB	Х
	GPIB-USB-B	Х
	GPIB-USB-HS	Х
	ExpressCard-GPIB	Х
	PCIe-GPIB	Х

This list doesn't claim to be complete.

As a standard we highly recommend to use the following hardware: IEEE Interface **Type PCIe-GPIB** of **NATIONAL INSTRUMENTS**



National Instrument Driver

Install NI-488.2 rev. 15.0 or higher. The use of older revisions may cause in software errors.

1.6 Hardware setup connection Computer <-> Generator

A:) Application of USB interface.

USB interface "USB B" connector. For data transfer a USB interface is available. The internal RS 232 interface is converted to USB standard.

Therefore, the user must set the same **Baud rate** in the device and control software.

Using the USB interface, the user can have EMC problems during burst tests. According to our experience, that usually the computer USB port is disturbed by interference's. Therefore, a high-quality USB cable (USB 2.0 standard) must be used.

USB cable setup

The USB cable must be above ground with a distance of at least 10 cm. Otherwise the cable can be an antenna for the common mode burst pulses and will "collect" the interferences. For longer distances such as 10 m, it can be too long and USB cable is not the best option. An alternative cable should be used.

For filtering the following type of ferrites can be used: Kitagawa TR-40-27-15 with 8 windings

B:) Application of IEEE 488 interface. Use a general IEEE488 resp. GPIB - cable. Connect the instruments.

C:) Application of Ethernet interface. Use an Ethernet cable. Connect the instruments.



1.7 Computer settings restrictions

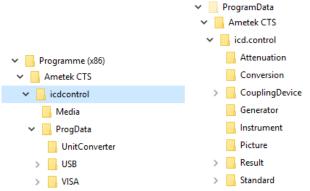
The following computer settings are mandatory for proper software operation.

Settings	Remark			
Energy safe or Suspend Mode must be disabled.	Windows sets the IEEE interface in the standby mode. The software can switch to simulation mode. Problems occur with long durations tests, where the PC is idle for a long time.			
Screen safer disable	Screen safer can influence the running program.			
Hard disk sleepmode disable	The access of programs to a hard drive in sleeping mode may be a reason for program conflicts.			
Notebook operation use mains power	When the storage battery is low, the notebook will close the program and shut down the computer. The test generator stays in remote status with the last voltage and frequency settings, until the setup is changed manually on device.			

1.8 Directory Structure of the *icd.control* Software

The software shows the following directory structure after a default installation (Windows 10 style):

Program	C:\Programs (x86)\Ametek CTS\icdcontrol
Program Data	C:\ProgramData\Ametek CTS\icd.control



The following list of directories shows the default purpose of application:

Directories icd.control for program data

Files for specifying the attenuation
Files for specifying the conversion
Files for specifying the coupling devices in use
Generator configuration files
Configuration files for internal and external measuring instruments
Library for setup pictures
Reports generated by icd.control
Library for icd.control standard tests

Directories icd.control for programs

Media	Some media files for internal use
ProgData	Software components

1.1. icd.control Software Install and Uninstall

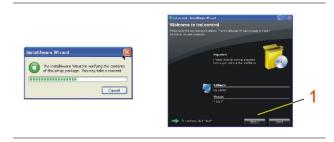
1.1.1. Installation

To start the installation, select the routine **icdcontrolSetup.exe** from the software CD or USB.

1. Press Next to continue

The installation routine guides you with an easy dialogue through the installation procedure. During the installation the relevant data will be expanded, copied and the user program will be installed either in a new or in an existing program group.

- 2. Press the field: I accept the terms of Licence Agreement.
- 3. Press Next to continue
- 4. Accept the default Product install path
- 5. Check the available disk space
- 6. Press Next to continue
- 7. Press Install continue.
- 8. Press Finish for terminate the installation.









AMETEK CTS

1.1.2. Uninstall

1. Start the uninstall procedure in the **System control** and

select icd.control for uninstall

- 2. Select Uninstall for remove installation
- 3. Press Next for start the uninstall procedure

- 4. Click **Uninstall** to remove icd.control
- 5. Click **Finish** after a successful uninstall procedure





2. Guide to icd.control

2.1. Software Overview

1.) Start Windows operating system.



2.) Start icd.control, double-click on the icd.control -Icon.

•) icd.control File Standards Help		- 🗆 ×		
Standard Test Vector Test Test Result	Last Test Result General Setup Open Instrument Device Control Device Transfer	•) ICD.CONTROL		
ISO 11451-4 (Edition 3) - BCI - Closed loc	qu	< Simulation >		
Open	Standard Tests			
Last Standard Test	ISO 11451-4 (Edition 3) - BCI - Closed loop			
Last Vector Test	MIL-STD-461G - CS114 - Level 5,5,5 - A,N,AF			
	IEC 61000-4-6 (Edition 4)			
🕅 MIL-STD-461G - CS114 - Level 5				
💹 ISO 11451-4 (Edition 3) - BCI - Closed loop Oct1				
🔣 MIL-STD-461G - CS114 - Level 2				
IEC 61000-4-6 (Edition 3)				
	🔟 ISO 11452-4 (Edition 4) - Closed loop			
	IEC 61326-3-2 (Edition 1) - Conducted RF			
	🛄 DIN EN 60945 (2003)			
Signal off	ISO 11451-4 (Edition 3) - BCI - Closed loop	NSG 4070C-60 🔒 isense		
ad apartral main deal		ikense		

icd.control main desktop

2.2. Software License

With the software license you get the access to the full program facilities. Each license is associated with one device (by serial number for NSG 4070 and SWN i.e., software number for CWS)

Click on **General Setup** on the top menu bar. This is where you enter your license code. If you have finished entering your license you will see the SWN code of your generator.

	NSG 4070		TCPIP0::11.0.0.100 TCPIP0::192.168.0.3		0000	2.17		^
Device 5:					~			
				1	EKRNO-QO	0Q00-G5AH3-J8M5P	-5A87U-N4ISCJAYUSW	G
Interface:		TCPIP0::1	1.0.0.100::12345 🖘	U	cense un	checked		

icd.control without license:

Without license icd.control runs with it complete functional range but only in simulation mode. That means the software may be used for demonstration purposes, file transfer of results, file configurations and report generating but not together with a connected generator.

icd.control Licence:

All functions are accessible. icd.control runs without limitations.

2.2.1. Operating mode

icd.control works in two different operating modes.

Test System

- icd.control has connection to one generator.
- You can work with icd.control together with your generator.

Simulation

- icd.control works in simulation mode.
- icd.control has no contact to a generator.
- The interface is not or wrong configured (software or generator).

2.2.2. Status bar

Z.Z.Z.	Status bar	
		IEC 61000-4-6 (Edition 3) CWS 500N1 - PM1000 🔐 Itense
	Info related to the curs	or position Actual standard Model Status
2.2.3.	Main Toolbar	Open the standard test manager.
	Standard Test	
	Vector Test	Open a vector test file.
	Test Result	Open a test result in the view mode.
	Last Test Result	Open the last test result.
	X Setup	Open the general setup.
	Open Instrument	Open the instrument list for configuration.
	Device Control	Open the device control panel window for manual control of the generator.
	Device Transfer	Exchange of calibration files for IEC 61000-4-6 edition 3 in combination with CWS. The connection with NSG reads the directional coupler data and result files. See Chapter 3.2.1 for details.

2.3. The icd.control window in the test mode

.

This is how you recognize the test mode.

AMETEK CTS

•) IEC 61000-4		🛃 Export 🛛 🖨 Print				Forward Power: Internal Power Meter - Forward	
E Save	Settings					<mark>,∃</mark> dBm	0,5 8 MHz
Standard:	IEC 61000-4-6 (Editi					[dBm] Attenuation: Linear -40dB	େ⊖େର୍ସ୍
requency:			Use Limiter			8	
tep:	(in	* % · ·		AM	1kHz 80% 🗸		
well Time:						6	
M	_ <u></u> .	•		_		3	
						1 100 kHz 1 MHz	10 MHz 100 M
						100 N 12 1 1912	101412 10014
1.7							
1.3							
	Level I						
1.0							
					Level:		
0.7					Level III		
					Level II		
0.3					C Level 1		
					Steps: 633		
0.0 +		1 MHz	10 MHz	100 MHz	Test Time: 00h 10m 33s		
Coupling Device	CDN Clamp	CDN-M3		~ 🖲	Start *		
alibration File:	Comp			~ 0	🔥 Check		
					+ Add Monitor		
orward Power	Takaraal			~ #			

2.3.1. Test Mode Toolbar

Last Test Result
Setup
Setup Standard
Export Report
Preview Report
▶ Start ▼
Start manual Test Check last Events

Switching into the view mode and opens the last test result.

Open the general setup. All settings are changeable except of selecting another generator.

Open the settings window of the standard.

Export the standard or instrument settings into a pdf or rtf file.

Open the preview window for the standard or instrument settings.

This features allows you to manually run the test for each step. The user has to click Forward each time to go to the next step.

RF Output: 🗵	2	Simulation	
		0%	
Stop	d Back	Forward	😂 Measure 🔮 Store

2.4. The icd.control window in data view mode

You can view the data files about instruments, test reports and calibration files.

Test result files are viewed by clicking on "**Test Result**" or "**Last Test Result**" icons at the top. For the calibration data, please see the below

File	Standards H	lelp					
	New	>		1	20		
	Open	>	Calibration Data		General Setup	Open Instrument	Devi
	Report Setup		Coupling Device		1 .		
	Exit	Alt+F4					
Open			Attenuation		its		
ľ	pen		Conversion				
Last Standard Test			IEC	61000)-4-6 (Edition 4)		

) icd.control - View	ſ			
ile Multireport View Help		•) Simulation CDN-M3, Level I, 0_15 - 80 MHz, 5% :	sept 19 sim.cal —	
Test Result Calibration Data	g Device Transfer	Standard: IEC 61000-4-6 (Edition 4)	Environment	
IEC 61000-4-6 (Edition 4)		Frequency: 0.15 - 80 MHz, 5% Level: Level I	Temperature: 23 °C Humidity: 46 % Pressure: 988 mbar	
Open	Standard Tests	File	Coupling Device	
Last Standard Test	🔟 IEC 61000-4	Date: 9/19/2019 8:12:31 AM	Name: CDN-M3	
Last Vector Test		Description:	Range: 0.15 - 80 MHz SNo:	
	📉 IEC 61000-		Note:	
	<u> I</u> SO 11452-	[M] Level I		
	🔟 ISO 11452-	0.9992 -		
	🔟 ISO 11451-	0.9975 -		
	🔟 DO-160G -	0.9958		
	ISO 11451-	100 kHz 1 MHz	10 MHz	100 MHz
	MIL-STD-46	No. Freq. [MHz] Level [V] Read [V] 1 0.150 1.000 0.995	Fwd. [dBm] Gen [dB] 18.76 -18.60	^
	🔟 Hyundai-Kia	- Save	Export	Print

2.4.1. View Mode Toolbar



Open a report file in the view mode.

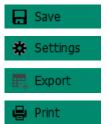


Opens a Calibration file.



Opens an Instrument log file.

2.4.2. View Mode options



Save the **active** window.

Open the settings window of the active window/panel object

Export the settings of the active window/panel object into a pdf or rtf file.

Open the preview window for the active window/panel object settings

3. First use

This chapter will guide you through the configuration menu with a suitable setting proposal for 95% of all users.

Steps for first use

- Software configurationPerforming of a calibration
- Proceed a test
- Viewing the results

3.1. **Software Configuration**

Overview

- Operation mode (Simulation / Connection computer <-> Generator)
- Device interface configuration and license
- Break, Fail, Trigger
- Password setup
- Miscellaneous settings

3.1.1. Device Setup



 Click on General Setup. The Device setup window of the system configuration appears.

Select **Test System** to work with a connected generator or

Simulation to work without a connected generator

To view other settings, click into the listed menu titles.

Select the correct generator under Device.

- Check the IEEE address of the device. If necessary, enter it in the field "Address:". Default address: 10. Software No should be matching the device. For NSG systems, the license is linked to the Serial No.
- 3. Enter the device **Serial number**. This number will be used for the test report and will be linked to the License of the software Each icd license is associated with one device.
- 4. Press the OK button

3.1.2. Search connected Devices

- 1. Click on the General Setup button
- 2. In the **Interface Setup** choose the corresponding interface and click on **Search** button
- 3. The software will automatically search connected devices on computers interfaces which corresponds to the selected unit.

ettings	Devices	Events						
State	Device		Interface	Software No.	Firmware	Equipm	ent	
	CWS500	N1.4	COM4	000000				1
	CWS500	N3	COM3	000333				
	CWS500)N4	GPIB0::10	000000		ACS500	N2.3	
	NSG 40	50	TCPIP0::11.0.0.10	050833		CDND N	1316-2	
	NSG 40	70C2-60	TCPIP0::11.0.0.100	000000	2.17			
	NSG 40	70-LFCP	TCPIP0::192.163.03	000000				\sim
	NSG 403	31	TCPIP0::192.163.03	000000				
Interfac	e:	TCPIP0::	:11.0.0.100::12345 📟	License OK				
Software No.: 000000		000000	Ope	n Interface Setup	rator: Freque	ncies:	0.004 - 1000) MHz
Softwar					Output	Delay:	0 ms	
Softwar					output		-	×.
	bration:				Output	1	10. <u>0</u> dBm	
Last Cali		ude Modula		Power Amp	Output	: Limit:		

Dev l	nterface Setup: N	NSG 4070C-80)			×	
Inte	RS 232 / USB	Ethernet	USB				000
Lice	Port:	COM3	~	Parity:	none	\sim	
Mod	Baud: 3	8400	~	Data Size:	8	\sim	
				Stop Bits:	1	\sim)n Monit
Pow	Communicatio	n					
Freq	Cycle Wait:	10 <u>0</u> ms	•	End of String:	LF	\sim	1000 M
🗆 P	Timeout:	100 <u>0</u> ms	*				Bm 🗧
E	All Sea	ırch		ОК	Can		

Interface Setup for NSG 4070C

	etup								>
Settings	Devices	Events							
State	Device		Interfac	ce	Software No.	Firmwar	e Equip	ment	
	CWS500	N1.4	COM4		000000				
	CWS500	N3	COM3		000333				
	CWS500	N4	GPIB0::	:10	000000		ACS50	JON2.3	
	NSG 406			::11.0.0.10	050833		CDND	M316-2	
	NSG 407			::11.0.0.100	000000	2.17			
	NSG 407			::192.168.0.3	000000				^
	NSG 403	1	TCPIPO	::192.168.0.3	000000				~
Softwar	e No.:	CWS	>		circul car	erator: Free	uencies-	0.004 - 1000	
		V NSG	>	NSG 4031 NSG 4060 NSG 4070 NSG 4070	в > с >	Out	put Delay: put Limit:	0 ms 10. <u>0</u> dBm	a v v
		VISG		NSG 4060 NSG 4070 NSG 4070 NSG 4070	8 > C > C1 >	Out Out plifier: Free	put Delay: put Limit: juencies:	0 ms 10. <u>0</u> dBm 0.004 - 400 M	↑ ↓ AHz
🗌 Exter	mal Amplitu			NSG 4060 NSG 4070 NSG 4070 NSG 4070 VSG 4070	8 > C > C1 > C2 >	Out Out plifier: Free NSG 40	put Delay: put Limit: juencies: 70C2-0	0 ms 10. <u>0</u> dBm 0.004 - 400 M	a v v
🗌 Exter	mal Amplitu	ude Modulatio		NSG 4060 NSG 4070 NSG 4070 NSG 4070	8 > C > C1 > C2 >	Out Out plifier: Free NSG 40 NSG 40	put Delay: put Limit: uencies: 70C2-0 70C2-0R	0 ms 10. <u>0</u> dBm 0.004 - 400 M	↑ ↓ AHz
🗌 Exter	mal Amplitu	ude Modulatio		NSG 4060 NSG 4070 NSG 4070 NSG 4070 VSG 4070	8 > C > C1 > C2 >	Out Out plifier: Free NSG 40 NSG 40	put Delay: put Limit: juencies: 70C2-0	0 ms 10. <u>0</u> dBm 0.004 - 400 M	↑ ↓ AHz
_	mal Amplitu	ude Modulatio		NSG 4060 NSG 4070 NSG 4070 NSG 4070 NSG 4070 NSG 4070	8 > C > C1 > C2 >	Out Out pifier: Free NSG 40 NSG 40 NSG 40	put Delay: put Limit: uencies: 70C2-0 70C2-0R	0 ms 10. <u>0</u> dBm 0.004 - 400 M	÷ •
🗌 Exter	mal Amplitu mal Directio	ude Modulatic	on .	NSG 4060 NSG 40701 NSG 40701 NSG 40700 NSG 40700 NSG 40700 NSG 40700 NSG 40700	8 > C > C1 > C2 > LECP Cance	Out Out NSG 40 NSG 40 NSG 40 NSG 40 NSG 40 NSG 40	put Delay: put Limit: uencies: 70C2-0 70C2-0R 70C2-35	0 ms 10.0 dBm 0.004 - 400 M	A V AHz
🗌 Exter	mal Amplitu mal Directio	ude Modulatic	on .	NSG 4060 NSG 4070 NSG 4070 NSG 4070 NSG 4070 NSG 4070	8 > C > C1 > C2 > LECP Cance	Out Out NSG 40 NSG 40 NSG 40 NSG 40 NSG 40 NSG 40	put Delay: put Limit: (uencies: 70C2-0 70C2-0R 70C2-35 70C2-45	0 ms 10. <u>0</u> dBm 0.004 - 400 M	A V AHz

Mode:

O Test System

Simulation (Software only)

3.1.3. icd.control Interface

In the row Address the Interface address, normally IEEE488 device address or Ethernet IP Address, needs to be entered. The same address as shown in the display of the related test generator must be entered here. This is the address iec.control will search for to communicate with connected test generator. The addresses given below show the factory settings. When changing any of this address check the related test generator for equal setting of the interface address. Click into field on the right side of the device address for open the interface setup and configure the interface. *See also section 4.1.1 for details on test setup.*

A) Using the USB interface

Now set the Baud rate in generator

- 1. Select USB / RS232
- 2. Choose the **COM Port** and the **Baud rate**. Factory setting: COM 3, 38400 Baud
- 3. An **Additional Timeout** can be used if no answer is received from Gen.

B) Using the IEEE 488 Interface

Now enter the IEEE address in generator

- 1. Select IEEE/ GPIB
- 2. Set the IEEE address of the generator Factory setting: IEEE address = 10

The option Check STB (Status Bit) allows an efficient communication (not supported by all devices)

C) Using the Ethernet Interface (NSG 4060/4070 only) Now enter the Ethernet address in generator

- 1. Select Ethernet
- 2. Set the IP address of the generator

D) Using the USB Interface Option (NSG 4060/4070 only)

- 1. Select USB
- 2. Set Vendor ID, Model ID and Serial No. of the Generator

Interface Setup: NSG 4070C-80			×
RS 232 / USB Ethernet USB			
Port: COM3 ~	Parity:	none	\sim
Baud: 38400 ~	Data Size:	8	\sim
	Stop Bits:	1	\sim
Communication			
Cycle Wait: 100 ms	End of String:	LF	\sim
Timeout: 100 <u>0</u> ms			
All Search	ОК	Cance	I

Interface Setup: CWS 500D	×
RS 232 / USB GPIB	
Card: 🚺 🗸	
Address: 10	
Check STB: 🗹	
Communication	
Cycle Wait: 100 ms	End of String: LF \sim
Timeout: 100 <u>0</u> ms	
All Search	OK Cancel

Interface Setup: NSG 4070C-110	×
RS 232 / USB Ethernet USB	
Driver: TCPIP0 ~	
IP Address: 255 . 255 . 255 . 255	
✓ Port: 12345	
Communication	
Cycle Wait: 100 ms Find of String: LF	\sim
Timeout: 100 <u>0</u> ms	
All Search OK Cance	l

Interface Setup: NSG 4070C-110	} ×
RS 232 / USB Ethernet USB	
Driver: USB ~	Vendor ID:
	Model ID:
	Serial No.:
Communication	
Cycle Wait: 10 <u>0</u> ms	End of String: LF \checkmark
Timeout: 100 <u>0</u> ms	
All Search	OK Cancel

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3.1.4. Events (Break, Fail, Trigger)

Set your options according to the graphic at the right. This is the easiest way to follow the actions of the software. Here you can select Suspend and Threshold features during the test and adjust parameters in Auto Threshold

After the occurrence of an event, the software will use the auto select values until reaching the defined test

General Setup						×
Settings Devices E	ents					
	Auto Threshold	Suspend Test Run				
Keyboard [F3]:	\square		At Brea	ik [F2]:	Keep Output Signal On	
Instrument:						
Digital Input: high	~					
Optical Input: high	~ 🗆					
User Port 1: high	· ·					
User Port 2: high	· ·					
User Port 3: high	· -					
User Port 4: high	× 🗆		Auto T	hreshold:	Reducing Step: 0.0 dB	*
					Increasing Step: 1.0 dB	÷
					Step Dwell Time: 3.0 s	*
			OK Can	cel		

3.1.5. Password Device

If a password is set, then the software doesn't allow to change test parameters without entering the password. The software can be used without entering the password, but no changes to standard parameters are allowed. See also section 4.1.3

<u>F</u> ile	<u>S</u> tandards <u>H</u> elp		Change Password X
	New Open	>	Valid password:
	Report Setup		New password:
	Pass <u>w</u> ord Setup		Confirm new password:
	Exit	Alt+F4	

3.1.6. Settings

Set your devices according to the graphic at the right.

General Setup		×
Settings Devices Eve	ents	
Mode: C	Simulation (Software only)	
۲	Test.System	Show Communication Monitor
Show Startup Wine	dow	
Show all Standards		
Sound at Event		
Show Maximum Po	wer Warning	
Decimal Separator for	Report: point 0.00 v	
Report after Test:	uto Print Preview 🗸	
Unit Converter Path:		
D:\Program Files (x86	b)\Ametek CTS\unitconverter\unitconverter	.exe 🐼
	OK	Cancel
General Setup		×
,		
Device Events	Password Settings	
Device:	NSG 4070C-0 V	
Device.	1030 40700-0 V	
Interface:		Software No.:
License:	XYZ	
Mode:	 Simulation (Software only) 	
	Test System	Show Communication Monitor
Power Amplifier		Signal Generator
Fraguancias	0.004 1000 MUz	Fraguancian 0.004 1000 MUs
Frequencies:	0.004 - 1000 MHz	Frequencies: 0.004 - 1000 MHz
Power Limit:	80 W	Output Limit: 10.0 dBm 🚔

External Directional Coupler

Output Delay: 0 ms

Cancel

ОК

3.2. Perform a test

This manual will show you two examples with of tests according to IEC 61000-4-6 and ISO 11452-4. Other test examples refer to the special application notes web page of Signal Generator (e.g., NSG 4070C)

- Proceed a standard test
- Execute the test
- Create a report

Other test routines with icd.control:

- Vector Test program
- Device Control program

3.2.1. Standard Test as per IEC 61000-4-6

The following pages describes how to proceed an IEC 61000-4-6 standard test with CDN application. For detailed screen information of software please refer to the separate chapters at the end of this manual.

Basic Settings

Clicking on "General Setup" opens the generator settings

menu > Under Device select the appropriate generator model e.g., NSG 4070

If necessary, set limits for the connected hardware. "**Power Limit**" limits the forward power. This feature avoids a damage in case of error. Based on forward power measurement, the output power is limited from the amplifier to prevent any damage. **"Output Limit**" limits the output level of the signal generator and is e.g. to 0 dBm if the maximum input power of the connected amplifier is limited to 0 dBm.

For NSG 4070, if the "**External Directional Coupler**" is selected, it expects the forward power at channel 2. For operation with the internal power amplifier and internal directional coupler, the checkbox must not be set. After finishing settings, click **OK**

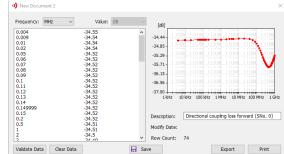
Click on "**Device Transfer**" to read the directional coupler data of the NSG 4070 and open the following window.



In this window, device specific values can be inserted according to calibrated results.

A comment can be inserted or changed in "**Description**"

Clicking on "Save" allows the program to assign a file name.



Setup

1. Click on the **Standard Test** button in the toolbar to open the standard manager window.



 Select the desired standard group on the left frame.
 IEC EN / Basic / Then the stored standard files of the selected standard appear in the right frame.

3. Select the desired standard EN 61000-4-6 (Edition 4) .nr in the right frame.

Click the **OK** button to switch to the test windows.

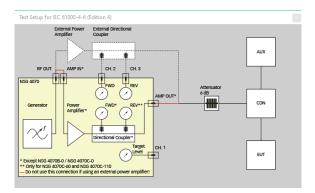
In order to view the test setup, click on $\ensuremath{\textit{View}}\xspace$ Show

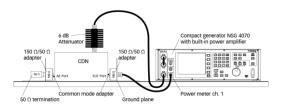


- CWS 500N1x / N2 or NSG 4070
- 6dB and 20dB attenuator (as needed)
- CDN coupling decoupling device

- 150/50 Ohm and common mode adapter as required for the coupling device. (R100N)

This setup can also be used for the first calibration. Please look for application notes on the web page for more info on setup.



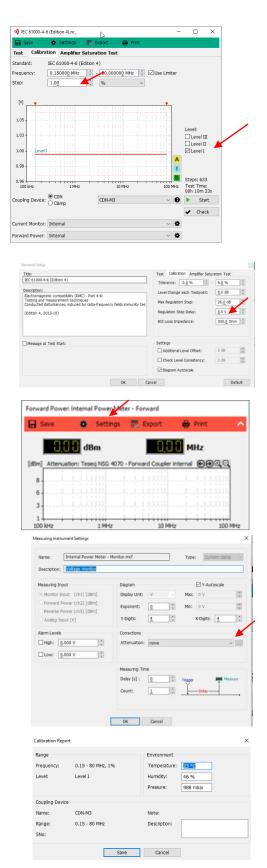


Example of Calibration setup with CDN and NSG 4070 with internal amplifier.

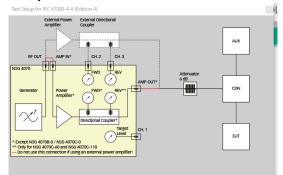
- A) Start a level specific attenuation calibration
- 1. Select Level I (1V) in the Level array.
- 2. Select the Calibration tab on top of the window.
- 3. Select in the field **Coupling Device** the radio button **CDN** and then the used CDN **M3**.
- 4. In the **Step** field, you can change the step size for each frequency change.
- Select the current monitor. Select "internal" if using the built-in power meter of CWS 500 or NSG 4070.
- 6. Click Settings to set the test level setting for the connected hardware.
- 7. In the field, "Level Change each Testpoint", a value of, for example, -6 dB, means the level would be lowered by 6 dB at each frequency step and then gradually increased to the target level. A level reduction may be required by the standard. During calibration (procedure for setting the test level) these requirements do not usually exist and a value of 0 dB shortens the calibration time. When finished, click OK
- Select the attenuator: In Current Clamp window, a double-click into the diagram or a simple click on the settings symbol opens the following menus.
- 9. Select the file containing the correction data of the attenuator connected on the power meter channel 1 of the NSG 4070, e.g. -20 dB for a 20 dB attenuator. This file can be supplemented with the attenuation values of the connected cable, recommended for long lines. For attenuation values, the software expects a minus sign before the numerical value. Clicking on the icon opens the file. No attenuator was set for this example. Click **OK**.

Similarly, double clicking on the "Internal Power Meter-Forward" will allow to set up the settings for the Forward Power Meter Coupler used (see also Sec 3.2.1). When finished, click **OK**.

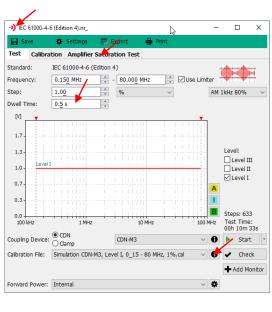
- 10. In case of external amplifier, see section 6.1.2.3
- 11. Press the button Start to begin calibration.
- 12. After successful calibration, the operator is prompted to save the file.

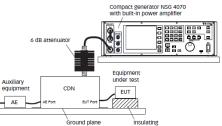


- B) Start the test
- 1. Amplifier Saturation Test allows you to test the performance of Amplifier and can observe if the Amplifier meets the allowed 5 dB tolerance level. The standard describes the following: If the difference is between 3,1 dB and 7,1 dB then the amplifier is in tolerance and the test system is sufficient for testing at the selected test level. If the difference is less than 3,1 dB or more than 7,1 dB then the amplifier is non linear and is not suitable for testing.
- 2. Immediately after calibration and saving the results, the program enters the test mode. Make sure the tab **Test** on top of the window is active.
- As it was done during Calibration, the test setup can be viewed by clicking on "View" -> "Show Test Setup"



- Select **Dwell Time** for the duration for one cycle of DUT <u>behavior (at least 0.3s)</u>.
- 5. Click Settings to set the test level settings for the connected hardware.
- 6. In the field, "Level Change each Testpoint", the test level can be changed e.g., -6dB.
- 7. Press OK and select the **Test** tab below the diagram.
- 8. Choose a **Calibration File**. immediately after calibration and saving the results, this file is used for the test. If necessary, select another calibration file. Click on the "i" icon to display the content.
- 9. **"Expert Mode"** allows the user to change the test criteria as may be needed for the test.
- 10. In case of external amplifier, see section 6.1.2.3
- 11. Press Start to begin the test procedure.





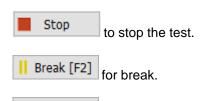
Example of Test Setup with CDN for NSG 4070 and internal amplifier.

C»		elp ert Mode w Test Setup	5					
est Res		nge all Win	dows (Edition 4).r		-		-	>
	E s	ave	🍄 Settin	gs 🛛 🔜 Eb	port	🖶 Print		
pen	Test	Calibrat	ion Ampl	ifier Saturat	ion Test			
st Standa	Standa	rd:	IEC 61000-4	I-6 (Edition 4)			
	No.	Name	Frq. Start	Level Start	Frq. Stop	Level Stop	Frq. Step	Vector:
st Vector	3 01	Level I	0.150	1	80.000	1	1%	🖌 Edit
	02		0.150	3	80.000	3	1%	부 Insert
	03	Level III	0.150	10	80.000	10	1%	€ Restore
								S On / Off
	<						>	
	[V]							
	1.7 -							Level:
	1.3 -							Level III
		level I						Level II
	1.0 -							

icd.control

A test with 1s dwell time and 1% frequency step needs approx. 12-15 minutes.

Use following buttons:



V Event [F3] for an event.

Monitor window allows you to see parameters at each step

More information about the function see next chapters.

At the end of the test the finish window appears.

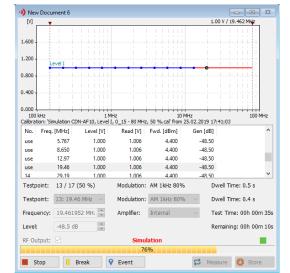
- 12. Enter a comment for the test complete documentation.
- 13. Press Save to save the test.
- 14. The selected report settings can be changed, saved or overwritten by loading another .rep file.

Report setting files contains following data:

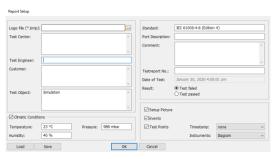
- Company logo (max. 256 color .bmp file)
- Test center and test engineer
- Customer name and address
- Tested object
- Used standard
- Result with comment
- Climatic conditions
- Visible elements for the report

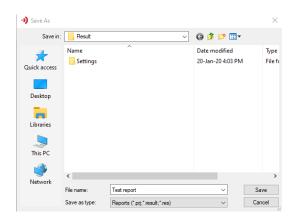
Confirm with OK.

15. Save the test under a given name. The file will be saved with the extension .prj.



Test Event: Finish	
Level:	1.0 V
Frequency:	80.000 MHz
Dwell Time:	0.5 s
Comment \ Index:	~ 🗙
	~ ~
E Save	Close





Last Test Result

16. The test result file will be quickly available by pressing **Last Result**.

Report functions refer chapter Viewing the results

3.2.2. Standard BCI Test as per ISO 11452-4

The following pages describes how to proceed a ISO 11452-4 BCI standard test with a closed loop application. For detailed screen information, please refer to the separate chapters.

Setup

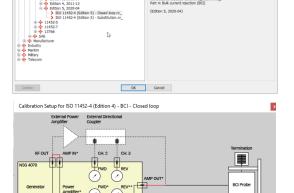
- 1. Click on the **Standard Test** button in the toolbar to open the standard manager window.
- Standard Test

4070C

- Select the desired standard group on the left frame. Automotive / International / ISO / 11452-4 / Edition 5 / Closed Loop Then the stored standard files of the selected standard appear in the right frame.
- Select the desired standard ISO 11452-4 (Edition 5) BCI Closed loop.nr_ in the right frame.

4. Click the **open** button to switch to the test window. For this first test we propose to use the following test setup as shown in the figure (as example) : In order to view the test setup, click on **View> Show Test Setup** and you will see the diagram on right.

•) icd.control - Setup						
File Calibration	View	Help				
		Expert Mode				
Last Test Result	\checkmark	Show Test Setup	port Report			
		Arrange all Windows				

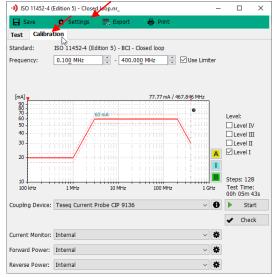


Been also available application notes on the web related to signal generator e.g., NSG

This setup can also be used for the first calibration.

Proceed the setup and calibration procedure

- 1. Select Level I in the Level array.
- 2. Select the **Calibration** tab below the diagram.
- 3. Select in the field **Coupling Device** the injection clamp model.
- 4. In order to change test parameters, click on setus standard and in calibration tab, you can adjust as needed. With a value of, for example, -6 dB, the level would be lowered by 6 dB at each frequency step and then gradually increased to the target level. A level reduction may be required by the standard. During calibration (procedure for setting the test level) these requirements do not usually exist and a value of 0 dB shortens the calibration time.
- 5. Press OK to save settings
- In order to change the setting of power meters, click on settings icon in the following window or simply double click on the graphs.



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- 7. In the Measuring Instrument Settings (as shown on right). In the field Attenuation, select the file containing the correction data of the attenuator connected on the power meter channel 1 of the NSG 4070, e.g. -20 dB for a 20 dB attenuator. This file can be supplemented with the attenuation values of the connected cable, recommended for long lines. For attenuation values, the software expects a minus sign before the numerical value. Clicking on the icon opens the file.
- 8. In Conversion field, Select the file which allows the correction data for current measurement in the 50 ohm jig, e.g. Linear 50R.cp. Clicking on the - icon opens the file. Click OK to save settings.
- 9. Press Start to begin calibration.

ISO 11452-4 (Edition 4) - BCI - Closed loop	
	Tolerance: -12.2 % 0 + 12.2 %
escription:	and the second sec
toad vehicles - Component test methods for electrical disturba l'art 4: Bulk current injection (BCI)	Max Regulation Step: 26.0 dB
(Edition 4, 2011-12)	Regulation Step Delay: 0.0 s
	(The life
Message at Test Start:	Settinos
Treamy at real start.	Additional Level Offset: 0 dB
	Check Level Consistency: 3 dB
ОК	Cancel Default
dBm dBm [dBm] Attenuation: Teseq NSG 407 8.200	
1.000	100 MHz 1 GHz
1.000	100 MHz 1 GHz
	100 MHz 1 GHz
1 MHz 10 MHz Measuring Instrument Settings	×
1 MHz 10 MHz Measuring Instrument Settings Name: Internal Power Meter - Monitor.mcf	×
1 MHz 10 MHz Measuring Instrument Settings	X Type: Ournet clump
1 MHz 10 MHz Measuring Instrument Settings Name: External Power Meter - Monitor.mcf Description: Current monitor instrument Measuring Input: Diagram	X Type: Qurrett clarg
1 MHz 10 MHz Measuring Instrument Settings Name: Instrument Settings Convert monter instrument Measuring Insut: Measuring Insut: Beastrum Parts (4) (c(d1) (c(d1)) Deply U	Type: Qurrett clarge
1 MHz 10 MHz Measuring Instrument Settings Marree: External Power Metter - Monitor.mcf Description: Current monitor instrument Measuring Irouit Measuring Irouit Forward Power (d/s) (d/m) Forward Power (d/s) (d/m)	Type: Queet dee
1 MHz 10 MHz Measuring featuremit Settings Rume: External Power Metter - Monitor.md Descriptions: Connent monitor indrument Measuring Input: Measuring Input: Measuring Input: Generate Power (cd) (clim) Generate Power (cd) (clim) Expense Power (cd) (clim)	Type: Qurrett clarge
1 MHz 10 MHz Measuring Instrument Settings Name: Internal Power Meter - Montox.md Description: Current Tender Internation Measuring Insure: (ds) (dlin) Reverse Power (ds)2 (dlin) Malagi Instrument International Internati	Type: Qurrett clares
1 MHz 10 MHz Measuring Instrument Settings Means: Description: Current monitor instrument: Meansing Input: Meansing Input: Meansing Power (db2) (dbm) Forward Power (db2) (dbm) Reverse Power (db2) (dbm	Type: Ourset clares
1 MHz 10 MHz Messuring Instrument Settings Marrie: Enternal Power Metter - Monitor.md Description: Current monitor natrument Messuring Inout: Messuring Inout: Messuring Inout: Messuring Power (cd2) (dlm) Reverse Power (cd2) (d	Type: Durrent clarg C Y-Autoscale net: A VAutoscale net: A VAutoscale net: A VAutoscale Mex: 0 mA VAUtoscale A VAutoscale net: A VAutoscale Nex: 0 mA VAUtoscale Nex: 0
1 MHz 10 MHz Measuring Instrument Settings Marrie: Enternal Power Metter - Monitor.md Description: Current monitor natrument Measuring Input:	Type: Ourset clares
1 MHz 10 MHz Measuring Instrument Settings Marrie: Enternal Power Meter - Montoc.md Description: Current monitor instrument Measuring Ioput. Measuring Ioput. Forware Power (cd2) (dm) Reverse Power	X Type: Durrent Clarge X Vulutoscale net: A Vulutoscale net: A Vulutoscale Mas: 0 mA Vulutoscale A Vulutoscale Mas: 0 mA Vulutoscale A Vulutoscale Nas: 0 mA Vulutoscale A Vulutoscale Nas: 0 mA Vu
1 MHz 10 MHz Measuring Instrument Settings Marrie: Enternal Power Metter - Montoc.md Description: Current monitor natrument Measuring Input: Measuring Input: Measuring Power (cl2) (dm) Reverse Pow	Type: Ournett clarge Type: Ournett clarge A Autoscale nt: A Rac OrnA Rac OrnA Met: OrnA Met: OrnA S S Compared Compared S S Compared Compared S S S S S S S S S S S S S
1 MHz 10 MHz Meaning Instrument Settings Meaning Instrument Settings Meaning Instrument Settings Meaning Instrument Meaning Instrument Meaning Instrument (cl) (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Prever (cl) (cl) Reverse Preverse Prevers	Type: Qurrent clere Type: Qurrent clere C Y Autoscale nt: A Max: OrnA t: Q Max: OrnA Max: OrnA M Max: OrnA M M M M M M M M M M M M M
1 MHz 10 MHz Meaning Instrument Settings Marrie: Internal Power Meter - Montox.md Description: Current montor indument Meter Power (a)2 (Sine) Reverse Power (a)2 (Sine) Rever	Type: Quenet daru
1 MHz 10 MHz Meaning Instrument Settings Marrie: Internal Power Meter - Montox.md Description: Current montor indument Meter Power (a)2 (Sine) Reverse Power (a)2 (Sine) Rever	Type: Qurrent clere Type: Qurrent clere C Y Autoscale nt: A Max: OrnA t: Q Max: OrnA Max: OrnA M Max: OrnA M M M M M M M M M M M M M
1 MHz 10 MHz Meaning Instrument Settings Marrie: Internal Power Meter - Montox.md Description: Current montor indument Meter Power (a)2 (Sine) Reverse Power (a)2 (Sine) Rever	Type: Qurrent clere Type: Qurrent clere C Y Autoscale nt: A Max: OrnA t: Q Max: OrnA Max: OrnA M Max: OrnA M M M M M M M M M M M M M
1 MHz 10 MHz Measuring Instrument Settings Marrie: Internal Power Meter - Monitor.mm Description: Convent montor indrument Methods Paper (da) (dine) Reverse Power (da)2 (dine) Reverse Power (da)2 (dine) High: <u>0,000 mA</u> Convection Lices: <u>0,000 mA</u> Description Description	Type: Quenet daru Type: Quenet daru Autoscale nt: A Raz OrnA Raz Nez
1 MHz 10 MHz Measuring instrument Settings Merrer: Internal Power Metter - Montocurert Describetor: Correct monitor instrument Mentors Prover (day) (dim) Reverse Power (day) (dim) Reverse Power (day) (dim) Reverse Power (day) (dim) Low: [000 m A]	Type: Quenet daru Type: Quenet daru Autoscale nt: A Raz OrnA Raz Nez
1 MHz 10 MHz Meanwing Instrument Settings Meanwing Instrument Settings Descriptions: Current monitor instrument Descriptions: Current monitor instrument Descriptions: Current monitor instrument Description: Carlos Aranisp Input (v) Aranisp Input (v) Aranisp Input (v) Current Current Description Current Current Description Current Description Current Description Current Current Description Current Curre	Type: Ormet Care Type: Ormet Care C Y Autocole nt: A Organize A Organize A A Organize A Organize A A Organize
1 MHz 10 MHz Meanwing Instrument Settings Meanwing Instrument Settings External Power Metter - Monitor.met Description: Contexts Added power (0-2) (301)	Type: Orientedure C Y Autocole net: C Y Autocole net: C Y Autocole C Y Autocole Net: C NA C C NA Net: C NA Note: C NA
1 MHz 10 MHz Meanuing Instrument Setting: Image: I	Type: Ourset Caree Careet Environment Temperature: 23 °C
1 MHz 10 MHz Meanwing Instrument Settings Meanwing Instrument Settings Meanwing Input Descriptions Meanwing Input (di-1) (dim) Pervand Power (d-2) (dim)	Type: Orientedure C YAutocole net: C YAutocole

10. Enter a description and the ambient parameter and press Save.

- 11. The icd.control will make a proposal for the calibration file name.
- 12. Press Save.

lame:	FCC Probe F-120-6A	Note:	CW input 100W (30 min)		
ange: No:	0.004 - 400 MHz	Description:	1		
	Save	Cancel			
calibration					
isting Calibrati	on Files :				

Save Cancel

File Name: Simulation FCC Probe F-120-6A, 60 mA, 1 - 400 MHz

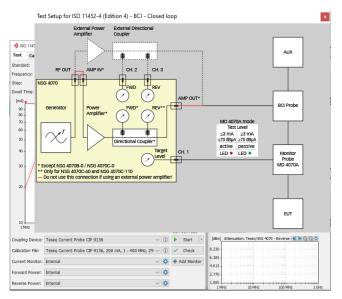
icd.control

Start the test (Closed loop method)

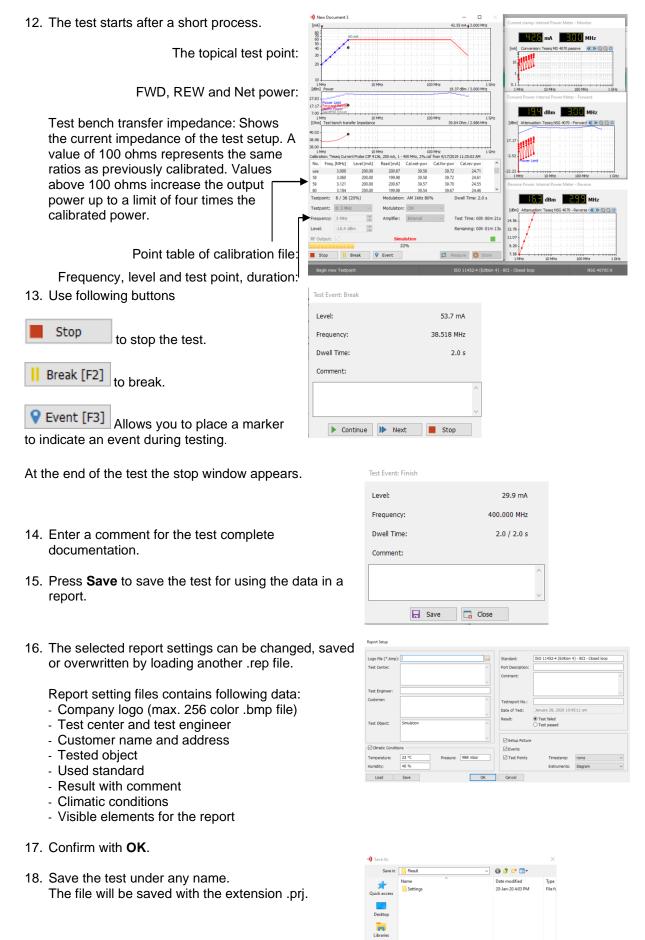
- 1. Immediately after calibration and saving the results, the program enters the Test mode.
- Select "View" and "Show Test Setup" to display a sample image for the test setup.
- 3. Click Settings to set the test level change setting for the connected hardware.
- In the field, "Level Change each Testpoint", the test level can be changed e.g., -6dB. Also, the Max Power level can be set above the calibrated power.
- 5. Select the **Test** tab below the diagram.
- Choose a Calibration File. Immediately after calibration and saving the results, this file is used for the test. If necessary, select another calibration file. Click on the "i" icon to display the content.
- A double click into the diagram of " Current clamp" or a simple click on the settings symbol opens the following menu for selecting the MD 4070. After selecting the right options, click "OK"

Name:	Internal Power Meter	- Monitor.mcf	unitor.mcf			rent clamp 👘 🗸 🗸	
Description:	Current monitor instru	ument					
Measuring In;	put	Diagram			Y-Aut	oscale	
Monitor In	nput (ch1)[dBm]	Display Unit:	A 🗸	Max:	0 mA	14 14	
	Power (ch2) [dBm] Power (ch3) [dBm]	Exponent:	- <u>3</u> *	Min:	0 mA	1	
O Analog In	put [V]	Y-Digits:	4		X-Digits:	4	
Alarm Levels		Corrections	/				
High: 0	.000 mA	Attenuation:	none			~	
Low:	.000 mA	Conversion:	Teseq MD 4070	passive.	¢	~	
Start Measure	e	Measuring Tim	e				
Auto Swit	tch (active / passive)	Delay [s] :	<u>0</u>	Trigger		Measure	
		Count:	1		Delay	⊣	

- Select **Dwell Time** for the duration for one cycle of DUT behavior (as needed by standard).
- 9. Select the **Test** tab below the diagram.
- 10. Choose a Calibration File.
- 11. Press **Start** to begin the test procedure. For Manual start, click on down arrow next to **Start** and select as shown on right side.



	00h	01m 35s				
i		Start	•			
(i)		Start ma	nual	Test		
-		Check la	st Ev	ents		
\$		Add Mome	01		_	



19. The test result file will be quickly available by pressing Last Result.

Report functions refer chapter Viewing the results

Viewing the results

- 1. The viewer window will open and shows the following windows:
 - Test report window including:
 - The topical test points.

- The graph with the power and the indicated power limit.

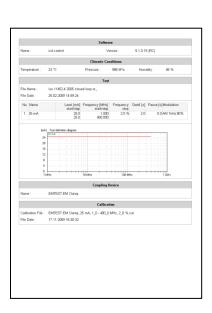
- The EUT impedance characteristic.

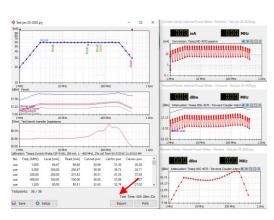
- Instrument panels with the measured values. Within the test point diagram, you can ask for a frequency and voltage on the topical cursor position by clicking the left mouse-key.

2. To create a report, press **Export** for direct save into a pdf or rtf file.

To open a report preview window for printing press **Preview Report**. Reports can be saved into pdf or rtf files in the report preview, too.

EM TEST AG Stemenhofstr 15 1125 Reinach	🔨 em test
	Test Report No.08-02-29.1
Source File :	_LastTest.prj
Date :	17.11.2009 17:30.45
Customer :	Customer name, Address, Phone, Fax
Test Generator :	EM TEST AG, CWS 500N2, Simulation, SNo.
Test Object :	Description of customers test object Model - number
Part Description:	Description of customers test port
Standard :	ISO 11452-4:2005 Closed loop
Tester :	Your test engineer
Comment :	Add a comment. Description for the test setup.
	Test Result
Result :	Test passed





L≫ Last Test Result

3.2.3. Magnetic Field Test as per ISO 11452-8

The following pages describes how to proceed a H-Field ISO 11452-8 standard test with a radiation loop coil. For detailed screen information please refer to the separate chapters. Magnetic Field Test as per ISO 11452-8

Setup

1. Click on the **Standard Test** button in the toolbar to open the standard manager window.



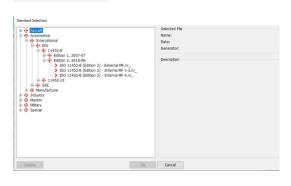
- Select the desired standard group on the left window.
 Automotive / International / ISO/ 11452-8 / Edition 2, 2016-06
 On the right side the stored standard files of the selected standard appear.
- Select the desired standard ISO 11452-8 (Edition 2) Internal-1-3.nr_ on the right side of the window.
- 5. Click to the **open** button for change to the test windows.

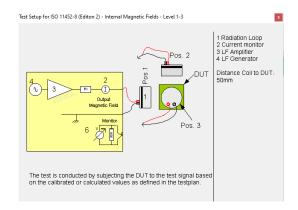
For the first test we propose to use the following test setup as shown in the figure (as a example) : In order to view the test setup, click on **View> Show Test Setup** and you will see the diagram on right.

- CWS 500N3
- Radiating loop
- Radiating loop sensor

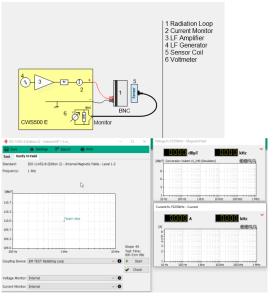
Proceed the setup and calibration procedure

- 6. Connect the **Radiation loop** together with **the Sensor loop** and connect the measuring cable to the BNC monitor input plug.
- 7. Select to the **Verify H-Field** tab below of the diagram to perform a verification.
- 8. Click to the **Start** button to begin the verification.
- 9. The message box appears who informs, that the supply power line will be switched off. Disconnect the DUT if you are running a calibration.





Verification Setup for ISO 11452-8 (Editon 2) - Internal Magnetic Fields - Level 1-3



AMETEK CTS

 A window with this verification result appears. Click the **Save** button. icd.control makes a proposal for the filename.

Magnetic Field	Verify Report	×
Device:	EM TEST Radiating Loop SNo:	
Note:		
Result:	$\begin{array}{ll} \mbox{Magnetic field generated by current failed!} \\ \mbox{Expected H-field:} & 110.0 \mbox{ dBpT} (\pm 3 \mbox{ dB}) \\ \mbox{Measured H-field:} & 132.7 \mbox{ dBpT} \end{array}$	
	Save Cancel	

Start the test

- 1. Click on the tab **Test and** Select **Level I** in the **Level** array.
- 2. Select in the field **Coupling Device** the antenna model.
- 3. Select the Current Instrument.

Press Start to begin test.

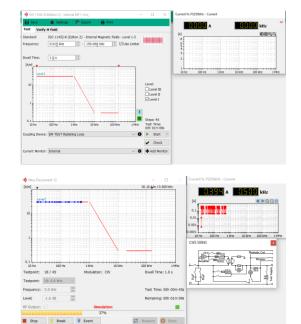
The test will be started after a short process.

During this process a diagram-window with the CWS 500N3 settings opens on display.

The topical test point will be shown in the main diagram.

Frequency, level and test point number will be shown in the bottom status line.

At the right side is the current instrument



icd.control

The following pages describes how to proceed a Sweep IEC 61000-4-16 standard test.

Setup

For the first test we propose to use the following test setup as shown in the figure (as an example). As explained in the tests above, choose the right Signal

Generator, e.g., NSG 4060 in the

neral Set					
Device	Events	Password	Settings		
Device:		NSG 4060		\sim	
Interfac	e:				 So

Select right coupling e.g. NSG 4060-1. See picture in 4.1

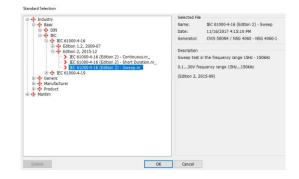
- 1. Click on the **Standard Test** button in the toolbar to open the standard manager window.
- Select the desired standard group on the left window.
 Basic / IEC / IEC 61000-4-16 / Edition 2, 2015-12

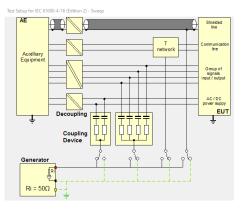
On the right side the stored standard files of the selected standard appears. 3. Select the desired standard

- IEC 61000-4-16 (Edition 2) Sweep.nr_ on the right side of the window.
- 4. Click to the **open** button for change to the test windows.

In order to view the test setup, click on View> Show Test Setup

•) icd.control -	Setup		
File Calibration	View Help		
Last Test Result	Seneral Setup	Setup Standard	Export Report





Start the test

display.

diagram.

1. Select Level I in the Level array.

The test will be started after a short process.

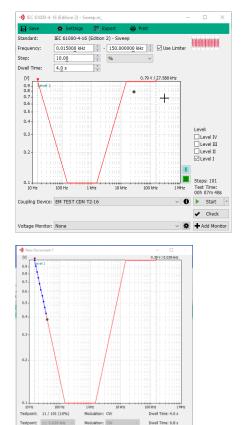
shown in the bottom status line.

During this process a diagram window opens on

The topical test point will be shown in the main

Frequency, level and test point number will be

- 2. Select in the field **Coupling Device** the CN model.
- 3. Press Start to begin test.



Remaining: 00h 05n

🕑 Sto

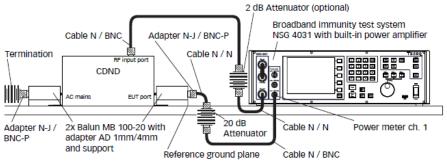
Level: 0.3855 V

Stop || Break 💡 Event

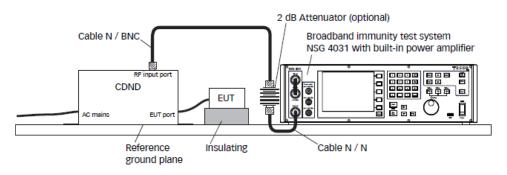
3.2.5. NSG 4031 testing for the IEC 61000-4-31

This chapter describes the testing procedure of NSG 4031 with icd control software.

Before the test, if the equipment must be calibrated by using the following level setting process. The picture shows the NSG 4031 with build in power amplifier. Calibration is recommended to be done on the device.

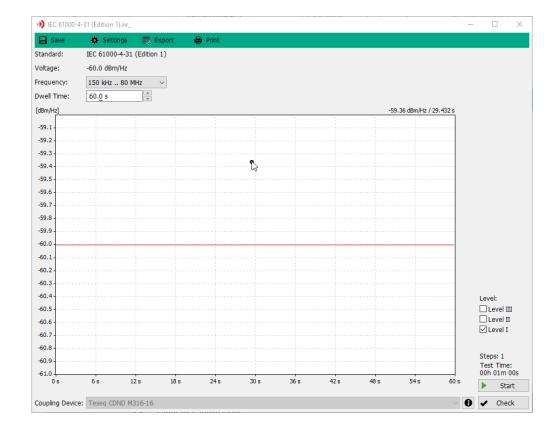


For testing, the following test set up is applied after calibration.



As first step, start the icd control software, select the NSG 4031 under the Device option of **General Setup.** Then choose the correct standard under the **Standard Test** option.

- 1) Select the Frequeny range for the test
- 2) Choose the Dwell time
- 3) Select the required Level
- 4) The coupling device is selected by defaul
- 5) Click on Start.
- 6) After the test is finished click on Save to store the results.



3.3. Other test applications

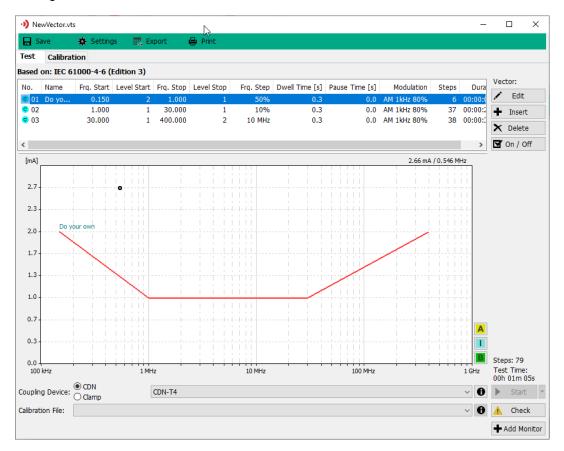
3.3.1. Vector test

1. Click on the **Vector Test** button in the toolbar to open the vector editor window.



2. The insert window for the definition of the test process parameters appears.

The vector test is always based on the active standard displayed in the window and on the bottom of the icd.control desktop. Another reference standard can be selected with the standard manager.



3. Change the test parameters by Edit or Insert.

Note: At least one Vector must be active, so it can be shown in the diagram and be used for the test. Switch on the option field **Enabled**.

Vector No.: 01			
Vector Name:	Þo your own		
Start		Stop	
Frequency:	0.15000 <u>0</u> kHz	Frequency:	1.00000 <u>0</u> kHz
Level:	2.000 <u>0</u> mA	Level:	2.000 <u>0</u> mA
Step			
Type:	Percentage ~	Width:	5 <u>0</u> .00 %
Dwell Time:	1. <u>0</u> s		
Pause Time:	0. <u>0</u> s	Modulation:	~
	ОК	Cancel	

3.3.2. Device Control Panel

•

Click on the button Device Control on the menu bar.

1. Device Control		
2. The window with the panel for	CWS 500N1.4 - PM1000 Control Panel	×
manual control appears. 3. In manual operating mode the	Modulation: CW ~	
user can operate the selected	Frequency: 0.009000 MHz	
device	Level: -63. <u>5</u> dB	
	RF Output: Simulation	😫 Measure
	Monitor: 0.0 dBm Forward: 0.0 dBm Reverse: 0.0 dBm	P net: -99.0 dBm

Restrictions by operating with the Device Control Panel:

- The panel does not use any calibration file of a coupling device.
 The measured instrument value is not matched with a transfer impedance of the measuring device.

4. File

The setup menu offers different menus for configuring the software to the system. The configuration is available on the main desktop.

•) File	icd.control Help		New:	Lets the user to create new configuration files such as report setting	report settings,
	New Open Report Setup	pen >		coupling device, instruments, attenuatio and correction files opens existing configuration files for editing.	
Exit		Alt+F4	Report Se	etup: Opens the report setup	
			Exit:	Closes the software	

4.1. General Setup

The configuration fixes the basic adjustments of icd.control. It can only be activated if there is no test window open. The configuration dialogue creates a file with the name icdcontrol.ini in the installation directory.

Choose the topic of interest from the list. With the first start this will be the topic "Settings".

Settings Device Events

Settings Dev Mode:	vices Events	
Mode:		
	O Simulation (Soft)	ware only)
	Test System	Show Communication Monitor
Show Sta	rtup Window	
Show all S	Standards	
Sound at	Event	
Show Max	kimum Power Warning	
Show Pov	wermeter Underflow Warni	ng
Decimal Sepa	arator for Report: point	0.00 ~
Report after	Test: Auto Print Preview	<i>ı</i> ~
Unit Convert	er Path:	
		nitconverter\unitconverter.exe

4.1.1. Settings

Mode:

When opening a test file, icd.control tests whether the communication with an attached instrument is possible. In case that icd.control finds no instrument it switches automatically to the operating mode "Simulation".

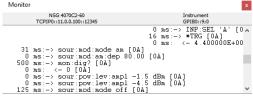
Simulation:

You can simulate the icd.control without a connected instrument. Of course, all the functions which are based on a connected instrument are not available anymore, i.e. the loading of calibrations files. **Test System:**

The icd.control communicates with the connected generator.

Show Communication Monitor:

Enables or disables the interface monitor. The monitor is a helpful tool for interface analysis in case of troubleshooting. The window size can be adjusted as needed.



Show Startup Window:

If this option is enabled the icd.control opens the Startup Window every time when the icd.control starts.

Show all Standards:

If this option is disabled (recommend) the Standard Manager shows you only the appropriate standards to the selected generator.

If this option is enabled all available standards will be displayed.

Sound at Event:

As soon as the test is finished, an acoustic signal will be given (Fail, Stop and Limit).

Show Powermeter Underflow Warning (CWS500x only):

Should the expected measuring signal be lower than the specified noise floor of the power meter a warning will appear to prevent of wrong measurements.

Show Maximum Power Warning:

If the generator reaches its maximum power the icd.control shows a warning message, which can be suppressed by this option.

Report after Test:

Will configure the behavior of the report after the test.

There are three possible settings:

- Open manually After the test has finished the test window will be closed and the report has to be opened manually from the menu bar.
- Auto Print Preview After finishing the test a window will open which shows the print preview.
- Auto Export to PDF/RTF The report will be automatically exported to a PDF or RTF file. A dialog will appear to enter the desired file path.

Unit Calculator Path:

Press to the field ^{lea} to find the path the desired Unit Calculator. This program will be executed if the menu entry Help -> unit.converter is pressed.

4.1.2. Device

Click on drop down under **Device** and Select the correct generator from the device list.

General	Setup							×
Settings	Devices	Events						
State	Device		Interface	Software No.	Firmware	Equipr	ment	
	CWS50 CWS50		COM4 COM3	000000				
	CWS50		GPIB0::10	000000		ACS50	0N2.3	
	NSG 40	50	TCPIP0::11.0.0.10	050833		CDND	M316-2	
	NSG 40	70C2-60	TCPIP0::11.0.0.100	000000	2.17			
	NSG 40	70-LFCP	TCPIP0::192.168.0.3	000000				^
	NSG 40	31	TCPIP0::192.168.0.3	000000				$\mathbf{\vee}$
Device Interfac	ce:	NSG 4060 TCPIP0::: 050833) 1.0.0.10::12345 📟	License und	-		37U-N4ISCJAYUS 0.015 - 150 M	
Last Ca	libration:				Output			× ×
Last Ca	ibracion.				Output	CITIC.	0.0 0011	v
Ext. Eq	uipment:	CDND M3	16-2 ×	Power Amp	lifier: Freque	ncies:	0.015 - 150 M	Hz
			ОК	Cancel				

Interface

Shows information's about the actual configured communication interface.

Interface:

TCPIP0::11.0.0.10::12345

Setup:

A click on the button "⁽²⁰⁰⁷⁾" opens the Interface Setup window. An example of Interface setup for NSG 4070C is shown on the right side.

Interface Setup: Instrument	×
RS 232 / USB GPIB Ethernet USB	
Card: 🖸 🗸	
Address: 22	
Check STB: 🗹	
Communication	
Cycle Wait: 100 ms End of String: LF	\sim
Timeout: 10000 ms	
All Search OK	Cancel

Definition of the communication interface GPIB, USB/RS232, Ethernet, USB.

GPIB:

If you run an IEEE 488-card in your computer, choose this set-up. The IEEE address will be set in the Device setup screen.

Test the correct function of your IEEE-card using the analysis tools attached by the manufacturer of the card. (Hardware and software test program).

USB/RS 232:

USB communication or RS232 communication through a 9-pole cable, not crossed. Using the USB/RS 232 interface the selected COM port and baud rate will be displayed.

Ethernet:

Communication through a Ethernet cable.

IEEE setup:

Actually, EM TEST supports the cards manufactured by **National Instruments**.

The option **Check STB** (Status Bit) allows an efficient communication (not supported by all devices)

Card configures the corresponding card address of the installed National Instruments GPIB adapter. The actual address may be obtained from the National Instruments card driver configuration software "Measurement & Automation Explorer".

Device address by using a IEEE-488 card.

Enter the correct IEEE-address of your Generator. Values from 1 to 30 are allowed.

USB / RS232 setup:

Interface COM: Choose the used COM interface. **Baud rate**: Make sure that the baud rate in the Generator corresponds to the one set in the icd.control.

Additionally, the **Parity** Bit, **Data size** and number of **Stop Bits** can be set. Ethernet setup: Select the used Ethernet protocol TCPIP. **IP Address:** Choose the IP address of the generator.

RS 232 / US	B GP B		
Card:	0 ~		
Address:	1 <u>0</u>		
Check STB: 🗹			

RS 232 / 1	JSB Ethernet USB		
Port:	COM3 ~	Parity:	none 🗸 🗸
Baud:	38400 ~	Data Size:	8 ~
		Stop Bits:	1 ~

RS 232 / USB Ethernet USB				
Driver:	ТСРІРО 🗸			
IP Address:	255 . 255 . 255 . 255			
Port:	1234 <u>5</u>			

User with more than one generator

The icd.control Software can handle different generators. The different generators can be connected to the same IEEE interface network, but only one generator can be served. For change the model select the model in the device setup. After change the generator model exit and restart the icd.control software.

Serial number

Serial number is only used for the report.

4.1.2.1. License

The license field was explained earlier in the icd software setup section.

4.1.3. Events

Defines the reaction of icd.control in case of a hardware Fail2 or software Trigger. An example on right side is shown for NSG 4070C

Suspend Test Run

If you check this box, the test will stop at all those events. Otherwise, the test will continue as by defined parameters.

General Setup						×
Settings Devices	Events					
	Auto Threshold	Suspend Test Run				
Keyboard [F3]:				At Break [F2]:	Keep Output Signal On	
Instrument:						
Digital Input: high	ı ~ □					
Optical Input: high	n ~ 🗌					
User Port 1: high	n ~ 🗆					
User Port 2: high	ı ~ 🗌					
User Port 3: high User Port 4: high				Auto Threshold:		
						-
					Step Dwell Time: 3.0 s	
			ОК	Cancel		
						_

Auto Threshold (reducing step: -3dB / Increasing Step +1dB):

If the **Auto Threshold** value is set, then at the occurrence of a Trigger event, the output will be reduced by -3dB steps till the fail disappears or the output level reaches the minimum power. Thereafter the output will increase till the fail2 will appear again. Then icd.control will continue with the next step frequency with the original set output level.

After each Fail2/Trigger, icd.control continues with one of the following procedure:

Continue:	The test frequency will be changed to next test point.
Repeat:	The actual test point will be repeated.
Stop:	The test will be stopped. The stop dialogue appears.

If the parameter **Reducing Step** is set to 0, then if a trigger is occurred the next frequency will be tested directly.

4.2. **Report Settings**

report.

The standard report configuration has the advantage for fill out all standard forms of the automatic generated report. This will save a lot of time to generate the reports in future.

Choose menu File -> Report Setup	Choose	menu	File ->	Report	Setu	D
----------------------------------	--------	------	---------	--------	------	---

This will open the form for enter the default report information. Fill out the blank fields if there is always the same entry.

·)) i	 icd.control 		
File	Help		
	New	>	
	Open	>	
	Report Setup		
	Exit	Alt+F4	

-	ompany logo for print File must be in the	Report Setup
BMP format.		Logo File (*.bmp): Standard:
Test Center: house	Address of the test	Test Center: Port Description: Comment:
		Test Engineer:
Test Engineer: who is responsible	Name of the person e for the test.	Customer: Testreport No.: Date of Test:
Customer:	Customer Address	Test Object: Result: Test Aled O Test passed
Test Object: description	Test object	Conditions C
Standard: standard is autom	Normally the applied natic insert into the	Humidity: Instruments: none ~

Port Description: The description of the EUT port.

Comment: Comment to the test

Testreport No: May be the first letters of the report number (date). After the test the user can complete the report number.

Date of Test: This field will be automatic set from the computer internal date and time.

Result: Default setting will be automatically overtaken in each report.

Temperature: Actual temperature

Humidity: Actual humidity Pressure: Actual pressure **Setup Picture:** If activated, a picture of the test setup will be inserted into the report. **Events:** If activated, the events may be occurred during test will be listed in the report. **Test Points:** If activated, a list of each test point will be inserted into the report. Instruments: Allows option to show the instrument values in different ways.

4.3. **Password Setup**

Change Password	×
Valid password:	
New password:	
Confirm new password:	
ОК	Cancel

This setup has the following functions:

- Change of the password
- Enable/ disable the Password dialogue at the startup

Using a password can protect to overwrite test files.

Number of Passwords: Procedure:	There can be used only one password. Once the full access mode is protected by a password you must use this password at the beginning of each full access session. In the other case the software continues working in the low access mode.
Full access mode:	Changing and saving all files is possible. A password is merely wanted, when defined before. In case there is a password defined and not entered, only the low access mode will be accessible.
Reduced access mode:	(Low Access): Test- and calibration files cannot be saved. All other functions for testing are available.
Forgotten password: Password changes: Disable password:	The icd.control software must be newly installed. The password can only be changed in full access mode in General Setup menu To disable a password make no entry in the field new password.

Change the password

- 1. Enter the valid password. If no password exists, press the Enter key
- 2. Enter the new password,
- Press Enter.
- 3. Confirm the same password; Press OK

4.3.1. Password Setup

Show Password dialogue at start-up

switches the password log-in dialogue on or off when starting the icd.control software.

Password for User Access			
User Access	If a password exists, full		
Password desired ? (no)	access to all data only with password possible!		
Show password dialog at start-up			
0 <u>K</u>	<u>C</u> ancel		

4.4. Measure Instrument

see chapter 8

4.5. Attenuation File

The attenuation is the decrease in transmitted signal power resulting from the insertion of a cable or used attenuators. It is usually expressed relative to the signal power delivered to that same part before insertion. Insertion loss is usually expressed in decibels (dB).

A certain amount of signal will be lost as it travels through coaxial cable. This loss is dependent on two factors: the type of cable used, and the frequency of the signal being carried. Losses are greater at higher frequencies; therefore loss compensation should be made at frequencies higher than 200MHz.

icd.control software compensate the insertion loss in the measuring cable in function of the frequency. The insertion loss of a measuring cable is stored in the insertion loss file *.los.

4.5.1. Create a new Attenuation File with manual data input

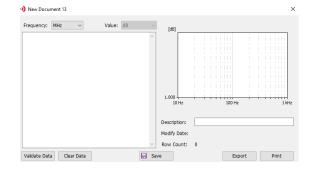
- 1. Select the menu File / New / Attenuation
- 2. An empty window appears, where you have the possibility to enter the insertion loss data of the cable or define used attenuators in front of the measuring channel.

File	Help			
	New	>	Coupling Device	
Open		>	Instrument	
	Report Setup		Instrument	
			Attenuation	
	Exit Alt+F4		Conversion	

) icd.control

Format: xxxx.xxxMHz yyy.yydB

- Enter the data into the table in the following mode: Frequency[MHz]; TAB or space; loss value[dB] Continue until the list is complete
- 4. Enter the **Description** (cable type and length)
- 5. Click to **Validate Data** for drawing the graph in the diagram window.
- 6. Select the save icon and enter the filename
- 7. The file will be stored with the extension *.los



4.5.2. Create a new Attenuation File with data input from txt file

Much easier is to create an insertion loss file from a file like you can get from network analyzers. This file must have the following **data format:**

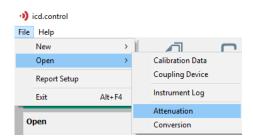
Frequency [Hz] TAB (as separator) loss value [dB]

Example:		
9000	\rightarrow	-2.97550577670336E-02
9144.9462890625	\rightarrow	1.83761510998011E-02
9292.2265625	\rightarrow	1.77272483706474E-02
9441.87890625	\rightarrow	1.87315847724676E-02
9593.94140625	\rightarrow	3.77311147749424E-02
9748.4521484375	\rightarrow	4.12851050496101E-02

icd.control will automatically convert this data into the correct form

Procedure for make a new attenuation file from a text file

1. Select the menu File / Open / Attenuation

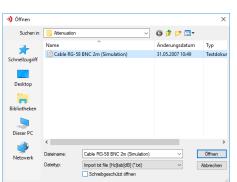


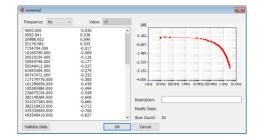
- 2. Select the filetype: **Import txt file[Hz] tab [S21dB] (*.txt)** This file is created by a network analyzer using the parameter S21.
 - Note: For more information about the S21 parameter refer to your network analyzer manual.
- 3. Select the file you like to convert into an insertion loss file.
- 4. Press open for create the insertion loss file.

A new window opens with the converted data and graphic display.

- 5. Enter the **Description** (cable type and length).
- 6. Select the **save icon** and enter the filename.

The file will be stored with the extension *.los.





4.6. Setup Conversion

The conversion reflects the frequency behavior of a connected current probe. This data must be taken from the used calibration certificate. icd.control offers a list of current probes, calJig and other sensors. All this data are approximative data from the device used by EM Test/ TESEQ.



For correct measurement it is mandatory to adjust the installed transfer impedances with the calibrated data from the used probes.

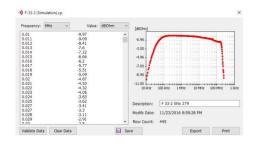
4.6.1. New conversion file

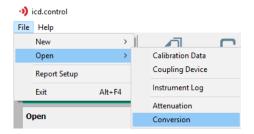
- 1. Select the menu File / New / Conversion
- 2. Select the **unit** of your frequency steps.
- Select the unit of the transfer impedance This unit will be displayed later in the parameter list and as title in the graphic.
- 4. Enter the Description (device and serial number)
- 5. Enter the **data** into the table in the following mode: Frequency [kHz / MHz]; TAB or space; value[unit] Continue until the list is complete
- 6. The file will be stored with the extension *.cp

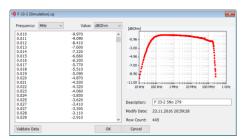
4.6.2. Edit or open a conversion file

- 1. Select the menu File / Open / Conversion
- 2. **Select** the **transfer impedance file** you like to Open or Edit for modify.
- 3. **Select** the **transfer impedance file** you like to Open or Edit for modify.
- 4. **Select** the **parameter** at the desired frequency for modify the value according the **actual used** transfer impedance.
- 5. Change the **description** if necessary.
- 6. Select the **save button** and enter the filename and save the file as .cp file

·))	icd.control		
File	Help		
	New	>	Coupling Device
	Open	>	
	Report Setup		Instrument
	Exit	Alt+F4	Conversion







AMETEK CTS

4.7. Setup Coupling Device

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A coupling device file describes the parameters and behavior of each individual coupling device. During a calibration icd.control software takes all information from this file (exception CDN calibration of *.cdn files). Also, the used frequency information for a frequency range check will be taken from this file. If the user expands the range of used coupling devices it is necessary to make a file with the information about the new coupling device.

There are four different types of coupling devices. The user can separate the type of coupling device from the extension.

	Extension	Coupling device	
	*.1xx	CDN	
*.2xx Clamp, Striplings, Cells		Clamp, Striplings, Cells	
_	*.3xx	Devices for CWS 500N3 model	
	*.4xx	Devices for CWS 500N4 / NSG 4070 model	

4.7.1. New coupling device

- -

1. Select the menu File / New / Coupling Device

·))	icd.control		
File	Help		
	New	>	Coupling Device
	Open	>	Instrument
	Report Setup		Attenuation
_	Exit	Alt+F4	Conversion

0.10<u>0</u> MHz 📫 ... 100.<u>0</u> MHz 📫

50.0 Ohm of Stripline/TEM Cell

OK Cancel

*

🖶 between Septum and Ground

Clamp, Stripline

0.15 m

Antenna Factor: 76.0 /m

Attenuation: None

nonar

Type: Name: Description: Serial No :

Frequency:

Impedance:

Distance:

2. Fill in the parameters of the coupling device and safe the file.

4.7.2. Open coupling device

- 1. Select the menu Setup / Open / Coupling Device
- 2. Open the coupling device you like to modify.
- 3. Change or modify the parameters of the coupling device and save the file.

·)	icd.control			
File	Help			
	New	>	A	
	Open	>	Calibration Data	
	Report Setup		Coupling Device	
	Exit	Alt+F4	Instrument Log	
0	pen		Attenuation Conversion	

•) CDN-AF2.101		×
Type:	CDN	\sim
Name:	CDN-AF2	
Description:		
Serial No.:		
Frequency:	0.15 <u>0</u> MHz A 80. <u>0</u> MHz A	
Impedance:	0.0 Ohm of Stripline/TEM Cell	
Distance:	0.00 m between Septum and Ground	
Antenna Factor:	1.0 /m	
Attenuation:	None ~	
	OK Cancel	

5.1.

5. Standard Tests

The standard tests manager shows all programmed standards you can test with your connected equipment.

A device specific routine filters the applicable standards for the devices: - CWS 500 C series - CWS 500 D - CWS 500 E - CWS 500 N1 - CWS 500 N2 - CWS 500 N3 - CWS 500 N4 - NSG 4060 - NSG 4070 series	Open Standard Test
Benefit of the standard tests manager	

The manager organizes the tree structure of the different standards. It looks like the Windows Explorer but reduces the activities to the necessary one.

The standard tests manager is responsible for the basic setup according to the selected standard. You can organize your one standard tree according to your demands. It is based on the file and folder structure in the ...\icdcontrol\Standard\ directory. For creating folders or copying files between folders, you should use a file manager.

I.e. you can create folders with the necessary test's for all of your Product's.

This tree was created by using a file manager (Windows Explorer). Example: Create a structure in the standard folder of the icd.control, as follows
[\ icdcontrol \ Standard] Create sub folder: [Products] Create sub folder: [TV] Copy from IEC EN61000-4-6 EN55020 loudspeaker EN55020 input output

5.2. Using the standard test manager

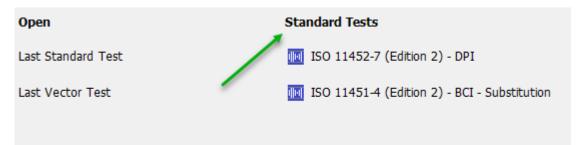
1.) Open it with a click on

File Standards Help	
Standard Test Vector Test Test Result	It General Setup Open Instrument Device Control
Open Standard Test	Selected File Name: ISO 11451-4 (Edition 2) - BCI - Substitution Date: 02.11.2016 23:08:58 Generator: CWS 500N2 (N1) Description Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 4: Bulk current injection (BCI) (Edition 2, 2006-06)
Delete OK	Cancel

Select and double click on a standard or click **OK**.

5.3. Favorite standards

The last 26 standard tests are listed on the desktop for quick selection.



6. Test

The procedure for a standard test application includes the following steps:

Action	Remarks	Window
Standard selection	Loading the standard test from the standard manager.	Standard Manager
DUT Parameter setting	- Test Level - Frequency step - Dwell time	Test
Setup	 Coupling device Port selection Calibration file of the used coupling device Measuring instrument 	Setup
Calibration (if no cal file exist) Check the setup Start the test	- Create a calibration file	Calibration Setup Test

6.1. Test definition window

This window delivers the information about the test procedure. All modifications of the test parameters are selectable in this window.

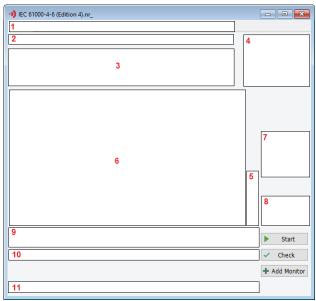


A test can be start when the following conditions are ok.

- The focus of the program shows to the test definition window (click in the window to activate)

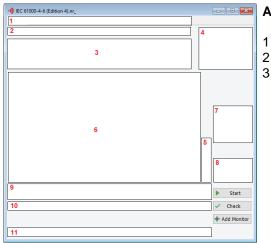
- Field above the setup button is green colored (click to the setup button and adjust the setup)

6.1.1. Areas in the Standard control window



Areas in the standard control window

- 1 Procedure selection
- 2 Applied standard
- 3 Parameter field
- 4 Modulation control
- 5 Control box for breakpoints, amplifier and instrument switch
- 6 Diagram window
- 7 Level control
- 8 Test time overview
- 9 Coupling device
- 10 Used coupling device calibration file
- 11 Used measuring instruments



Areas in the standard control window

- Procedure selection
- Applied standard
- Parameter field

1 Procedure selection

Enables the customer to switch between the procedures Test and Calibration. If specified in the corresponding standard also Amplifier Saturation Test, Source Impedance and Verify H-Field are displayed.

2 Applied standard

Name of the applied standard with reference to the version and date of the standard. This standard is also displayed in the information line at the bottom of the icd.control window.

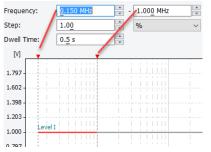
3 Parameter field

Frequency:	0.01 <u>0</u> MHz	· -	400.00 <u>0</u> MHz	*
Step:	2.35	*	%	\sim
Dwell Time:	1. <u>0</u> s	*		

Selectable parameters (input box) For adjust the test parameters to the DUT behavior.

Frequency :

Range of the selected standard. The default value equals to the frequency range specified in the actual standard. For development and analysis purposes the range can manually be limited.



The limited active range which will be tested is indicated by red markers above the diagram.

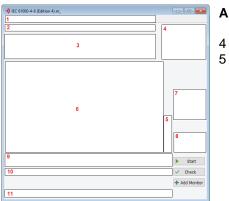
➔ The limitation may easily be changed by clicking moving the red marker.

Step :

Frequency step between two frequencies. A change of this parameter will change all vectors related to this standard which are not customized vectors.

- %:
- Step in percent based on the previous applied frequency. Fix frequency step between each frequency.
- MHz / kHz : Fix frequency step between each frequency.
 points/decade : Points per decade. Number of frequency steps per decade.

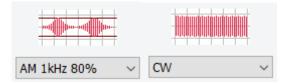
Dwell Time : Application time of the interference signal to the coupling device.



Areas in the standard control window

- 4 Modulation control
 - Control box for breakpoints, amplifier switch

4 Modulation control



Some standards recommend different modulation modes for the test. A list box allows to select from all necessary modulation modes.

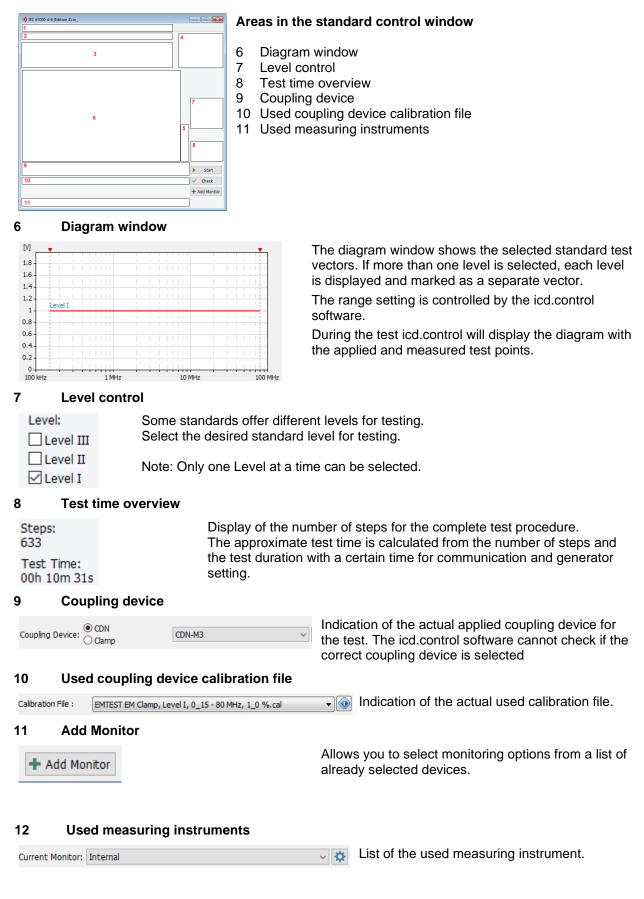
AM1kHz80% : Amplitude Modulation 1kHz 80% CW : Continuous Wave

The modulation control changes only the active vectors! (See vectorlist)

5 Control box for break points, amplifier and instrument switch

A breakpoint will interrupt the actual test procedure for modify the test setup or test equipment. For generate a breakpoint the user has to click to one of the triangle buttons left side of the diagram window. icd.control offers different kind of breakpoints with the following meaning.

Picture	Color	Breakpoint	Remark	
	yellow blue green	create breakpoint	blue: yellow: green:	 Instrument switch Amplifier switch for change amplifier User defined during the test or Coupling device for calibration and test
	yellow	Amplifier switch	Change a	utomatically between two connected amplifiers
	green	Universal Breakpoint	A user defined breakpoint who breaks a test. If the option "Calibrated setup change" is active the program makes a break during a calibration procedure for change coupling devices.	
}	blue	Instrument switch		It for changing one of the measuring instruments in her the calibration or test.
	olive	Standard defined	•	it is defined in the standard procedure for modify etup. User can't create or delete this type of t.
Y	red	Frequency sweep limiters	Markers fo	or limiting the test frequency range.



6.1.1. Other functions in the Standard control window

With the menu **Setup Standard** the user can modify standard related settings. There are different settings available.

itandard Setup			
Title:	Test Calibration		
RTCA/DO-160G - Section 20 - Category O	Tolerance: -2.0 %	5. <u>0</u> %	•
Description: Radio Frequency Susceptibility (Radiated and Conducted)	Level Change each Testpoint:	-13. <u>0</u> dB	*
(2010-12)	Max Regulation Step:	26. <u>0</u> dB	×
	Regulation Step Delay:	<u>0</u> .0 s	*
	Power max Limit : Pcal +	6. <u>0</u> dBm	×
Message at Test Start:	Settings		
	Additional Level Offset:	0 dB	A.
	Check Level Consistency:	3 dB	A.
ОК	Cancel	De	fault

Standard related settings:

Level Change at each Testpoint

Before changing to the next frequency, icd.control reduces the power of the applied signal. After the measurement icd.control calculates the next values to apply the signal in a tolerance of +10% -1%.

Max Regulation Step

Max output change during regulation.

Regulation Step Delay

Pause between each regulation step.

Power max limit

icd.control will limit the maximum power at the value $P_{calibration}$ + setted value [dB]

Fix current limitation

Max. allowed rf current. Limitation at this level.

Additional Level Offset

Adds an additional offset to the configured test level. The resulting test level will be calculated as follows: Vector level + additional offset.

Fast Test Run Mode (IEC61000-4-6 Ed. 3 only) Improves the run mode to achieve the shortest possible test time.

Default

Reset of the values to the default standard settings.

6.1.2. Breakpoint

A breakpoint will interrupt the actual test procedure for modify/change the test setup or test equipment. icd.control offers different kind of breakpoints with the following meaning.

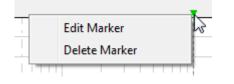
Picture	Color	Breakpoint	Remark
	yellow	Amplifier switch	Change automatically between two connected amplifiers
	green	Universal Breakpoint	A user defined breakpoint which breaks a test. If the option "Calibrated setup change" is active the program makes a break during a calibration procedure for change coupling devices.
	blue	Instrument switch	Breakpoint for changing one of the measuring instruments in use for either the calibration or test.
#	olive	Standard defined	Breakpoint is defined in the standard procedure for modify the test setup. User can't create or delete this type of breakpoint.

Create a breakpoint

For create a breakpoint click into one of the triangle buttons left side of the diagram window. A window appears for enter the frequency and other parameters.

A	yellow: blue:	 Amplifier switch for change amplifier Instrument switch
B	green:	 User defined during the test or Coupling device for calibration and test

Edit or delete a breakpoint



Select Edit Breakpoint with a click on the right mouse button to the triangle in the graphic window. The edit field appears, and the user can modify or delete the breakpoint.

Note: With a left mouse click you will move the breakpoint frequency. Therefore, it is necessary to click with the right mouse.

6.1.2.1. User defined breakpoint

The user defined breakpoint breaks the test at the selected frequency.

M 🕌	•		
1.797	Breakpoint		×
1.602	Frequency:	10.00 <u>0</u> MHz	
1.398	Comment:		
1.203			
1.000 Level I			
0.797	Calibrated Setup	Change	
0.602	Keep Output Sigr	nal On	· + + +-+-
0.398	ОК	Cancel	
0.203			
0.000 100 kHz	1 MHz	10 MHz	100 MHz

A window appears on the screen with the entered message.

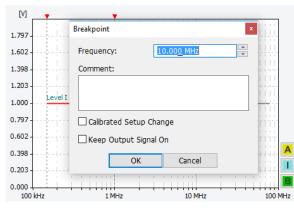
Click into **OK** button to **continue** the test.

User defined breakpoint

6.1.2.2. Setup Change breakpoint

The user defined setup change breakpoint breaks during the calibration and test at the selected frequency. The user can change the setup (i.e. coupling device) at this break. To create a setup change breakpoint:

- 1. Create a user defined breakpoint.
- 2. Click the field "Break for setup change".
- 3. Enter your comment into the comment field.



A window appears on the screen with the entered message.

Click into OK button for continue the test.

User defined setup change breakpoint

Note:

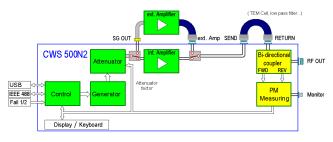
To recognize the two coupling devices in report, the user has to create a new coupling device file where both coupling devices are described. This new coupling device must be selected in the test setup.

6.1.2.3. Breakpoint for amplifier switch

A breakpoint for amplifier switch will change the used amplifier.

Amp 1 = internal built in amplifier Amp 2 = external amplifier

icd.control will change the amplifier and continues with testing with no break.



With the external amplifier the user expands the frequency- or power range of the generator.

The Amplifier switch change the RF signal between the internal and external Amplifier.

It is important, that the calibration happens with the correct amplifier.

•) ISO 11451-4 (Edition 3) - BCI - C	Closed loop.nr_		_	· 🗆 🗙		es higher or equal the
Gave Save	😫 Settings	🔣 Export	🖶 Print				quency, icd.control will switch to
Test Calibra	tion					the selected a	amplifier.
Standard: Frequency:	ISO 11451-4 (Ed			Use Limiter			
Dwell Time:	2. <u>0</u> s	×		АМ	1kHz 80% ~		amplifier is marked with he bottom of the window.
[mA]	External Amplifier	r		×		F	
70 60	Frequency:	10.000 N	1Hz		Level:		
50	Switch Device:	SW 4070			Level IV	The user can	also use the SW 4070 switch
30	Switch Amplifier	r to: Band B	```		Level II	and use exte	rnal amplifiers with switching
20	Show Amplifi	ier Change Info				Turiotion.	
	(OK Ca	incel		Steps: 103	External Amplifier	×
10	10 MHz		100 MHz	1 GHz	Test Time: 00h 04m 36s	Frequency:	10.000 MHz
Coupling Device:	Teseq Current P	robe CIP 9136		~ 0	Start	Switch Device:	SW 4070 ~
Calibration File:	Simulation Tesed	q Current Probe	CIP 9136, 60 m	A, 1 - 4(🗸 🔒	✓ Check	Switch Amplifier to:	SW 4070 IFI SCDX Series
Current Monitor:	Internal			~ 🌣	+ Add Monitor	Show Amplifier Ch	IFI SMX Series Trial IFI SMX Series
Forward Power:	Internal			~ 🌣]		
Reverse Power:	Internal			~ 🌣]	OK	Cancel

In order to make a change in setup, such as Band change of amplifiers, user can access the filers C:\ProgramData\Ametek CTS\icd.control\Instrument and make necessary changes.

6.1.2.4. Instrument breakpoint: "Directional Coupler"

In case of changing the amplifier during the testing, it is convenient to change the measurement instrument for the forward and reverse power by adding and instrument switch and choosing a directional coupler. The losses for the forward path can be chosen. The software will change the power meter reading for forward and reverse power to channel 2 and channel 3, respectively. In case a current loop is used e.g., in IEC 61000-4-39 LF standard, the forward power will be measured

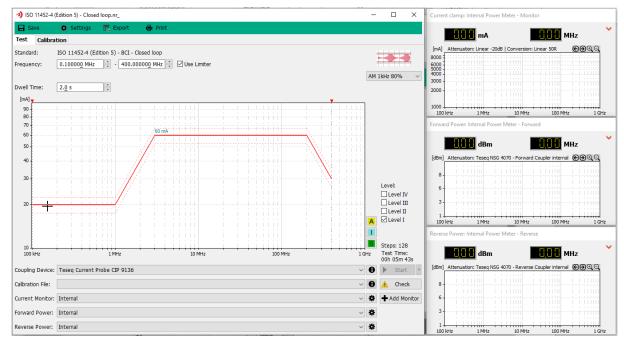
In case a current loop is used e.g., in IEC 61000-4-39 LF standard, the forward power will be measured using channel 3.

6.1.2.5. Standard defined breakpoint

Standard defined breakpoints are generated direct from the icd.control software. It is not possible to eliminate the breakpoint.

The test will stop at the breakpoint frequency for modify the test setup according to the standard. Click **OK** to continue the test.

6.2. Test setup configuration



Coupling Device:

Coupling Device:	FCC Probe F-120-6A	×
	FCC Probe F-120-6A FCC Probe F-120-9A	
	FCC Probe F-130A-1	
Current Monitor:	FCC Probe F-140A Teseg Current Probe CIP 9136	
		-

Frequency range check status



Selection of the coupling device

The properties of a coupling device is defined in a file with the extension

- *.1xx : CDN
- *.2xx : CLAMP, Stripline

*.3xx : Coupling devices (CWS 500N3)

*.4xx : Coupling devices (CWS 500N4, NSG 4060)

You can edit this files with a standard file editor.

This indicator here shows if the frequency ranges of the test match with the calibration file and the used coupling device.

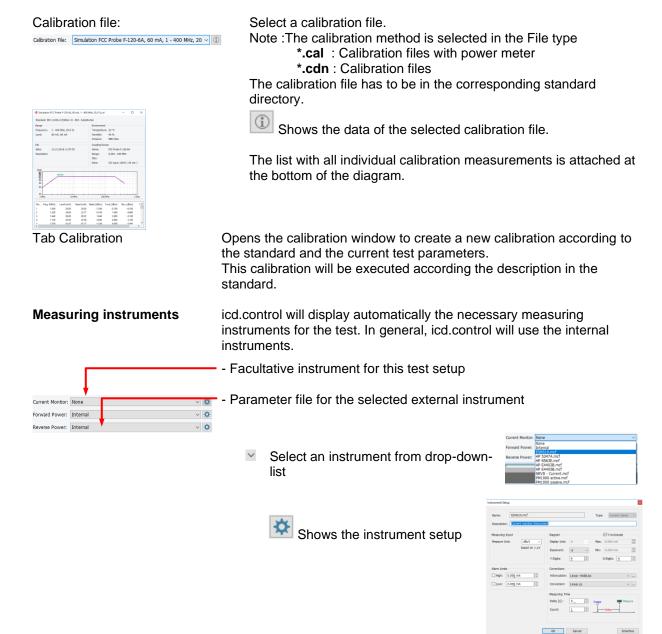
Calibration file and coupling device matches with the test.

You cannot start any test because of a frequency mismatching.

A click on this indicator Shows the range check diagram with frequencies of :

Test file

Calibration file Coupling device



6.2.1. Current clamp selection

For using a current clamp, icd.control must be adjusted to the transfer characteristic of the installed current clamp. icd.control offers a wide range of different probe characteristics. Most transfer impedances in the software are typical curves of used probes. To adjust please refer to the original calibration data and match the curve to the used current probe.

st Result General	Setup			Measuring Instru							
••) IEC 61000-4-6 (_	Name:	Internal Power Meter	- Monitor.mcf] Type	: Curr	ent clamp	
_	🔅 Settings	🔜 Export 🛛 🖶 Pr	int	Description:	Voltage monitor						_
Test Calibrati	on		_	beschption							
Standard: I	EC 61000-4-6 (E	dition 3)		Measuring In	put	Diagram			Y-Aut	oscale	
Frequency:	0.15000 <u>0</u> MHz	- 80.00000 <u>0</u> MHz	≑ ⊠ι	Monitor Ir	put (ch1)[dBm]	Display Unit:	V	Max:	0 V		*
Step:	1.0 <u>0</u>	× %	\sim		ower (forw) [dBm]						*
					ower (ch5) [dBm]	Exponent:	<u>0</u>	🗘 Min:	0 V		¥
M				O Analog In	put [V]	Y-Digits:	<u>4</u>		X-Digits:	4	*
1.06											
1.05				Alarm Levels		Corrections					
1.04				High: O	.000 V	Attenuation:	none			~	
1.03 -				Low:	.000 V						
1.02											
1.01 - Leve	el I					Measuring Tim	ne				
0.99			1			Delay [s] :	<u>0</u>	Trigger		Measure	e
0.98 -						Count:	1	i j	—Delav —	Ī	
0.97			·			count:	1		Delay		→
0.96 100 kHz	+ + +										
		1 MHz									
	CDN Clamp	CDN-T4				ОК	Cancel				
	Ciamp										

For selecting the used current probe proceed the following steps.

1. Select the used measuring instrument

- use internal
 external instrument according the table
- 2. Click to the **button** $\overline{\mathbb{M}}$ for open the instrument setting window
- 3. Click to the Button if for open the drop-down-list and select the transfer impedance file for the used current probe.
- 4. Press the button OK for close the window

6.2.1. Setup as per IEC 61000-4-6 for CDN and clamps

For the setup for testing according IEC 61000-4-6 and other standards with relation to this basic standard, the user has to select the right coupling device.

🔒 Save	🗱 Settings	E CDN-AF10
Test Calib	ration	CDN-AF12 CDN-AF15
Standard: Frequency: Step:	IEC 61000-4-6 0.15000 <u>0</u> MH 1.0 <u>0</u>	CDN-AF2 (Edition 3 CDN-AF25 CDN-AF3
[M]	•	CDN-AF8 CDN-CAN CDN-M1
1.06		CDN-M2
1.05	, , , , , , , , , , , , , , , , , , ,	CDN-M3
1.04		CDN-M5
1.03		CDN-S1 CDN-S15
1.02		CDN-S2
1.01		CDN-S25 CDN-S37
1.00	Level I	CDN-S4
0.99		CDN-S50 CDN-S8
0.98		CDN-S9
0.98		CDN-S-HDMI CDN-S-USB CDN-T2
0.96		CDN-T2
100 kHz	CDN	CDN-T8 None
Coupling Devic		CDN-T4

Coupling Device:	○ CDN ● Clamp 30	0 Ohm	EM TEST EM 101 V
Calibration File:	Simulation EM	I TEST EM	EM TEST EM 101 FCC Probe F-120-6A FCC Probe F-120-9A
Current Monitor:	PM1000 activ	e.mcf	FCC Probe F-130A-1 FCC Probe F-140A
			ISO_TS 7637-4 Test pulse B coupling Teseq Current Probe CIP 9136
			Teseq Current Probe CIP 9138 Teseq DTEM
			Teseq KEMZ 801 Test Jan282020.101

Coupling in to

Select the button for coupling device

- Clamp: Clamp or BCI
- **CDN**: Coupling decoupling network

Select the coupling network out of the offered list.

6.3. Calibration Window

•) IEC 61000-4	4-6 (Edition 3).nr_	N		- 🗆 X
B Save	🛱 Settings	ार स्ट्रि Export 🚽 Print		
Test Calib	ration			
Standard:	IEC 61000-4-6 (Edition 3)		
Frequency:	0.15000 <u>0</u> MHz	- 80.00000 <u>0</u> MHz	Use Limiter	
Step:	1.00	<u>^</u> % ∨		
M				
1.06				
1.05	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
1.03				
1.02				Level:
1.01	Level I			Level II
1.00 0.99				Level I
0.98				
0.97		· · · · · · · · · · · · · · · · · · ·		
0.96 100 kHz		1 MHz	10 MHz	100 MHz Test Time:
Courtine Deview	CDN	CDN MD		00h 10m 31s
Coupling Device	e: 🔿 Clamp	CDN-M3		V 🕒 Start
				✓ Check
Current Monito	r: Internal			✓ ※
			rds a test may be starten ng any parameter.	ed without
Parameter	r fields	The parameters a or in the coupling	re defined in the test wi device file	indow
				Standard: IEC 61000-4-6 (Edition 3)
		Calibration freque	ncy range and frequend	
		Coupling device		Couping Device: CDN CDN-AF10 V
		Calibration instrun	nents	Current Montor: İnternal 🗸 🗸
Frequency check stat			e shows if the frequency I the used coupling dev	y ranges of the test match with the ice.
		:The coupling	device matches the cal	libration frequency and level.
 Check 	ck	🔺 :You can not s	start the calibration beca	ause of a frequency mismatching.
		A click on this indi diagram with frequ Calibration Coupling o	n file	Check Frequency Range Report
		1 0		Calibration File Frequency Range: 0.15 - 80 MHz, 1.0 % Couping Device Frequency Range: 0.15 - 80 MHz Settings correct! Test is ready to start.
				ОК

Window during a test 6.4.

•) New Document 2	 7
2	
3	8
	8
4	
5	
	 9
6	
1	

Areas in the test window

- 1 Control buttons
- 2 Test point window
- 3 Power window
- EUT impedance window (only if recommended) 4
- 5 Calibration file information
- 6 Test parameter/status information
- 7 Instrument 1 : Forward power *
- 8 Instrument 2 : Reverse power *
- 9 Instrument 3 : Current clamp *

* The number of instruments depends on the test setup

Measuring values

The actual measured values are marked during the test. The test frequency and measured values are displayed on the right side above the window.

The same happens by clicking the mouse in the window.

Measuring point with related data

Edit measuring parameter window

During a test it is possible to change the parameters of the measuring instrument. After closing this window, icd.control will continue with the changed parameters

- 1. Double-click with the mouse in the scale area of a measuring instrument or click on settings icon
- 2. Change the desired parameters in the edit window.
- 3. Close the window with OK or Cancel

Pause or Fail event

During Stop, Break or Event a window appears to insert a comment and the control panel can be used as an analysis tool.



Stop ward 🙆 Store

Test Event

The window appears after stop or fail displays the following parameters, who are automatically added in the report.

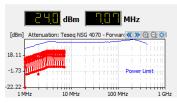
- 1. Enter your description to the event in the box. There are 10 indexes who allows to reload the last comments in the comment box.
- 2. Close the window with Continue, Next or Stop

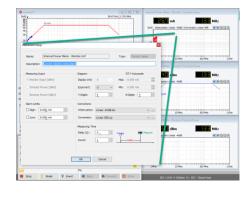
Automatic registered parameters: Level, Frequency, Dwell time



Operation Manual

Forward Power: Internal Power Meter - Forward





6.4.1. Control the analysis panel

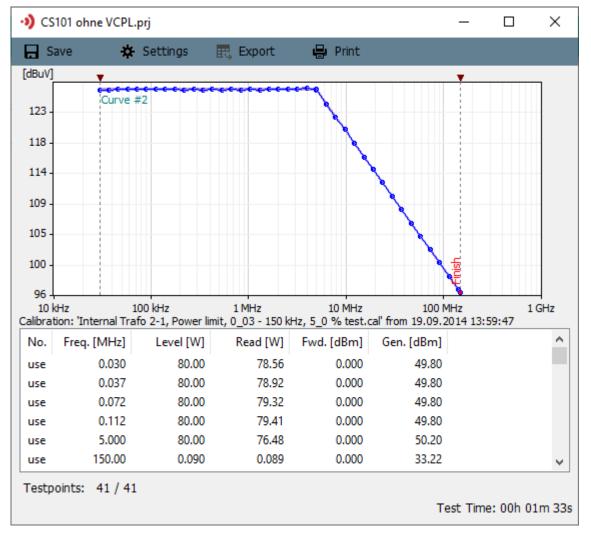
Testpoint Combobox	
Testpoint: 40: 2.165 MHz v	Jumps as a single step to the next or prior test point as defined in the testfile. The step is defined in the setup screen of the test. The next step uses the calibration data for the specific test point. The test parameters ar synchronized with the regular test.
Change Frequency Frequency: 2.000000 MHz	Increase or decrease the test frequency for detailed frequency analysis near the test frequency.
	The step frequency is defined by the underlined number in the frequency step. In this example the console frequency step is 100kHz.
	Change frequency by mouse 1. Click in the frequency display and keep the mouse. 2. Move the pressed mouse up or down on the screen.
Add to Report	The Store value button sets a Marker in the Report. If you manually change test points, through the test, a step to the next point is automatically done when closing the Report box with OK. This means the test will continue again at the point it was interrupted.
Change Output Level Level: 40.5 dBm	Increase or decrease the test power. Same behavior as the frequency control.
Level: 40.5 dBm	
Level: 40.5 dBm	control.
Level: 40.5 dBm	control.
Level: 40.5 dBm	control. Preselected settings applied by the most standards. Selecting "custom" opens a window to set individual modulations. Shape: CW, AM, PM Frequency: 1Hz3000Hz step 1 Hz
Level: 40.5 dBm	control. Preselected settings applied by the most standards. Selecting "custom" opens a window to set individual modulations. Shape: CW, AM, PM Frequency: 1Hz3000Hz step 1 Hz Modulation depth: 1%99% Remark : These settings are not factory calibrated. The accuracy of

7. Report Window

To open a report file (*.prj) press one of the following buttons:

Last Test Result		Change to the report window and open - the last test result or - the last edited and saved report.
Test Result		Open a file explorer to select a saved test result.
•) icd.control File Help New >		Open the calibration report.
Open >	Calibration Data Coupling Device	
Report Setup		
Exit Alt+F4	Instrument Log	
Open	Attenuation	
Open	Conversion	

7.1. Report Menu



7.2. Report export as RTF file

*	Secongs
E	Export

Click on **Settings** to change settings on the report and format.

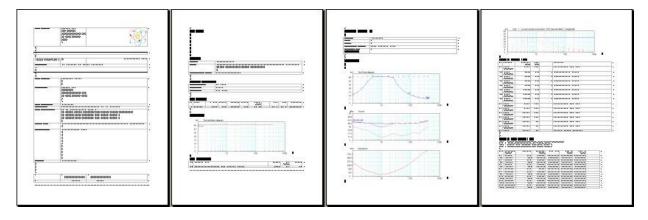
Press the button **Export** for export the report as a rtf file. icd.control will start a word processor program. In this program the user can complete the report.

🚽 Print

Click on **Print** to view the report or print it.

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icd.control



7.2.1. Sources of the report data

The report is composed from data of different origin. For modify the report data the user can - edit in the RTF file report. - change at the source of the data in the correspond window or file.

Item	Where to modify	
Test Center Logo	Standard report description	Test house
Test report No		
Standard	Standard manager (selected t	test)
Test object Customer	Standard report description	Customer / EUT
Test engineer Recorded	Standard report description Computer date / time	Test house
Description Result	Standard report description	Result
Test plan		
Testfile		
Name Path		
Modification date		
Climatic condition		
Temperature PathHumidity Pressure	Standard report description	Test house
Test values		
Test summary		
Coupling device		
Model	Origin in : Config coupling dev	vice
Sno Note	Data from calibration file (crea	ated during the calibration)
Frequency range		
Coupling port	Setup screen	
Diagrama		
Diagrams Test Point diagram	Created during a test from icd	control program
Power	Greated during a test north to	
Impedance		
Instr 1		

Table of events		
Breaks	Created during a test . Input at break or tested	
End of test		

Table of Test points

Instrument	Used instrument (Description in instrument configuration
List	Measured values

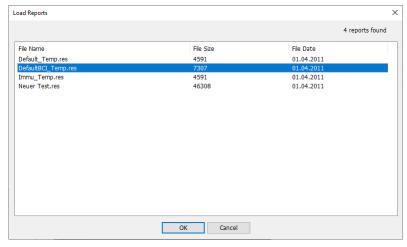
7.2.2. Import report from NSG 4070 and NSG 4060

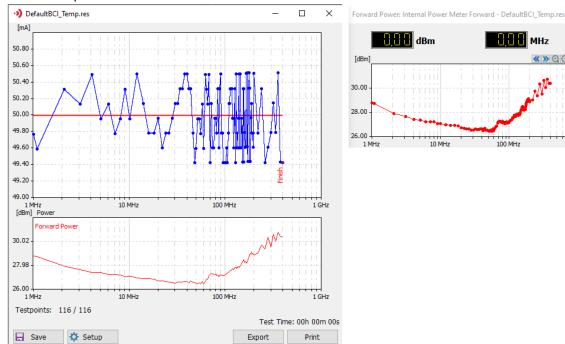
The icd control software allows the user to import test files stored in the NSG 4070 / 4060 generators and view them in the icd control software.

In order to import the report, click on the Device Transfer button and then select the option of Read **Generator Reports**

 icd.control 		– 🗆 ×
ile Standards Help		
🚊 늘 🗇	G 🕺 🔛 🗈 🖡	
Standard Test Vector Test Test Result	Last Test Result General Setup Open Instrument Device Control Device Tr	Read Generator Reports
		Read Directional Coupler Coupling Factor
IEC 61000-4-6 (Edition 3)		< Simulation >
Open	Standard Tests	
1-2	100 TEC (1000 4 01 (Edition 1)	

Then select the file you would like to view and import in icd control.





Then the report is shown as follows:

It can then be saved, exported or printed as required.

≪≫⊙⊙☆

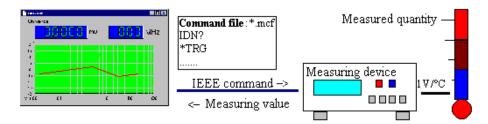
1 GH:

8. Introduction Additional Monitoring

Additional monitors are used to register the measuring values.

The source of measuring values is any measuring equipment that has an IEEE or RS232 interface available.

The measuring equipment can communicate with icd.control, i.e. icd.control can be informed in case a measured value exceeds the preset limit. The icd.control can react on it.



The additional monitor panel communicates through the IEEE interface with the measuring equipment. The IEEE communication commands for the measuring equipment are explained in a command file. That makes the data logger independent from a specific measuring equipment. The user must know the art of communication commands. For this purpose, please consult the manual from the manufacturer.

The actual measuring values can be shown in a display. The characteristic of a measuring signal throughout time or frequency will be shown on a diagram. The measuring values will be saved in a file and are ready for further adaptation. The timing for data collection of the measurement will be prepared by the software. These and other parameters must be configured. For this purpose the configuration dialogue is available.

The additional monitor can send commands to icd.control and vice versa. That allows a flexible test setup. Innumerable application possibilities arise without a firm bond on one prescribed test set-up. Please note, that each measuring equipment needs its own IEEE-address.

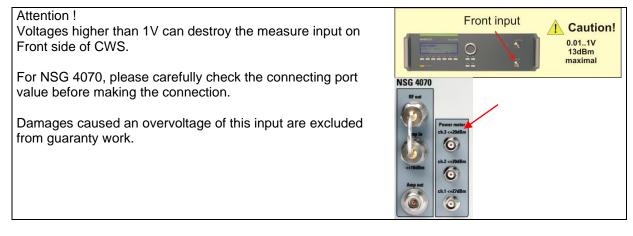
8.1. Measuring instrument

8.1.1. Internal PM current monitor

Depending of the model and option the following internal instruments are available:

- Monitor input \rightarrow all other applications
- Forward power \rightarrow bi directional coupler
- Reverse Power \rightarrow bi directional coupler

With the internal RF meter, it is possible to perform a current clamp test with BCI applications or where it is necessary to measure the current.



8.1.2. External instrument

The measuring instrument must have an interface. A measuring instrument is such instrument that can send back a value on request (Trigger).

8.2. Configuration of a measuring instrument

The simplest way to define a new instrument is to copy an existing instrument definition file. By changing the IEEE and diagram parameters it is simple to create a new measuring equipment. This can be done in the Interface Setup dialog. The default value is 10s and will be set automatically after creating.

Retrieving USB interface parameters:

Systemeigenschaften ? 🛛	🖴 Geräte-Manager 📃 🗖 🔀	Eigenschaften von USB Test and Measurement Device 🛛 ? 🗙
Systemwiederherstellung Automatische Updates Remote Allgemein Computername Hardware Enweitert Geräte-Manager Der Geräte-Manager listet alle auf dem Computer installierten Hardwaregeräte auf. Verwenden Sie den Geräte-Manager, um die Eigenschaften eines Geräts zu ändern. Geräte-Manager Tieber Durch die Treibersignierung kann sichergestellt werden, dass installierte Treiber mit Windows kompabled sind Über Windows update körnen Sie festlegen, wie Treiber über diese Website aktualisiert werden sollen. Treibersignierung Windows Update Hardwareprofile Image: Über Hardwareprofile können Sie verschiedene Hardware- konfigurationen einrichten und speichern. Mardwareprofile Mardwareprofile Image: Mardwareprofile	Datei Aktion Ansicht ? Image: State of the state of	Allgemein Treiber Details Comparison USB Test and Measurement Device Geräteinstanzkennung Image: Comparison USB\VID_0957&PID_0407\MY44021152 Image: Comparison USB\VID_0957&PID_0407\MY44021152 Image: Comparison DK Abbrechen

To create a new instrument, proceed according the following steps:

A: Copy an existing instrument

Generator Internal

Select the check box for internal or external instrument. To make a instrument definition for internal measuring instrument this filter must be enabled. All external instruments are disabled. icd.control supports the current clamp measuring instrument.

- 4.) a) Double click into the Instrument field
 - **b)** Enter the parameters for Measurement filter, Description, Vertical settings, Trigger and Pass / Fail threshold
 - c) Configure the instrument commands and Interface setup
 - d) Press Save As button for save the create a new instrument name.

Name: Aglent 34970A - Current Description: Aglent 34970A DAQ Syst		Current A	c	Туре	Gen	eral	v
Reasuring Input Neasure Unit: A v	Diagram Display Unit:	A	~	Marc	Y-Aut		
Headone sinc. A V	Exponent: Y-Digits:	0	v v		0.000 / X-Digits:		10
Narm Limits High: 0.000 A	Corrections Attenuation:	none					v
Eart Measure Before Dwell Time (No Nodulation) With Dwell Time (Nodulated) After Dwell Time (Nodulated) After Pause Time (Output Off)	Measuring Tim Dalay [s] : Count:	0.5	x x		- Delay -	T	Seasure

B: Create a new instrument

- Click open Instrument and then "New" button

Open Instrument		
Filter: General 🗸		26 instruments
File Name	Instrument Description	
Nill Aglent 34411A - Current AC.mcf	Multimeter HP 34411A Voltage DC	
Nim Aglent 34411A - Voltage AC.mcf	Multimeter HP 34411A Voltage DC	
Him Agient 34970A - Current AC.mcf	Aglent 34970A DAQ System Measument Current AC	
Nim Aglent 34970A - Current DC.mcf	Aglent 34970A DAQ System Measument Current DC	
Nim Aglent 34970A - Resistance.mcf	Aglent 34970A DAQ System Measument Resistance	
Nill Aglent 34970A - Temperature.mcf	Aglent 34970A DAO System Measument Temperature	
IIII Aglent 34970A - Voltage AC.mcf	Aglent 34970A DAO System Measument Volt AC	
Hill Aglent 34970A - Voltage DC.mcf	Aglent 34970A DAQ System Measument Volt DC	
Nill Aglent MSO 6054A.mcf	Mixed Signal Oscilloscop	
IIII Aglent MSO-X 3054A.mcf	Mixed Signal Oscilloscop	
IN External Interface.mcf	External monitoring Software	
NIT Fluke 187.mcf	Hand-held Multimeter	
Fille 8846A.mcf	Nultimeter Voltage DC	
NIII HP 34401A - Voltage AC.mcf	Multimeter HP 34401A Voltage DC	
NIII HP 34401A - Voltage DC.mcf	Multimeter HP 34401A Voltage DC	
IIII Keithley 2000 - Frequency.mcf	Kethley 2000 Multimeter	
IIII Keithley 2000 - Voltage AC.mcf	Kethley 2000 Multimeter	
Nill Kethley 2000 - Voltage DC.mcf	Kethley 2000 Multimeter	

- Enter the interface parameters
- Enter the control commands for control the new instrument.
- With Send and Receive button , the command executes immediately. This is useful for test the commands.
- Press **OK** button for close the window of the new instrument.

	g inversion over	angs			-	
-	Instrument Interf	ace Setup		×	-	
Name	Interface				Type:	General \checkmark
Desc	Address:	1			_	
Meas	Start				6	Y-Autoscale
Meas	Identification:	*idn?) × <	Maxe	1 V 🔹
	Initialization:			^ >	Min:	0 V 0
				~ <	×	-Digits: 4
Alarm	Measuring					
Пн	Prepare:			^		×
				~		
Start	Frequency:			0		
ОВ	Measure:			^ >	Tripper	Measure
Ow				~ <	Ϋ́	Delay
• A1	Separator:	<none> ~</none>	Position:	0	-	- veay
OAt						
		ОК	Cancel			Interface
E S	ne		UN	Cancer		Incenace

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8.2.1. Instrument Timeout

For match the icd.control instrument timeout to long dwell time, it can be necessary to adjust the timeout duration. This can be done in the Interface Setup dialog. The default value is 10s and will be set automatically after create.

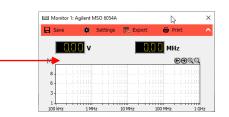
Measuring Instrument Settings Instrument Interface Setup Agile Interface Name: Description: Mixe USB0::0x0957::0x1744 ... Address: Measuring Input Start * Measure Unit: Identification: *idn' Interface Setup: Instrument *RST :AUT :CHA Initialization: RS 232 / USB GPIB Ethernet USB Port: COM3 Parity: none Alarm Levels Measuring High: 0.000 \ Prepare: :MEA Baud: 9600 ~ Data Size: 8 1 Stop Bits: Low: 0.000 \ Frequency: Communication Start Measure Measure: :MEA Cycle Wait: 100 ms End of String: LF O Before Dwell Tir With Dwell Time Timeout: 1000<u>0</u> ms O After Dwell Time Separator: <no O After Pause Tim All Search OK Cancel Interface

8.3. Configuration Dialogue

Click the Open Instrument in the Tool button

or

double click in the center of the *Instrument* during the test.



Open Instrument

Dialogue window for measuring instrument parameter.

The possibilities of entering elements remind to a cathode-ray oscilloscope (CRO) with vertical and horizontal deflection.

Min: 0.000 V V Min: 0.000 V
→ Max: 0.000 V → → Min: 0.000 V →
→ Min: 0.000 V
✓ Min: 0.000 V
X-Digits: 4
×
Trigger IIII Measure
Delay-

While working with icd.control the horizontal deflection and the frequency of icd.control have to be synchronized.

8.3.1. Buttons

OK	The settings will be applied for only this test, but are not saved for later
	measurements.
Save As	The settings will be stored and used for later measurements
Cancel	Cancel all changes
Interface	Definition of the IEEE commands

8.3.2. Type of measurement (Create an instrument)

Your measuring instrument has to be informed about what kind of measuring task (Measuring type) you assign it to. The icd.control reacts differently according to the task. There are seven measuring types to choose from.

Type: General General Current clamp Forward Power Reverse Power Field Probe Voltage fs Max: 0.0 Current fs

8.3.2.1. General measuring instrument

The measuring instrument records the values in a file and put them into a diagram. According to the alarm settings, the measuring instrument can send an eventmessage to icd.control. For this reason, it reacts according to **EVENTS** set-up.

See icd.control, Configuration, Reaction EVENTS

8.3.2.2. Current clamp measuring instrument

The measuring instrument is used for control of flowing current in the EUT. This set-up is chosen while working with a current clamp example closed loop controlled. When the icd.control realizes that the current exceeds I > Imax = $Uo/150\Omega$, Uo will be reduced to I <= Imax. The alarm - functions are disabled in this mode. Instead of that you must state U/I-factor.

8.3.2.3. Forward Power / Reverse Power

Measuring the forward or reverse power of a bi-directional coupler. The internal instrument gets the result from the built-in bi-directional coupler of the generator.

8.3.2.4. Calibration measuring instrument (icd.control Calibration High Resolution)

Must be set-up when doing the calibration with the monitor input or an external measuring instrument

8.3.2.5. Field Probe

This instrument is using a linear field probe with a fiber optic RS 232 modem. The software supports a frequency linearization file for the probe.

8.3.3. Description

Description of configuration file (*.mcf).

Information about the measuring instrument and its set-up which will be sent via the interface. The text is displayed as instrument description when you select an instrument from the library.

|--|

8.3.4. Trigger

Delay

After a successful triggering through the icd.control, there is a preset time before the first measurement is released. In this case the length of the rest time must be long enough for icd.control! This delay allows you to wait until the transient phase of the sample is elapsed. Then the icd.control waits until all measuring instruments signalize the end of the measuring. Then no measuring errors can occur during the interval-phase.

8.3.5. Alarm

By exceeding the High- resp. Low level the icd.control can be alarmed. This happens by sending a Fail3-message to the icd.control.

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icd.control	
100.001100	

Alarm Limits			
High:	0.00 <u>0</u> V		
Low:	0.00 <u>0</u> V		

High [Hi]

Maximum allowed level. Fail3 will be released when level is exceeded.

Low [Lo]

Minimum allowed level. Fail3 will be released when signal goes below.

8.3.6. Current Probe Transformer Impedance for current probe

The icd.control anticipates that the measuring value represents a current. As a rule, the current is intercepted with a current-probe delivering a certain voltage as the measured value. With the help of the transfer impedance the data logger can convert the voltage into a current and compensate the frequency dependence of the clamp.

For IEC measurement with a current limit icd.control matches the measuring value I_{ist} with the maximum allowed current, that results from the formula

 $I_{max} = U_0 / 150\Omega$ $I_{ist} >= I_{max}$? -> U_0 reduced = U_0 * I_{max} / I_{ist}

8.3.7. Current Probe Transfer Impedance

The Current (transformer) clamp transfer impedance file contains the factor across the frequency band to convert the voltage into current.

Refer to the manual of your clamp manufacturer to get the list of the factors, or read them out of the transfer curve diagram.

The factor can be entered in Ohm or dBOhm. To enter the list use the TAB or SPACE bar, it expands the values with the unit (Hz, kHz, MHz, Ohm or dBOhm). Between the defined points the icd.control use a log interpolation to get the correct factor for each frequency. Outside of the definition, the nearest factor is taken.

				-
Frequency: MHz	~ Value	c Ohm	~	[Otel]
10.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 20.000 80.000 80.000 80.000 50.000	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000			2000

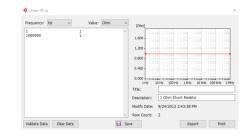
CWS 500C/N1 user

If you use a CWS 500C/N1 with internal PM current monitor, icd.control make a download of the table with the transfer impedance to the CWS500C/N1 memory. The icd.control software uses always the CWS500C/N1 memory for measurement.

It is possible to up- and download two different current clamp files to storage CP1 or CP2. For testing without icd.control you can use the stored current clamp file. In the window.

8.3.7.1. Download a Current Probe Transfer Impedance to Device (CWS 500C/N1 user)

- 1. Select the *Device Transfer* button and select *Write Current Probe Transfer Impedance*
- Device Write Generator Calibration (0.1..240 MHz) Read Generator Calibration (0.1..240 MHz) Write Current Probe Transfer Impedance Read Current Probe Transfer Impedance
- 2. Select the desired CP file After loading the transfer impedance characteristic file is presented on the desktop.



- 3. Select the CP Store CP1 or CP2 in the CWS
- 4. Press "Write" button
- Note: The CWS 500C/N1 will limit the frequency range of the CP-file to 100kHz... 250kHz (see picture after upload).

N	Vrite File: Linear 50R -20dB.cp				
	• CP1: • CP2: Internal CP:	Name Date/Time of the data set - -			
		d data is converted to generator format! Write Cancel			

8.4. Configuration file of measuring equipment

This dialogue is shown if:

- 1.) the key "Interface" in the configuration dialogue is pressed.
- 2.) by setting up a new measuring instrument with the selection dialogue.

A measuring instrument with an interface has a set of commands. This set of commands helps the measuring instrument to communicate with other instruments.

There are different standard commands in the world of IEEE488. Standard IEEE488.2 and the language SCPI are being mostly used. This is not mandatory in the presented case.

The commands set the measuring instrument in an intended operating mode through the interface IEEE or RS232. It is possible to read information about the status and the measuring values.

The procedure for setting up the communication as a rule is the same for all instruments. In any case there must be **a manual of the particular measuring instrument** available.

The data logger sends first (one way/single action after start) the information from the "Search string" field.

Then (one way/single action after start) the "Initialize string"

And after that the "Trigger string". for each measurement

Instrument Interf	ace Setup	×
Interface		1
Address:	USB0::0x0957::0x1744::MY44003027	
Start		
Identification:	*idn?	> <
Initialization:	*RST ^	>
	:CHAN1:PROBE 10	<
Measuring		_
Prepare:	:MEASURE:SOURCE CHANNEL1	
	~	
Frequency:	^	
	V	
Measure:	:MEASURE:VPP?	>
	~	<
Separator:	<pre><none> v</none></pre> Position: 0	×
	O <u>K</u> <u>C</u> ancel	

1.) Interface setup: (open with button Setup) Set the IEEE-Addresses correctly (supposition for all following steps).

Interface commands

2.) Identification:

Search and identify instrument at this IEEE-Address.

 Initialization: Initializes the instrument. Set channel, measuring range, measuring size, correction i.e. 6dB.

Receiving string

4.) Position

Position of the interested value in the received string. For filter the result out from the string.

Check: Sends the corresponding string to the measuring instrument and displays the feedback string.

The strings can be composed from various symbols, they will be sent string by string.

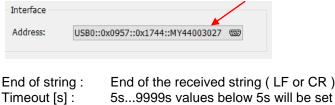
×

8.4.1. Filename configuration file

The configuration file will be saved under the given name. The names will be shown in the measuring instrument selection table.

8.4.2. Interface set-up

Shows the interface configuration in a short form. The set-up key starts the interface configuration dialogue. Here you define the setting of interface to your measuring instrument.



automatically to 5s

Instrument address (1...30)

RS 232 / USB GPIB Etherne	et USB
Card: 🖸 🗸	
Address: 22	
Check STB: 🗹	
Communication	
Cycle Wait: 100 ms	End of String: LF \sim
Timeout: 1000 <u>0</u> ms	
All Search	OK Cancel

Interface Setup: Instrument

RS 232 : Interface, Baud rate Parity, Size, Stop bit

8.4.3. Search String

IEEE Interface :

The instrument on the configured IEEE address should identify itself. Command according to IEEE488: ***idn?**

An instrument receiving this string goes in remote-operation and sends its denotation resp. its designation back.

From now, the instrument is ready to receive further commands via IEEE-interface.

8.4.4. Initialize String

The instrument on the configured IEEE-address should set itself into the transmitted operating mode. Example for command according to SCPI:

volt:ac:range 1 AC-Voltage with 1V-measuring range.

From now on the instrument will run in the 1V-AC measuring range.

For initialize an instrument it is possible to add more than one command in the initialize string. Example: *CLS

*CLS DISP:TEXT:CLE DISP:TEXT 'DC VOLT' VOLT:AC:RANGE:AUTO ON

8.4.5. Prepare String

The instrument on the configured IEEE-address should perform a measurement and prepare it on the interface.

Command according to SCPI: func 'volt:ac';:read?

Invites the measuring instrument to perform a measurement and to write the measuring result on the interface.

8.4.6. Receiving String

Sometime it is necessary to separate the characters with the values from the received return string. icd.control offers a function for filter out the data of interest.



Number of sign Signature	Integer value range [049] for the position of the data
	The separator character Can be any character or one of the offered selection ["," "." ";" ":"] .
Example	Part of interest after : 2 and ;
	Received string : VOLTAGE 123;700;200;235LF
	Data for icd.control : 200 (value after the second separator character

":")

8.4.7. Additional parameter (optional)

The icd.control works in RF-frequency range. For many RF-measuring instruments it is necessary to specify frequency at which the measurement should be done. icd.control offers two kind of commands to send this information to the measuring device:

1. Add frequency information using for power meter

The instrument on the configured IEEE-address should perform a measurement at the transferred frequency spot. The measured value must be corrected with the correction factor at the specified frequency.

Command according to SCPI:

SENS:CORR:FREF %0.2E

Timing of the command

Measuring Time	e			
Delay [s] :	0. <u>1</u>	* *	Trigger	Measure
Count:	<u>1</u>	×	_ <u> </u>	-Delay

2. Prepare used for Scopes and Spectrum analyzers

This command is to set for example the time base of a scope depends on the actual frequency. icd.control offers a Math. compiler where the user can calculate the values, transferred to the instrument.

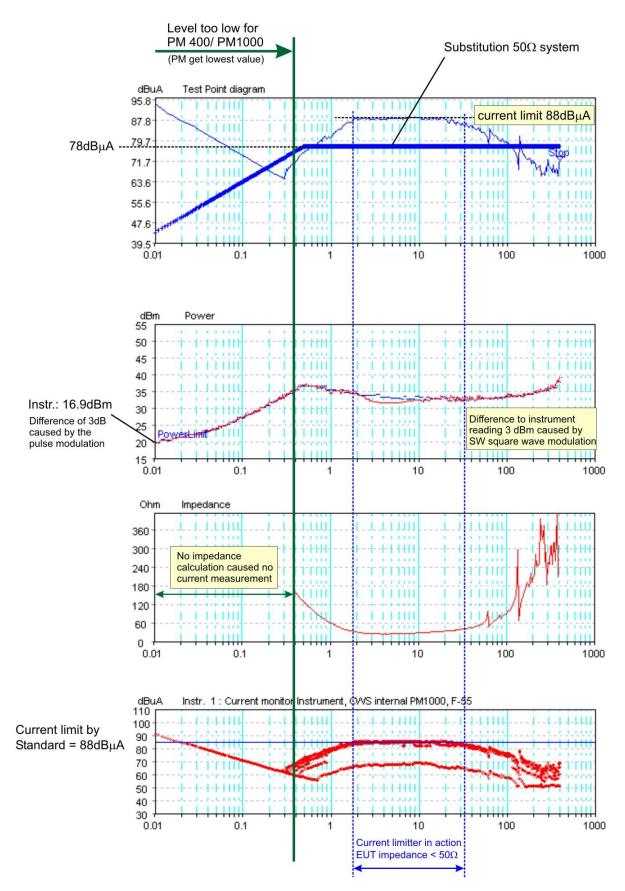
Command	According the instrument language			
Timing of the command	Measuring Time			
	Delay [s] : 0.1 Trigger Measure			
	Count: <u>1</u> <u>Delay</u>			
Separator	# is the separator for the icd.control compiler			
Functions	XPARAM: Applied frequency [Hz]YPARAM: Applied Generator output levelCHANNEL: Instrument channel index			
Mathematical functions	Using {} allows to add the existing mathematical functions ADD or + : Addition SUB or - : Subtraction MUL or * : Multiplication DIV or / : Division P10 : Powers of base 10 L10 : Logarithmic of base 10 () : For prioritizing calculations			
Examples	SENS:FREQ:CENT {XPARAM * 3} SENS:FREQ:SPAN {XPARAM * 5} C1:TRLV {YPARAM*400} TDIV {XPARAM}			
For formatting output value (needs always 2: begin and end) Example: gen:level {XPARAM*10#.1f#}; will be "gen:level 65.5"				
3. Wait command used for wait till the instrument is ready for the next command				
The software offers the following order for wait till the instrument has finished his actual process. Available commands for waiting:				
*OPC?	waits for receiving 1 on the bus			
ICD:COM:WAIT [ms]	waits a time in ms Example : ICD:COM:WAIT 500			

4. Additional commands used to send informations to external devices as displays

- ICD:INIT:STANDARD ICD:PARAM:FRQ ICD:PARAM:LEV ICD:PARAM:MOD ICD:MEAS:LEV ICD:MEAS:FPOW ICD:CAL:LEV ICD:CAL:LEV ICD:CAL:FPOW ICD:CAL:RPOW
- Name of the actual standard Frequency Test Level Modulation Current Clamp Value Forward Power Reverse Power Calibrated Level Calibrated Forward Power Calibrated Reverse Power

Example: "Forward Power: {ICD:MEAS:FPOW*2} dBm"

8.5. Report understanding the graph behavior in a report



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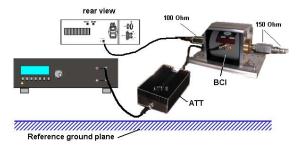
8.6. CWS 500C / CWS 500N1 calibration setup for EM clamp and BCI clamp

This chapter describes the calibration acc. IEC 61000-4-6 using a CWS 500C or a CWS 500N1. There is **no different between the built in power meter** (standard instrument or optional built in power meter PM 402).

Setup

The calibration setup is according the figure on the right side. The calibration setup is a 300Ω system and therefore the calibration jig is terminated with resistors of 150Ω and 100Ω in series with the 50Ω of the PM 402 impedance.

Connect the measuring cable to the **CAL INPUT** on the **rear side** of the CWS 500C or CWS 500N1



icd.control setup

icd.control will make all settings automatically for calibration with clamps (BCI or EM clamp). The figure shows the setting for using the generators CWS 500N1 and CWS 500N2 with different calibration setup for each generator model.

