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Operating-manual

CNV 504N1 CNV 504N2

N-Series

Coupling network for
surge to signal and datalines

CNV 504N1.1, N1.2 , N1.3 , N1.6
CNV 508N1, N1.1, N1.2 N1.3
CNV 508N2, N2.2 N2.3 N3.3

EN/IEC 61000-4-5
EN 50121-3-2
EN 50155

The coupling network of the series CNV 504 / 508 are designed for coupling surge- or telecom pulses to signal or data lines.

The coupling network expands the range of application of the impulse generator UCS500, VCS500 and CSS500 for testing signal and data lines.

Main characteristics are the advantages for handling and the easy using with banana plugs.

The benchmark for emc

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Content

1. Standards for testing with coupling networks of CNV 504 / CNV 50x series

The coupling network CNV504 / CNV50x series are suitable for testing the following standards:

- **IEC 61000-4-5** Surge 1.2/50µs , 10/700µs
- **EN 50121-3-2** Surge CNV 504N1
- **IEC 61000-4-12** Ringwave

1.1. Device models

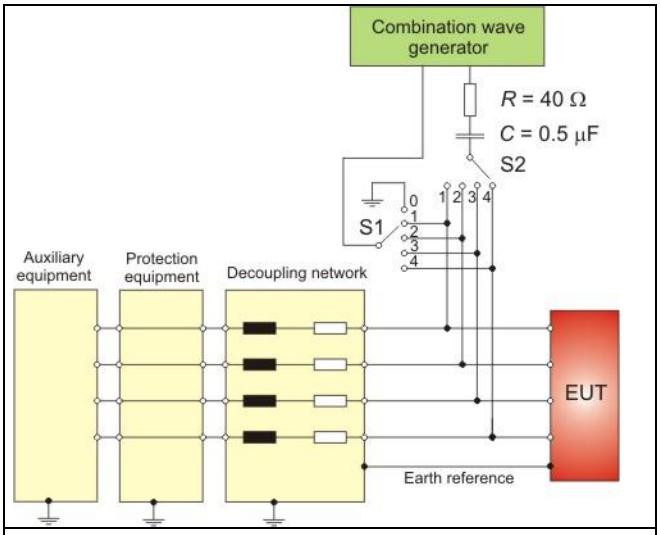
Following coupling decoupling network for signal and data lines exist:

Standard devices:

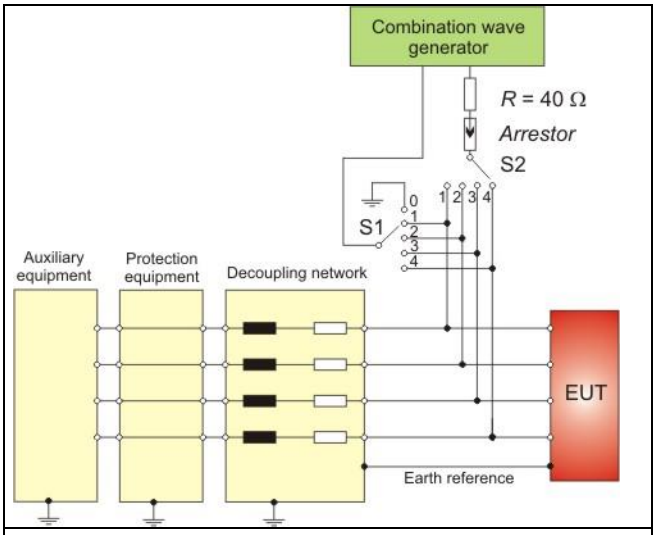
CNV 504N1	**4kV** coupling/decoupling network for Surge and Ringwave onto 4 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/1A**
CNV 504N1.1	**4kV** coupling/decoupling network for Surge and Ringwave onto 4 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/4A**
CNV 504N1.2	**4kV** coupling/decoupling network for Surge and Ringwave onto 4 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/1A**
CNV 504N1.3	**4kV** coupling/decoupling network for Surge and Ringwave onto 4 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/4A**
CNV 504N1.4	**4kV** coupling network for 4 data/signal lines 50V, via coupling capacitor and gas arrestor (No decoupling included !!!)
CNV 504N1.5	**4kV** CDN for 4 data/signal lines **230V/1A**, via coupling capacitor and gas arrestor (600V)
CNV 504N1.6	**4kV** coupling/decoupling network for Surge and Ringwave with 40ohm via 0.5uF capacitor (asper fig.11, IEC 61000-4-5) and gas arrestor (as per Fig.12) ; with 3.3uF capacitor for Ringwave (as per fig.9, IEC 61000-4-12); Rated line voltage/current **250V/4A**, max. 50V for tests with gas arrestor
CNV 508N1	**4kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/1A**
CNV 508N1.1	**4kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/4A**
CNV 508N1.2	**4kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/1A**
CNV 508N1.3	**4kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/1A**

CNV 504N2	**7kV** coupling/decoupling network for Surge and Ringwave with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/1A**
CNV 504N2.1	**7kV** coupling/decoupling network for Surge and Ringwave with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/4A**
CNV 504N2.2	**7kV** coupling/decoupling network for Surge and Ringwave with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/1A**

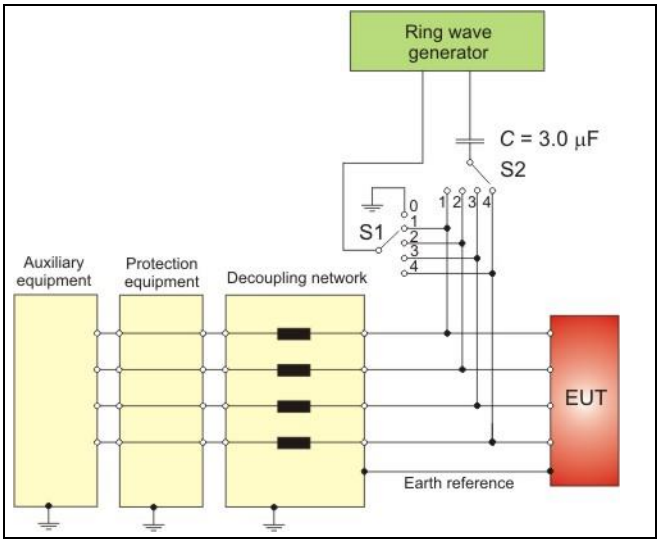
CNV 508N2	**7kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/1A**
CNV 508N2.1	**7kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **50V/4A**
CNV 508N2.2	**7kV** coupling/decoupling network for Surge and Ringwave onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5); with 3.3uF capacitor for Ringwave (as per Fig. 9, IEC 61000-4-12); Rated line voltage/current **250V/1A**
CNV 508N2.3	**7kV** coupling/decoupling network for Surge onto 8 signal/data lines; coupling via capacitor Rated line voltage/current **250V/4A**
CNV 508N3	**10kV** coupling/decoupling network for Surge onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5) and arrestor (as per Fig.12); Rated line voltage/current **50V/1A**
CNV 508N3.2	**10kV** coupling/decoupling network for Surge onto 8 signal/data lines with 40ohm via 0.5uF capacitor (as per Fig. 11, IEC 61000-4-5); Rated line voltage/current **250V/1A**
CNV 508N3.3	**10kV** coupling/decoupling network for Surge onto 8 signal/data lines; coupling via capacitor Rated line voltage/current **250V/4A**



IEC 61000-4-5 Ed.2 Figure 11



IEC 61000-4-5 Ed.2 Figure 12



IEC 61000-4-12 Figure 9

1.2. Impulse generators

The CNV 504/CNV 508 can be used for the following surge generators:

Device	previous name	Pulse	Remark
compact NX5		1.2/50µs - 8/20µs	up to 5000V as per IEC 61000-4-5
UCS 500N4	UCS 500M4	1.2/50µs - 8/20µs	up to 4000V as per IEC 61000-4-5
UCS 500N5		1.2/50µs - 8/20µs	up to 5000V as per IEC 61000-4-5
	UCS 500M6	1.2/50µs - 8/20µs	up to 6600V as per IEC 61000-4-5
UCS 500N6	UCS 500M6B	1.2/50µs - 8/20µs	up to 6600V as per IEC 61000-4-5
UCS 500N7		1.2/50µs - 8/20µs	up to 7000V as per IEC 61000-4-5
VCS 500N4	VCS 500	1.2/50µs - 8/20µs	up to 4000V as per IEC 61000-4-5
VCS 500N8	VCS 500M8	1.2/50µs - 8/20µs	up to 8000V as per IEC 61000-4-5
VCS 500N10	VCS 500M10	1.2/50µs - 8/20µs	up to 10000V as per IEC 61000-4-5
	TSS 500M4	10/700µs / 1.2/50µs	up to 4000V as per IEC 61000-4-5
	TSS 500M2B	1.2/50µs - 8/20µs	up to 2000V as per Bellcore
	TSS 500M2F	<2/>10µs	up to 2500V as per FCC part 68

2. Safety

2.1. Safety aspects

Read the following operation manual carefully. Pay special attention to both safety and operation details !!!
Observe all of these precautions to ensure your personal safety and to prevent damage to the test equipment.
The generators correspond to Installation Category II (overvoltage category).

Symbols marked on equipment

	**WARNING**	Risk of electric shock. Dangerous voltages are present. Use extreme care. Refer to the manual.
	**GROUND**	Indicates protective earth terminal

Power Mains
The equipment is intended to operate with a power mains supply that will not apply more than 250Vrms between the supply conductors or between either supply conductor and ground. A proper protective ground connection, through the grounding conductor in the power cord, is essential for safe system operation.

Safety Ground and grounding the generators
The generators are grounded through the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle where earth ground has been verified by a qualified service person. Do this before making connections to the input or output terminals of the test equipment.
Without the protective ground connection, all parts of generators are potential shock hazards. This includes knobs and controls that may appear to be insulators. The equipment **MUST NOT BE USED** if this protection is impaired.

Use the proper power cord
Use only the power cord and connector specified for your product. Only use a power cord that is in good condition.

Use the proper fuse
To avoid fire hazard, use only the fuse specified in the parts list for your product, with matching type, voltage rating, and current rating.

Do not remove covers or panels
To avoid personal injury, do not operate the generators without the panels in place or covers.

Do not operate in explosive atmospheres
The generators provide no explosion protection from electrostatic discharges or arcing components. Do not operate them in an atmosphere of explosive gases around explosive chemicals.

Electric Overload
Never apply a generator's voltage to a connector which is not specified for that voltage range.

☞ **Read the Operation Manual of each instrument carefully!**

2.2. Testing and danger

All tests offered by the High Voltage or EMC generators are immunity tests on electronic equipment or devices. These tests are potentially dangerous for the operator. Therefore it is the responsibility of the user to avoid critical failures and risks to the environment and operator.

Long and distributed lines of the DUT are able to radiate certain energy to their vicinity. Therefore it is also the responsibility of the user to decide whether it is allowed to conduct immunity tests in a given installation.

Test voltages above 500V may generate spark discharges. Therefore it is forbidden to test in an explosive environment.

National and international recommendations regarding human safety must be followed.

People with certain health conditions, e.g. with a heart pace-maker or similar device, must be excluded from testing.

When setting up the test national and international regulations regarding human safety have to be guaranteed.

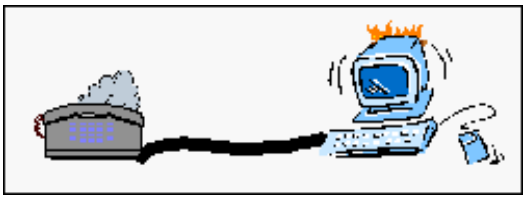
Generator and coupling/decoupling network must be grounded and connected to reference plane.

2.2.1. Coupling networks

- The coupling network has mostly no On- Off switch and no internal fuse for the EUT power supply. This is caused the different regulation in each country. The device under test must be protected by the user in an adequate safe solution. As an option special adapters and switches can be built in, but the user must to specify this special solutions.
- Generators and coupling devices must be grounded and connected to the reference ground.
- For coupling pulses to the lines the coupling path must be settled.
- If a line has not to be coupled, it is necessary to disconnect or switch off this coupling path.
- Special safety adapter cables are part of the delivery.

2.2.2. Danger from EUT

The device being tested may become defective and ignite due to the influence of the applied test signal.



Therefore the operator shall take the following precautions:

- As soon as the EUT ceases to operate as intended, the test shall be stopped immediately.
- In case of internal damage, the operator may be exposed to high frequency signals of high power (up to 75 Watts and more) anywhere on the EUT.
- Cables and connectors can be overloaded by high voltages or energies.
- Due to internal damage of components fire and/or explosion may occur.
- Unintended use of the EUT may cause hazardous situations in the vicinity of the test area.

Never touch the EUT or anything connected to the EUT during a test.

It is suggested to read the operating manual carefully and completely. It is absolutely necessary to observe and comply with all safety recommendations.

3. Device functions and operating

3.1. Operation elements on the CNV 504 / CNV 508 series

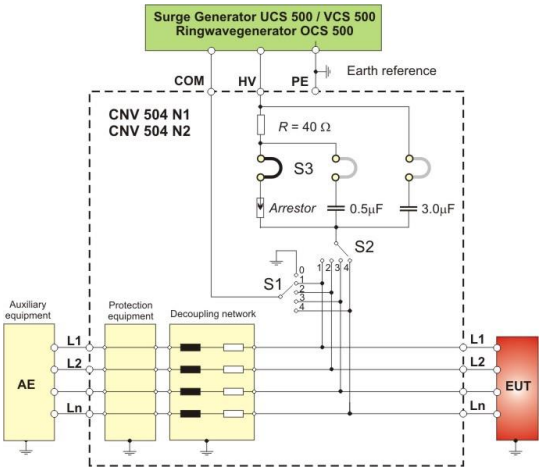
The position of the short circuit connectors are in relation to standard IEC 61000-4-5 as figure 11 and 12 respective figure 9 in IEC 61000-4-12 for Ringwave.

The switches S1 and S2 correspond to the positions of the jumpers on the pictures.
With two short-circuit connectors (S1 …S3) the coupling modes can be selected on top/front of the coupling unit.

S1: Return of a line or the earth back to the generator COM
S2: Coupling of the high voltage to one line
S3: Selection of the coupling mode via gas arrestor or 0.5µF coupling capacitor or the 3.0µF capacitor for ringwave pulse.

It is not possible to couple several lines at the same time. The operator would cause a short-circuit between the lines.

The operator has to select „/“ for the coupling mode of the surge generator. This means that no coupling mode for the internal coupling network of the surge generator shall be selected.



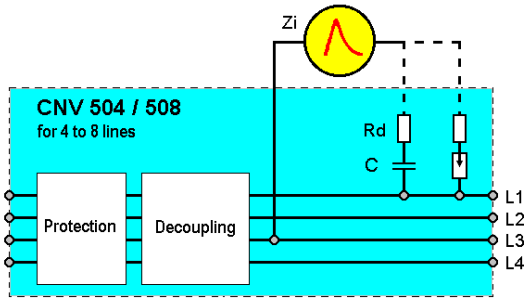
3.2. General

The coupling network has to couple the interference pulses in a well defined way to the input/output lines of an electronically system. The coupling is realized by coupling capacitors according IEC 61000-4-5 in figure 11 or with the help of gas arrestors as per IEC 61000-4-5, figure.

The decoupling part is required for the following reasons:

- to decouple auxiliary equipment or other instruments connected at the same line; protection of non tested equipment
- to increase the line impedance for the surge generator

Due to the filter of the CNV decoupling network the data signals cannot pass the CNV. CDN with special decoupling networks can extend the frequency range.



3.3. Input / output to CNV 504 / 50x

The input/output connectors of the coupling network are located at each side of the housing. The lines under test can be connected with safety laboratory cables. All lines are single lines.

Also at one side of the housing the connectors for the surge generator are mounted. There are the same cables as be used for the CNV 503 or the coupling matrix CNI for coupling to power lines.

For reduce the influence of the cable we propose to **twist the high voltage cables** from the impulse generator to the CNV

The plugs have the following color code:

High voltage HV :	coaxial cable or red cable (>4kV)
High voltage COM :	black
Earth connection CNV :	green - yellow

The earth must be connected at the earth plug on the rear side of the generator UCS500 / VCS500.

3.4. Coupling

The coupling network has to couple the interference pulses in a well defined way to the input/output lines of an electronically system. The coupling is realized by coupling capacitors according IEC 61000-4-5.

The surges may be coupled in two different coupling modes to the lines:

- Line to ground (unsymmetrical)
- Line to line (symmetrical)

3.4.1. Coupling to signal and data lines

The coupling to I/O lines is generally realized with coupling networks different from those used for power supply lines. The loading of the I/O lines with big coupling capacitors is mostly impossible. The data transmission may be disturbed.

For coupling to I/O lines special couplers acc. IEC 61000-4-5 are available, with smaller coupling capacitors such as the CNV 504 and the CNV 508 for four respectively for eight wire systems.

For much application it will be necessary to design special coupling/decoupling networks according to the specification of the lines under test.

3.4.2. Coupling to Telecom Lines

The coupling to telecom lines is generally realized with other coupling networks than for power supply lines. The loading of the telecom lines with big coupling capacitors is mostly not possible. The data transmission will probably be disturbed.

For coupling to telecom lines special couplers as IEC 61000-4-5 are available, with smaller coupling capacitors or gas arrestors such as the CNV 50x S1 series for 4, 6, or 8 wire systems.

For much application it will be necessary to design special coupling/decoupling networks according to the specification of the lines under test.

3.5. Test setup

According to the standard IEC 61000-4-5 the coupling impedance to signal- and data lines is 42Ω.
The impedance is separated in 2Ω built in the impulse generator and 40Ω in the CNV 504 network.

Arrangement

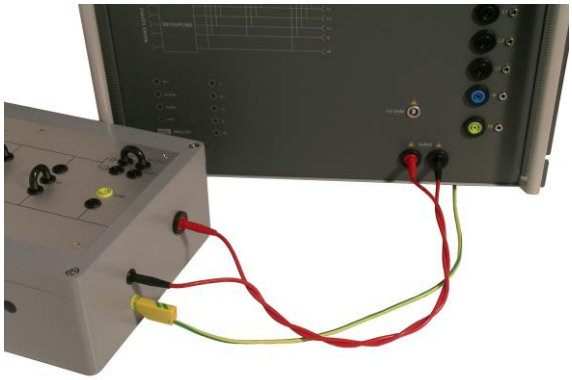
Both equipment, the surge generator and the coupling network can be mounted above or besides each other, whatever is more convenient.

The equipment must be connected by the following cables:

- High voltage cable, coaxial type.
- high voltage common cable (black safety laboratory cable)
- Earth cable

For generators with more than 4kV the high voltage cables are designed with banana plugs.

For reduce the influence to the waveshape we propose to drill the HV and COM cables.



Using the CNI 503 output to the CNV

For earthing the CNV 50x do not use the earth connector of the EUT output on the front panel. This Earth is intern decoupled for burst testing.

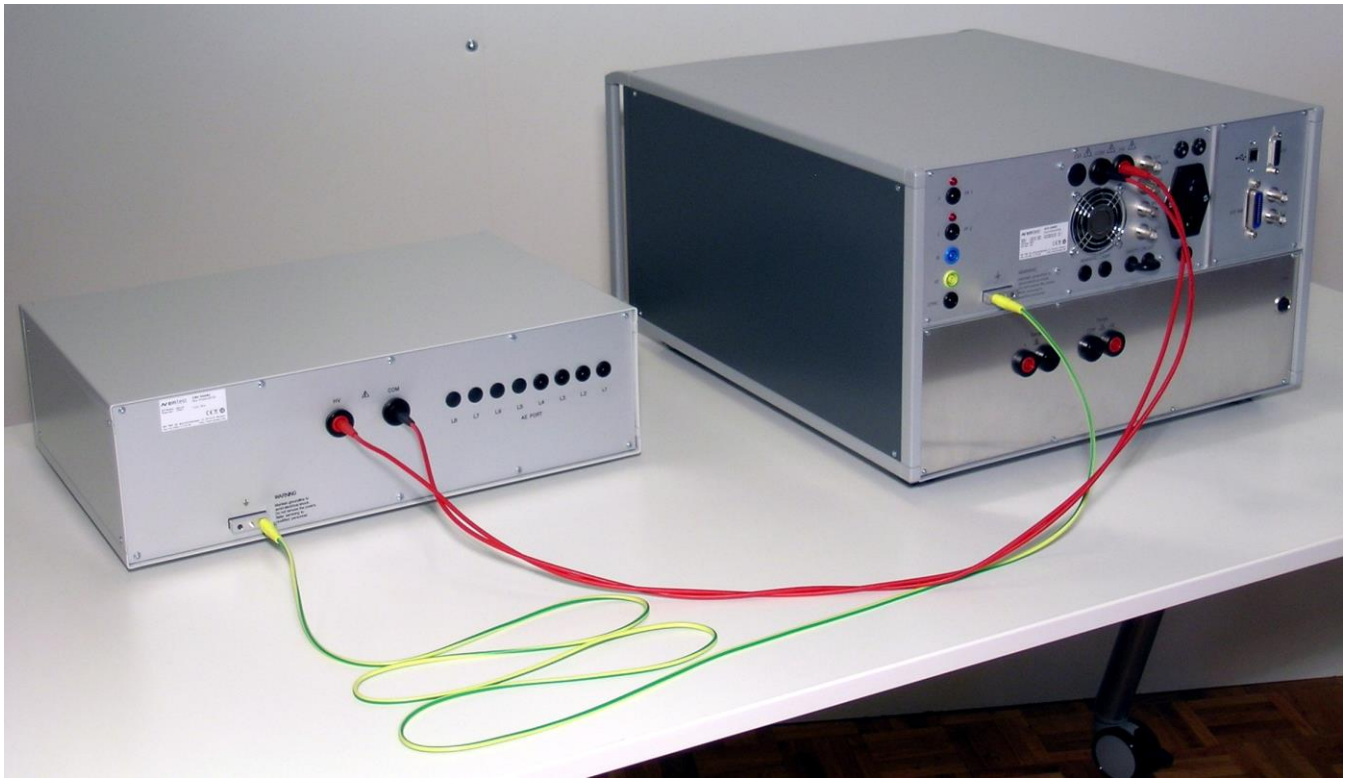
Grounding

According IEC 61000-4-5 the decoupling part is specified so that an increased ground current is caused.

This means:

1. **Ground fault current relays cannot be used in laboratories in which surge testing is daily practice.**
2. **Both equipment, the generator and the coupling/decoupling network, therefore must be well connected to the protective earth system of the test setup.**

3.5.1. Test setup with CNV 504N2



Example of a test setup with UCS 500N7 and CNV 504N2. The Ground must be connected to the Groundplane, if there is one, and to the building GND

3.5.2. Test setup with CNV 50a/508 Nx with earth set

The figure below shows the earth connection of a CNV 504/508 with an earth set

Example of a test setup with an UCS 500N5 and CNV 508N2.3. It is important to connect GND wire the CNV 504/508 to the impulse generator as short as possible. Tha HV impulse cables between the generator and CNV 504/508 must be twisted for mimimize the magnetig field influence.
The Ground must be connected to the Groundplane, if there is one, and to the GND of the building

Erdset
The following earthsets are available:

Art :109045: Erdset 0.6m	**Art :109046**: Erdset 0.25m / 0.55m / 1.0m
	

Following CNV includes the Earthset Art. 109046 in the delivery:

CNV 504 4 wires	**CNV 508** 8 wires	**CNV 510** 10 wires	**CNV 516**
CNV 504 N2	CNV 508 N2	CNV 510 S1	CNT 516
CNV 504 N2.1	CNV 508 N2.1	CNT 510 S1	
CNV 504 N2.2	CNV 508 N2.2		
CNV 504 N2.3	CNV 508 N2.3		
CNV 504 N3	CNV 508 N2.5		
CNV 504 N3.1	CNV 508 N3		
CNV 504 N3.2	CNV 508 N3.1		
CNV 504 N3.3	CNV 508 N3.2		
CNV 504 N7	CNV 508 N3.3		
CNV 504 N7.1	CNV 508 N4		
CNV 504 N7.2	CNV 508 N4.1		
CNV 504 N7.3	CNV 508 S1		
CNV 504 N8	CNV 508 S3		
CNV 504 N9	CNV 508 S8		
CNV 504 S5	CNV 508 S10		
CNV 504 S7	CNV 508 S12		
CNV 504 S7.1	CNV 508 S16		
CNV 504 S9	CNV 508 S17		
CNV 504 S19	CNV 508 S19		
	CNT 508		

4. Technical data

4.1. CNV 504N1 / CNV 508N1

Test level	**CNV 504N1**	**CNV 508N1**
Rated voltage	max 50V	Max50V
Rated current	1A	1A
Max. test voltage (surge)	4000V 1,2/50µs	4000V 1,2/50µs
Decoupling	L = 20mH	L = 20mH
Residual voltage (decoupled side) see calibration report	max. 75V	max. 75V
Coupling mode		
Capacitive	Coupling C 0,5µF damping resistor 40Ω	
Gas arrestor	Gas arrestor 90V alternative selectable to coupling C 0,5µF	
Ringwave	coupling C 3.3µF	
Output		
Number data lines	4 banana plugs	8 banana plugs
General		
Dimension L x W x H	250mm x 160mm x 130mm	
Weight	5.00kg	approx. 6.5 kg
Temperature	5 - 40 °C operation	
Humidity	10%...90% non condensing	

4.2. CNV 504N1.2, CNV504N1.3

Test level	**CNV 504N1.2**	**CNV 504N1.3**
Rated voltage	max 250V	max 250V
Rated current	1A	4A
Max. test voltage (surge)	4000V 1,2/50µs	4000V 1,2/50µs
Decoupling	L = 20mH	L = 20mH
Residual voltage (decoupled side) see calibration report	Varistor S20K 300	Varistor S20K 300
Coupling mode		
Capacitive	Coupling C 0,5µF damping resistor 40Ω	
Gas arrestor	No Gas arrestor mounted because rated voltage >90V	
Ringwave	coupling C 3.3µF	
Output		
Number data lines	4 banana plugs	4 banana plugs
General		
Dimension L x W x H	250mm x 160mm x 130mm	
Weight	4.85 kg	9.65kg
Temperature	5 - 40 °C operation	
Humidity	10%...90% non condensing	

4.3. CNV 504N1.6

Test level	**CNV 504N1.6**
Rated voltage	max. 250V via 0.5 and 3.3µF 50V dc with Gas arrestor
Rated current	4A
Max. test voltage (surge)	4000V 1,2/50µs
Decoupling	L = 20mH
Residual voltage (decoupled side) see calibration report	Varistor S20K 300
Coupling mode	
Capacitive	Coupling C 0,5µF damping resistor 40Ω
Gas arrestor	Gas arrestor alternative selectable to coupling C 0,5µF
Ringwave	coupling C 3.3µF
Output	
Number data lines	4 banana plugs
General	
Dimension L x W x H	250mm x 160mm x 130mm
Weight	Approx. 9 kg
Temperature	5 - 40 °C operation
Humidity	10%...90% non condensing

4.4. CNV 504N2 / CNV 508N2

Test level	**CNV 504N2**	**CNV 504N2.2**	**CNV 508N2**
Rated voltage	max 50V	250V	max 50V
Rated current	1A	1A	1A
max. test voltage (surge)	7000V 1,2/50µs 7000V 10/700µs		7000V 1,2/50µs 7000V 10/700µs
Decoupling	L = 20mH		L = 20mH
Residual voltage (decoupled side) see calibration report	max. 75V		max. 75V
Coupling mode			
Capacitive	Coupling C 0,5µF damping resistor 40Ω		
Gas arrestor	Gas arrestor 90V alternative selectable to coupling C 0,5µF		
Ringwave	coupling C 3.3µF		
Output			
Number data lines	4 banana plugs		8 banana plugs
General			
Dimension L x W x H	19",3HE	447mm x 309mm x 144mm	
Weight approx.	7.45kg		approx. 8.5 kg
Temperature	5 - 40 °C operation		
Humidity	10%...90% non condensing		

4.5. CNV 508N1.2 / CNV 508N2.3

Test level	CNV 508N1.2	CNV 508N2.3
		
Rated voltage	max 250V	Max. 250V
Rated current	1A	4A
Max. test voltage (surge)	4000V 1,2/50µs	7000V 1,2/50µs
Decoupling	L = 20mH	L = 20mH
Residual voltage (decoupled side) see calibration report		
Coupling mode		
Capacitive	Coupling C 0,5µF damping resistor 40Ω	
Gas arrestor	No Gas arrestor mounted because rated voltage >90V	
Ringwave	Coupling C 3.3µF	
Output		
Number data lines	8 banana plugs	8 banana plugs
General		
Dimension L x W x H	330mm x 230mm x 115mm	447mm x 396mm x 156mm 19",3HE
Weight	5.70 kg	17.45kg
Temperature	5 - 40 °C operation	
Humidity	10%...90% non condensing	

=> Non relevant data for the standards can be changed by the manufacturer <=

5. Maintenance

5.1. General

The coupling network is built with passive components only. The coupling network of the series CNV is absolutely maintenance free.

5.2. Calibration and Verification

5.2.1. Factory calibration

Every EM TEST generator is entirely checked and calibrated as per international standard regulations before delivery. A calibration certificate is issued and delivered along with a list of the equipment used for the calibration proving the traceability of the measuring equipment. All auxiliary equipment and accessories are checked to our internal manufacturer guidelines.

The calibration certificate and the certificate of compliance (if available) show the date of calibration.

The EM Test equipment are calibrated in the factory and marked with a calibration mark. The used measuring instruments are traceable to the Swiss Federal Office of Metrology.
The calibration date is marked. The validity of the calibration is to the responsibility of the user's quality system. Neither the certificate of calibration nor the corresponding label mark any due date for re-calibration.

Example: Calibration mark

5.2.2. Guideline to determine the calibration period of EM Test instrumentation

Our International Service Departments and our QA Manager are frequently asked about the calibration interval of EM TEST equipment.

EM TEST doesn't know each customer's Quality Assurance Policy nor do we know how often the equipment is used and what kind of tests is performed during the life cycle of the equipment. Only the customer knows all the details and therefore the customer needs to specify the calibration interval for his test equipment.

In reply to all these questions we like to approach this issue as follows:
EM TEST make use of a solid state semiconductor switch technique to generate high voltage transients. A precious advantage of this technique is the absolute lack of periodical maintenance effort. In consequence thereof a useful calibration period has to be defined based on two criteria:

- The first one is the customer's Quality Assurance Policy. Any existent internal regulation has to be applied at highest priority. In the absence of such internal regulation the utilization rate of the test equipment has to be taken into consideration.

- Based on the experience and observation collected over the years **EM TEST recommends a calibration interval of 1 year** for frequently used equipment. A 2-years calibration interval is considered sufficient for rarely used test generators in order to assure proper performance and compliance to the standard specifications.

5.2.3. Calibration of Accessories made by passive components only:

Passive components do not change their technical specification during storage. Consequently the measured values and the plots stay valid throughout the storage time. The date of shipment shall be considered as the date of calibration.

5.2.4. Periodically In-house verification

Please refer to the corresponding standard before carrying out a calibration or verification. The standard describes the procedure, the tolerances and the necessary auxiliary means. Suitable calibration adapters are needed. To compare the verification results, EM Test suggests referring to the wave shape and values of the original calibration certificate.

All calibrations and verifications are always done without mains supply voltage connected to the coupling network input.


Danger

Before starting the calibration or verification

remove the EUT Mains Supply

from the generator and from the coupling network

5.3. Maintenance, Adjustments, Replacement of Parts

ATTENTION

Electrical maintenance must only be performed by qualified service technicians..

The generators do not contain any parts or components requiring special maintenance.

Electrical maintenance must only be performed by experienced and specially trained technicians. Generally, standard maintenance requires only the periodic cleaning of the instrument, verification and calibration of certain parameters.

- When removing the cover or other parts of the equipment, high voltage parts may become exposed. High voltages are potentially lethal.
- For service, repair, adjustment or replacement of parts, the generator must be disconnected from all power supply sources before covers are to be removed.
- The user is not permitted to change or modify any EM TEST generator. Only original EM TEST parts and components shall be used for repair and service. EM TEST is not responsible for accidents or injuries caused through the use of parts or components not sold by EM TEST.
- Maintenance and service must only be performed by qualified service technicians who are trained and familiar with the dangers of servicing the EM TEST generator.
- Only fuses of correct voltage and amperage as specified by the manufacturer are to be used for replacement. The repair of fuses is not permitted.

6. Delivery Groups

6.1. Basic equipment

- Base equipment CNV 50xN1 or N2
- 2 short circuit connections (The number can be differ)
- 2 High voltage connection cables 0.45m
- Manual on USB memory card

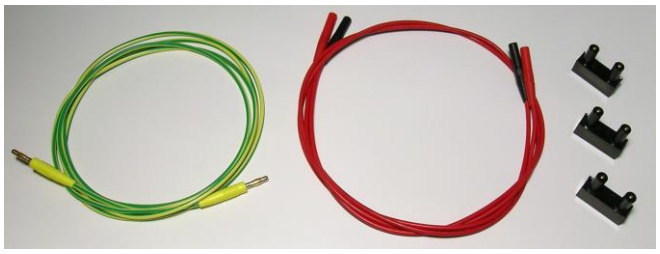
6.2. Accessories

Accessories CNV 504N1 CNV 508N1

1x Earth cable 2m 0.09kg

2x HV cable 1m

3x Short circuit connectors

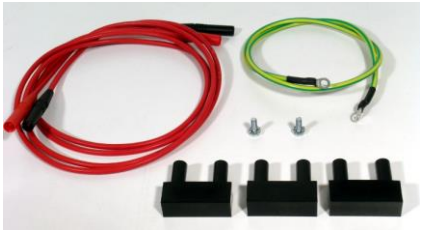


Accessories CNV 504N2 CNV 508N2

1x Earth cable 2m 0.09kg

2x HV cable 1m

3x Short circuit connectors

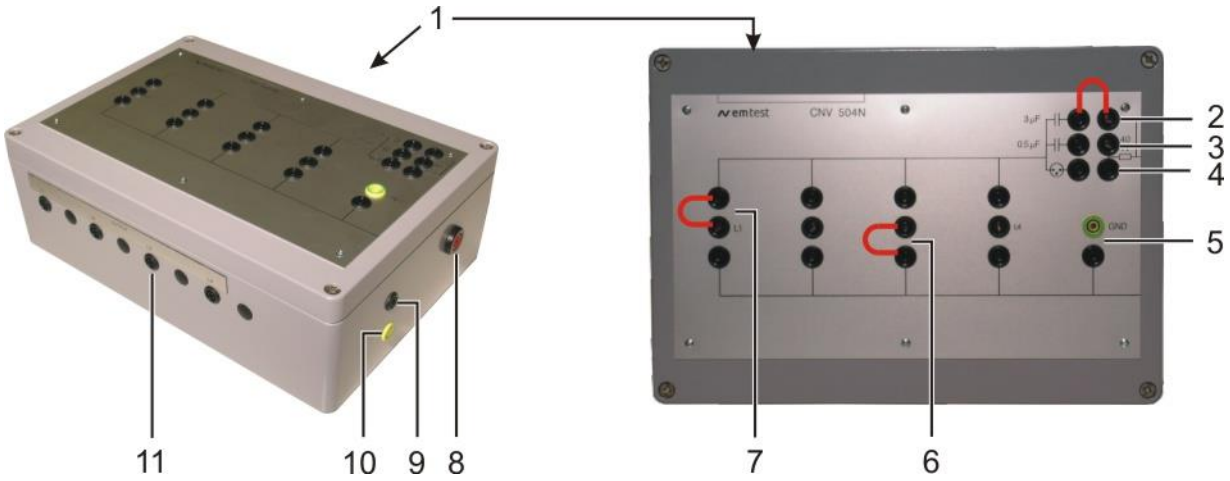


7. Coupling devices

7.1. Coupling network CNV 504N1, CNV 504N1.2, CNV 504N1.3, CNV 504N1.6

CNV 504 N1

Top view CNV 504N1

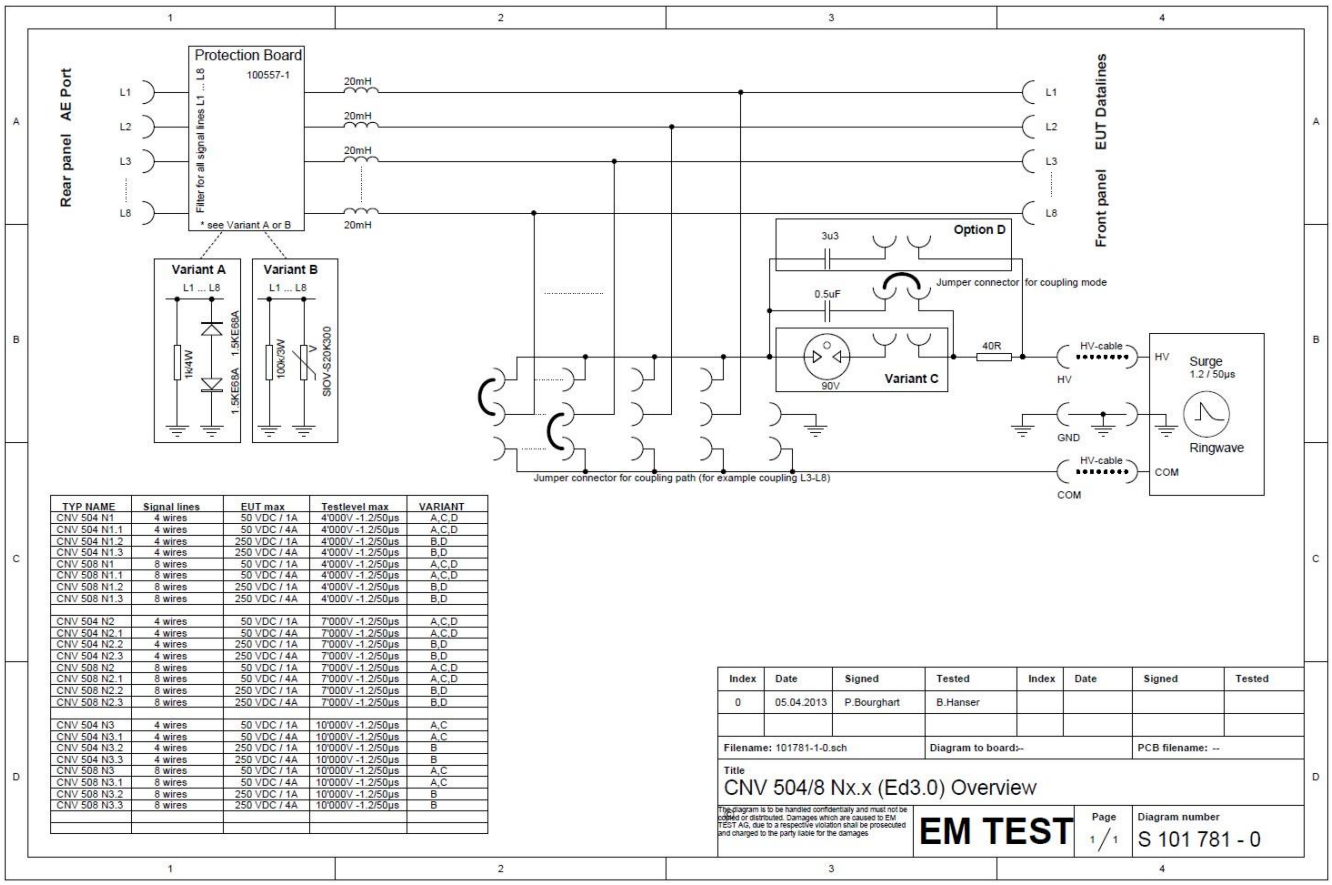


1. Input data lines
2. Coupling ringwave
3. Coupling with 0.5µF / 40Ω
4. Coupling with gas arrestor / 40Ω
5. Connection PE / COM
6. Coupling data lines - COM (L3- COM)
7. Coupling data lines - HV (HV - L1)
8. HV-IN connector surge 1.2/50
9. COM connector Surge 1.2/50
10. PE connector
11. Output data lines to EUT

Remark:

CNV504N1.2 and CNV504N1.3 have the same design. The gas arrestor is not mounted in these devices.

7.1.1. Diagram CNV 504N1 / 508N1



TYP NAME	Signal lines	EUT max	Testlevel max	VARIANT
CNV 504 N1	4 wires	50 VDC / 1A	4'000V -1.2/50µs	A,C,D
CNV 504 N1.1	4 wires	50 VDC / 4A	4'000V -1.2/50µs	A,C,D
CNV 504 N1.2	4 wires	250 VDC / 1A	4'000V -1.2/50µs	B,D
CNV 504 N1.3	4 wires	250 VDC / 4A	4'000V -1.2/50µs	B,D
CNV 508 N1	8 wires	50 VDC / 1A	4'000V -1.2/50µs	A,C,D
CNV 508 N1.1	8 wires	50 VDC / 4A	4'000V -1.2/50µs	A,C,D
CNV 508 N1.2	8 wires	250 VDC / 1A	4'000V -1.2/50µs	B,D
CNV 508 N1.3	8 wires	250 VDC / 4A	4'000V -1.2/50µs	B,D
CNV 504 N2	4 wires	50 VDC / 1A	7'000V -1.2/50µs	A,C,D
CNV 504 N2.1	4 wires	50 VDC / 4A	7'000V -1.2/50µs	A,C,D
CNV 504 N2.2	4 wires	250 VDC / 1A	7'000V -1.2/50µs	B,D
CNV 504 N2.3	4 wires	250 VDC / 4A	7'000V -1.2/50µs	B,D
CNV 508 N2	8 wires	50 VDC / 1A	7'000V -1.2/50µs	A,C,D
CNV 508 N2.1	8 wires	50 VDC / 4A	7'000V -1.2/50µs	A,C,D
CNV 508 N2.2	8 wires	250 VDC / 1A	7'000V -1.2/50µs	B,D
CNV 508 N2.3	8 wires	250 VDC / 4A	7'000V -1.2/50µs	B,D
CNV 504 N3	4 wires	50 VDC / 1A	10'000V -1.2/50µs	A,C
CNV 504 N3.1	4 wires	50 VDC / 4A	10'000V -1.2/50µs	A,C
CNV 504 N3.2	4 wires	250 VDC / 1A	10'000V -1.2/50µs	B
CNV 504 N3.3	4 wires	250 VDC / 4A	10'000V -1.2/50µs	B
CNV 508 N3	8 wires	50 VDC / 1A	10'000V -1.2/50µs	A,C
CNV 508 N3.1	8 wires	50 VDC / 4A	10'000V -1.2/50µs	A,C
CNV 508 N3.2	8 wires	250 VDC / 1A	10'000V -1.2/50µs	B
CNV 508 N3.3	8 wires	250 VDC / 4A	10'000V -1.2/50µs	B

Index	Date	Signed	Tested	Index	Date	Signed	Tested
0	05.04.2013	P.Bourghart	B.Hanser				

Filename: 101781-1-0.sch | Diagram to board:-- | PCB filename: --

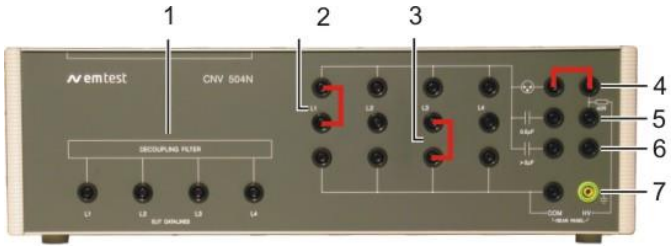
Title: CNV 504/8 Nx.x (Ed3.0) Overview

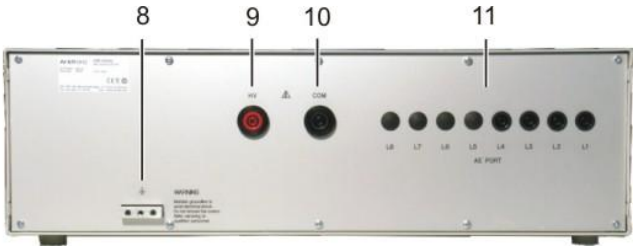
EM TEST | Page 1/1 | Diagram number S 101 781 - 0

Devices for 250V includes for voltage protection varistors and no transzorb diodes.

7.2. Coupling network CNV 504N2

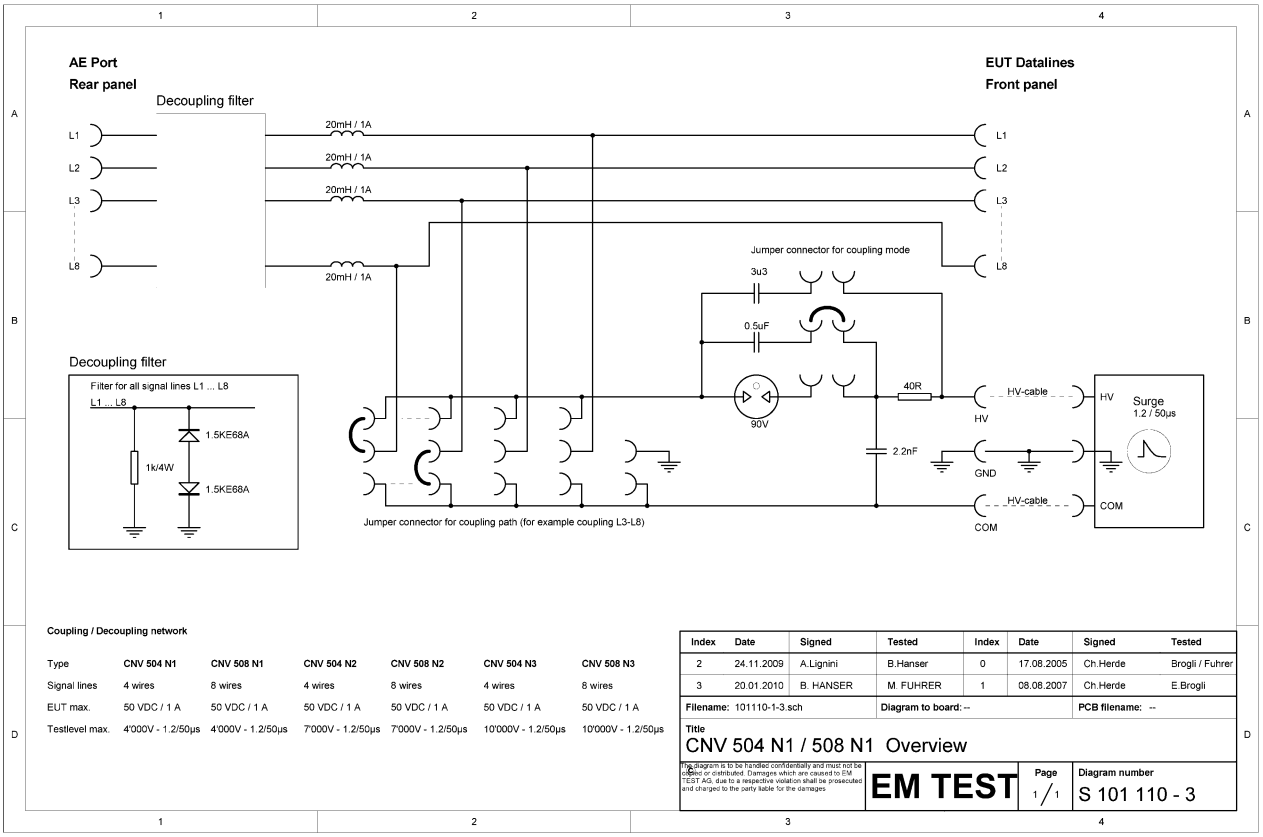
CNV 504 N2





1. Output data lines to EUT
2. Coupling data lines - HV (HV - L1)
3. Coupling data lines - COM (L3- COM)
4. Coupling with gas arrestor / 40Ω
5. Coupling with 0.5µF / 40Ω
6. Coupling ringwave >3 µF
7. Connection PE / COM
8. Earth bolt / PE connection
9. HV-IN connector surge 1.2/50
10. COM Connector Surge 1.2/50
11. Input Datelines AE port

7.2.1. Diagram CNV 504N2 / 508N2



Coupling / Decoupling network

Type	CNV 504 N1	CNV 508 N1	CNV 504 N2	CNV 508 N2	CNV 504 N3	CNV 508 N3
Signal lines	4 wires	8 wires	4 wires	8 wires	4 wires	8 wires
EUT max.	50 VDC / 1 A	50 VDC / 1 A	50 VDC / 1 A	50 VDC / 1 A	50 VDC / 1 A	50 VDC / 1 A
Testlevel max.	4'000V - 1.2/50µs	4'000V - 1.2/50µs	7'000V - 1.2/50µs	7'000V - 1.2/50µs	10'000V - 1.2/50µs	10'000V - 1.2/50µs

Index	Date	Signed	Tested	Index	Date	Signed	Tested
2	24.11.2009	A.Lignini	B.Hanser	0	17.08.2005	Ch.Herde	Brogli / Fuhrer
3	20.01.2010	B. HANSER	M. FUHRER	1	08.08.2007	Ch.Herde	E.Brogli

Filename: 101110-1-3.sch | Diagram to board: -- | PCB filename: --

Title: CNV 504 N1 / 508 N1 Overview

EM TEST | Page 1/1 | Diagram number S 101 110 - 3

8. Appendix

8.1. Declaration of conformity

Manufacturer :	**EM TEST (Switzerland) GmbH**
Address:	Sternenhofstr. 15 CH 4153 Reinach Switzerland

declares, that under is sole responsibility, the product's listed below, including all their options, are conformity with the applicable CE directives listed below using the relevant section of the following EC standards and other normative documents.

Product's name:	Coupling network for Oscillating Compact Simulator
Model Number(s)	CNV 504N1.1, CNV 504N1.2, : CNV 504N1.3, N1.6, CNV 504N2.2 CNV 508N1.1, CNV 508N1.2, CNV508N2, CNV 508N2.3 All other special CNV 5XX NX.Y

Low Voltage Directive 2014/35/EU

Standard to which conformity is declared:

EN 61010-1:2011	Safety requirements for electrical equipment for measurement, control, and laboratory use.

EMC Directive 2014/30/EU

Standard(s) to which conformity is declared:

EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use (Requirements for devices to use in industrial area.)

The purpose of this instrument is the generation of defined interferences signals for EMI immunity testing. Depending on the arrangement of the test rig, the configuration, the cabling and the properties of the EUT itself, a significant amount of electromagnetic radiation may result that could also affect other equipment and systems. The user himself or herself is ultimately responsible for the correct and controlled operation of the rig. In case of doubt, the tests should be carried out in a Faraday cage.

	European representative	Manufacturer
	AMETEK CTS Germany GmbH Lünenerstr. 211 D 59174 Kamen Tel: +49 (0) 2307 / 26070-0 Fax: +49 (0)2307 / 17050	EM TEST (Switzerland) GmbH Sternenhofstr. 15 CH 4153 Reinach Tel: +41 61-7179191 Fax: +41 61-7179199
By	A. Gerstner General manager	A. Burger Business Manager Conducted EMC
Place	Kamen, Germany	Reinach BL, Switzerland
Date	20. December 2016	25. February 2016

8.2. Overvoltage protection on sensor input

The diagrams shown in this section are the ones being valid for the standard coupling/decoupling network rated 50V/1A. The values for the voltage limitations as shown in figures 2 and 4 will differ according to the specified operation voltage.

The following part shows the diagrams with impulses with different couplings

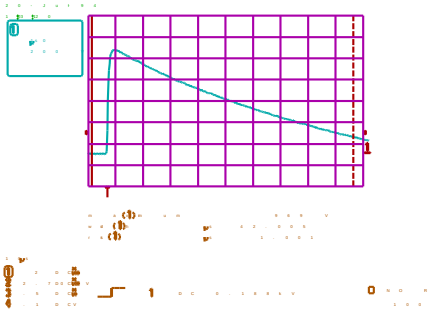


Fig 1: pulse 1,2/50

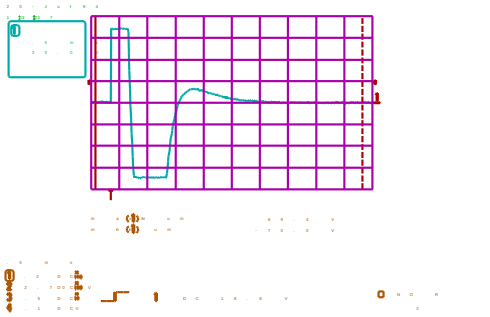


Fig 2: pulse 1,2/50 µs, symı

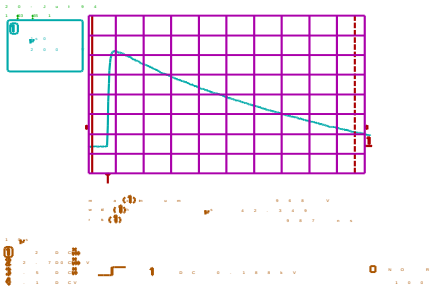


Fig 3: pulse 1,2/50 µ

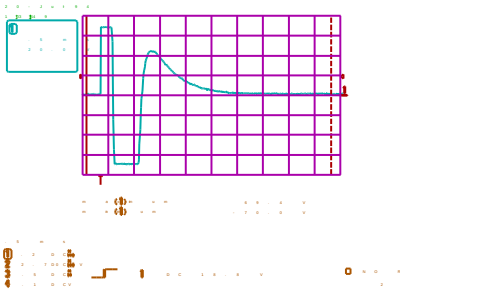
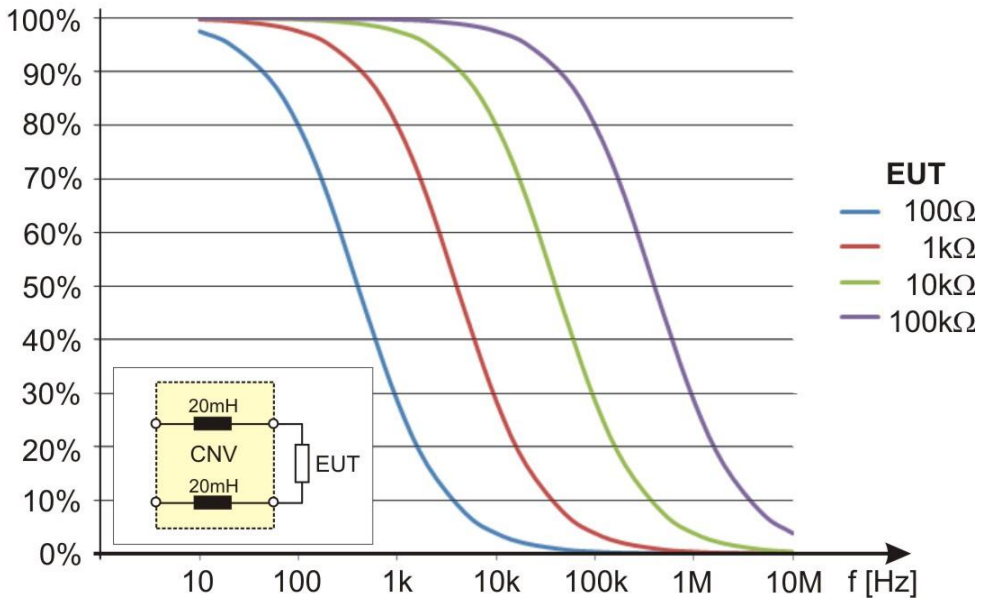


Fig 4: pulse 1,2/50 µs, unsyn

Spec devices: The residual voltage is according the ordered specification in the technical data.

8.3. Transferfunktion in function with the EUT Impedance

The figure below illustrate the transferfunction respective the voltage drop over the inductances of the coupling network (2x20mH). The graph shows the influence of different UET impfdances. Is only one inductance used, the voltage drop is reduced and the ratio is to recalculate.



Transferfunktion f(EUT impedance and frequency)