# MANUAL HIGH-CURRENT COUPLING NETWORK CDN 3083-S100

## USER MANUAL

601-275A

TESEQ

Advanced Test Solutions for EMC

# MANUAL HIGH-CURRENT COUPLING NETWORK CDN 3083-S100

## USER MANUAL

# CONTENTS

# 1 EXPLANATION OF THE SYMBOLS USED IN THIS MANUAL

Please take note of the following explanations of the symbols used in order to achieve the optimum benefit from this manual and to ensure safety during operation of the equipment.

The following symbol draws your attention to a circumstance where non-observation of the warning could lead to inconvenience or impairment in the performance.

Example:

**This connection must not be confused with the EUT power input.**

The following symbol draws your attention to a circumstance where non-observation of the warning could lead to component damage or danger to the operating personnel.

Example:

**Never connect or disconnect the EUT while the test system is performing a test.**

**Never connect or disconnect the coupling path while the test system is performing a test.**

**Lethal danger from high voltages and the risk of radiating illegal electromagnetic interference.**

**The CDN 3083 may only be installed and used by authorised and trained EMC specialists (electrical engineers).**

**The CDN 3083 must only be used for EMC tests as set down in these operating instructions.**

**Personnel fitted with a heart pacemaker must not operate the instrument and must not be in the vicinity of the test rig while it is in operation.**

**Lethal danger from high voltages and the risk of high levels of electromagnetic radiation being generated.**

**When the system is used in conjunction with options, accessories or other equipment the safety instructions concerning those devices must also be observed.**

# 2 SAFETY ADVICE



The coupling network CDN 3083 is intended for use with surge generators. These generators produce high voltage test pulses with high energy.

**Improper or careless handling can be fatal! The instrument must only be used by trained personnel.**

These operating instructions form an integral part of the equipment and must be studied carefully before putting the device into use. It needs to be available to the operating personnel at all times. All the safety instructions and advice notes are to be observed.

Keeping responsibility to the instructions and recommendations that follow is imperative.

The safety advice referring to the generators also applies and must be complied with when using the instruments together with the CDN 3083.

Neither Teseq AG, Switzerland nor any of the associated sales organizations accept any responsibility for personal injury or for material or consequential damage that may results through irresponsible or negligent operation of this equipment.

**When used with a generator NSG 3040 or Modula the EUT input voltage is limited to max. 440 Vrms line to line and 440 Vrms line to ground. If this level should be exceeded the generator might be damaged.**

## 2.1. Safety measures

Persons fitted with a heart pacemaker must not operate the instrument and should not be in the vicinity of the test rig when pulses are triggered.

The test rig must provide adequate insulation protection for up to 10 kV surge. Particular care should be given to the connections between the CDN 3083 and the equipment under test (EUT).

The EUT may only be tested when placed inside a suitable protective enclosure which should provide protection against flying fragments, fire and electric shock.

The pulse voltage must not be able to find its way to unearthed metal objects in the event of the EUT failing.

Only use the instrument in a dry room.

Never leave the instrument unattended when the EUT is switched on.

Regularly check the heat of the CDN using the built in thermometer and switch EUT off if the temperature should exceed 70°C.

Do not open the instrument. Repairs and adjustments must only be carried out by qualified maintenance personnel.

Do not continue to use the CDN should any mechanical damage occur. The CDNs housing and the cables have both insulating and screening function, which can only be assured while the housing is intact. Return the damaged CDN to a Teseq service centre immediately for repair.

## 2.2 Installation

The test system conforms to protection class 1. Local installation regulations must be respected to ensure the safe flow of leakage currents.

**Operation without a protective earth connection is forbidden! Therefore it is imperative to screw both earth copper rails to the CDN.**

**Switch off EUT power before accessing EUT power «in» or «out» terminals. Use the insulated allen key always when working on the terminals.**

Two independent protective earth connections are necessary (for the test system and the EUT). These must be connected back to the local permanent installation or to a fixed, permanent protective earth conductor.

Operate the equipment only in dry surroundings. Any condensation that occurs must be allowed to evaporate before putting the equipment into operation. Do not exceed the permissible ambient temperature or humidity levels. Use only officially approved connectors and accessory items.

Ensure that a reliable return path for the interference current is provided between the EUT and the generator. The reference ground plane and the earth connections to the instruments, as described in the relevant test standard serve this purpose well.

Since the instrument works, on principle, with two independent power supplies (one for the generator and one for the EUT), the CDN 3083 must be disconnected from both sources before any modifications to the test rig are undertaken. Besides the mains connections themselves, certain components also operate at high voltages, which are not provided with any form of extra protection against being accidentally touched.

### 2.3 Installation of an equipment under test power switch

It is recommended to connect the CDN through a properly rated power switch device, which should be located close to the test setup. In order to ensure an easy and quick access to the equipment under test (EUT) power, same should be clearly and visibly labelled as a device for «EUT power on/off» switching.

The in-house power distribution needs to be equipped with a proper circuit breaker and an emergency off button as per IEC/EN 61010-1:2001.

**The test setup should only be accessible to trained persons.**

Dimensioning of mains supply and rating of fuse protection of AC or DC power supply must conform with national prescriptions and EUT requirements.

Inappropriate arrangement, mounting, cabling or handling of the device under test or the protective elements can make the protective features that are incorporated in the concept of the instrument worthless.

#### 2.3.1 Applicable safety standards

Development and manufacture is in compliance with ISO 9001.

The instrument complies with the safety requirements of IEC/EN 61010-1 (safety requirements of electrical equipment for measurement, control and laboratory use).

The interference immunity has been tested in accordance with EN 61326-1.

It is the user's responsibility to ensure that the test rig does not emit excessive electromagnetic interference (EMI) that might affect other items. The test system itself does not produce any excessive radiation; however, the injection of interference pulses into the EUT can result in the device and/or its associated cables starting to radiate EMI. To avoid radiating unwanted interference into the environment, the standards organisations recommend that the test rig be operated in a Faraday cage.

### 2.3.2 Leakage current

Local installation regulations must be respected to ensure the safe flow of leakage currents.

Use only nationally approved connectors and accessory items.

Ensure that a reliable return path for the interference current is provided between the EUT and the coupling network. The reference ground plane and the earth connections to the instruments as described in the relevant test standard serve this purpose well.

# 3 APPLICATIONS

With the prevailing high power consumption for electronically controlled industrial installations, the need for high-current couplers goes in line.

The manual coupling network CDN 3083 fulfils the requirements called for in the surge standard IEC/EN 61000-4-5, including the new features concerning high currents as well as in the ANSI C62.45 and other relevant standards.

The form of construction selected suits the demands placed on the instrument in its working environment. In its basic form, the coupler is made for use on a floor or for table top placement in an EMC laboratory or in a development workshop. It can be even mounted onto the wall to have free space on test bench, for instance.

High-current couplers may need to be taken to test sites where it is commonly impossible to move large installations in. For convenience, the CDN 3083 can be disassembled in handy parts and can easily move to other places. Optional wheels with braking features can be mounted to manoeuvring the coupler even on ramps and uneven surfaces.

Injecting surge pulses into power connections always involves a careful weighing up of partially conflicting requirements. On the one hand the power network has to be protected from the interference signals while the effects of the pulses are concentrated on the item under test, yet on the other hand the back filter must not result in any significant voltage drop.

In order to keep voltage losses within reasonable limits with increasing current levels, the IEC has defined three classes of filter inductances, namely: up to 25 A, 25 to 60 A and 60 to 100 A.

Note: Classic high-current couplers cannot therefore be used any longer for lower current levels since the filtering effect is insufficient.

**Manual high-current coupling network CDN 3083–S100**

Through the use of special choke technology, Teseq has managed to avoid the costly disadvantage of using several couplers. By using an auto-adaptive back filter, the CDN 3083 fulfils the requirements for both protection and voltage drop over the range from just a few amps to full load.

Further construction features make the application of the unit even more universal. The nominal maximum current rating of 100 A per phase can, during short test periods, be considerably exceeded. The unit will tolerate the frequently encountered inrush currents without complaint and, in extreme cases it can be overstressed until the internal environment has reached the max. temperature of 70°C.

The CDN 3083 is hence usable where otherwise a CDN for more than 100 A would be necessary. For single phase application even 200 A per phase is possible by paralleling 2 decoupling network paths and adding decoupling units.

The CDN 3083 is tested for safety in compliance with IEC 61010. The rugged connection terminals together with the solid earth line assure a proper connection, this in combination with a rugged housing.

The coupling network CND 3083 serves to inject the following standardized surge pulses from the surge generator into the mains supply to the device under test:

- Voltage surge of up to 8 kV which follows the 1.2/50 µs curve (open-circuit)
- Current surge of up to 4 kA which follows the 8/20 µs curve (short circuit conditions)

The CDN 3083 is designed to be used with an EUT supply of up to 620 Vrms at 100 A resp. 440 Vrms in use with NSG 3040 and Modula. Operation is manual, simple and designed to be safe.

The construction takes into account the relevant specifications issued by the VDE and IEC concerning personal safety.

The CDN 3083 enables coupling modes with all types of symmetrical and asymmetrical coupling given in the IEC/EN 61000-4-5 and ANSI C62.41 2002.

# 4 ASSEMBLING OF TEST RIG AND THE CDN SUB-UNITS

The CDN 3083-S100 contains following parts:

- 1 Surge decoupling network CDN 3083-S100 N – L1
- 1 Surge decoupling network CDN 3083-S100 L2 – L3
- 2 Earth rails
- 1 Allen key, isolated
- 1 User manual CDN 3083 E
- 1 Test certificate

IEC coupling set

- 1 INA 3080 Surge coupling unit

IEC/ANSI coupling set

- 2 INA 3080 Surge coupling unit
- 1 Connection cable 0.5 m Fischer/Fischer connector

Depending on generator used, the CDN set may include following complementary items for:

NSG 2050 generator system

- 1 INA 3085 Synchronisation unit for NSG 2050 system
- 2 x Cable 1 m, with Fischer/Lemo connector
- 1 Dummy plug for NSG 2050 generator

NSG 3040 or Modula

- 1 INA 3084 Synchronisation unit for NSG 3040 or Modula
- 2 x Cable 1 m, with each a Fischer/Fischer connector

Optionally:

- To fulfil the ANSI specification or optional IEC line coupling mode a second INA 3080 is required. All necessary connection cables are included.

### 4.1 Installation of a test rig

This section describes the check-up and installation of the CDN 3083 coupling network after delivery as well as providing a check on the functions of the unit after being transported or following to significant changes within the test rig.

Installation should only be carried out by experienced personnel.

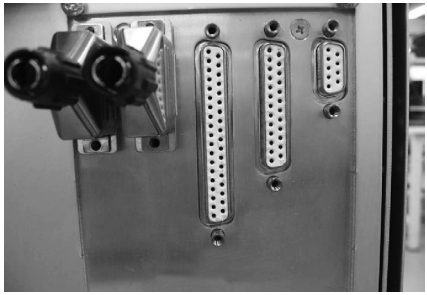
a) Check the delivery for completeness.
b) Check the unit for any signs of damage in transit. Report any damage found to the carrier immediately.
c) Study the manual.
d) Set up the surge generator in accordance with the instructions in its manual but do not, however, switch the instrument on.
e) For convenience, place the coupling network close to the generator.
f) Connect the protective earth to the terminal. The same protective earth should also be connected to the earth terminal of the generator.
g) Plug the high voltage connectors into the surge generator.
h) Connect the INA 3085 synchronisation unit to the generator.
i) Connect the EUT supply.
j) Switch on the mains power at the generator.
k) Choose the appropriate coupling mode.
l) Connect the device to be tested according to the relevant safety specifications and with due regard to the magnitude of the pulse voltage selected. Take the necessary measures to cope with any possible explosion or outbreak of fire.
m) Switch on the EUT power supply.
n) Operate the generator as instructed in its manual and carry out the required tests.

It is assumed that the test rig has been set up in accordance with the foregoing notes and that the device to be tested has been connected taking the relevant safety measures into account.

**When used with a generator NSG 3040 or Modula the EUT input voltage is limited to max. 440 Vrms line to line and 440 Vrms line to ground. If this level should be exceeded the generator might be damaged.**

### 4.1.1 Dummy connector for NSG 2050

Using the CDN 3083 together with NSG 2050 system a dummy plug needs to be connected at the back plane of the NSG 2050 system defined as CDN. On the NSG 2050 itself the coupling mode L1->N needs to be selected.

### 4.2 Preparation of the CDN 3083

Prepare the test setup conform to the chosen standard and put both decoupling network units, etc. to the place where the CDN shall be used for testing.

### 4.2.1 Mounting of the common earth rails

Place the two surge decoupling networks in parallel to each other. Looking from the top, make sure that the N-L1 network is below the L2-L3 network.

**To enable proper synchronisation, assure that side L1 being placed next to L2!**

Use the delivered isolated allen key to screw the copper earth rails on to both ends of the decoupling networks (2 x 2 screws each side per network).

**Make sure that the copper rail is properly mounted and tightened. Use only the delivered screws.**

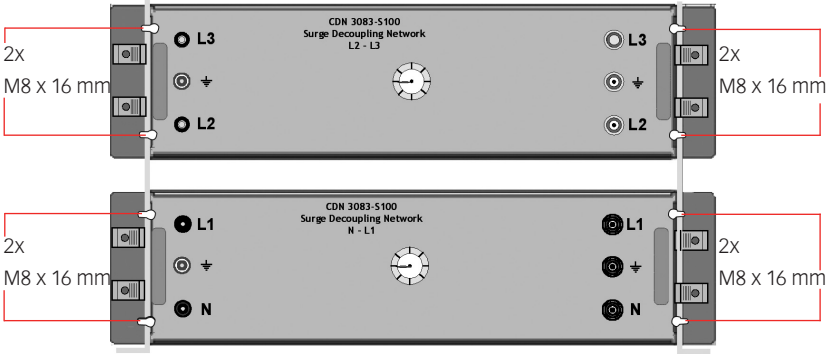



Figure 1: Top view on CDN units

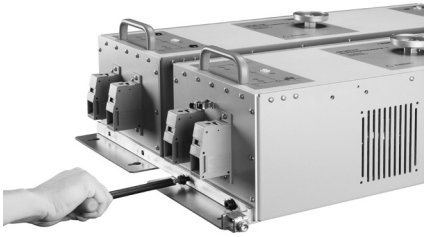


Photo 1: Assembly of copper earth rail

After this preparation work, the CDN is stable enough for being turned to its side prior to mounting the wheels at the bottom of the case, if required.

### 4.2.2 Mounting positioning plates

Screw the base plates (positioning plates) of the synch unit and of the coupling unit, with the knurled screws to the foreseen holes on the outside of the decoupling networks. Connect the synch lines (safety banana connector) to the decoupling units. If CDN 3083 decoupling networks are not placed correctly, the positioning plates can not be screwed on.

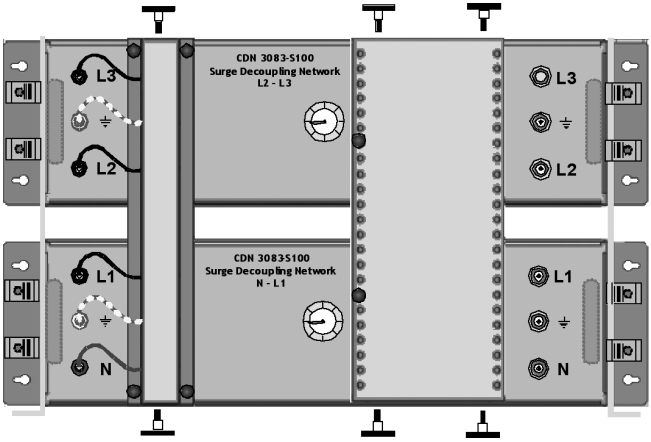



Figure 2: Location of synchronisation unit and of positioning plate

Photo 2: Synchronisation plate (l.h.) and positioning plate (r.h.)

### 4.2.3 Assembly for IEC coupling

For IEC coupling, add the coupling modules INA 3080 in the middle of the positioning plate and press it slightly down into the positioning holes. Fix the INA by pushing the black quick snap-on knobs down. The CDN 3083 is now ready to use.

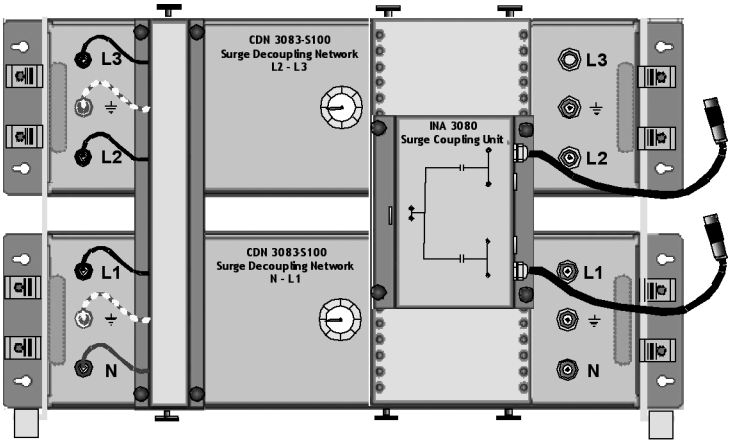



Figure 3: Location of IEC coupling module

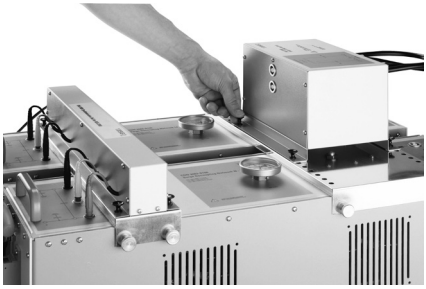


Photo 3: View of IEC coupling module

### 4.2.4 Assembly for ANSI coupling or additional IEC lines coupling mode

For ANSI coupling, add both coupling units INA 3080 on the positioning plate and press it slightly down into the positioning holes. Fix the INAs by pushing the black quick snap-on knobs down. The CDN 3083 is now ready to use.

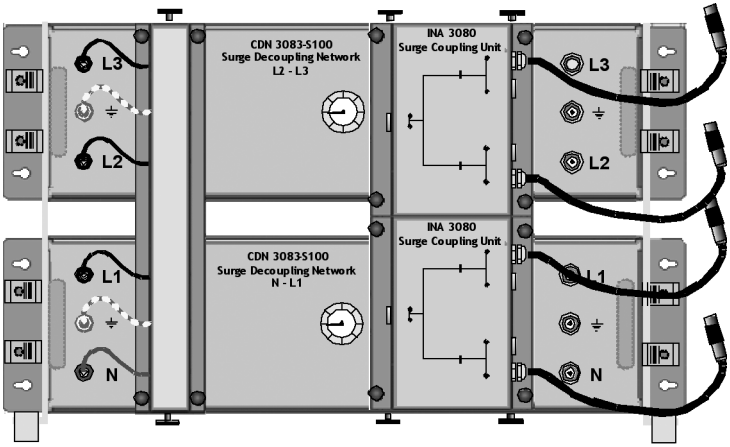



Figure 4: Location of ANSI coupling modules or additional IEC coupling mode

Photo 4: View of ANSI coupling modules

**Because of the coupling capacitors, the mains voltage can be present at the HV connectors when the EUT power supply is switched on. The HV connectors must therefore always be hooked up to the generator before the mains and the EUT power supply are switched on.**

### 4.3 EUT connections

The CDN 3083 is equipped with EUT terminals suitable for a max. wire gauge of 110 mm² AWG 4-4/0 (230 A), torque: max. 20 Nm.

**The in-house power distribution needs to be equipped with a proper circuit breaker and an emergency off button as per IEC/EN 61010-1:2001.**

#### 4.3.1 EUT power feed

The power is fed in via 5-core cable leads.

**Do not mismatch the EUT power input of the CDN and the EUT power output. Use only the delivered isolated allen key to screw the cables to the terminals. Never touch the terminals during the EUT power is on.**

**EUT power input** **EUT power output**

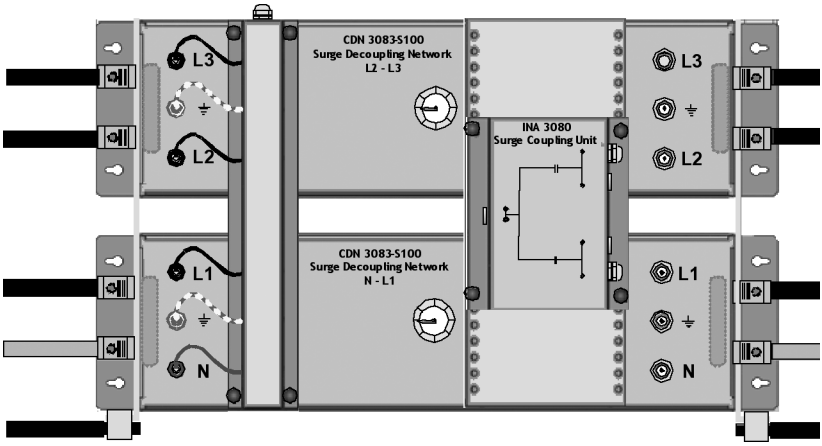



Figure 5: Identification of EUT power input and output

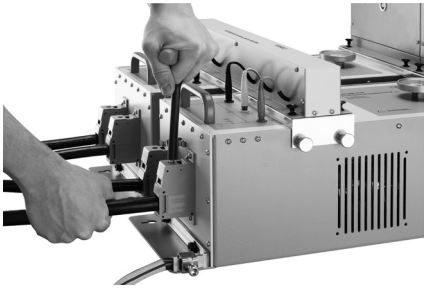


Photo 5: View of EUT power input connection side

**When used with a generator NSG 3040 or Modula the EUT input voltage is limited to max. 440 Vrms line to line and 440 Vrms line to ground. If this level should be exceeded the generator might be damaged.**

### 4.3.2 Earth connection

The earth connection terminal ensures a positive link to the copper earth rail connected on the CDN housing.

On the CDN unit «EUT power out» side it is electrically connected to the middle connection, identified by «earth connection» symbol. In case of a test installation with a solid earth (e.g. a Faraday cage), this earth terminal can be used to form a star-connection point for the earth wires of the test setup.

## 4.4 Test conditions

Every test rig must be planned carefully. All the instrumentation should be readily accessible and rigidly positioned. Cable connections are to be made positively.

**The whole test assembly should be supplied from the same mains connection in order to prevent uncontrolled flow of pulse current in other parts of the system. Installation in a Faraday cage ensures that non-associated items and equipment are not disrupted by pulses radiated from the cabling or the device under test. Connections to the EUT must be of low impedance and be made with high contact pressure. Otherwise welding or arcing might occur at the contact points.**

# 5 COUPLINGS MODE OVERVIEW

Following all possible coupling modes are described.

**Never run the CDN with a loose end of the coupling unit. All connectors need to be plugged.**

The following example shows a coupling from L3 to N whereby the generator High output is connected to the INA 3083 surge coupling unit input. One end is looped, so we will have the recommended 18 µF capacitance required for line to line coupling according to IEC/EN 61000-4-5. The other pulsed end is connected to L3. The generator low output is directly connected to the N line.

For synchronisation purpose the loose end of the INA 3085 synchronisation unit needs to go to the synch connection of the generator.

The zero cross reference is taken all the time from phase L1 to N. So that phase shift of 120° from L1 to L2 and another 120° from L2 to L3 needs to be taken into account and set manually in the generator setting.

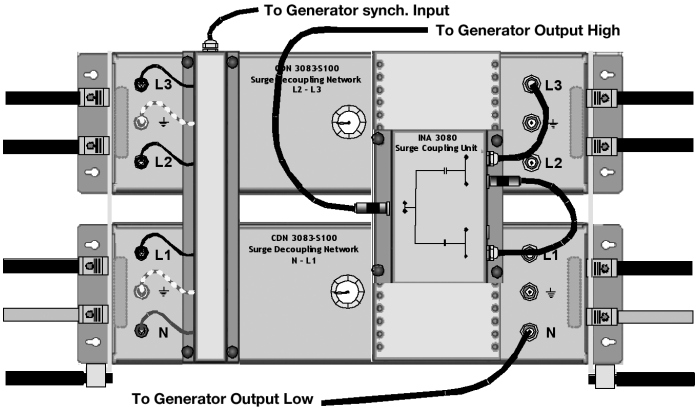



Figure 6: Example of IEC coupling L3- N

Alternative connection possibilities are summarized in table 1 hereafter.

## 5.1 IEC coupling modes

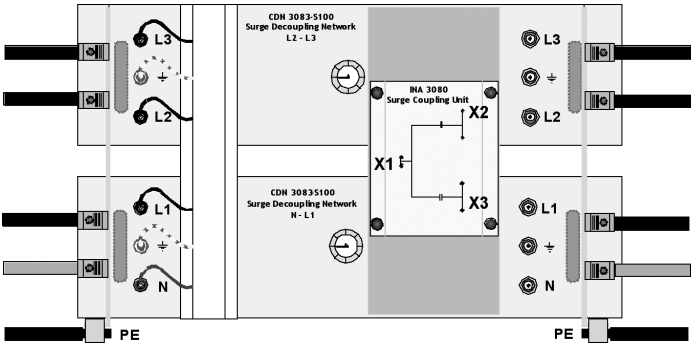



Figure 7: IEC coupling basic configuration

All IEC/EN 61000-4-5 coupling possibilities are listed. For easy understanding, the coupling network INA 3080 input is identified by X1 while the outputs are marked with X2 and X3. Depending on coupling mode selected following connections are to be established for:

## IEC line to line

| | Generator output | | Loop on INA 3080 | Decopling network CDN 3083-S100 | | |
|---|---|---|---|---|---|---|
| | High | Low | | L1 | L2 | L3 |
| L1 – N | X1 | N | X2 to X3 | X3 | | |
| L1 – L2 | X1 | L2 | X2 to X3 | X3 | | |
| L1 – L3 | X1 | L3 | X2 to X3 | X3 | | |
| | | | | | | |
| L2 – N | X1 | N | X3 to X2 | | X2 | |
| L2 – L1 | X1 | L1 | X3 to X2 | | X2 | |
| L2 – L3 | X1 | L3 | X3 to X2 | | X2 | |
| | | | | | | |
| L3 – N | X1 | N | X3 to X2 | | | X2 |
| L3 – L1 | X1 | L1 | X3 to X2 | | | X2 |
| L3 – L2 | X1 | L2 | X3 to X2 | | | X2 |

## IEC line to ground

| | Generator output | | Loop on INA 3080 | Decopling network CDN 3083-S100 | | | |
|---|---|---|---|---|---|---|---|
| | High | Low | | N | L1 | L2 | L3 |
| N – PE | X1 | PE | X2 to X2 | X3 | | | |
| L1 – PE | X1 | PE | X2 to X2 | | X3 | | |
| L2 – PE | X1 | PE | X3 to X3 | | | X2 | |
| L3 – PE | X1 | PE | X3 to X3 | | | | X2 |

Table 1: Selection of IEC coupling modes

## Manual high-current coupling network CDN 3083–S100

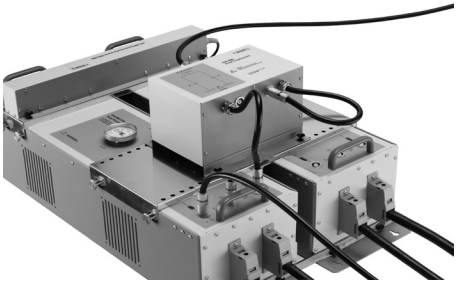


Photo 6: IEC coupling L1-N

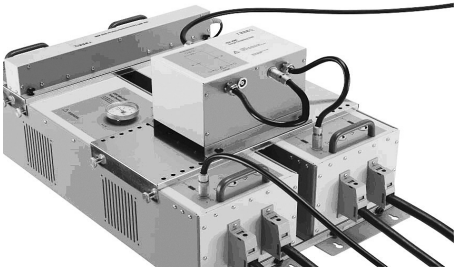


Photo 7: IEC coupling L2-N

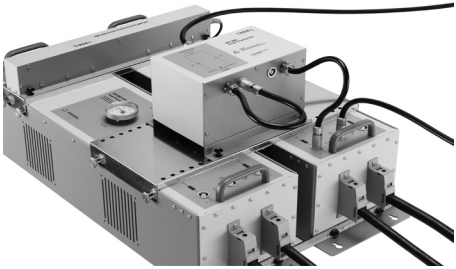


Photo 8: IEC coupling L2-PE

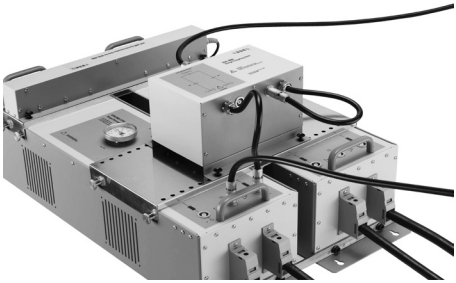


Photo 9: IEC coupling L1-PE

### 5.1.1 Optional IEC coupling

Optional coupling modes are possible with a second surge coupling unit INA 3080. Those are different multiline couplings to ground such as:

| | |
|---|---|
| L1+L2 – PE | L1+L2+L3 – PE |
| L1+L3 – PE | L1+L2+N – PE |
| L1+N – PE | L1+L3+N – PE |
| L2+L3 – PE | L2+L3+N – PE |
| L2+N – PE | L1+L2+L3+N – PE |
| L3+ N – PE | |

## 5.2 ANSI coupling mode

For coupling modes required by ANSI standard, a second INA 3080 needs to be added on the CDN 3083.

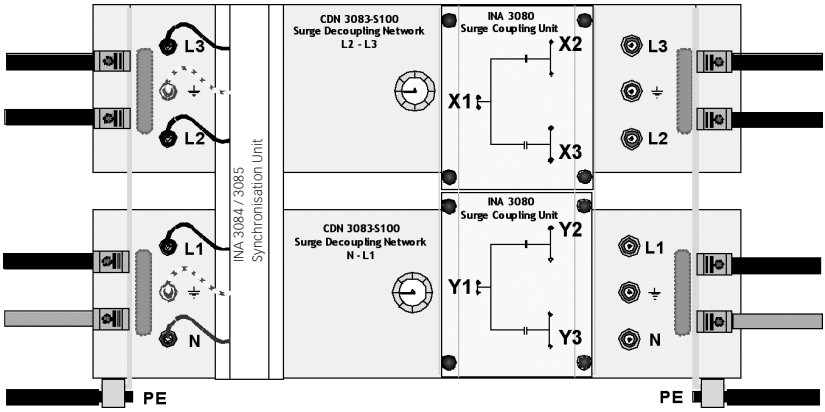



Figure 8: ANSI coupling basic configuration

## ANSI coupling

| | Generator output | | Loop on INA 3080 | Connection from X1 to Y1 | Decoupling network CDN 3083-S100 | | | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | | | N | L1 | L2 | L3 |
| Basic 1 | X1 | PE | –– | Yes | Y3 | Y2 | X3 | X2 |
| Basic 2 | X1 | L1 | X2 to X3 | No | | | X3 | |
| Basic 3 | X1 | L2 | X2 to X3 | No | | | | X2 |
| Basic 4 | X1 | L3 | Y3 to Y2 | No | | Y2 | | |
| | | | | | | | | |
| Suplemental 1 | X1 | PE | Y2 to Y3 | No | Y3 | | | |
| Suplemental 2 | X1 | PE | Y3 to Y2 | No | | Y2 | | |
| Suplemental 3 | X1 | PE | X2 to X3 | No | | | X3 | |
| Suplemental 4 | X1 | PE | X3 to X2 | No | | | | X2 |
| | | | | | | | | |
| Diagnostic 1 | X1 | N | Y3 to Y3 | Yes | | Y2 | X3 | X2 |
| Diagnostic 2 | X1 | PE | Y3 to Y3 | Yes | | Y2 | X3 | X2 |

Table 2: Selection of ANSI coupling modes

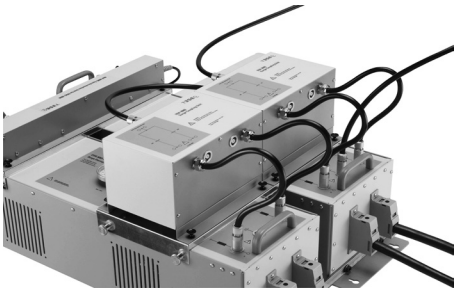
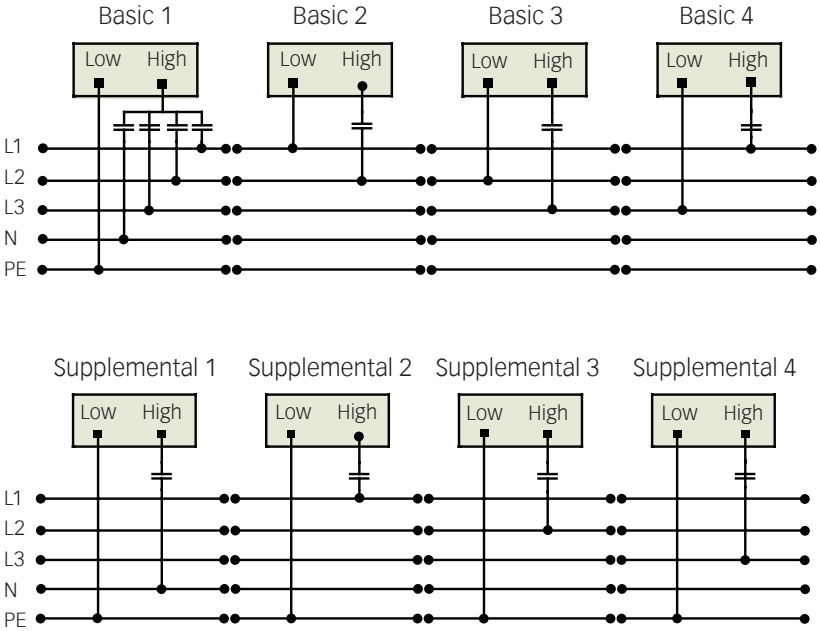
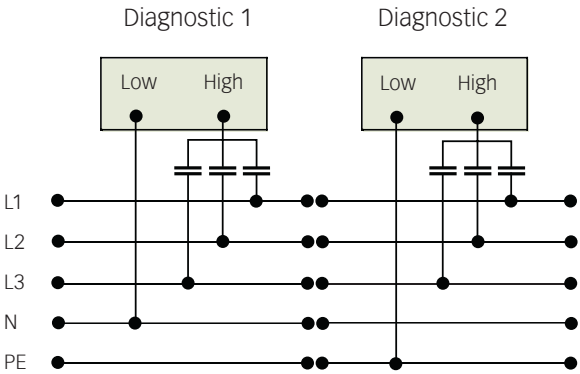


Photo 10: ANSI coupling basic 1




**Manual high-current coupling network CDN 3083–S100**




The following example shows diagnostic 1 ANSI coupling.

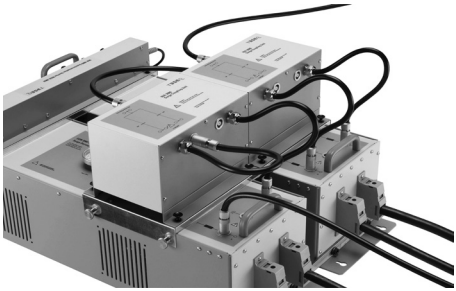


Photo 11: ANSI coupling diagnostic 1

# 6 EFFECTS ON THE EUT

The surge pulse contains considerable energy. When super-imposed on the mains, a significant resultant current can occur if the EUT becomes defective. The effects can be very different, depending on the characteristics of the equipment undergoing the test:

- No effect
- Brief faulty operation without permanent damage
- Reduction of the insulation resistance or similar
- Quality is affected (life expectancy)
- Change in the technical specification of the device under test
- Flash-over in cables, connectors and equipment
- Bursting of components
- Explosion of components
- Burning of parts caused principally by resultant mains current when mains superposition mode is used
- Damage to equipment, systems or components that are electrically or inductively coupled to the pulse current path

**When testing with high energy surge pulses, a test on a device should never be considered as being damage-free until a subsequent thorough investigation proves that the EUT is still fully intact.**

# 7 MAINTENANCE



Basically there is no need of maintenance and the CDN does not contain serviceable parts. The housing may be cleaned with a moist cloth with possibly just a trace of detergent liquid. Industrial spirit is also a suitable cleaning agent. Other solvents are not permitted.

Only specialist or trained maintenance personnel may carry out internal work on the instrument. In the event of more service or repair work being necessary, the instrument should be returned to a Teseq service center accompanied by an appropriate description of the problem. The instrument contains no fuses.

# 8 TECHNICAL SPECIFICATIONS CDN 3083–S100

The CDN 3083 is a 3-phase manual coupling network for surge interference pulses as per IEC/EN 61000-4-5 and ANSI C62.45 and other related standards.

| | |
|---|---|
| The CDN 3083-S100 base set is consisting of: | 1 Surge decoupling network CDN 3083-S100 N – L1<br>1 Surge decoupling network CDN 3083-S100 L2 – L3<br>2 Earth rails<br>1 Wheel set<br>1 Allen key, isolated<br>1 User manual CDN 3083 E<br>1 Test certificate |
| Optionally required either: | |
| IEC coupling set | 1 INA 3080 Surge coupling unit |
| or | |
| IEC/ANSI coupling set: | 2 INA 3080 Surge coupling unit<br>1 Connection cable |

Depending on generator used, following complementary items are required for:

| | |
|---|---|
| NSG 2050 generator system: | 1 INA 3085 Synchronication unit for NSG 2050 system<br>2 x Cable 1 m, with Fischer/Lemo plug<br>1 Dummy plug for NSG 2050 generator |
| Modula: | 1 INA 3084 Synchronisation unit for NSG 3040 and Modula<br>2 x Cable 1 m, with each a Fischer/Fischer plug |
| NSG 3040/3060: | Consult factory |

**Manual high-current coupling network CDN 3083–S100**

| | |
|---|---|
| Pulse voltages/current: | 8 kV/4 kA max. |
| EUT power supply voltage:<br><br><br>Current:<br>Frequency: | Line-to-line or line-to PE 620 Vrms or 620 VDC, max. (max. 440 Vrms for NSG 3040 and Modula)<br>100 Arms or DC max. per line<br>DC to 60 Hz (400 Hz max. with increased power loss) |
| EUT connection: | Screw-terminals, 230 A, up to 110 $mm^2$ (AWG 4-4/0) |
| Max. temperature: | 70°C |
| Decoupling conditions: | As per IEC/EN 61000-4-5 and ANSI C62.45 |
| Coupling modes: | Surge differential, lines to PE, common to PE (with ANSI coupling set or with optional INA 3080 coupling unit for IEC) |
| Dimensions: | 850 x 520 x 345 (L x D x H) mm (33.5 x 20.5 x 13.6") |
| Weight: | 80 kg approx. |
| Optional accessories: | INA 3080 Surge coupling unit (for IEC)<br>MD 300 Current measuring probe<br>MD 200/200A Voltage measuring probe |

| | | |
|---|---|---|
| **IEC coupling modes:** | Line to ground (9 µF) | L1 — PE<br>L2 — PE<br>L3 — PE<br>N — PE |
| | Line to line (18 µF) | L1 — N<br>L1 — L2<br>L1 — L3<br>L2 — N<br>L2 — L3<br>L3 — N |

**Optional IEC coupling modes (possible only with second INA 3080):**

| | |
|---|---|
| Lines to ground (9 µF) | L1+L2 — PE |
| | L1+L3 — PE |
| | L1+N — PE |
| | L2+L3 — PE |
| | L2+N — PE |
| | L3+ N — PE |
| | L1+L2+L3 — PE |
| | L1+L2+N — PE |
| | L1+L3+N — PE |
| | L2+L3+N — PE |
| | L1+L2+L3+N — PE |

**ANSI coupling modes (possible only with second INA 3080):**

| | |
|---|---|
| Basic 1 (9 µF) | L1+L2+L3+N — PE |
| Basic 2 (18 µF) | L2 — L1 |
| Basic 3 (18 µF) | L3 — L2 |
| Basic 4 (18 µF) | L1 — L3 |
| | |
| Supplemental 1 (18 µF) | N — PE |
| Supplemental 2 (18 µF) | L1 — PE |
| Supplemental 3 (18 µF) | L2— PE |
| Supplemental 4 (18 µF) | L3 — PE |
| | |
| Diagnostic 1 (9 µF) | L1+L2+L3 — N |
| Diagnostic 2 (9 µF) | L1+L2+L3 — PE |

**Manual high-current coupling network CDN 3083–S100**

# 9 WARRANTY



Teseq grants a guarantee of 2 years on this instrument, effective from the date of purchase.

During this period, any defective component/part will be repaired or replaced free of charge or, if necessary, the instrument will be replaced by another of equivalent value. The decision regarding the method of reinstating the functional capability is at the sole discretion of Teseq.

Excluded from the guarantee are damage or consequential damage caused through negligent operation or use as well as the replacement of parts subject to degradation.

The guarantee is rendered invalid by any intervention by the customer or a third party.

The goods are to be returned in the original packing or other equivalent packing suitable for the purpose of the foreseen means of transport. Teseq shall accept no responsibility for damage in transit.

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