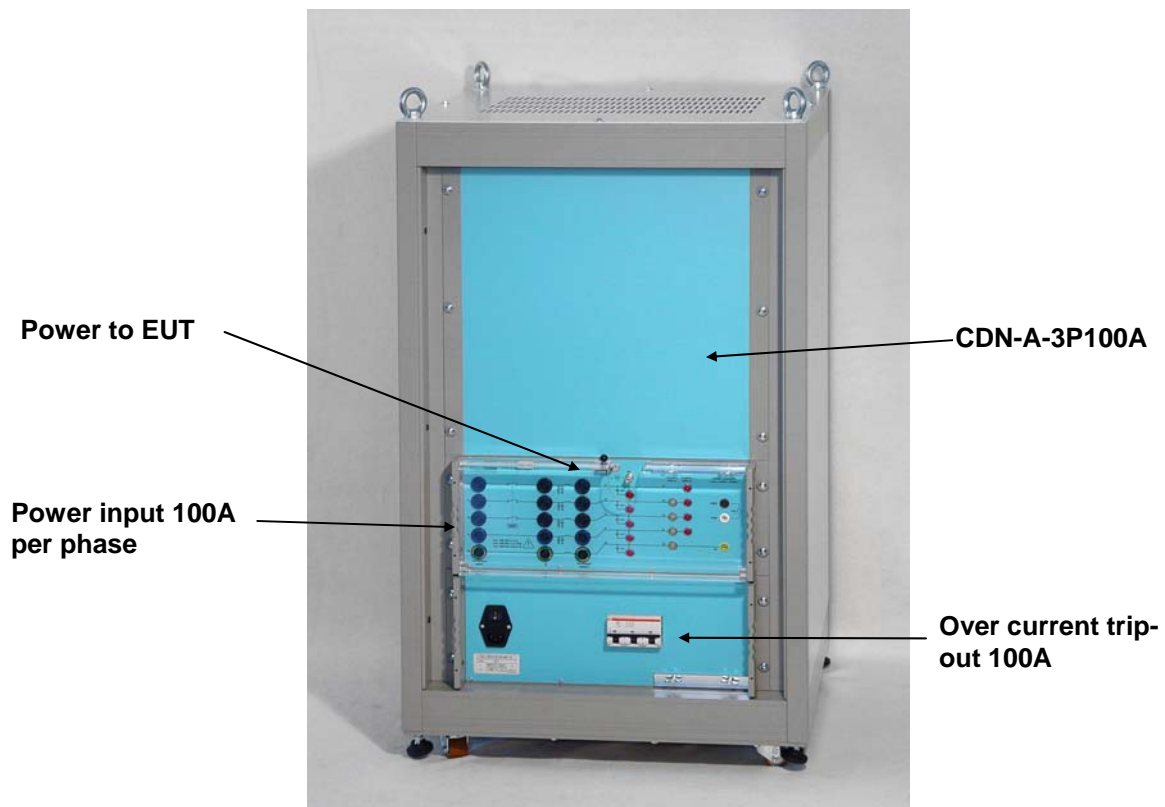


## Technical Specification

No. E-CDN-A-3P100-xxx F-S.doc  
Revised: 22.June 2012

### CDN-A-3P100 xxx F-S 100A / 690V ac and dc



The CDN-A-3P100 xxx F-S is a three phase coupling decoupling network for three phases up to 100A a.c. per phase. The coupling paths switching can be programmed with TRA3000 or TRA2006. The CDN-EFT-3P100A does not include the TRA generator.

**Two versions are available:**

**CDN-A-3P100-480 F-S, PN 104116:** Phase to phase voltage maximum 480V and 280V Phase to neutral or protective earth

**CDN-A-3P100-690 F-S, PN 104118:** Phase to phase voltage maximum 690V and 398V phase to neutral or protective earth

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### 1.1 Introduction

TRA3000 or TRA2006 testers can be extended with a manually or automatically operated three-phase coupling network. With regard to its price and dimensions, the three-phase coupling network is a genuine alternative to mains coupling filters available on the market today. The CDN-A-3P100-xxx F-S can be used for SURGE as well as for EFT superimposing. The desired coupling path can be selected in the generator control. The coupling network fulfils the requirements laid down in the IEC 61000-4-5- and IEC 61000-4-4 Ed.2 standards.

## 2 General

### 2.1 Brief description of the CDN

The CDN-A-3P100 xxx F-S is a coupling decoupling network for impulses with voltage wave shape 1,2/50  $\mu$ s and current wave shape 8/20  $\mu$ s.

The serial chokes in the decoupling filter are of low inductance (0.25 mH) therefore the voltage drop at 100 A is still below 10 %. Furthermore the low inductance allows to start heavy loads with large „turn ON“current. With serial inductance of 1.5 mH a lot of EUT can not be powered up.

### 2.2 EUT connection (equipment under test)

The EUT power lines are connected on the front panel of the CDN-A-3P100 xxx F-S. The un-surged power lines are on the rear connected to the CDN.

### 2.3 Standards, applications

#### IEC 61000-4-5 Ed.2

Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test

Information in IEC 61000-4-5 Ed.2 related to coupling de-coupling on power line

To prevent unwanted voltage drops in the coupling/decoupling networks, the value of the coupling element generally must be reduced for coupling/decoupling networks rated at >25 A. For this case, the "time to half value" of the open-circuit voltage waveform may be reduced in accordance with Tables 6 and 7 below.

Current rating 60 A – 100 A:

$C_{\text{coupling}}$  18 $\mu$ F->50  $\mu$ s +10  $\mu$ s/-20  $\mu$ s

$C_{\text{coupling}}$  9 $\mu$ F-> 50  $\mu$ s +10  $\mu$ s/-35  $\mu$ s

NOTE For EUTs having a rated input current above 100 A, direct surge coupling to a non-powered EUT without the use of a coupling/decoupling network may be the only reasonable test method. Failure criteria in Clause 9 are only applicable for powered equipment, however if an EUT is tested non-powered, item d) of Clause 9 should apply after the EUT is turned back on. Partial testing of the EUT (e.g. of the control unit alone) is acceptable when it is not possible to test an entire system due to a.c. mains current requirements of greater than 100 A.

#### IEC 61000-4-4 Ed. 2.0 b

Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

NOTE The coupling method using the clamp is required for acceptance tests on lines connected to I/O and communication ports. It may also be used on ac/dc power supply ports only if the coupling/decoupling network defined in 6.2 cannot be used.

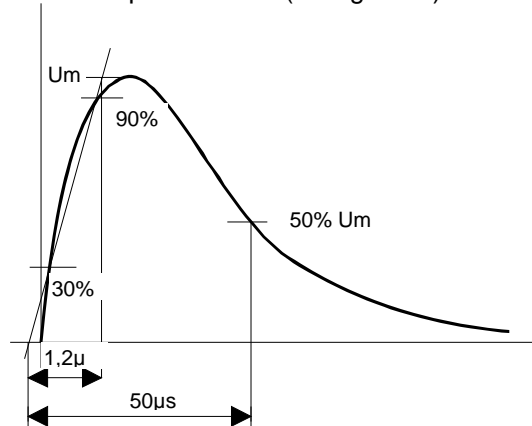
### 3 Voltage drop and wave shapes definition

The decoupling inductance shall be selected by the simulator's manufacturer so that the a.c. mains voltage drop at the EUT connector of the coupling/decoupling network is less than 10 % at the specified current rating, but should not exceed 1,5 mH.

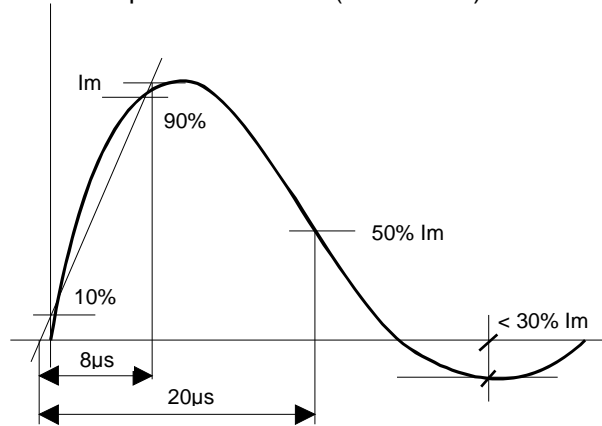
#### 3.1 Wave shape definition

**Definition of the waveforms:**

Wave shape "No load" (voltage Voc)



Wave shape "Short circuit" (Current Isc)



Both waveforms are verified in open circuit (voc) and short circuit (isc).

**Table 6 – Voltage waveform specification at the EUT port of the coupling/decoupling network**

Surge voltage parameters under open-circuit conditions	Coupling impedance	
	18 $\mu F$	9 $\mu F + 10 \Omega$
Front time	1,2 $\mu s \pm 30 \%$	1,2 $\mu s \pm 30 \%$
Time to half value:		
Current rating < 25 A	50 $\mu s + 10 \mu s / - 10 \mu s$	50 $\mu s + 10 \mu s / - 25 \mu s$
Current rating 25 A – 60 A	50 $\mu s + 10 \mu s / - 15 \mu s$	50 $\mu s + 10 \mu s / - 30 \mu s$
Current rating 60 A – 100 A	50 $\mu s + 10 \mu s / - 20 \mu s$	50 $\mu s + 10 \mu s / - 35 \mu s$
NOTE The measurement of the surge voltage parameters should be done with the power supply input port of the coupling/decoupling network open-circuit.		

### 3.2 Mechanical dimensions, climatic conditions

Type	Dimensions [mm]	Weight [kg]	Versions
	width x depth x height		
CDN-A-3P100 xxx F-S	610 x 680 x 1020 mm	Approx. 99	19" Rack 18 UH

Supply power :			
Power voltage	L-N single phase 230 V/ 115V ±10% plus protective earth	auto switching	
Power consumption	Maximum <400 VA Standby < 10 VA	(230 V, 50 Hz)	(115 V, 60 Hz)

Environment conditions		
Temperature range	°C	0 to 35 °C
Humidity	rh %	25 to 80%
Pressure	kPa	86 to 106



#### Accessories to CDN-A-3P100 xxx F-S

- Power cord length 5 m ( 5 x 25 mm<sup>2</sup>)
- Safety Circuit "MIG Auxiliary" (1 pce)
- 5 MC connector 100 A (3 x black, 1 x yellow, 1 x blue) for EUT connection
- MC banana plug cables 2 m length (3 x black, 1 x blue, 1 x yellow/green)
- 4 screws for top cover fixing, when transport rings are removed
- Key for rear door
- User manual (1 pce) including:
  - Declarations of conformity: EMC, LVD, BASIC
  - Verification protocol EMC PARTNER
  - EMCP Demo Software Package (1CD)

CDN-A-3P100 xxx F-S

**The power connection cables for 100A are normally inflexible and heavy; as a consequence the generator must also be robust. For 100 A loads usually the EUT are also large and the set-up is made on laboratory floors. Therefore the CN-EFT-3P100A is designed in a movable rack. The CDN can be easily moved around in the laboratory.**

## 4 Technical data

### 4.1 Coupling filter to Combination SURGE Tester

<b>Coupling:</b>	Connection between generator and power supply line to the EUT.	
<b>SURGE</b>	Automatic coupling path selection	on display or software TEMA
IEC 61000-4-5	L1-PE, L2-PE, L3-PE, N-PE	10 Ω 9μF plus 2 Ω within generator
	L1-L2, L2-L3, L1-L3, L1-N, L2-N, L3-N	2 Ω generator plus 18μF
Damping	According to IEC 61000-4-5	
<b>De-coupling:</b>		
SURGE	according to IEC 61000-4-5	

#### Three phase coupling

<b>Power supply EUT/ ac</b>		<b>Versions:</b>
Nominal voltage	Phase – Phase $f < / = 60$ Hz	Max. 690 V or 480V
	Phase - Null	Max. 400 V or 280V
	Phase - Earth	Max. 400 V or 280V
Voltage Fluctuation		± 10% of Nominal Voltage
Synchronisation	onto different phases possible L1, L2 and L3. Automatically switched with the coupling path, or external or „OFF“	
Nominal current	per phase	100 A a.c. $f < / = 60$ Hz
Voltage drop	< 10 V per phase or neutral	at 100 A per phase
Over current protection switch	Continuous current: Short time current:	switching at 100 A up to 500 A switching at <2s
<b>Power supply EUT/ dc</b>		
Nominal voltage	L - N L - L	60 V one pole 110 V two pole
Nominal current	per line	63 A

#### DC and Single phase coupling with lines connected in parallel for higher current

<b>Power supply EUT a.c</b>	single phase	
L1//L2 and L3//N	100 A	voltage drop < 5 V per phase
	160 A	voltage drop <10 V per phase
<b>Power supply EUT d.c</b>	with over-current protector (CB)	
L1 to N	63 A	voltage up to 60 V
L to L	63 A	voltage up to 110 V
L1//L2 and L3//N	126 A	voltage up to 60 V
<b>Power supply EUT d.c</b>	<b>CB short circuited / by-passed</b>	
Input Lx to Lx and Lx to Lx	100 A	Input voltage up to +/-300 V
EUT Output Lx to Lx	100 A	Output voltage up to 600 V



**ATTENTION, The DC power supply MUST be connected to the CDN earth**

When the EUT is powered with d.c and the over-current protector is short circuited or by-passed the EUT power supply can not be turned „OFF“ by the CDN or the test generator. External fuses or interrupter must be within the circuit to turn „OFF“ the d.c. power supply.

4.1.1 Coupling filter to EFT Tester

<b>Coupling:</b>	Connection between the TRA and the power supply line to the EUT.	
EFT	Automatic selection of the coupling path	on display or software TEMA
IEC 61000-4-4	L1-GND, L2-GND, L3-GND, N-GND, PE-GND	GND = reference ground = reference ground plane
	L1+ L2 + L3 + N + PE to GND	10 nF per path
Damping	correspond to IEC 61000-4-4 Ed.2	
<b>De-coupling:</b>		
EFT	correspond to IEC 61000-4-4 Ed.2	

Three phase coupling

<b>Power supply EUT/ ac</b>		
Nominal voltage	Phase - Phase $f \leq 60$ Hz	Max. 690 V or 480V*
	Phase - Null	Max. 400 V or 280V
	Phase - Earth	Max. 400 V or 280V
Voltage Fluctuation		$\pm 10\%$ of Nominal Voltage
Nominal current	per phase	100 A a.c. $f \leq 60$ Hz
Voltage drop	$< 10$ V per phase or neutral	at 100 A per phase
Over current protection switch	Continuous current: Short time current:	switching at 100 A up to 500 A switching at $< 2s$
<b>Power supply EUT/ dc</b>		
Nominal voltage	L - N L - L	60 V one pole 110 V two pole
Nominal current	per line	63 A

\*Note: ordering number for the different version see page 1

DC and Single phase coupling with lines connected in parallel for higher current

<b>Power supply EUT a.c</b>	single phase	
L1//L2 and L3//N	100 A	voltage drop $< 5$ V per phase
	160 A	voltage drop $< 10$ V per phase
<b>Power supply EUT d.c</b>	with over-current protector (CB)	
L1 to N	63 A	voltage up to 60 V
L to L	63 A	voltage up to 110 V
L1//L2 and L3//N	126 A	voltage up to 60 V
<b>Power supply EUT d.c</b>	<b>CB short circuited / by-passed</b>	
Input Lx to Lx and Lx to Lx	100 A	Input voltage up to $\pm 300$ V
EUT Output Lx to Lx	100 A	Output voltage up to 600 V



**ATTENTION, The DC power supply and CDN MUST be connected to earth**

When the EUT is powered with d.c and the over-current protector is short circuited or by-passed the EUT power supply can not be turned „OFF“ by the CDN or the test generator. External fuses or interrupter must be within the circuit to turn „OFF“ the d.c. power supply.

### 5. DC connections to CDN-A-3P100-690-F-S

The following diagram is an example of how to connect the CDN-A-3P100-690-F-S for dc operation.

