RadiCoupler®

Part of the conducted immunity testing bundle

Product Manual

Models:
CPL M1-16A, CPL M2-16A, CPL M3-16, CPL M5-32A
CPL AF2, CPL AF3, CPL AF4
CPL T2, CPL T4, CPL T8
CPL USB-P, CPL USB-C, CPL USB3.0-P, CPL USB3.0-C
Cal adapter sets

CERTIFIED
LR
ISO 9001

Radi*C*oupler® Product Manual

This service and operating manual pertains to the Radi*C*oupler® system.
Model: CPL M1-16A, CPL M2-16A, CPL M3-16, CPL M5-32A
CPL AF2, CPL AF3, CPL AF4
CPL T2, CPL T4, CPL T8
CPL USB-P, CPL USB-C, CPL USB3.0-P, CPL USB3.0-C
Cal adapter sets

Made by DARE!! Instruments.

We ask that you read this manual carefully before operating your new product and adhere to any safety instructions it might contain.

Please contact DARE!! Instruments or your local reseller if you have any questions.

Supplier Information

Radi*C*oupler® manual v.1.0
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Table of Content

WARNINGS & PRECAUTIONS

Read the contents of this manual and become familiar with the safety markings, instructions, operation and handling of the system.

Become familiar with the contents of the manual.

Only qualified service personnel is allowed to carry out adjustments, maintenance or repairs on the equipment.

The Radi*C*oupler® contains materials that can be recycled and reused to minimize material waste. At the 'end-of-life', specialized companies can dismantle the discarded system to collect the reusable and recyclable materials. If your product is discarded at its 'end-of-life', please return it to your local reseller for recycling.

The Radi*C*oupler® M3 and M5 models require a protective earth connection. The mains power source for the equipment must supply an uninterrupted safety ground to the IEC input connector.

The Radi*P*ower® contains no hazardous substances as described in the RoHS-directive.

1   Introduction

1.1   Product Introduction

The international basic standard for conducted immunity testing (IEC 61000-4-6) specifies the design and characteristics of a range of coupling / decoupling networks (CDN's). To be able to perform conducted immunity testing on an EUT (Equipment Under Test) with several types of connecting cables, different CDN's are needed. DARE!! Instruments introduces a complete range of high quality, full compliant and easy-to-use CDN's that enables customers to perform full compliant, simple and reliable conducted immunity testing on any kind of EUT cable.

1.2   Related Products

Conducted Immunity Test Bundle

The CI test Bundle is a turn-key solution for conducted immunity testing based on the RadiCentre® modular EMC test system including Radi**G**en® RF signal generator, Radi**A**mp® RF power amplifier and Radi**P**ower® RF power meter.

Radi**M**ation® software

Radi**M**ation® is the EMC software package from DARE!! Instruments used for remote control and automated testing of the Radi**C**entre® plug-in cards and modules (such as the Radi**F**ield® system).

1.2.1   Available plug-in cards

The Radi*C*entre® can be expanded with many different plug-in cards. The following cards are available:

Radi*C*ontrol®

A versatile antenna tower and turntable controller.

Radi*F*ield®

Power supply plug-in card to power the Triple A, this card fills two slots.

Radi*G*en®

A range of EMC signal generators, from 9 kHz to 6 GHz.

Radi*L*ink®

A range of analogue fiber optic RF links, up to 3 GHz.

Radi*P*ower®

A four channel USB plug-in card for a range of power meters for EMC and RF applications, at 6 and 18 GHz.

Radi*S*upply®

Power supply plug-in card for battery free, laser powered, Radi*S*ense® EM Field Sensors, at 4, 6 and 18 GHz.

Radi*S*witch®

A range of coaxial switch plug-in cards with SMA, N-type and K-type relays up to 40 GHz.

2   The RadiCoupler

2.1   Product Characteristics

The Radi*C*oupler® Coupling / Decoupling Network (CDN) is intended for conducted immunity testing on EUT cables. The Radi*C*oupler® is full compliant to the international standards CISPR16, IEC61000-4-6, EN55015 and EN55035 and each model covers a frequency range from 100 kHz to 300 MHz. The Radi*C*oupler® has a robust RF N-type input connector and uses a patented Easy Magnetic-Grounding connection.

2.2   Components

The Radi*C*oupler® is delivered with the following items:

- The Radi*C*oupler® Coupling / Decoupling Network

- Calibration certificate (ISO17025 accredited calibration is optional)

- USB stick containing the (digital) User Manual

2.3   Different Models

The Radi*C*oupler® is available as a range of products that is suitable for different types of cables and/or connectors.

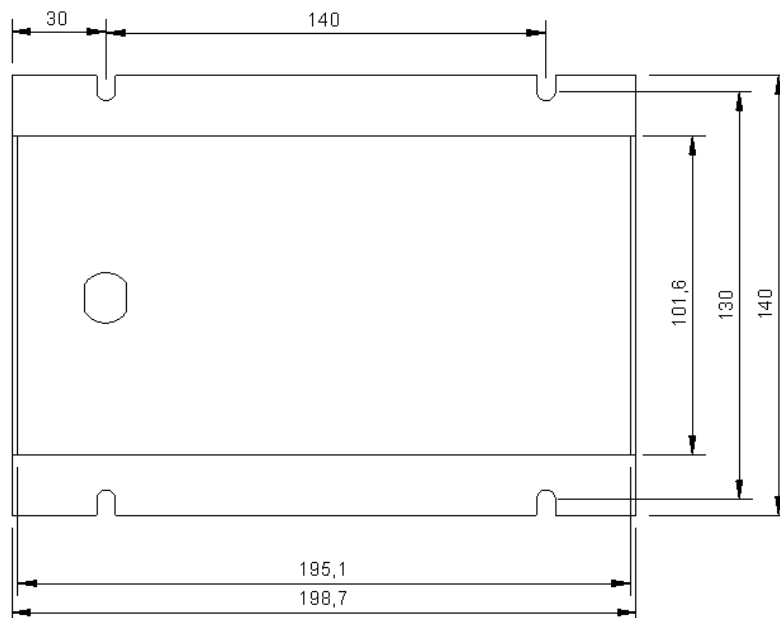| Type Cable	Product name*	Application	Connector EUT port	Connector AE port
Mains	CPL M1 16A	1 line, 16 A	4 mm safety banana	4 mm safety banana
Mains	CPL M2 16A	2 line, 16 A	4 mm safety banana	4 mm safety banana
Mains	CPL M3 16A	3 line, 16 A	4 mm safety banana	4 mm safety banana
Mains	CPL M3 32A	3 line, 32 A	4 mm safety banana	4 mm safety banana
Mains	CPL M5 32A	5 line, 32 A	4 mm safety banana	4 mm safety banana
Unscreened	CPL T2	2 line, balanced	4 mm safety banana	4 mm safety banana
Unscreened	CPL T4	4 line, balanced	4 mm safety banana	4 mm safety banana
Unscreened	CPL T8 RJ45	8 line, RJ45	RJ45	RJ45
Screened	CPL S8 RJ45	8 line, RJ45	RJ45	RJ45
Screened	CPL USB-C	USB	USB-B	USB-A
Screened	CPL USB-P	USB	USB-A	USB-B
Screened	CPL USB-3.0-C	USB 3	USB-B 3.0	USB-A 3.0
Screened	CPL USB-3.0-P	USB 3	USB-A 3.0	USB-B 3.0
Screened	CPL HDMI	HDMI	HDMI	HDMI
Unbalanced	CPL AF2	2 line, unbalanced	4 mm safety banana	4 mm safety banana
Unbalanced	CPL AF3	3 line, unbalanced	4 mm safety banana	4 mm safety banana
Unbalanced	CPL AF4	4 line, unbalanced	4 mm safety banana	4 mm safety banana

3   Hardware

The Radi*C*oupler® with calibration adapters (optional: CPL CAL SET)
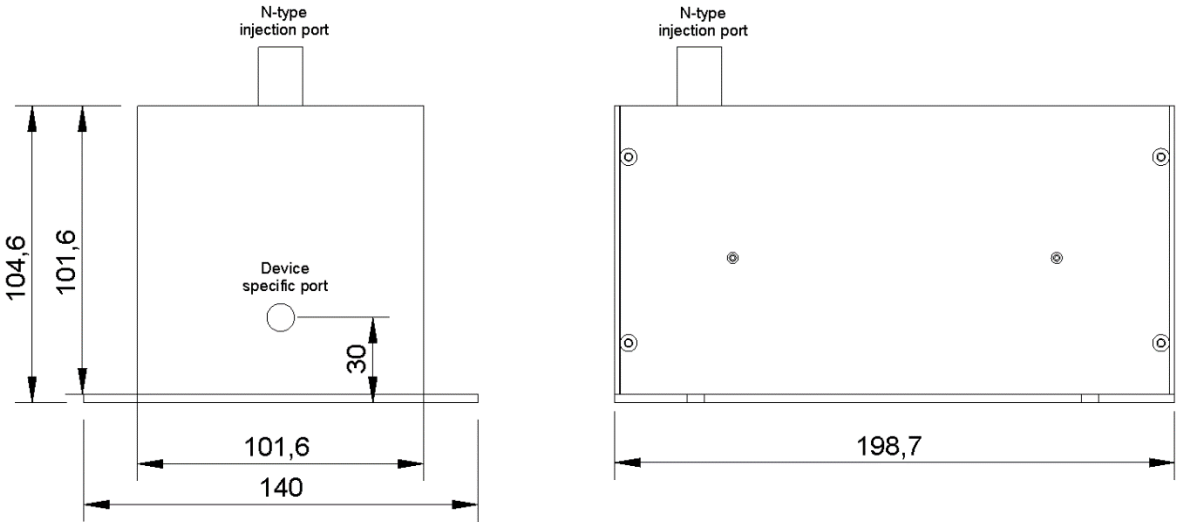

3.1   CDN Dimensions

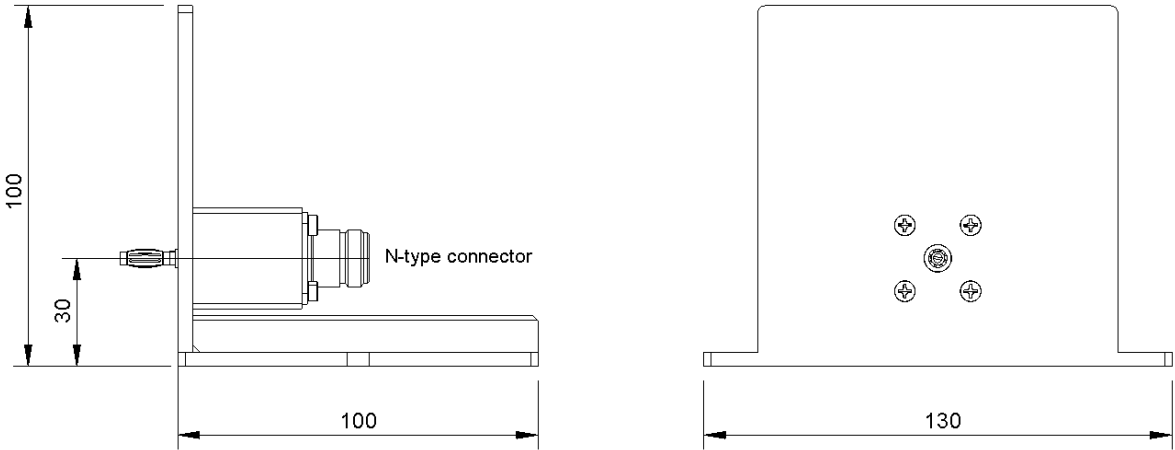Top view of the Radi*C*oupler®

Side views of the Radi*C*oupler®

Each Radi*C*oupler® has a device specific connector for the EUT and AE-port. This connector is located at 30mm above the bottom plate of the CDN.
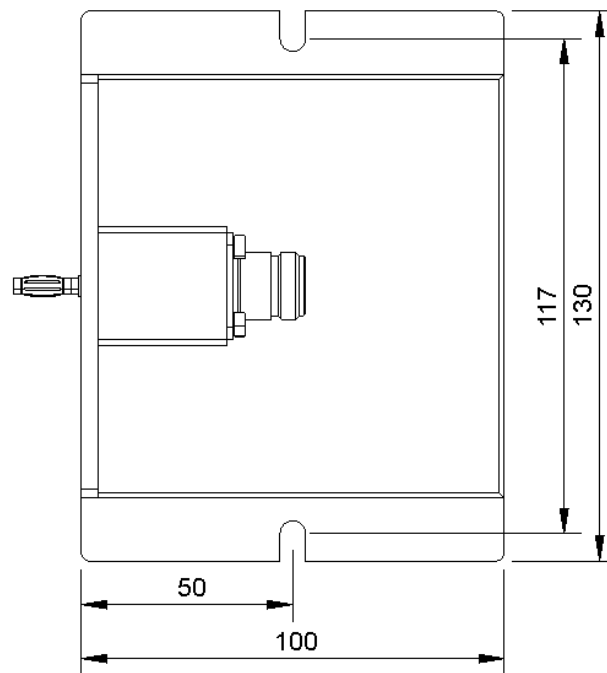
3.2   Cal adapter set

The Cal adapter set consists of 2 sets of adapters: one 0 Ohm set and one set to match 50 to 150 Ohms. Each set matches the height of the CDN's and are delivered with two adaptor connectors to match the specific connector on the CDN to the Cal adapter set.
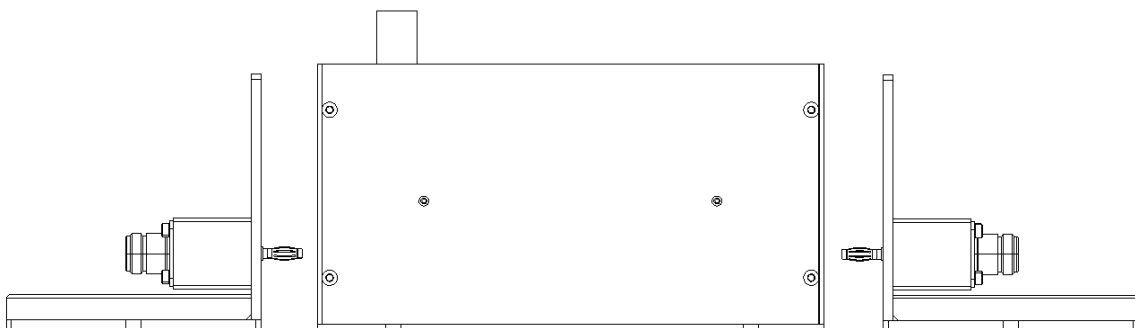
Side views of the Cal adapter

Top view of the Cal adapter

3.3   Mechanical fixation

All Radi*C*oupler® CDN's as well as the Cal adapters are provided with an integrated powerful magnet for easy and quick fixation to a metal ground plane. Please beware that while placing the CDN or Cal adapter on any metal plate, the force can be quite large. The housings of the CDN's and Cal adapters are all conductive to provide good grounding to the ground plane of the test setup.

4. RadiCoupler specifications

For measurements using CDN's, several standards are available. The table below gives an overview of these standards with each specific requirement for the impedances, transfer and isolation.

Standard	Value	Frequency	RadiCoupler®
CISPR 16-1-2			
Impedance (magnitude)	150 ± 20 Ω	0,15 - 30 MHz	✅
Impedance (phase)	± 20 °	0,15 - 30 MHz	✅
Response	-9,6 to -12,6 dB	0,15 - 150 MHz	✅
Isolation	> -40 dB	0,15 - 108 MHz	✅
IEC 61000-4-6			
Impedance (magnitude)	150 ± 20 Ω	0,15 - 24 MHz	✅
	150 + 60 Ω / -45 Ω	24 - 80 MHz	✅
	150 ± 60 Ω	80 - 230 MHz	✅
EN 55015			
Impedance (magnitude)	150 ± 20 Ω	0,15 - 26 MHz	✅
	150 + 0 Ω / -45 Ω	26 - 80 MHz	✅
	150 ± 60 Ω	80 - 300 MHz	✅
EN 55020			
Impedance (magnitude)	150 ± 20 Ω	0,15 - 30 MHz	✅
Impedance (phase)	± 20 °	0,15 - 30 MHz	✅
EN 55035			
Response	± 30 dB	0,15 - 30 MHz	✅
All standards combined			
Impedance (magnitude)	150 ± 20 Ω	0,15 - 30 MHz	✅
Impedance (phase)	± 20 °	0,15 - 30 MHz	✅
Response	-9,6 to -12,6 dB	0,15 - 150 MHz	✅
Isolation	> -40 dB	0,15 - 108 MHz	✅

The RadiCoupler® CDN's comply to all of these standards

Mechanical specification	
Dimensions CDN housing (W x H x D)	100 mm x 100 mm x 200 mm
Dimensions CDN outline (W x H x D)	140 mm x 120 mm x 206 mm
Weight	± 1.2 kg

WARRANTY CONDITIONS

DARE!! Instruments offers a standard warranty term of three years on their products, starting from the shipping date. This warranty is applicable to all EMC test & measurement products, such as:

- Radi*C*entre® modular / multifunctional EMC test systems
- Radi*C*ontrol® antenna tower/turntable controllers
- Radi*F*ield® Triple A field generators
- Radi*G*en® signal generators
- Radi*P*ower® RF power meters
- Radi*S*ense® laser powered E-field probes
- Radi*S*witch® RF coaxial switches
- Radi*C*oupler® Coupling / Decoupling Networks

On the conducted immunity bundle (complete system) is a warranty term of 5 years applicable.

If a defect occurs within the warranty term, a Return Material Authorization (RMA) 'Warranty Repair' request can be issued using the RMA link at http://rma.dare.eu. The defective product can then be shipped to DARE!! Instrument for repair by our service department.
There will be no charge for repair services (materials or labor) within the warranty term. The customer will need to cover the costs for returning the product to DARE!!, such as shipping and/or any applicable duties and taxes. DARE!! Instruments will arrange the courier and cover the costs for the return shipment.

These warranty terms are not applicable to:

- Fiber optic cables
- Products that have been improperly used
- Products that have been used outside their specified range
- Products that have been improperly installed and/or maintained
- Products that have been modified without approval of DARE!! Instruments
- Calibration and/or re-calibration of the product
- Consumable products such as batteries, ink etc.

Repair services on products that are not covered by the DARE!! warranty will be charged to the customer. If a defect occurs to our product outside the warranty period, a RMA repair and/or re-calibration request must be issued using the RMA link at http://rma.dare.eu.
The repairs (outside the original warranty period) have a warranty limited to six months. Shipping conditions are the same as with repairs within the original warranty period.