

# User Manual

Version 3.26

Technical Data 4.8



## DOW3000

- CDN-DOW-DATA-LF
- CDN-DOW-DATA-HF
- CDN-DOW-DATA-HF
- ADAPTER BOX RJ45-8L
- MF1000-1
- MF1000-2
- CN-EFT1000
- VERI-CP-EFT
- VERI1K EFT
- VERI01 OSI
- VERI50 EFT

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## Typographical Conventions



### Warnings

Safety notices that must be heeded are indicated with this warning triangle.



### Additional Advice

Throughout the user manual very important or helpful advice is indicated with this symbol.

## The Small Print



All products from EMC PARTNER, where appropriate, fulfil the requirements for CE certification. A copy of the individual certificates can be viewed and downloaded from [www.emc-partner.com](http://www.emc-partner.com) section company documents.

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## Safety Instructions



This warning sign is visible on the tester. Meaning: This equipment should only be operated by trained personnel after carefully reading the user manual.

The system belongs to safety class 1.

The system fulfils the requirements of the safety standards IEC 61010 for laboratory measurement equipment "Safety requirements for electrical measuring, control and laboratory equipment".

Consider always the following safety points

- Dangerous mains voltage or high voltages are present inside the test equipment and ALL devices attached to it.
- The Protective Earth must be connected to Earth on the test equipment.
- Before removing any covers from the test equipment, remove all external connection cables.
- Before changing the mains fuse, remove all external connection cables.
- Fuses should only be replaced with the same type and value.
- People with heart pacemakers must not be in the vicinity of the test equipment when it is in operation.
- Do not switch on or operate the test equipment if an explosion hazard exists.
- The test equipment should be operated in a dry room. If condensation is visible, the affected unit(s) should be dried before operating.
- Never touch the Equipment Under Test (EUT), when the test system is operating.
- Establish a safety barrier around the EUT and if required connect it to the safety circuit in the auxiliary connector on the rear panel. The cables under high voltage must not be touched during testing.
- The EUT should be covered and/or well marked during the tests.
- If protective parts are tested, which are likely to explode during tests, they must be covered with a protective cabinet.
- If the test equipment or any of the system components are damaged or it is possible that damage has occurred, for example during transportation, do not apply any voltage.
- This user manual is an integral part of the test system. EMC PARTNER and its sales partners refuse to accept any responsibility for consequential or direct damage to persons and/or goods due to non-observance of instructions contained herein or due to incorrect use of the test equipment.

## Sicherheitshinweise



Gefahr! Dieses Warnsymbol ist am Tester sichtbar angebracht. Es bedeutet: Diese Ausrüstung darf nur durch ausgebildetes Personal bedient werden, nachdem diese die Bedienungsanleitung sorgfältig gelesen hat.

Das Gerät gehört der Schutzklasse I an.

Das Gerät erfüllt die Anforderungen der Sicherheitsnormen IEC 61010 für Messungen in Laboratorien "Sicherheitsanforderungen an elektrische Mess- und Regelgeräte sowie Laborausrüstung".

Beachten Sie stets die folgenden Sicherheitshinweise:

- Gefährliche Netzspannung oder Hochspannung liegt im Inneren der Testausrüstung und an ALLEN daran angeschlossenen Geräten an.
- Der Schutzerdeanschluss der Testausrüstung muss mit der Schutzerde des Netzes verbunden sein.
- Bevor Sie irgendwelche Abdeckungen von der Testausrüstung entfernen, entfernen Sie alle äusseren Anschlusskabel.
- Bevor Sie die Netzsicherung austauschen, entfernen Sie alle äusseren Anschlusskabel.
- Netzsicherung nur mit demselben Typ und Ansprechwert ersetzen.
- Personen mit Herzschrittmacher dürfen sich nicht in der Nähe des Geräts aufhalten, wenn dieses in Betrieb ist.
- Schalten Sie die Testausrüstung nicht ein oder betreiben Sie das Gerät nicht, wenn Explosionsgefahr besteht.
- Die Testausrüstung darf nur in einem trockenen Raum betrieben werden. Wenn Kondensation (Beschlag) sichtbar ist, sind die betroffenen Teile der Ausrüstung zu trocknen.
- Berühren Sie niemals die getestete Ausrüstung (EUT), wenn das Testsystem arbeitet.
- Stellen Sie eine Sicherheitsabtrennung rund um das EUT auf und verbinden Sie diese, wenn verlangt, mit dem Sicherheitskreis im Hilfsanschluss (Auxiliary) an der Rückwand. Die unter Hochspannung stehenden Kabel dürfen während des Tests nicht berührt werden.
- Während des Tests sollte das EUT abgedeckt und / oder gut markiert werden.
- Wenn Schutzelemente leicht explodieren können während Tests, müssen diese mit einem schützenden Deckel abgedeckt werden.
- Legen sie keine Spannung an, wenn die Testeinrichtung oder irgendwelche Systembestandteile beschädigt sind oder möglicherweise ein Schaden eingetreten ist, zum Beispiel beim Transport.
- Diese Bedienungsanleitung ist ein vollständiger Bestandteil des Testsystems. EMC PARTNER und seine Verkaufspartner lehnen jede Verantwortung für direkte wie für Folgeschäden an Personen oder Gütern ab, die aufgrund von Nichtbeachten von hierin enthaltenen Anweisungen oder aufgrund von unrichtigem Gebrauch dieser Testausrüstung entstehen.

## Consignes de sécurité



Ce sigle d'avertissement est visible sur le testeur. Signification: Cet équipement ne doit être utilisé que par du personnel formé et après avoir soigneusement lu le mode d'emploi.

Le système appartient à la classe de sécurité 1

Le système répond aux exigences des normes de sécurité CEI 61010 pour les équipements de laboratoire "Exigences de sécurité pour les appareils électriques de mesure, de contrôle et d'équipement de laboratoire".

Considérez toujours les points de sécurité suivants:

- Des tensions secteur dangereuses ou des tensions élevées sont présentes à l'intérieur de l'équipement de test et de TOUS les périphériques.
- La mise à la terre de l'équipement de test doit être effectuée.
- Avant de retirer les couvercles de l'équipement, débranchez tous les câbles de connexion externes.
- Avant de changer le fusible secteur, débranchez tous les câbles de connexion externes.
- Les fusibles ne doivent être remplacés que par le même type et valeur.
- Les personnes portant un stimulateur cardiaque ne doivent pas se tenir à proximité de l'équipement de test lorsqu'il est sous tension d'opération.
- Ne pas allumer ou faire fonctionner l'équipement de test si un risque d'explosion existe.
- L'équipement de test doit être utilisé dans un local sec. Si de la condensation est visible, les appareils affectés doivent être séchés avant utilisation.
- Ne jamais toucher l'équipement sous test (EST), lorsque le système est sous fonction.
- Mettre en place une barrière de sécurité autour de l'EST et, si nécessaire raccorder la au circuit de sécurité du connecteur auxiliaire sur le panneau arrière. Les câbles sous haute tension ne doivent pas être touchés pendant le test.
- L'EST doit être couvert et / ou bien marqué pendant les essais.
- Si des éléments de protection sont susceptibles d'exploser lors de tests, ils doivent être couverts avec un boîtier de protection.
- Si l'équipement de test ou l'un des composants du système ont été endommagés ou il est possible que des dommages ont eu lieu, par exemple pendant le transport, ne pas appliquer de tension.
- Ce manuel fait partie intégrante du système de test. EMC PARTNER et ses partenaires commerciaux refusent d'accepter toute responsabilité pour des dommages indirects ou directs à des personnes et / ou des marchandises dues au non-respect des instructions contenues dans ce document ou en raison d'une mauvaise utilisation de l'équipement de test.

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## 1 System Overview



Not all accessories are used for all tests. The chapter “Perform a test” provides more information.

### 1.1 DOW3000

The DOW3000 generator is a compact system with all waveforms for IEC 61000-4-18, IEC 61000-4-10 and several product standards. The Generator with an integrated 3-phase coupling and decoupling network is available in different versions with a combination of the following circuits.

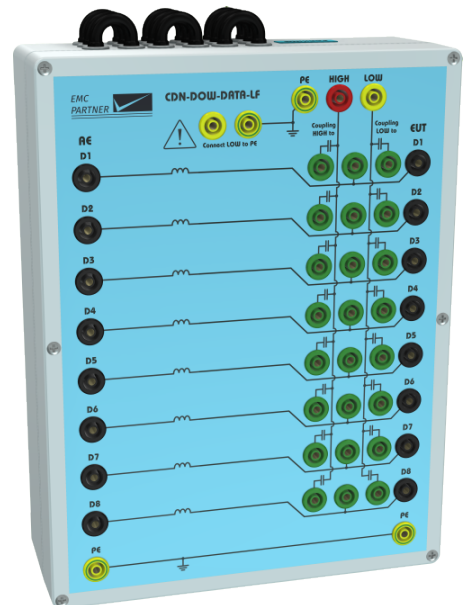
- Slow Damped Oscillation 100 kHz and 1 MHz
- Fast Damped Oscillation 3 MHz, 10 MHz and 30 MHz
- Insulation Test Impulse 1.2/50 us with 0.5 J

The 7 inch graphic colour touch panel provides an intuitive and comfortable user interface. Interactive parameter input, help text and graphic illustrations, guide the user through the instrument programming process.



### 1.2 CDN-DOW-DATA-LF (PN 108260)

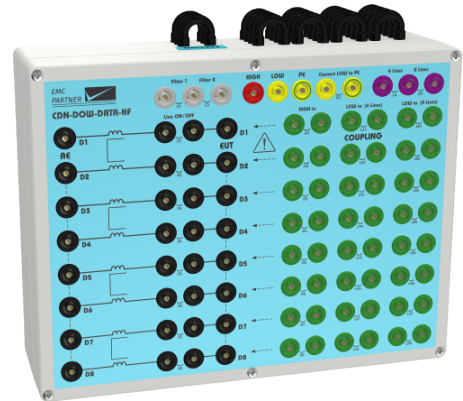
The CDN-DOW-DATA-LF is a compact coupling-decoupling network specifically designed to couple Slow DOW signals on up to eight datalines. Both 1 MHz and 100 kHz signals can be coupled via 0.5 uF capacitors, either in differential mode or in common mode according to IEC 60255-26 and IEC 61000-4-18. Additionally, common mode coupling of the signal lines directly to PE is possible. The CDN-DOW-DATA-LF is capable of handling high-power EUTs with AC or DC voltage. Each line has a decoupling impedance to protect the auxiliary equipment from the DOW test signals.





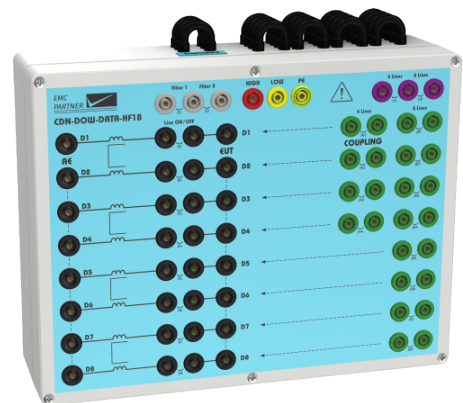
### 1.3 CDN-DOW-DATA-HF (PN 108321)

The CDN-DOW-DATA-HF is a compact coupling-decoupling network specifically designed to couple Slow DOW signals on 2-pair or 4-pair symmetrical high-speed communication lines. Both 1 MHz and 100 kHz signals can be coupled in common mode via 0.5 uF capacitors, according to IEC 60255-26. The coupling is one pair versus another pair or versus multiple other pairs. Each pair has a decoupling impedance as well as protection devices to protect sensitive auxiliary equipment from the DOW test signals.



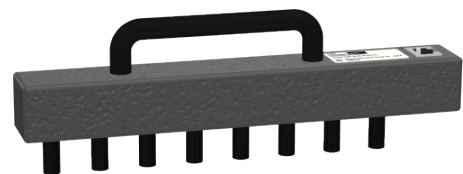
### 1.4 CDN-DOW-DATA-HF18 (PN 108495)

The CDN-DOW-DATA-HF18 is a compact coupling-decoupling network specifically designed to couple Slow DOW signals on 2-pair or 4-pair symmetrical high-speed communication lines. Both 1 MHz and 100 kHz signals can be coupled in common mode via 0.5 uF capacitors, according to IEC 61000-4-18. The coupling is all lines versus PE. Each pair has a decoupling impedance as well as protection devices to protect sensitive auxiliary equipment from the DOW test signals.



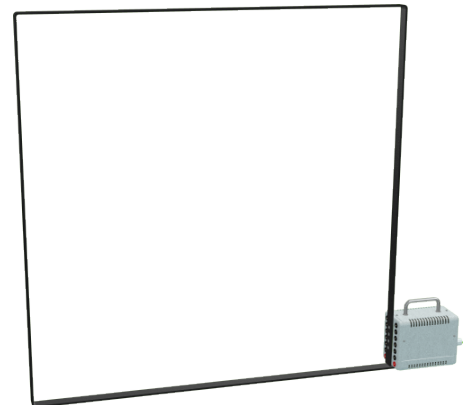
### 1.5 ADAPTER BOX RJ45-8L (PN 108322)

The ADAPTER BOX RJ45-8L is an Ethernet adapter compatible with the CDN-DOW-DATA-HF and CDN-DOW-DATA-HF18, which allows you to connect your Ethernet devices directly to the CDNs without the need for special cabling.



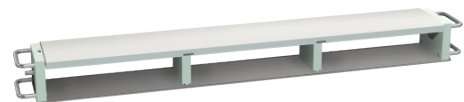
### 1.6 MF1000-1 (PN 103480) and MF1000-2 (PN 103481)

Test coil for Slow DOW magnetic field test according IEC 61000-4-10. The MF1000-2 has more than twice the height of MF1000-1 for larger EUTs.



### 1.7 CN-EFT1000 (PN 103468)

The clamp provides the ability of coupling the damped oscillatory waves to the circuit under test without any galvanic connection to the terminals of the EUT's ports, shielding of the cables or any other part of the EUT.



### 1.8 VERI-CP-EFT (PN 104668)

Transducer plate for CN-EFT1000 capacitive coupling clamp calibration. The plate has a SHV-BNC connector and a 15 cm strap to bond to the reference ground.



### 1.9 VERI1K EFT (PN 103473)

1 kOhm termination with SHV-BNC connector for the Fast DOW voltage calibration.



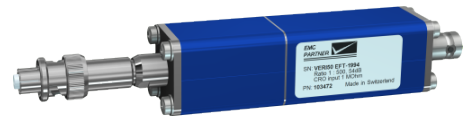
### 1.10 VERI01 OSI (PN 103570)

0.1 Ohm shunt with SHV-BNC connector for the Fast DOW current calibration.



### 1.11 VERI50 EFT (PN 103472)

50 Ohm termination with SHV-BNC connector for the Fast DOW calibration together with a capacitive coupling clamp.



## 2 Initial Operation

### 2.1 Unpacking and Checking

1. Check the packaging for signs of damage. If damage is visible, report this to the shipping company immediately.
2. Gently remove the equipment from the packaging.
3. Check the delivery for completeness using the delivery note and the accessory lists for the various items. If something is missing, contact EMC PARTNER or your local sales representative immediately.
4. Check the equipment for any damage. If there is damage, immediately contact the shipping company who made the delivery.



Retain the original packing material for a safe transport at a later date.

### 2.2 Installation

The equipment is designed for use under laboratory conditions. Make sure that all fan openings are unobstructed, that the airflow perforations are unimpeded, and that the minimum distance from the wall is 10cm. An insufficient airflow can cause the equipment to overheat, which may disturb the operation and even cause damage.



Most equipment from EMC PARTNER can be mounted in a 19" Rack. A special rack mounting kit is available. Contact your local sales representative for a quotation.

### 2.3 Powering the Equipment

Check that the local AC-supply is suitable for the equipment. Power rating of the instrument is indicated on the type plate next to the AC power supply connector located on the rear panel. Only use the supplied power cord to connect to your public power supply.



The equipment must always be connected to protective earth. Check the earth connection on your power outlet before you connect and turn on the equipment.

### 2.4 Safety Circuit

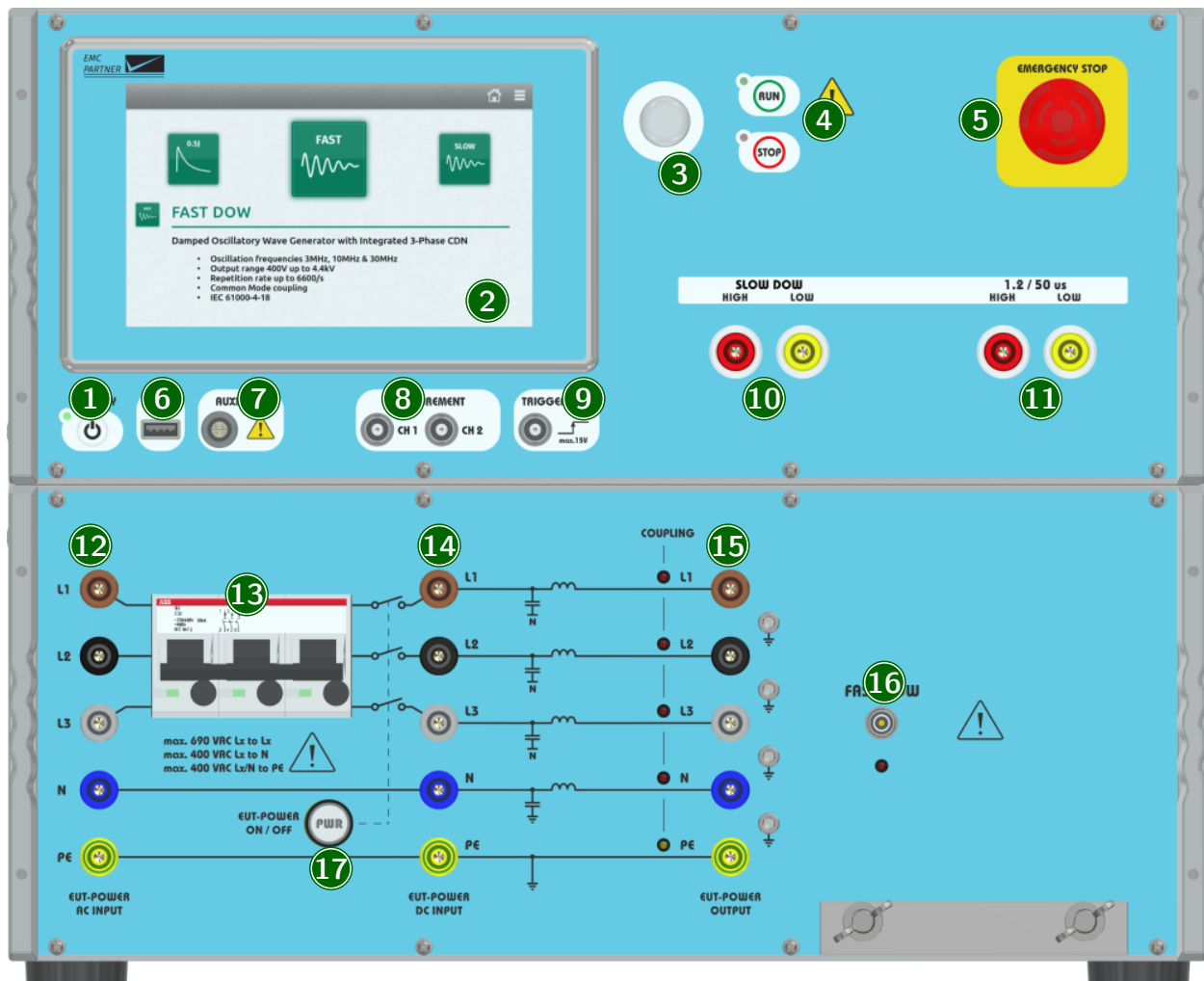
The generator is equipped with a safety circuit. As long as the safety circuit is open, no test can be started. To close the safety circuit

1. connect the auxiliary connector on the rear panel
2. pull out the emergency stop button on the front panel with a slight turn clockwise

A closed safety circuit is indicated by a red illuminated emergency stop button

## 3 Using the Generator

### 3.1 Front Panel



#### 1 ON/STBY

Power-up or power-down the generator.

#### 2 Touchscreen Monitor

User interface to perform all functions including test types selection, parameter entry, saving and recalling tests.

#### 3 Rotary Knob

Entry device enables faster navigation and parameter entry.

#### 4 Run/Stop

Starts, stops or pauses the selected test.

A green blinking LED indicates a running test.

A red blinking LED indicates a stopped test due to an error.

A red LED indicates a finished test.

## 5 Emergency Stop Button

Push to open the safety circuit.

As soon as the safety circuit is open, all running tests are immediately stopped and no more tests can be started.

Release the emergency stop button with a slight turn clockwise.

A closed safety circuit is indicated by a red illuminated emergency stop button.

## 6 USB Port

Connect a USB memory stick to copy files (setups, protocols, error logs) from the generator. The USB interface is also used to update the internal firmware.

## 7 Auxiliary Connection

Interface for additional external equipment.

## 8 Measurement Output

BNC output for a direct connection to an oscilloscope to monitor the impulse of selected waveshape. In DOW3000, only CH1 is used for the 1.2/50 us insulation waveshape voltage measurement. See the technical data for more information.

## 9 Trigger Output

BNC output for a direct connection to an oscilloscope to start pulse acquisition. Level and duration depend on the specific test. Some typical values are

- 12 V primary impulse trigger
- 8 V secondary impulse trigger
- 5 V EUT power state

## 10 DOW Slow Output

Direct output for the Slow Damped Oscillation circuit.

## 11 1.2/50 Insulation Output

Direct output for 1.2/50 us Insulation circuit.

## 12 Fused EUT-Input

Fused Input of the internal CDN.



Never connect DC-Voltage. The internal fuse and switch are not compatible to DC. For DC, use the dedicated input.

## 13 Fuse

## 14 Unfused EUT-Input

Unfused Input of the internal CDN. Use this input for DC.

## 15 EUT Power Output

Output of the internal CDN for the connection to the EUT. The current coupling is indicated by a LED.

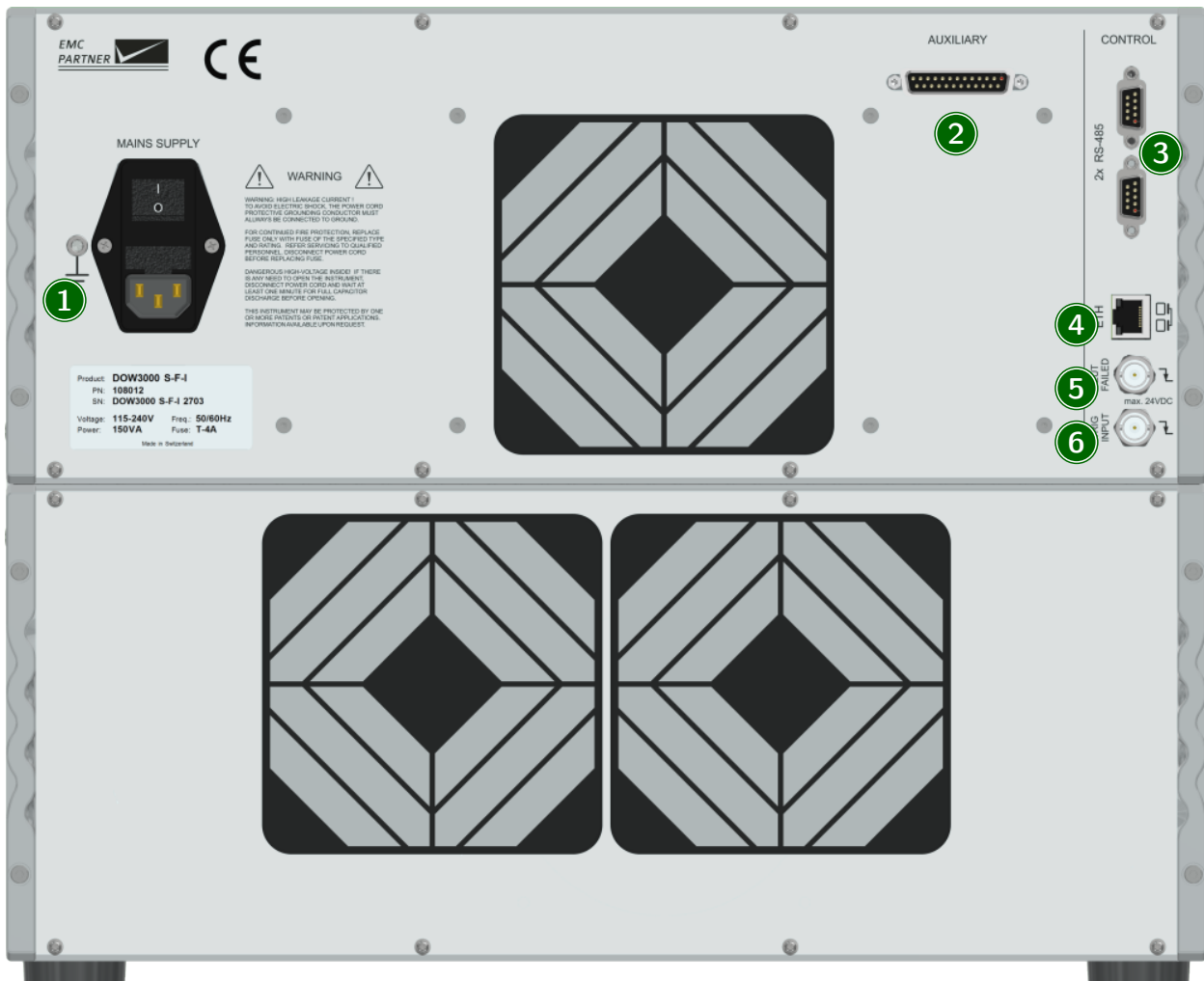
## 16 DOW Fast Output

Direct output for the Fast Damped Oscillation circuit.

## 17 Power Switch

Power-Switch of the internal CDN. A closed switch is indicated by an illuminated switch.

### 3.2 Rear Panel



#### 1 AC Socket / Mains Fuse

A country specific mains cable is delivered with the equipment, this should be used to connect to the mains power supply. A mains fuse is located in the socket housing. The value is indicated on the equipment type plate.



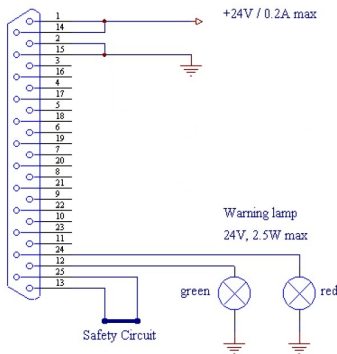
Take care to ensure the power mains matches the power ratings on the equipment type plate.

The generator must always be connected to protective earth

#### 2 Auxiliary Connector

Fit the auxiliary connector delivered with the equipment, to close the safety circuit.

It is possible to extend the safety circuit or to connect additional external warning lamps.



- The green lamp indicates safety circuit open, no test can be started
- The red lamp indicates safety circuit closed, tests can be started

### 3 RS485 Interfaces

Interfaces to connect additional equipment that is controlled directly from the test equipment.

### 4 Ethernet Interface

Remote control using TEMA3000 software via a common ethernet interface.

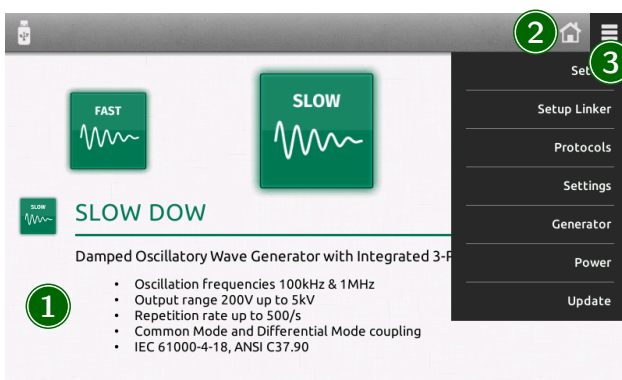
### 5 EUT Failed

A falling edge to ground impressed on the BNC connector is indicated in the test protocol as an EUT Fail condition. The input is internally pulled up to max. 24V. Driving with an open-collector output is recommended.

### 6 Trigger Input

A falling edge to ground on the BNC connector, triggers impulse release. This function must be configured in the test parameter menu. The input is internally pulled up to max. 24V. Driving with an open-collector output is recommended.

## 3.3 Software User Interface



### 1 Test selection

The main window is a carousel of all tests available in the equipment. A short description is included with each test type. A green icon indicates that the test is available, a grey icon indicates that the test is not currently available. Select a test by bringing the relevant icon to the centre of the screen. This is achieved by finger swipe on the touch panel or by using the rotary knob.





Not all tests are available all the time. Availability depends on the hardware configuration. To simplify the menu structure, tests that are unavailable can be removed from the carousel.

≡ (General Menu) -> Settings -> Test Settings

## 2 Home button

Select from any point in the menu structure to return to the main window.

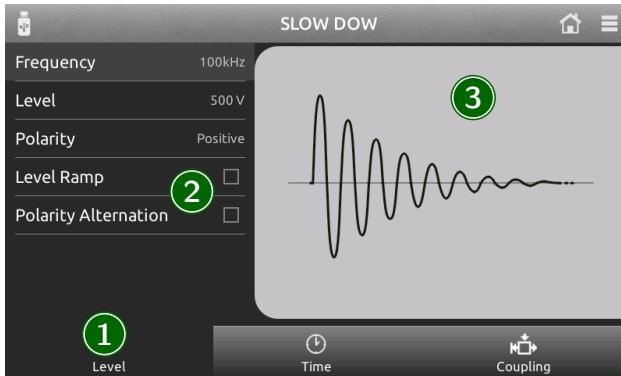
## 3 General menu

Activates a drop-down menu on the right side giving access to the equipment configuration settings.

## 4 Perform a Test

### 4.1 Programming the Generator

The same process is used to program the generator for different tests. In the first step, the parameters should be set according to the requirements of the test.



#### 1 Main Category

For quick access, categories at the bottom of the display contain groups of relevant parameters. Select a category using the touch panel.

#### 2 Parameter List

All parameters from a selected category are shown on a single screen. Click on a parameter to edit the value.

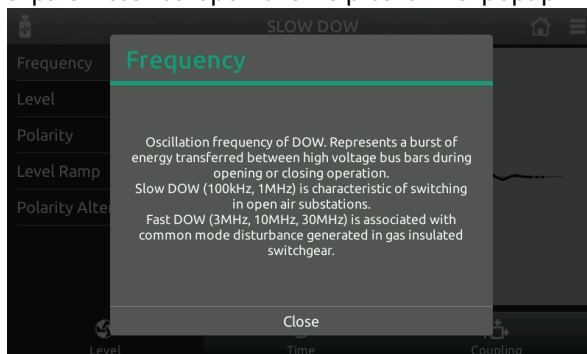


Press and turn the rotary knob at the same time for a quick parameter change.

All parameters are checked for validity during the entry process. If necessary (for example test level too high), the system automatically corrects the value. Corrected values are indicated by a red background.

The system also checks for inconsistencies with other parameters and, where necessary, makes an adjustment. It is not possible to create a test containing invalid parameters.

For each parameter, an additional help text is provided directly on the generator. Press and hold a parameter to open the help text in a popup window.

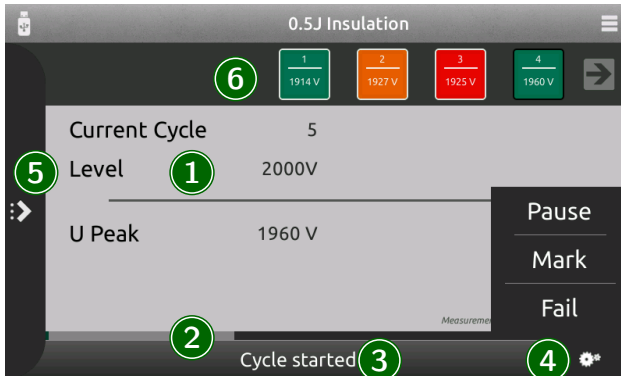


#### 3 Parameter Image

Individual images clarify the effect of each parameter.

## 4.2 Run a Test

Starting a test by pressing the run button on the front panel, changes the display to the run view.



### 1 Information Area

Indicates the most important information about a running test.

### 2 Progress Bar

Indicates progress of the whole test and, if available, about the current cycle.

### 3 Status Bar

Provides information about the current event.

### 4 Running Options

Click to open a menu for additional options while a test is running.

- Mark or Fail add this information at the current test position. This information will be included in the protocol.
- Pause will pause the running test. With Resume, the test will continue at the current position.
- Trigger will release an impulse. This option is only available in the manual trigger mode.



Pressing the Run button during a running test activates the pause. Another press on the run button will resume the test at the current position.



During the pause, only the disturbance source is interrupted. A possible EUT voltage will not be switched off. Only a stopped test and an open safety circuit (pressed emergency button) guarantees a safe operation on the connected device.

### 5 Parameter Change

Click to open a shutter menu containing all parameters that can be edited while a test is running. Depending on the test type, parameter change will take place with the next cycle or after a few seconds. Changed values are highlighted for a few seconds in the information area.

### 6 Pulse History

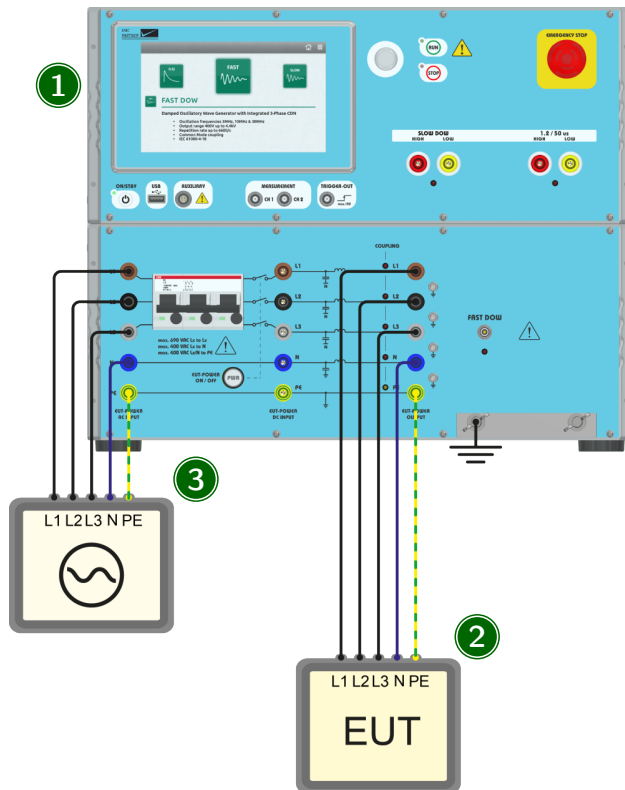
Surge tests with internal measurement circuits show the results as scrolling blocks. Browse the blocks while a test is running. Click on a block to view complete information.

Marked pulses have an orange background, failed ones a red and correct ones a green.



The pulse history is available for the 1.2/50 us insulation waveform only.

### 4.3 Slow and Fast DOW Test on EUT Power Ports



#### 1 Generator

Select the desired waveform and frequency and CDN as coupling device. The same connection setup can be used for Slow DOW and Fast DOW.



For Fast DOW, a reference ground plane must be used. For Slow DOW, a reference ground plane is recommended. All the equipment including generator and EUT must be placed on a ground reference plane. The generator earth bar on the frontpanel must be connected with the ground reference plane.

#### 2 EUT

Connect the EUT to the output of the CDN.

- For 1-phase AC, connect L1, N and PE
- For 3-phase AC, connect L1, L2, L3, N and PE
- For DC (floating), connect DC+ to L1 and DC- to N
- For DC (when DC- = PE), connect DC+ to L1 and DC- to PE



The blank sockets are used for calibration with the calibration adapter. See the calibration protocol for more information.

#### 3 Auxiliary Equipment

Connect the Auxiliary Equipment to the input of the CDN.

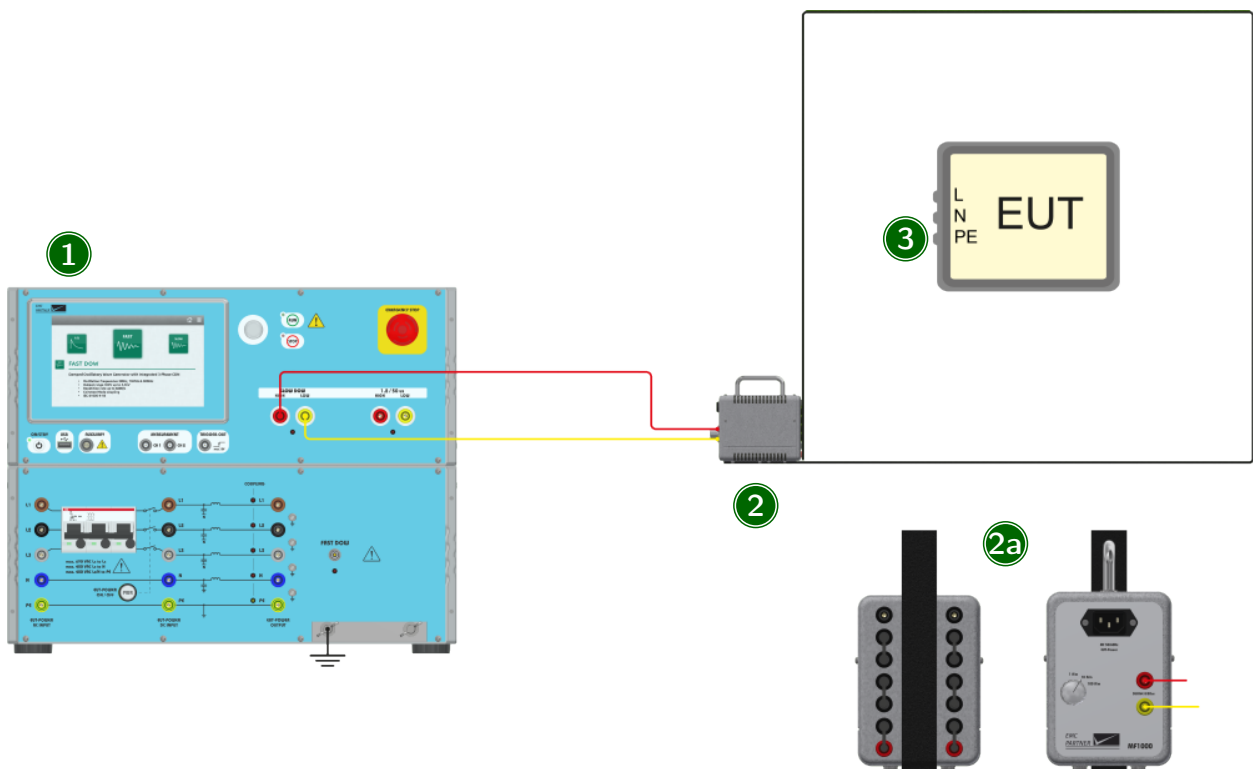
- For 1-phase AC, connect L1, N and PE

- For 3-phase AC, connect L1, L2, L3, N and PE
- For DC (floating), connect DC+ to L1 and DC- to N
- For DC (when DC- = PE), connect DC+ to L1 and DC- to PE



The fused input is only for AC. For DC, the dedicated unfused DC input must be used.

#### 4.4 Slow DOW Magnetic Field Test



##### 1 Generator

Select the magnetic field test and the correct antenna as coupling device.



A missing coupling device in the parameter list can be added in the generator main menu.

##### 2 Antenna

The DOW3000 can be used either with the MF1000-1 or MF1000-2. Connect the antenna with a 2m MC-cable to the direct output of the generator.



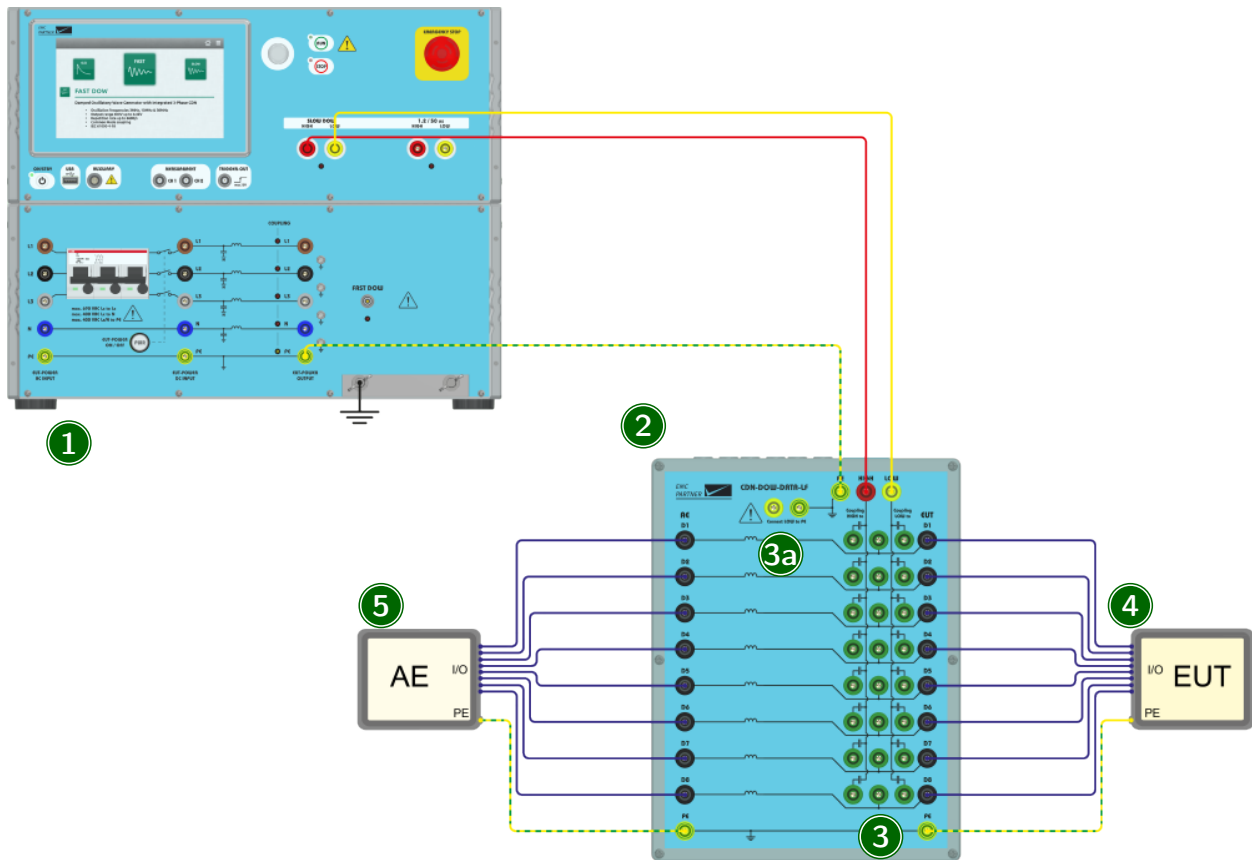
The antenna must be configured with all bridges in the lower position as shown in the picture.

The mains socket and the the range selection switch are not used for this test.

##### 3 EUT

Place the EUT in the center of the antenna

### 4.5 Slow DOW Test on Unshielded and Unsymmetrical Interconnection Lines



#### 1 Generator

Select the Slow DOW test and the CDN-DOW-DATA-LF as coupling device with the desired coupling type.



A missing coupling device in the parameter list can be added in the generator main menu.

#### 2 CDN-DOW-DATA-LF

Connect the CDN with three 0.5 m MC-cables to the generator. Two twisted cables for High and Low should be connected to the Slow DOW direct output; the third cable should be connected to the PE CDN output.

#### 3 Coupling selection

Every dataline can be connected to High or Low with a MC-Bridge. With an additional Bridge (3a), Low can be connected with PE. Not all bridges are used for every coupling. Unused Bridges can be stored in the parking position on the side.

##### Common Mode 1

Coupling of a single line to High, all other lines to Low. Low is not connected to PE.

##### Common Mode 2

Coupling of single line to High, all other lines to Low. Low is connected to PE.

##### Differential Mode

Coupling of a single line to High and another single line to Low. Low is not connected to PE.

### Common Mode

Coupling of a single line to High and Low to PE. Coupling of multiple lines to PE is possible too. See the technical data for details.

### 4 EUT

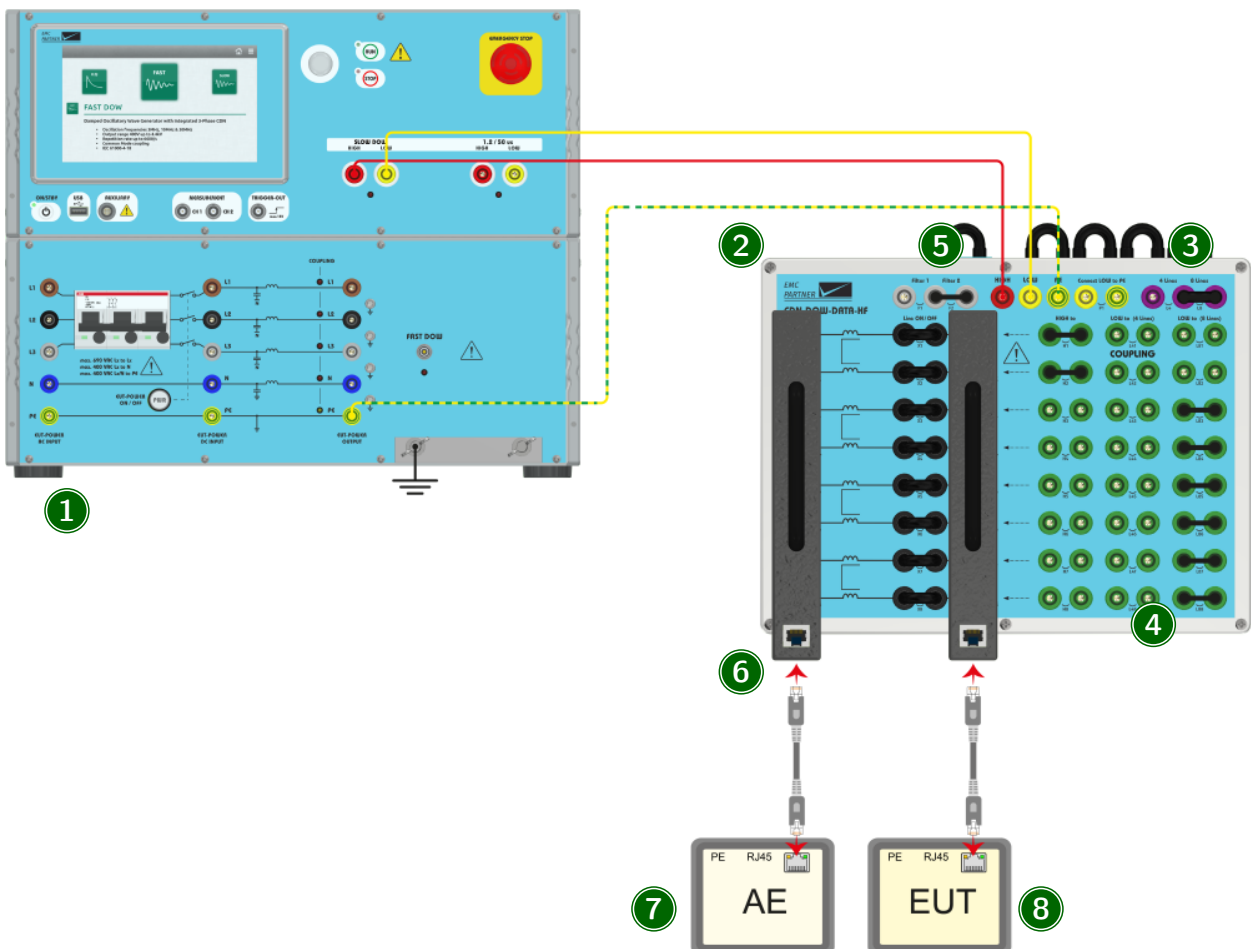
Connect the EUT to the output of the CDN.

### 5 Auxiliary Equipment

Connect the auxiliary equipment (AE) to the input of the CDN. The AE is protected with the internal line impedance of the CDN.

## 4.6 Slow DOW Test on Unshielded and Symmetrical Interconnection Lines

### 4.6.1 Coupling using CDN-DOW-DATA-HF according to IEC 60255-26



### 1 Generator

Select the Slow DOW test and the CDN-DOW-DATA-HF as coupling device with the desired coupling type.



A missing coupling device in the parameter list can be added in the generator main menu.

## 2 CDN-DOW-DATA-HF

Connect the CDN with three 0.5 m MC-cables to the generator. Two twisted cables for High and Low should be connected to the Slow DOW direct output; the third cable should be connected to the PE CDN output. For optimal results one should try to twist the PE cable as well with the two other cables.

## 3 Data line selection

You can select to couple either on 4 lines (2 pairs) or on 8 lines (4 pairs) by placing the MC- bridge L4 or L8.

All datalines (pairs) can be turned On or Off by placing the MC-bridges X1-X8. These additional MC ports allows access to individual datalines (pairs) without the need for special cabling.



In a standard test setup, the MC-Bridges X1-X8 are all plugged in.

## 4 Coupling selection

Low can be connected to PE by placing MC-bridge P1.

### Common Mode 1 according to IEC 60255-26

Coupling of one pair to High, all other lines to Low, i.e. one other pair in case of two pairs, and three other pairs in case of four pairs. Low is not connected to PE. P1 is unplugged.

### Common Mode 2 according to IEC 60255-26

Coupling of one pair to High, all other lines to Low, i.e. one other pair in case of two pairs, and three other pairs in case of four pairs. Low is connected to PE. P1 is plugged in.

Individual pairs can be selected by pairwise placing of MC-bridges HX and L4X (in case of 4 lines) or L8X (in case of 8 lines), for example, to couple the first pair to High, MC-bridges H1/H2 should be placed. In case of 4 lines, one other pair can then be coupled to Low by placing MC-bridges L43/L44, L45/L46, or L47/L48. In case of 8 lines, all other pairs should be coupled to Low by placing MC-bridges L83-L88. Unused bridges can be stored in the parking position on the side.

## 5 Filter selection

Depending on which coupling is performed different filter configurations need to be selected, this can be done by placing the MC-bridge F1 or F2, or no filter at all.

- No filter for 100 kHz Common Mode 2
- Filter1 (F1) for 100 kHz Common Mode 1
- Filter2 (F2) for 1 MHz Common Mode 1 and Common Mode 2

## 6 ADAPTER BOX RJ45-8L

The optional adapter box enables the direct connection of the EUT or the Auxiliary Equipment with a RJ45 connector.



Due to the small pin spacing of the standard RJ45-connector, the maximum voltage level is reduced to 1500 V.

## 7 EUT

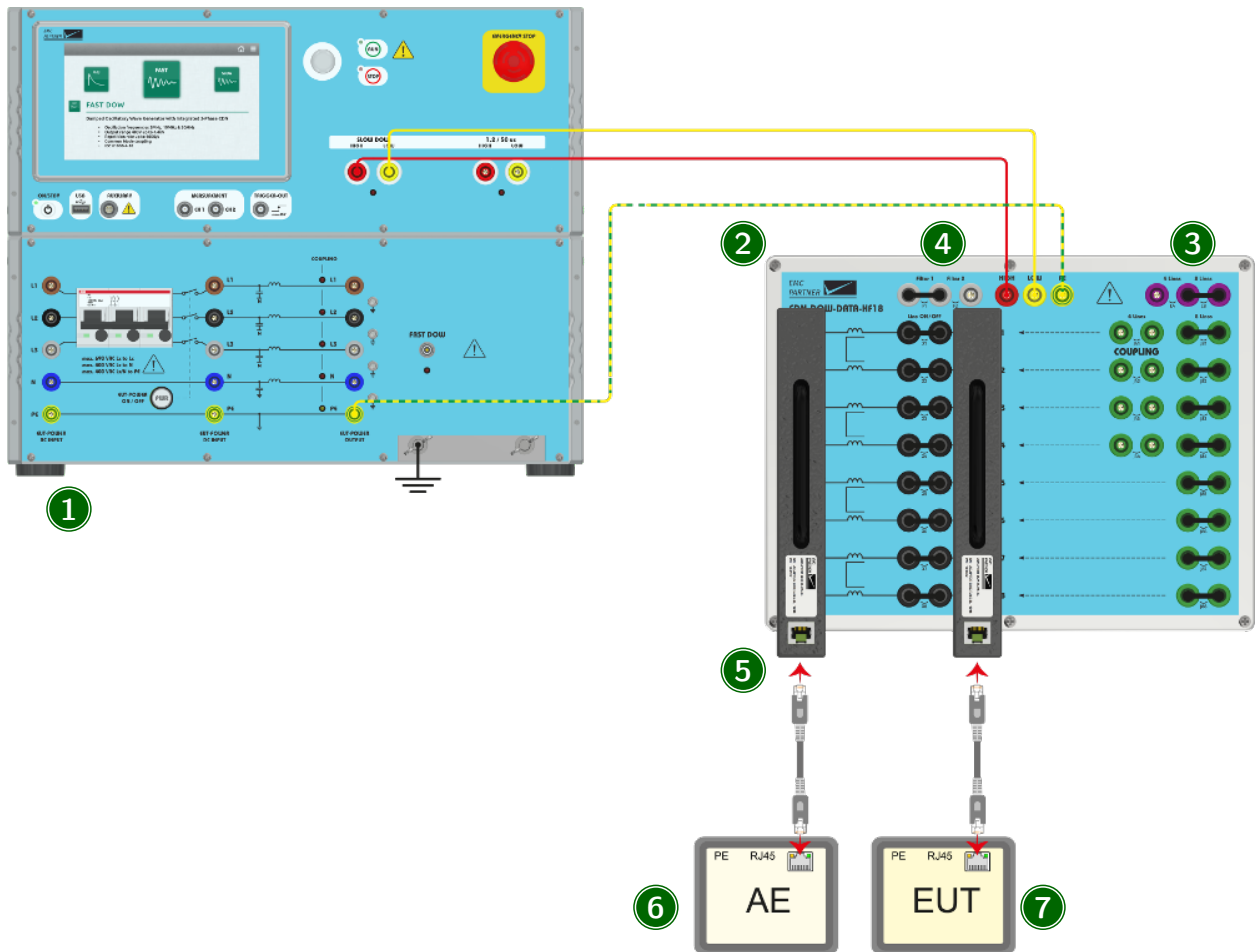
Connect the EUT to the output of the CDN, either via MC-connector cables, or you can connect your Ethernet equipment directly using the ADAPTER BOX RJ45-8L.

## 8 Auxiliary Equipment

Connect the AE to the input of the CDN, either via MC-connector cables, or you can connect your Ethernet equipment directly using the ADAPTER BOX RJ45-8L.



#### 4.6.2 Coupling using CDN-DOW-DATA-HF18 according to IEC 61000-4-18



##### 1 Generator

Select the Slow DOW test and the CDN-DOW-DATA-HF18 as coupling device with the desired coupling type.



A missing coupling device in the parameter list can be added in the generator main menu.

##### 2 CDN-DOW-DATA-HF18

Connect the CDN with three 0.5 m MC-cables to the generator. Two twisted cables for High and Low should be connected to the Slow DOW direct output; the third cable should be connected to the PE CDN output. For optimal results one should try to twist the PE cable as well with the two other cables.

##### 3 Data line selection

You can select to couple either on 4 lines (2 pairs) or on 8 lines (4 pairs) by placing the MC-bridge L4 or L8.

All datalines (pairs) can be turned On or Off by placing the MC-bridges X1-X8. These additional MC ports allows access to individual datalines (pairs) without the need for special cabling.

You can select to couple either on 4 lines (2 pairs) or on 8 lines (4 pairs). Coupling on 4 lines can be selected by placing the MC-bridge L4, as well as the four MC-bridges J41-J44. Coupling on 8 lines can be selected by placing the MC-bridge L8, as well as the eight MC-bridges J81-J88. All datalines (pairs) can be turned On or Off by placing the MC-bridges X1-X8. These additional MC ports allows access to individual datalines (pairs) without the need for special cabling.



In a standard test setup, the MC-Bridges X1-X8 are all plugged in.

#### 4 Filter selection

Depending on which coupling is performed different filter configurations need to be selected, this can be done by placing the MC-bridges at positions F1 and/or F2. The following four filter configurations are used:

- For 100 kHz on 8 lines, no filter is used
- For 1 MHz on 8 lines, select Filter 1 by placing a MC-bridge at position F1
- For 100 kHz on 4 Lines, select filter 2 by placing a MC-bridge at position F2
- For 1 MHz on 4 Lines, select both filters 1 and 2, by placing the MC-bridge 3 at positions F1+F2

#### 5 ADAPTER BOX RJ45-8L

The optional adapter box enables the direct connection of the EUT or the Auxiliary Equipment with a RJ45 connector.



Due to the small pin spacing of the standard RJ45-connector, the maximum voltage level is reduced to 1500 V.

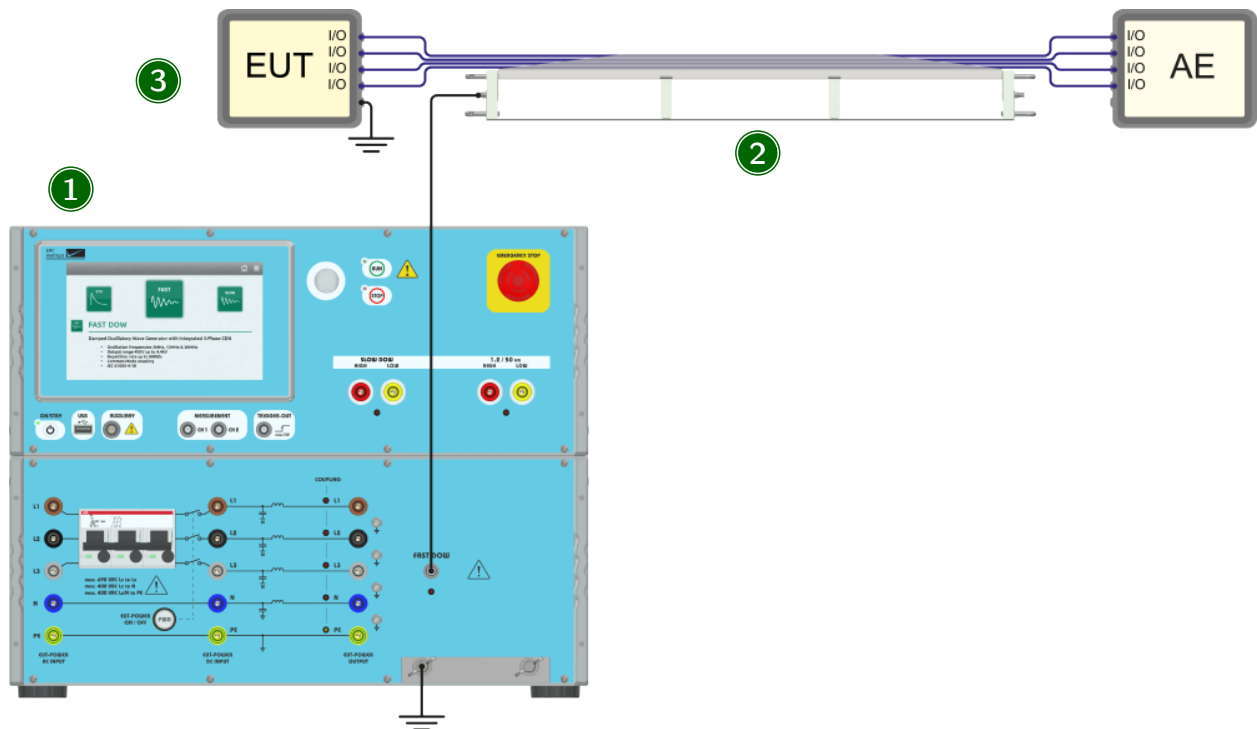
#### 6 EUT

Connect the EUT to the output of the CDN, either via MC-connector cables, or you can connect your Ethernet equipment directly using the ADAPTER BOX RJ45-8L.

#### 8 Auxiliary Equipment

Connect the AE to the input of the CDN, either via MC-connector cables, or you can connect your Ethernet equipment directly using the ADAPTER BOX RJ45-8L.

### 4.7 Fast DOW capacitive couplig clamp



#### 1 Generator

All the equipment including generator and EUT must be placed on a ground reference plane. The generator earth bar on the frontpanel must be connected with the ground reference plane.

Select the Fast DOW test and the CN-EFT1000 as coupling device.



A missing coupling device in the parameter list can be added in the generator main menu.

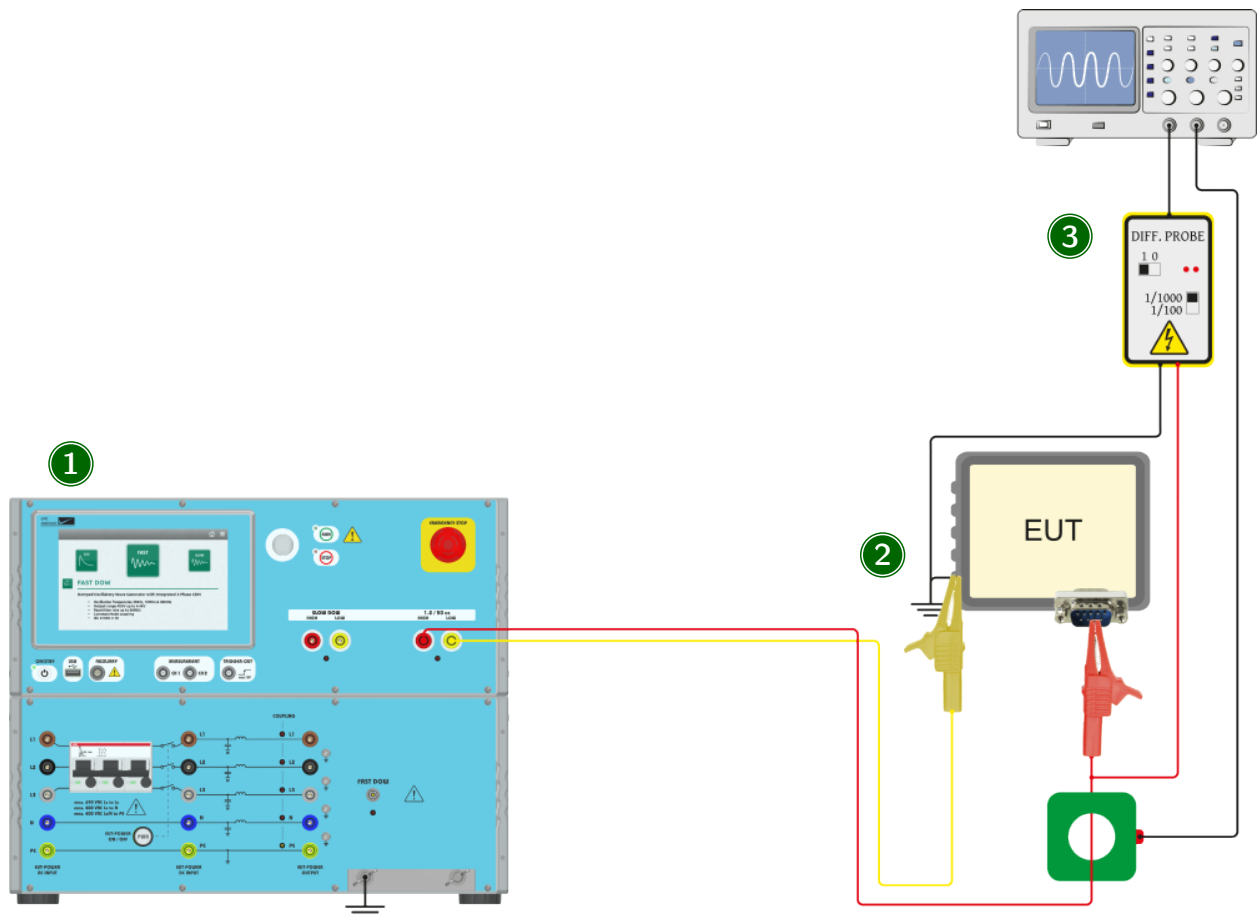
#### 2 Coupling Clamp

Connect the CN-EFT1000 coupling clamp with a 2m HV-BNC cable to the direct Fast DOW output of the generator.

#### 3 EUT

Place the cable to the EUT in the capacitive coupling clamp.

### 4.8 Insulation 1.2/50



#### 1 Generator

Select the Insulation test. The correct output of the generator will be illuminated.

#### 2 EUT



The EUT must be unpowered during the insulation test. Otherwise the Generator can be damaged.

#### 3 Measurement Equipment

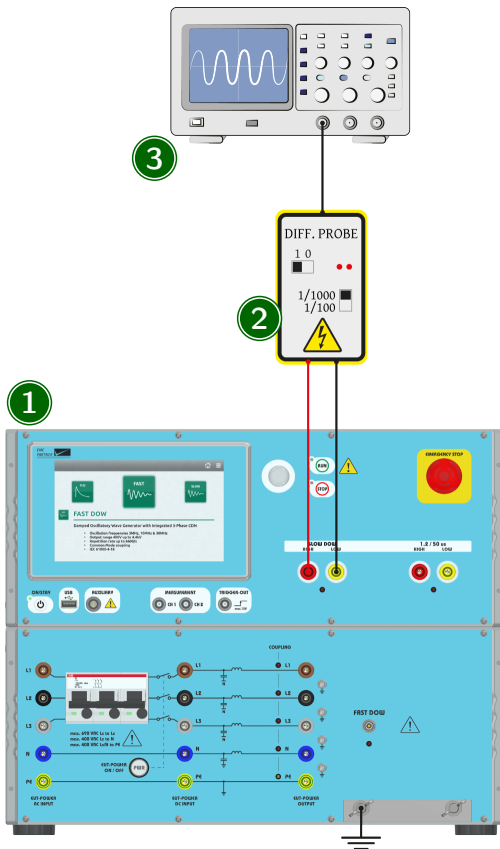
During the test, the voltage and current can be monitored with a current and voltage probe.

### 4.9 Calibration



The calibration is made without any EUT connected. Additional information for calibration is also available in the calibration report.

### 4.9.1 Slow DOW



#### 1 Generator

The calibration is carried out at the direct output of the generator. For a system calibration including the internal mains CDN or an external data line CDN, the calibration is carried out at the output of the CDN. For the calibration, an open and a short circuit measurement is required.

#### 2 Measurement Equipment

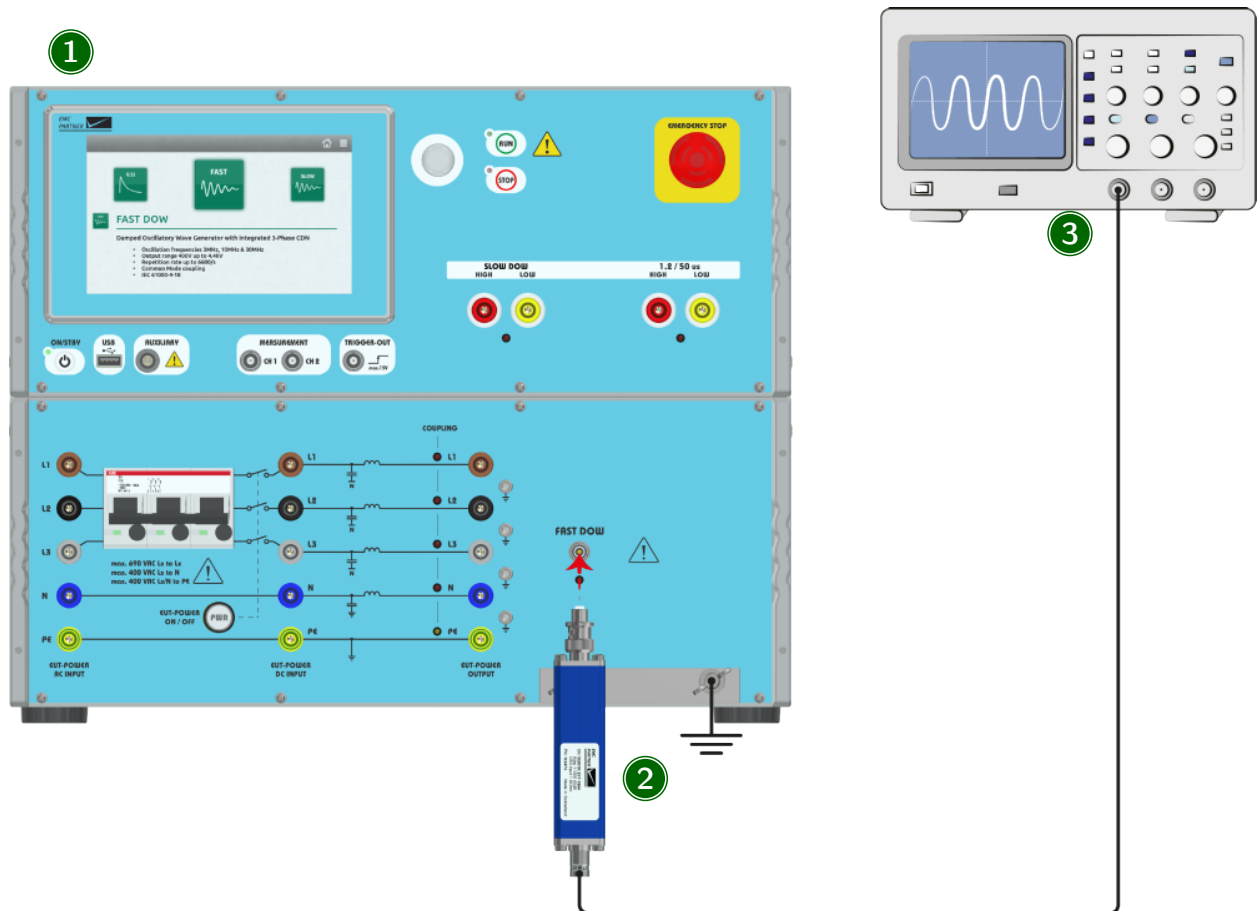
For calibration, an open and a short circuit measurement is required.

- For open circuit voltage measurement, a HV-Differential probe must be used. A suitable one is the V-PROBE-SI, available at EMC PARTNER.
- For short circuit current measurement, a current probe with enough bandwidth must be used. A suitable one is the I-PROBE-CS-P8585C, available at EMC PARTNER. The short circuit must be as short as possible.

#### 3 Oscilloscope

The oscilloscope must have a minimum bandwidth of 40 MHz.

### 4.9.2 Fast DOW



#### 1 Generator

The calibration is carried out at the direct output of the generator. For a system calibration including the internal mains CDN, the calibration is carried out at the output of the CDN. For the calibration, an open and a short circuit measurement is required. All equipment including generator and oscilloscope must be placed on a ground reference plane. The generator earth bar on the frontpanel must be connected with the ground reference plane.

#### 2 Measurement Equipment

For calibration, an open and a short circuit measurement is required.

- For open circuit voltage measurement, the VER11K-EFT must be used.
- For short circuit current measurement, the VER101 OSI must be used.

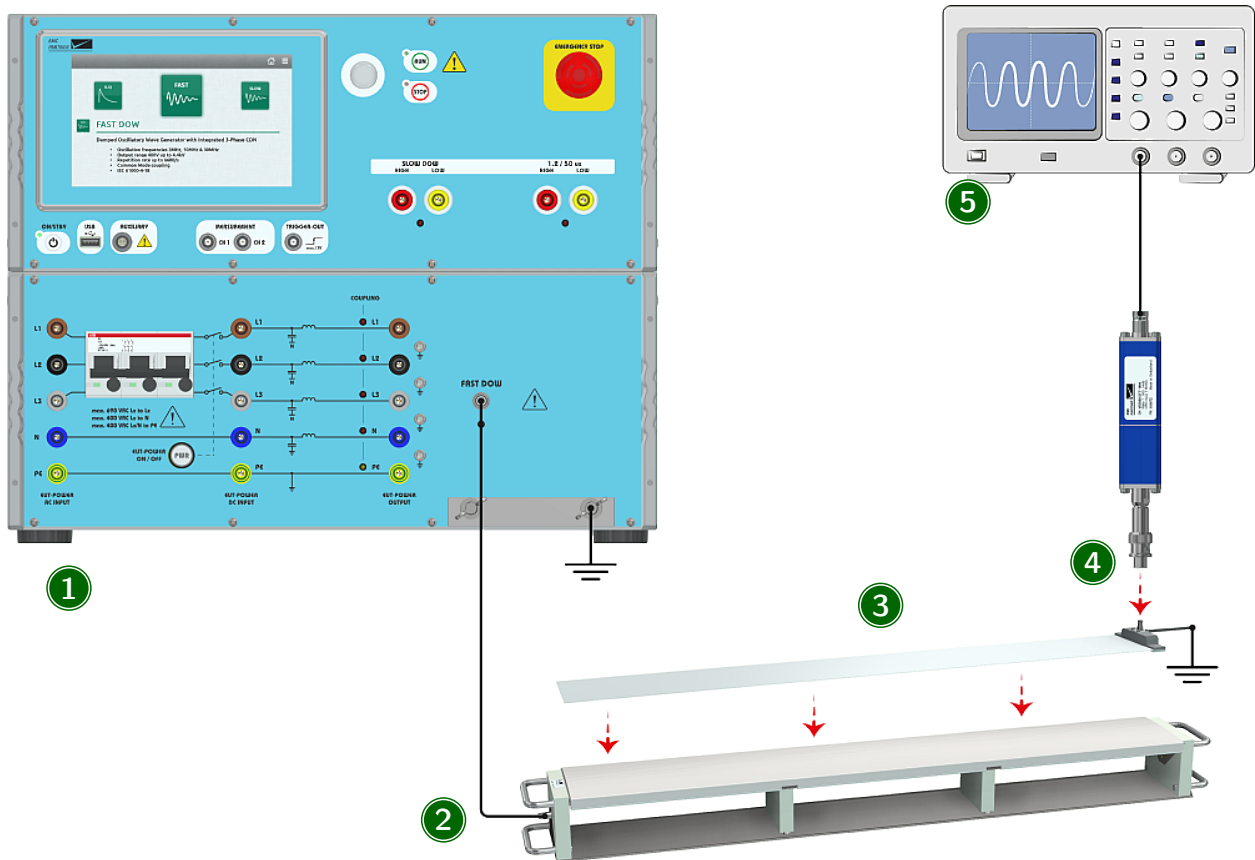
#### 3 Oscilloscope

The oscilloscope must have a minimum bandwidth of 400 MHz.



VER11K-EFT and VER101 OSI can be connected directly to the direct output of the generator. For measurements at the output of the internal CDN, the calibration adapter (part of the standard accessories) must be used.

### 4.9.3 Fast DOW with CN-EFT1000



#### 1 Generator

Select the Fast DOW test and the CN-EFT1000 as coupling device.

#### 2 CN-EFT1000

Connect the CN-EFT1000 with the Fast DOW direct output on the generator using a 2 m HV-BNC cable. All equipment including generator and oscilloscope must be placed on a ground reference plane. The generator earth bar on the frontpanel must be connected with the ground reference plane.

#### 3 VERI-CP-EFT

Place the VERI-CP-EFT in the CN-EFT1000. Connect the earth strap with the ground reference plane.

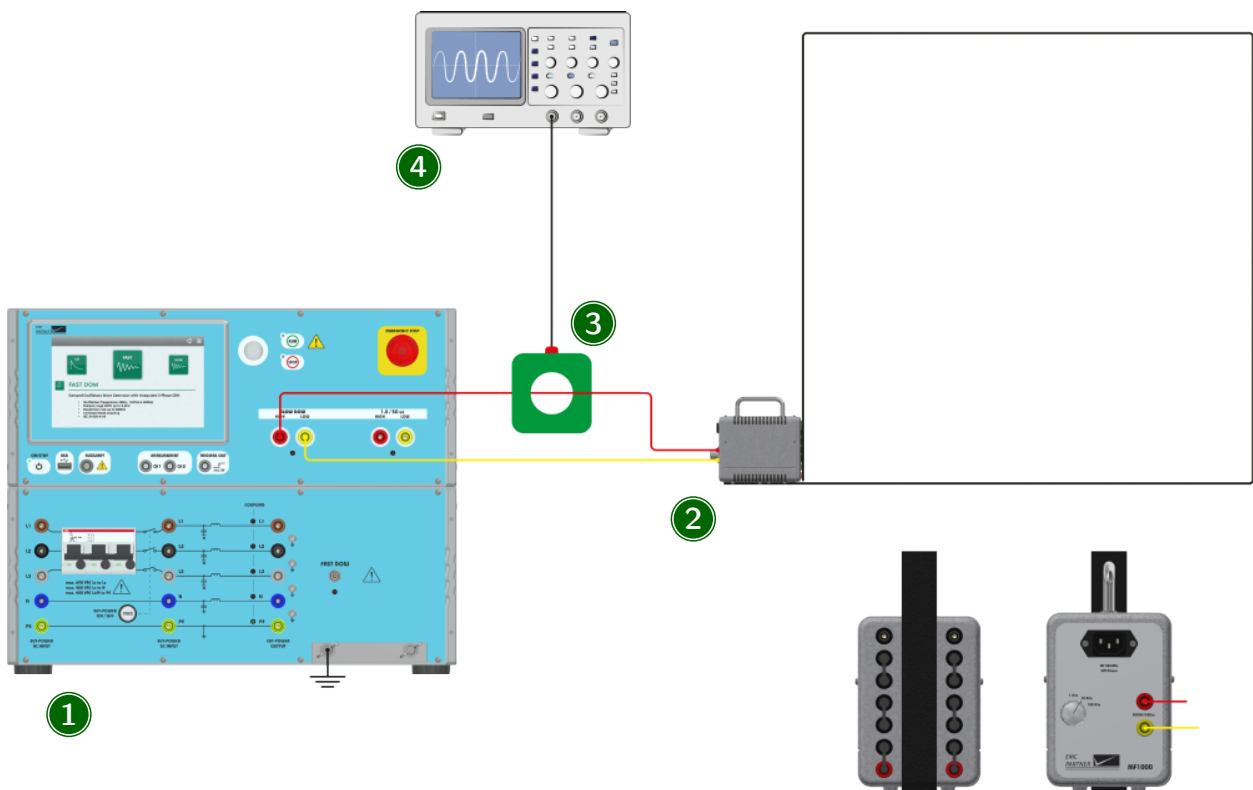
#### 4 VERI50EFT

Connect the VERI50 EFT with the VERI-CP-EFT.

#### 5 Oscilloscope

The oscilloscope must have a minimum bandwidth of 400 MHz.

#### 4.9.4 Slow DOW Magnetic Field



##### 1 Generator

Select the Slow DOW test and the correct antenna as coupling device. The picture shows the setup with MF1000-1, the setup for MF1000-2 is similar.

##### 2 Antenna

Connect the MF1000-1 or MF1000-2 with the Slow DOW direct output on the generator using a 2 m twisted MC-cable.

##### 3 Current Probe

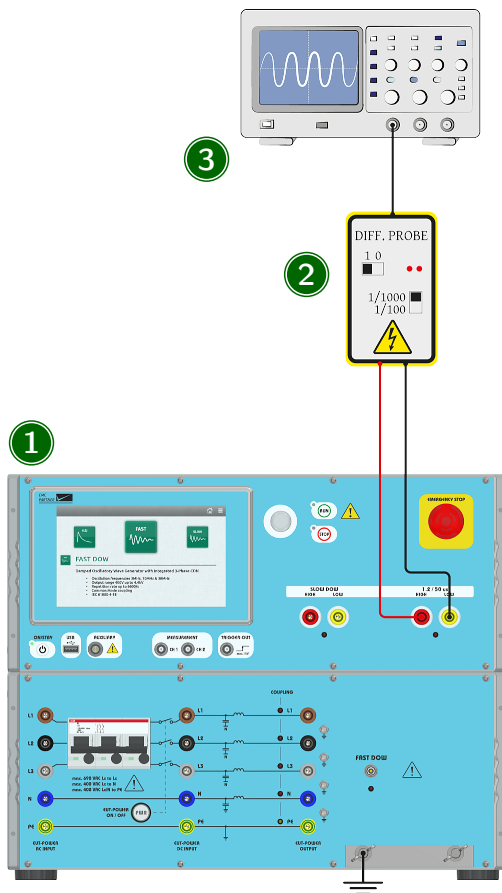
The calibration of the magnetic field is made with an indirect current measurement in the connecting cable.

##### 4 Oscilloscope

The oscilloscope must have a minimum bandwidth of 40 MHz.



### 4.9.5 Insulation



#### 1 Generator

The calibration is carried out at the direct output of the generator. For the calibration, an open and a short circuit measurement is required.

#### 2 Measurement Equipment

For calibration, an open and a short circuit measurement is required.

- For open circuit voltage measurement, a HV-Differential probe must be used. A suitable one is the V-PROBE-SI, available at EMC PARTNER.
- For short circuit current measurement, a current probe with enough bandwidth must be used. A suitable one is the I-PROBE-CS-P8585C, available at EMC PARTNER. The short circuit must be as short as possible.

#### 3 Oscilloscope

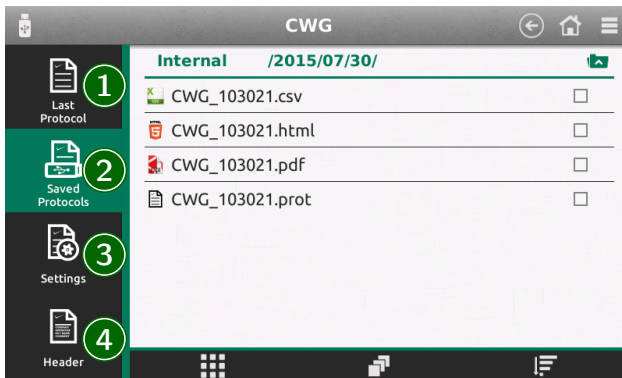
The oscilloscope must have a minimum bandwidth of 10 MHz.

## 5 Additional Software Features

### 5.1 Protocols

Select ≡ (General Menu) → Protocols

A protocol containing test parameters and results can be saved in the equipment. Additional information about the EUT and environment conditions can be added.



#### 1 Last Protocol

Shows a preview of the latest protocol, even if “Create Protocol” is not selected. It will be overwritten by the next test.

#### 2 Saved Protocols

All saved protocols are listed here in the selected formats. The internal file format \*.prot can be converted to CSV, HTML and PDF. Select a protocol to open the file manager. Protocol files can be deleted, copied, moved individually or as blocks of files. For more information about the internal file manager see section “File Manager”.



Single protocol files are copied to a USB memory stick by selecting the file and choosing copy to USB from the menu. To copy multiple protocol files, select with the check box on the right side. When all files to be copied are marked, press Copy selection to USB from the left hand menu.

#### 3 Settings

Select if and in which format the protocols should be stored. Basic storage format is for internal use. Stored protocols can be converted to other formats at any time.

Define the root directory for saving protocols. The default directory structure creates sub directories in the format <year>/<month>/<day>. The file itself is saved in the format specified in Save Name.

#### 4 Header

Enter additional information about the EUT and the test environment. This data will be displayed together with the test results in the protocol.

### 5.2 Setup library

Select ≡ (General Menu) → Setups

A predefined EMCP test setup library is included in the equipment. User defined tests can also be stored internally or externally on a USB stick.



The EMCP Library is read only. It is possible to copy a test from the library to the user space and edit the copy.

### 5.2.1 Store setup



#### 1 Create New Setup

Configure a test setup in a new window. The current test in the generator will not be changed.

#### 2 Save Current Setup

The currently configured test will be saved.

### 5.2.2 Load Setups

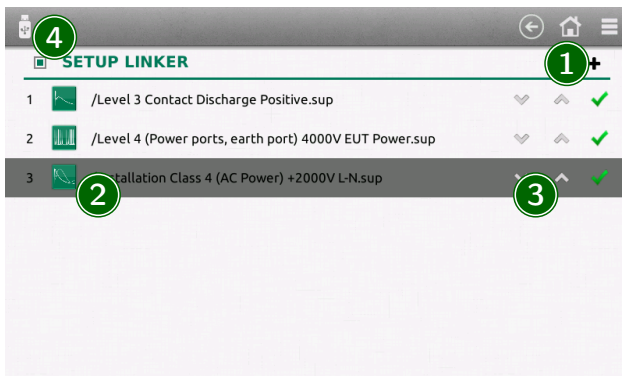
Choose between the EMCP Library with predefined setups, the user defined internal library or setups on the USB stick.

Select a setup, then choose load to configure the generator with the current setup.

### 5.3 Setup Linker

Select ≡ (General Menu) -> Setup Linker

You can link up to 15 tests, saved internally to run concurrently.



#### 1 Add a Setup to the List

Existing setups can be added into the sequence from the library or a new setup can be created directly.

## 2 Edit the Setup

Click on a setup to edit, modify or delete from the list. Setups are stored as a copy in the setup linker. Any change to parameters does not affect the source file in the library.

## 3 Change Order

Use the up and down arrows to move a setup position in the sequence.

## 4 Activate

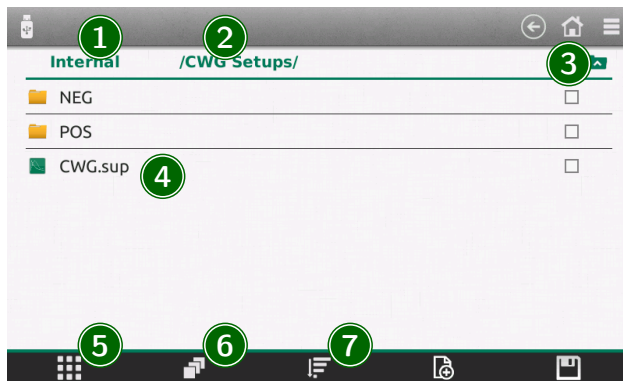
If checked, the setup linker is activated. Press run to start the linked tests.



A linked sequence cannot be saved internally. TEMA3000 Software provides a complete sequence generation package including DSO and other applications.

## 5.4 File Manager

The generator has a powerful file manager. It is used for the setup library and the saved protocols.



### 1 Root Directory

Files can be selected from the internal memory or, if connected, the USB memory stick

### 2 Selected Path

Shows the current location in the file structure.

### 3 Path Up

Select to move to a higher level in the file structure.

### 4 Current Folder

Shows the content of the selected folder. Press and hold on the file name to open a menu enabling modification of the file (cut, copy, delete, rename).

### 5 Context Menu

Opens a menu for different actions like create directories, copy, paste and delete multiple selected items.

### 6 Multiselect Mode

To perform an action (copy, delete, move) on multiple files. Activate directly from this menu point or select the checkboxes behind each file.

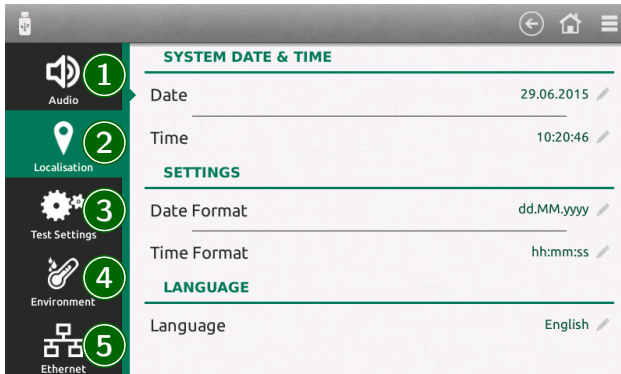
### 7 Sort

Files can be sorted by name, by date or by type.

## 6 Configuration

### 6.1 Settings

Select ≡ (General Menu) -> Settings



#### 1 Audio

Volume and type of the different audio messages

#### 2 Localisation

Set equipment time and date and the required format. This information will be included in the test report and file data.



The user interface is available in different languages. English (Default), German, French, Spanish, Italian, Chinese Traditional, Chinese Simplified and Russian. Additional languages can be provided on request. Please contact EMC PARTNER. All translations are made to the best of our knowledge and abilities, however, we cannot guarantee the correctness of all translations.

#### 3 Test Settings

Behaviour of the generator during the test

- Generator can stop as soon as the EUT failed
- The generator can perform different tests from the setup linker
- During a running test changed parameters can be resetted when the test is over
- Unavailable tests due to missing hardware can completely be removed (instead marked with a gray icon)

#### 4 Environment

Units for the internal temperature sensor can be selected between Celcius (°C), Fahrenheit (°F) and Kelvin (K). This information is included in the test protocols. This function is not available with all generators.

#### 5 Ethernet

Depending on the network capability, the TCP/IP address information for the equipment can be obtained in different ways. If the network supports dynamic TCP/IP configuration using the Dynamic Host Configuration Protocol (DHCP), all address information can be assigned automatically. If the network does not support DHCP, or if the equipment is set to use alternate TCP/IP configuration, the address must be set manually. By default, the equipment is configured to use manual address.

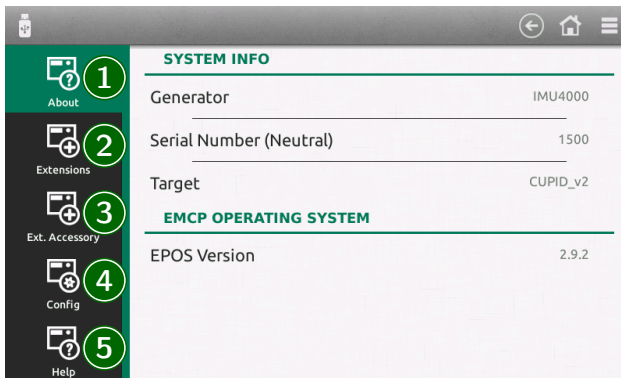


### Risk of network errors

Connection errors can affect the entire network. If the network does not support DHCP, or dynamic TCP/IP configuration is disabled, assign a valid address information before connecting the equipment to the LAN. Contact the local network administrator to obtain a valid IP address.

## 6.2 Generator

Select ≡ (General Menu) -> Generator



### 1 About

Information about the generator (type, serial number) and the current version of the system software

### 2 Extension

Name, serial number and firmware version of all currently connected extensions (internal and external)

### 3 Ext. Accessory

Only external accessories available for connection to the test equipment are shown in this list. Any test requiring an external accessory will only be available to the user after correct selection has been made.

A further advantage is that only those accessories available to the test system will be shown.

Press "Change Accessories" and select all available items. This needs to be done only once when setting up test equipment for the first time.

### 4 Config

Save or restore the current configuration of the generator.

### 5 Help

A factory reset will set the generator to the default configuration

Format SD card will delete all stored user information

Copy information to USB transfers different system information to a connected memory stick. This is useful for failure analysis. See chapter Service.

## 7 Remote Operation

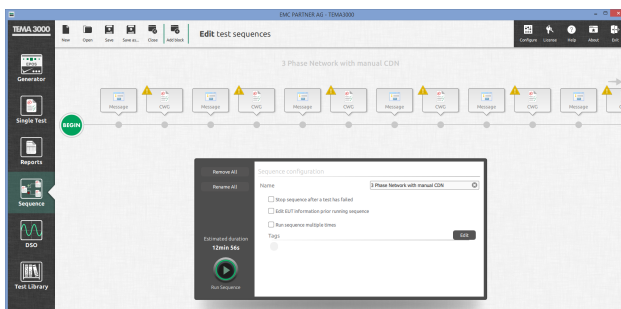
The latest test protocols can be accessed quickly using the internal webserver. Access is through any common web browser and is totally independent of any operating system. In the web browser, enter only the address `http://<ip-address>`



The factory default IP address is 192.168.0.150

A programmer manual is available upon request.

### 7.1 TEMA3000



TEMA3000 is a forward looking software suite designed to run on operating systems from Windows 7 and upwards. Graphic user interface with icons to simplify operation. Parameter entry through Remote EMC PARTNER Operating System (REPOS) interface reduces learning time for users familiar with the generator hardware. TEMA3000 base version includes generator remote control interface and single test capability, save and recall of files and a comprehensive help file. Test routines can be prepared in TEMA3000 and then uploaded into the generator in the test lab. Programming with the REPOS interface is exactly the same as sitting in front of a generator. Report generation in TEMA3000 base version is through the Web Server in the generator or the generator USB port.

Main features of TEMA3000 are

- Remote control of generator
- Save single tests
- Combine different tests to a test sequence with pictures about test setups and additional help for test operator
- Outstanding protocol features including export in different file formats
- Easy to use test library with hundreds of tests
- Seamless integration of your DSO

Get in touch with your local representative or directly with EMC PARTNER for more information about TEMA3000.



Go to [www.emc-partner.com](http://www.emc-partner.com) for a free software demo version.

## 8 Maintenance and Service

### 8.1 Firmware update

Keeping test instrumentation up to date is an important part of the product life cycle. EMC PARTNER makes continuous improvements to all products. This can be in the form of hardware changes or software changes. Software updates for all instruments are provided free of charge to existing customers. EMC PARTNER recommends to update the system regularly.

#### Online Update

Select ≡ (General Menu) -> Update

The easiest way if the generator is connected to the internet. If a newer version is available, the installation is made with a single click.

#### Update via USB

You can also download the newest version from [www.emc-partner.com](http://www.emc-partner.com). Store the update file on a USB-Stick and transfer into the equipment via the USB port on the front panel. The update process starts automatically.



We recommend storing only one update file at a time on the USB-Stick.

There are different update files for different hardware version (CUPID V1 or CUPID V2) available. To determine the hardware version Select ≡ (General Menu) -> Generator -> About



Do not switch off the generator during a firmware update

### 8.2 Maintenance

#### 8.3 Cleaning

Cleaning the front and rear panels can be made with small amount of warm soapy water and a soft cloth. The display can be cleaned with a cleaning tissue. EMC PARTNER recommends that the air filter of the ventilator be cleaned from time to time. The cleaning cycle depends on the environmental conditions. Wash out the air filter of the ventilator in soapy water. The air filter must be dried before being reinstalled.

#### 8.4 Warranty

EMC PARTNER's warranty is two years from date of invoice for manufacturing defects and one year from date of invoice for consumable parts, e.g. relays, capacitors, variac, connectors. During the warranty period it is EMC PARTNER's goal to repair the equipment within one working week at the service plant in Laufen, Switzerland. However, due to excessive work load or component supply deliveries this repair time may be extended. The warranty on demo equipment is limited in all cases to a maximum period of 2 years after delivery ex works (see EMC PARTNER Invoice date). For sales by sub-resellers or rental companies, the warranty will not be extended. Shipping expenses "Customer to EMC PARTNER" must be paid by customer or reseller. Return shipments "EMC PARTNER to Customer" are sent DAP delivery address using normal road transport for all destinations within Europe or CIP destination airport by airfreight through our house forwarder for all oversea shipments. Additional costs for express delivery must be borne by the customer. Return of EMC PARTNER's equipment for warranty repair is at the



sole discretion of EMC PARTNER's Customer service department. An RMA number has to be requested from EMC PARTNER before sending any equipment back to Switzerland. EMC PARTNER reserves the right to reject or invoice repairs on equipment returned for repair without such authorization.

## 8.5 Customer Service

EMC PARTNER is an international organization with designated service centres in all major markets. When any of the following occur:

- Accessories or replacement parts are needed
- Questions arise that are not covered in the user manual
- The equipment must be recalibrated
- The equipment needs repairing

contact the local EMC PARTNER representative or service centre. If the local contact is not known, check the internet site [www.emc-partner.com](http://www.emc-partner.com) and select contacts. If there is no local organization, contact EMC PARTNER headquarters in Switzerland. Our contact details are also given on the web site. Whenever further assistance is required, provide as much data as possible to help with a speedy solution. Service relevant information (system configuration, error logs, etc.) is collected by the equipment. This information can be very helpful in providing an early solution. Copy service information to a USB memory stick as follows:

- Plug in a USB stick
- Select ≡ (General Menu) → Generator
- In the tab Help select Copy to USB

The information is transferred to the root folder of the USB. Send file by e-mail to [service@emc-partner.ch](mailto:service@emc-partner.ch)

## 8.6 Recycling / Disposal

### RoHS directive 2011/65/EU

The system complies with the directive 2011/65/EU (RoHS - Restriction of certain Hazardous Substances). From December 2005, all EMC PARTNER products either hand soldered or by machine are produced using lead-free solder.

### WEEE directive 2012/19/EU

The system is exempted from the directive 2012/19/EU (WEEE) under category 9. The product should be recycled through a professional organization with appropriate experience for the disposal and recycling of electronic products. EMC PARTNER is also available to help with questions relating to the recycling of this product.

### Dismantling

There is no special danger involved in dismantling.

### Parts which can be recycled

The system contains parts made from steel, aluminium, PVC, two-component sealing compound. The impulse capacitors are filled with non-poisonous mineral oil. The various parts can be separated and recycled.

### Parts which cannot be recycled

None

## 9 Technical Data

### 9.1 DOW3000

#### 9.1.1 DOW Slow

<b>Standard</b>	IEC 61000-4-18:2019 ANSI C37.90 IEC 61000-4-12:1995 ENC50470-1
<b>Open Circuit</b>	
<b>Frequency</b>	100 kHz $\pm 10\%$ 1 MHz $\pm 10\%$
<b>Level Direct Output</b>	
100 kHz	200 V - 5000 V $\pm 10\%$
1 MHz	200 V - 5000 V $\pm 10\%$
<b>Level CDN Output</b>	
100 kHz	200 V - 4400 V $\pm 10\%$
1 MHz	200 V - 4400 V $\pm 10\%$
<b>Rise time</b>	75 ns $\pm 20\%$
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Short Circuit</b>	
<b>Level Direct Output</b>	
100 kHz	1 A - 25 A $\pm 20\%$
1 MHz	1 A - 25 A $\pm 20\%$
<b>Level CDN Output</b>	
100 kHz	1 A - 22 A $\pm 20\%$
1 MHz	1 A - 22 A $\pm 20\%$
<b>Impedance</b>	200 $\Omega$
<b>Polarity</b>	positive negative alternating
<b>Synchronisation EUT Power</b>	0-359° $\pm 10^\circ$
<b>Test Time</b>	1 s to 65535 s
<b>Burst Repetition</b>	100 ms to 200 s $\pm 10\%$
<b>Burst Duration</b>	1 ms to 20 s $\pm 10\%$
<b>Pulse Spacing</b>	
100 kHz	20 ms to 400 ms $\pm 10\%$
1 MHz	2 ms to 400 ms $\pm 10\%$
<b>max. Spikes/s <sup>1</sup></b>	
100 kHz <sup>2</sup>	409.6/[Level in kV] <sup>2</sup> and max. 50
1 MHz	2959/[Level in kV] <sup>2</sup> and max. 500

<sup>1</sup>The maximum number of spikes per second can be limited due to the minimum allowed pulse spacing. The maximum number of spikes per second is derated depending on the level.

<sup>2</sup>Legend: At 2 kV, the max. Spikes/s is  $409.6/(22) = 102$ . Due to the minimum Pulse Spacing of 20 ms, the effective value is 50.

Trigger Mode	automatic manual external
Coupling Device <sup>3</sup>	Direct Output Internal CDN

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<sup>3</sup>The direct output must not be connected to powered pins. When a test on powered pins is necessary, proper coupling elements, e.g. 0.5 uF coupling capacitors, need to be used. Alternatively CDN outputs can be used since those are fit with coupling capacitors.

### 9.1.2 DOW Fast

<b>Standard</b>	IEC 61000-4-18:2019
<b>Open Circuit direct and CDN output</b>	
<b>Level</b>	
selectable	400 V - 4400 V
calibrated	500 V - 4000 V $\pm 10$ %
<b>Frequency</b>	
	3 MHz $\pm 10$ %
	10 MHz $\pm 10$ %
	30 MHz $\pm 10$ %
<b>Rise time</b>	5 ns $\pm 30$ %
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Short Circuit direct and CDN output</b>	
<b>Level calibrated</b>	10 A - 80 A $\pm 20$ %
<b>Frequency</b>	
	3 MHz $\pm 30$ %
	10 MHz $\pm 30$ %
	30 MHz $\pm 30$ %
<b>Rise time</b>	
3 MHz	<330 ns
10 MHz	<100 ns
30 MHz	<33 ns
<b>Decaying</b>	
Peak5 to Peak1	>25 %
Peak10 to Peak1	<25 %
<b>Impedance</b>	50 $\Omega \pm 20$ %
<b>Polarity</b>	positive negative alternating
<b>Synchronisation EUT Power</b>	0-359° $\pm 10$ °
<b>Test Time</b>	1 s to 65535 s
<b>Burst Repetition</b>	10 ms to 200 s $\pm 10$ %
<b>Burst Duration</b>	1 ms to 20 s $\pm 10$ %
<b>Pulse Spacing</b>	150 $\mu$ s to 40 ms $\pm 10$ %
<b>max. average Spikes/s <sup>4</sup></b>	
3 MHz	16510/[Level in kV] <sup>2</sup> and max. 6666
10 MHz	5474/[Level in kV] <sup>2</sup> and max. 6666
30 MHz	1688/[Level in kV] <sup>2</sup> and max. 6666
<b>Trigger Mode</b>	automatic manual external

<sup>4</sup>The maximum number of spikes per second can be limited due to the minimum allowed pulse spacing. The maximum number of spikes per second is derated depending on the level.

<b>Coupling Device</b> <sup>5</sup>	Direct Output Internal CDN CN-EFT1000
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### 9.1.3 Internal CDN

#### AC-Mode 50/60 Hz

##### Voltage

Line to Line	max. 690 V AC
Line to N	max. 400 V AC
Line to PE	max. 400 V AC

**Current** max. 32 A fused

**Fuse** 32 A type C

**Power Switch** manual  
automatic

**Measurement** Voltage  
Current

#### DC-Mode

##### Voltage

Line to Line	max. 500 V DC
Line to PE	max. 500 V DC

**Current** max. 32 A unfused

**Measurement** Voltage

#### Coupling

<b>Differential Mode (only Slow)</b>	L1 - L2
	L1 - L3
	L2 - L3
	L1 - N
	L2 - N
	L3 - N

<b>Common Mode (Slow and Fast)</b> <sup>6</sup>	L1/L2/L3/N - PE
	L1 - PE
	L2 - PE
	L3 - PE
	N - PE
	L1/N - PE

#### Coupling capacitor

Slow DOW	0.5 $\mu$ F
Fast DOW	33 nF

**Decoupling Impedance** <1.5 mH

**Residual Voltage** <15 % of Peak

<sup>5</sup>The direct output must not be connected to powered pins. When a test on powered pins is necessary, proper coupling elements, e.g. 0.5  $\mu$ F coupling capacitors, need to be used. Alternatively CDN outputs can be used since those are fit with coupling capacitors.

<sup>6</sup>Calibrated according IEC 61000-4-18

### 9.1.4 DOW Slow Magnetic Field

<b>Standard</b>	IEC 61000-4-10:2016
<b>Frequency</b>	100 kHz $\pm 10\%$ 1 MHz $\pm 10\%$
<b>Test Time</b>	1 s to 65535 s
<b>Burst Repetition</b>	100 ms to 200 s $\pm 10\%$
<b>Burst Duration</b>	1 ms to 20 s $\pm 10\%$
<b>Pulse Spacing</b>	
100 kHz	20 ms to 400 ms $\pm 10\%$
1 MHz	2 ms to 400 ms $\pm 10\%$
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Polarity</b>	positive negative alternating
<b>Trigger Mode</b>	automatic manual external
<b>Coupling Device</b>	MF1000-1 MF1000-2
<b>MF1000-1</b>	
<b>Level</b>	
100 kHz	5 A/m - 220 A/m $\pm 20\%$
1 MHz	2.5 A/m - 110 A/m $\pm 20\%$
<b>max. average Spikes/s</b> <sup>7</sup>	
100 kHz	$846e3/[Level \text{ in A/m}]^2$
1 MHz	$2.22e6/[Level \text{ in A/m}]^2$
<b>MF1000-2</b>	
<b>Level</b>	
100 kHz	5 A/m - 160 A/m $\pm 20\%$
1 MHz	2.5 A/m - 60 A/m $\pm 20\%$
<b>max. average Spikes/s</b> <sup>8</sup>	
100 kHz	$400e3/[Level \text{ in A/m}]^2$ and max. 50
1 MHz	$656e6/[Level \text{ in A/m}]^2$ and max. 500

<sup>7</sup>The maximum number of spikes per second can be limited due to the minimum allowed pulse spacing. The maximum number of spikes per second is derated depending on the level.

<sup>8</sup>The maximum number of spikes per second can be limited due to the minimum allowed pulse spacing. The maximum number of spikes per second is derated depending on the level.

### 9.1.5 Insulation 0.5 Joule

<b>Standard</b>	61180-1/2 60060-1 62052-11 60255-27 60834-1/2 EN 50470-1
<b>Open Circuit</b>	
<b>Level</b>	500V +0 %/-10 % 1000V +0 %/-10 % 1500V +0 %/-10 % 2000V +0 %/-10 % 2500V +0 %/-10 % 3000V +0 %/-10 % 4000V +0 %/-10 % 5000V +0 %/-10 % 6000V +0 %/-10 % 8000V +0 %/-10 %
<b>Rise time</b>	1.2 $\mu$ s $\pm$ 30 %
<b>Duration</b>	50 $\mu$ s $\pm$ 20 %
<b>Source Energy</b>	0.5 J $\pm$ 10 %
<b>Impedance</b>	500 $\Omega$ $\pm$ 10 %
<b>Polarity</b>	positive negative alternating
<b>Repetition</b>	1 s - 655 s
<b>Trigger Mode</b>	automatic manual external
<b>Measurement</b>	
Internal Voltage Peak	$\pm$ 5 %
CH1 Voltage Monitor	1:4000 into 50 $\Omega$ $\pm$ 5 %
<b>Coupling Device</b>	Direct Output

### 9.1.6 DOW3000 Main Generator

<b>Input Power</b>	
Voltage	100 V - 240 V $\pm$ 10 %
Frequency	50 Hz - 60 Hz
Current	max. 4 A
<b>Consumption</b>	
Switched off	0 VA
Standby	<15 VA
Test running	max. 400 VA
Dimensions	60 cm x 45 cm x 37 cm / 19" 8HU
<b>Weight</b>	
Version S-F-I	43.3 kg
Version S-F	40.3 kg
Version S-I	40.3 kg
Version S	37.3 kg
Version F	37.3 kg
<b>Environmental Conditions</b>	
Temperature	10 °C - 35 °C
Humidity	<80 % non condensing
Pressure	86 kPa - 106 kPa
<b>System</b>	
Display	7" Touch 640 x 400 px
Internal memory	8 GB
<b>Connections</b>	
USB	Typ A Plug
LAN	RJ45 10/100 BaseT
Trigger Output	BNC max. 15 V
EXT. Trigger Input	BNC max. 24 V
EUT Fail Input	BNC max. 24 V
Auxiliary Connector	Safety Circuit Warning Lamps (24 V / max. 2.4 W)
<b>Emergency Stop</b>	
Control Ports	2 x RS485



## 9.2 MF1000-1

<b>Standard</b>	IEC 61000-4-8 IEC 61000-4-9 IEC 61000-4-10
<b>Coil Size</b>	1 m x 1 m
<b>Coil Factor</b>	0.87
<b>AC Magnetic field</b> <sup>9</sup>	
Range 1	0.8 A/m - 5.0 A/m continuous
Range 2	5.0 A/m - 40 A/m continuous
Range 3	40 A/m - 160 A/m continuous
<b>CWG Magnetic field</b> <sup>10</sup>	
8/20 us	93 A/m - 1855 A/m
<b>DOW Magnetic field</b> <sup>11</sup>	
100 kHz	5 A/m - 220 A/m
1 MHz	2.5 A/m - 110 A/m
<b>Dimensions</b>	120 cm x 100 cm x 10.5 cm
<b>Weight</b>	6 kg

## 9.3 MF1000-2

<b>Standard</b>	IEC 61000-4-8 IEC 61000-4-9 IEC 61000-4-10
<b>Coil Size</b>	1 m x 2.6 m
<b>Coil Factor</b>	0.66
<b>AC Magnetic field</b> <sup>12</sup>	
Range 1	0.5 A/m - 3.5 A/m continuous
Range 2	3.5 A/m - 28 A/m continuous
Range 3	28 A/m - 110 A/m continuous
<b>CWG Magnetic field</b> <sup>13</sup>	
8/20 us	67 A/m - 1345 A/m
<b>DOW Magnetic field</b> <sup>14</sup>	
100 kHz	5 A/m - 160 A/m
1 MHz	2.5 A/m - 60 A/m
<b>Dimensions</b>	120 cm x 260 cm x 10.5 cm
<b>Weight</b>	24 kg

<sup>9</sup>Effective range depends on generator. See technical specification of IMU-Generators.

<sup>10</sup>Effective range depends on generator. See technical specification of IMU-Generators.

<sup>11</sup>Effective range depends on generator. See technical specification of DOW-Generators.

<sup>12</sup>Effective range depends on generator. See technical specification of IMU-Generators.

<sup>13</sup>Effective range depends on generator. See technical specification of IMU-Generators.

<sup>14</sup>Effective range depends on generator. See technical specification of DOW-Generators.

## 9.4 CDN-DOW-DATA-LF

<b>Frequency</b>	100 KHz $\pm 10\%$ 1 MHz $\pm 10\%$
<b>Number of data lines</b>	up to 8
<b>Coupling</b>	
<b>Differential Mode</b>	Differential on one pair
<b>Common Mode 1</b>	Single Line to all other Lines (floating)
<b>Common Mode 2</b>	Single Line to all other Lines (grounded over 0.5 $\mu\text{F}$ )
<b>Common Mode <sup>15</sup></b>	Single Line to PE
<b>Coupling capacitor</b>	0.5 $\mu\text{F}$ per line
<b>Open Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	200 V - 4400 V $\pm 10\%$
1MHz	200 V - 4400 V $\pm 10\%$
<b>Rise time</b>	75 ns $\pm 20\%$
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Short Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	1 A - 22 A $\pm 20\%$
1 MHz	1 A - 22 A $\pm 20\%$
<b>Output Impedance</b>	200 $\Omega$
<b>Line Inductance</b>	>1.5 mH
<b>Operating Mode</b>	manual
<b>EUT</b>	
<b>Voltage</b>	max. 250 V DC or 50/60 Hz
<b>Current</b>	max. 4 A per line
<b>Dimension</b>	30.5 cm x 23 cm x 11 cm
<b>Weight</b>	5 kg

<sup>15</sup>This coupling is not required by a standard. In addition, coupling multiple lines to PE is possible too. With every additional line, the Rise time will increase and the open circuit voltage level will decrease. The short circuit level will be stable.

## 9.5 CDN-DOW-DATA-HF

<b>Standard</b>	IEC 61000-4-18:2019 IEC 60255-26:2013
<b>Frequency</b>	100 KHz $\pm 10\%$ 1 MHz $\pm 10\%$
<b>Number of data lines</b>	4 lines / 2 pairs (10/100 MBit/s) 8 lines / 4 pairs (1 GBit/s)
<b>Coupling</b>	
<b>Common Mode 1</b>	One pair to all other pairs (floating)
<b>Common Mode 2</b>	One pair to all other pairs (grounded over 0.5 $\mu$ F)
<b>Coupling capacitor</b>	0.5 $\mu$ F per line
<b>Open Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	200 V - 4000 V $\pm 10\%$
1 MHz	200 V - 4000 V $\pm 10\%$
<b>Rise time</b>	75 ns $\pm 20\%$
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Short Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	1 A - 20 A $\pm 20\%$
1 MHz	1 A - 20 A $\pm 20\%$
<b>Output Impedance</b>	200 $\Omega$
<b>Line Inductance</b>	>1.5 mH
<b>Operating Mode</b>	manual
<b>EUT (for Power over Ethernet)</b>	
<b>Voltage</b>	max. 60 V DC
<b>Current</b>	max. 1 A per line
<b>Dimension</b>	30.5 cm x 23 cm x 11 cm
<b>Weight</b>	3.7 kg

## 9.6 CDN-DOW-DATA-HF18

<b>Standard</b>	IEC 61000-4-18:2019
<b>Frequency</b>	100 KHz $\pm 10\%$ 1 MHz $\pm 10\%$
<b>Number of data lines</b>	4 lines / 2 pairs (10/100 MBit/s) 8 lines / 4 pairs (1 GBit/s)
<b>Coupling</b>	
<b>Common Mode</b>	All pairs to PE
<b>Coupling capacitor</b>	0.5 $\mu$ F per line
<b>Open Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	200 V - 4000 V $\pm 10\%$
1 MHz	200 V - 4000 V $\pm 10\%$
<b>Rise time</b>	75 ns $\pm 20\%$
<b>Decaying</b>	
Peak5 to Peak1	>50 %
Peak10 to Peak1	<50 %
<b>Short Circuit</b>	
<b>Level CDN Output</b>	
100 kHz	1 A - 20 A $\pm 20\%$
1 MHz	1 A - 20 A $\pm 20\%$
<b>Output Impedance</b>	200 $\Omega$
<b>Line Inductance</b>	>1.5 mH
<b>Operating Mode</b>	manual
<b>EUT (for Power over Ethernet)</b>	
<b>Voltage</b>	max. 60 V DC
<b>Current</b>	max. 1 A per line
<b>Dimension</b>	30.5 cm x 23 cm x 11 cm
<b>Weight</b>	3.7 kg

## 9.7 ADAPTER BOX RJ45-8L

max. DOW Level <sup>16</sup>	1500 V
Dimension	22 cm x 7 cm x 3 cm
Weight	0.2 kg

## 9.8 VERI1K EFT

Impedance	1000 $\Omega \pm 2\%$
DC Ratio	
50 $\Omega$ DSO Input	1:2000
1 M $\Omega$ DSO Input	1:1000 $\pm 3\%$
<b>Tolerance of Insertion Loss</b>	
up to 100MHz	$\pm 0.5$ dB
up to 400MHz	$\pm 3$ dB
Max. Level	7100 V EFT- or Fast-DOW-Impulse
Max. average Spikes/s	350 @7100 V
Dimension	13.5 cm x 2.5 cm x 2.5 cm
Weight	0.1 kg

## 9.9 VERI01 OSI

Impedance	0.1 $\Omega \pm 2\%$
DC Ratio	
50 $\Omega$ DSO Input	1:20
1 M $\Omega$ DSO Input	1:10 $\pm 2\%$
<b>Tolerance of Insertion Loss</b>	
up to 100MHz	$\pm 0.5$ dB
up to 400MHz	$\pm 3$ dB
Max. Level	6300 V Fast-DOW-Impulse
Max. average Spikes/s	500 @6300 V
Dimension	8.5 cm x 2.5 cm x 2.5 cm
Weight	0.1 kg

<sup>16</sup>Limitation due to the pin spacig of the RJ45-Plug.

### 9.10 VERI50 EFT

<b>Impedance</b>	50 $\Omega$ $\pm$ 2 %
<b>Ratio</b>	
50 $\Omega$ DSO Input	1:1000 $\pm$ 2 %
1 M $\Omega$ DSO Input	1:500
<b>Tolerance of Insertion Loss</b>	
up to 100MHz	$\pm$ 0.5 dB
up to 400MHz	$\pm$ 3 dB
<b>Max. Level</b>	7100 V EFT- or DOW-Impulse
<b>Max. average Spikes/s</b>	350 @7100 V
<b>Dimension</b>	15.5 cm x 2.5 cm x 2.5 cm
<b>Weight</b>	0.1 kg

### 9.11 CN-EFT1000

<b>Standard</b>	IEC 61000-4-4 IEC 61000-4-18:2019
<b>Insulation</b>	
EFT 5 ns / 50 ns	8 kV
DOW 3 MHz / 10 MHz / 30 MHz	5 kV
CWG 1.2 $\mu$ s / 50 $\mu$ s	5 kV
<b>Usable cable diameter</b>	up to 70 mm
<b>Coupling capacitance</b>	typically 100 pF - 1000 pF
<b>EFT Calibration into 50 <math>\Omega</math></b>	
Level	1000 V $\pm$ 20 %
Rise time	5 ns $\pm$ 1.5 ns
Duration	50 ns $\pm$ 15 ns
<b>DOW Calibration into 50 <math>\Omega</math></b>	
Level	1000 V $\pm$ 20 %
Frequency	3 MHz $\pm$ 20 % 10 MHz $\pm$ 20 % 30 MHz $\pm$ 20 %
<b>Dimensions</b>	114 cm x 15 cm x 10 cm
<b>Weight</b>	4 kg

## 9.12 VERI-CP-EFT

<b>Standard</b>	IEC 61000-4-4 IEC 61000-4-18:2019
<b>Dimension of the metallic part</b>	
Width	120 mm $\pm$ 1 mm
Length	1050 mm $\pm$ 1 mm
<b>Overall Dimension</b>	113 cm x 7 cm x 5 cm
<b>Insulation</b>	
EFT 5 ns / 50 ns	7.1 kV
DOW 3 MHz / 10 MHz / 30 MHz	4.4 kV
CWG 1.2 $\mu$ s / 50 $\mu$ s	>2.5 kV
<b>Weight</b>	1 kg