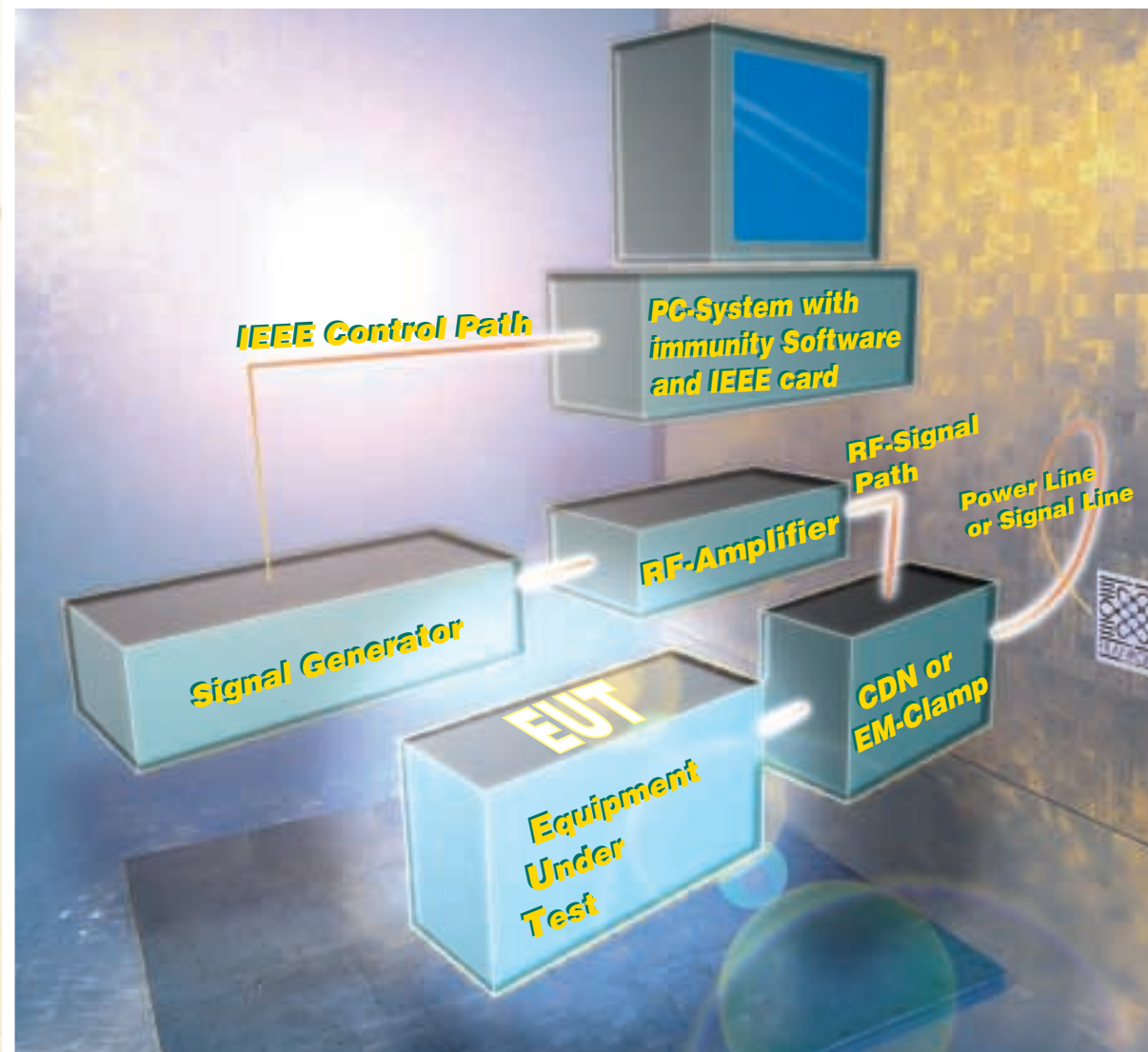


# Immunity Test System According to IEC 61000-4-6

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Depending on the customers requirements we offer immunity test systems according to IEC 61000-4-6 consisting of separate instruments or as a compact-test-generator.



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# IMMUNITY TEST SYSTEM ACCORDING TO IEC 61000-4-6

## General

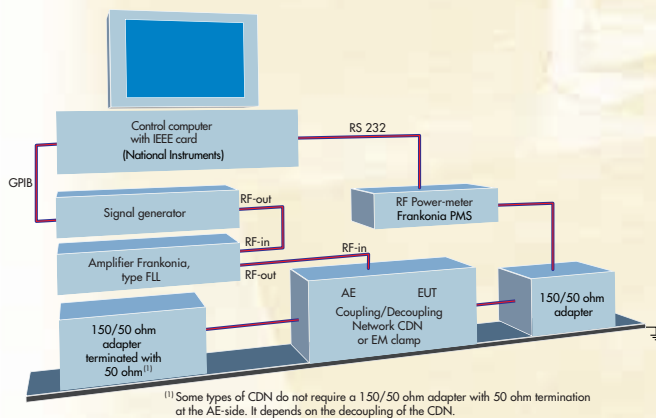
The immunity of an EUT to conducted RF interference is tested in the frequency range 150 kHz to 80 MHz (230 MHz) according to IEC 61000-4-6. This applies to all EUT with at least one circuit connection (power line, signal line, ground line). During the test process the interference is coupled directly onto the lines to be tested.

Contrary to this, when performing immunity tests in the frequency range (26 MHz) 80 MHz to 2000 MHz according to IEC 61000-4-3, the EUT is exposed to a defined radiated electromagnetic field. More detailed information is given in our information sheet „Immunity Test system according to IEC 61000-4-3“.

The described immunity test systems are to some extent composed of the same testing and measuring equipment. Therefore, these components have to be acquired only once.

## Test Assembly

The test system for susceptibility testing is in conformity with the following Standards: IEC 61000-4-6, EN 61000-4-61. It should be located on a well-grounded metal plate and be composed of the following equipment:



Block diagram 1: Set-up of a test system acc. to IEC 61000-4-6 for determination of the reference data.

## Control computer

A commercial IBM compatible PC and Microsoft Windows 95 or higher can be used with Pentium processor, with at least 16 Mbyte RAM memory and a screen resolution of 800 x 600. For controlling the test system it is necessary to have a GPIB interface card (IEEE-488) of „National Instruments“ installed.

## Control software

The control software „CD-LAB“ is the heart of the complete test system. The software performs the reference runs and stores the data thereof (see also reference run and test run). It permits manual and fully automatic tests and prepares the test record. A fully automatic monitoring of the EUT's function is reasonable in all cases where the EUT's compliance with preset tolerance limits can be monitored for up to four values to be measured.

- Further essential data of the software:
- ◆ Microsoft Windows Platform (WIN 95, WIN 98, WIN NT)
  - ◆ Simple operator's guide
  - ◆ On-line help function
  - ◆ Presentation of the results in on-line graphics
  - ◆ Export function of the files for further processing under Microsoft Word or Microsoft Excel
  - ◆ Step width, test voltage and frequency range to be selected at discretion
  - ◆ Control of test assembly by IEEE-488 bus and RS232 bus
  - ◆ Customized modifications possible

## Signal generator

A commercial signal generator is used as signal source. It should cover at least the required frequency range from 150 kHz to 80 MHz (230 MHz) and allow an amplitude modulation of the test signal with a sine wave of 1 kHz and 80 %, as requested by the Standards. Besides, it should meet the requirements regarding frequency step width. If the equipment supports the use of further modulation depths and procedures, as well as frequency step widths, this is an advantage because it is then perfectly equipped for the future, in case the Standards should be modified in this respect. The main data of a typical signal generator are as follows:

- ◆ Frequency range: 9 kHz- 1,0 GHz
- ◆ Level range: -140 dBm to +13 dBm
- ◆ Frequency resolution: 1 Hz
- ◆ Level resolution: 0.1 dB
- ◆ Amplitude modulation: 0 to 99.9 %
- ◆ Further modulation types: frequency modulation, phase modulation, pulse modulation
- ◆ Interface: GPIB (IEEE-488)

## RF Power amplifier

The software controls the level of the signal generators output with respect to the frequency. The voltage level available is then increased by the power amplifier to reach the test voltage required. It depends on the testing set-up (see coupling units) and the test level/test voltage (1V, 3V, 10V or special requirements, e.g. 100V) whether an amplifier output of 25W, 75W or 125 W is required.

Main data:

- ◆ Type: Frankonia FLL 25, FLL 75, FLL 125
- ◆ Frequency range: 10 kHz - 230 MHz
- ◆ Nominal output: 25W, 75W, 125W
- ◆ Feeding for nominal output: 1.0 mW (0dBm)
- ◆ Impedance: 50 Ohm
- ◆ Use for: CDN, EM coupling clamp



## Coupling units / coupling clamp

By means of the coupling units the test voltage is superimposed on the mains supplies, data lines or signal lines of the EUT. The technical construction of a coupling unit for the respective types of lines to be tested is prescribed by the Standard. Different coupling units are used for example for 1, 2, 3 and 5 wire circuits or for data and signal lines. The types of coupling units have to be determined individually for each customer.

When using the classic coupling units (CDNs Coupling/Decoupling Networks) the lines to be tested have to be separated. This is mostly impossible and unreasonable with data and signal cables with e.g. more than 4 lines. In these cases the EM coupling clamp can be used, in which the cable to be tested is put in. The disadvantage of the coupling clamp consists in the fact that a higher amplifier output is required for obtaining the desired test voltage. To generate a test voltage of 20V the EM coupling clamp requires 75W amplifier whereas a 25W amplifier is fully sufficient when using coupling units.

Type	Description
M1, M2, M3, M5	1, 2, 3 or 5 power lines
M2/M3	2/3 power lines combination
S1/50, S1/75, S1/93	Shielded cables; 1 line impedance 50; 75; 93 (Ohm)
S2, ..., S36	Shielded cables; 2,..., 36 lines
AF2, AF3, AF4, AF8	Unshielded cables, asymmetrically operated, 2, 3, 4, and 8 lines
T2, T4, T8	Unshielded cables, symmetrically operated 2, 4, 8 lines

## RF Power probe / Voltmeter probe

Just as the calibration installation, the RF voltmeter probe type Frankonia PMS is required only if the user himself wants to carry out the reference run of the coupling installation. In this case, the generated test voltage is measured and transmitted to the control computer.

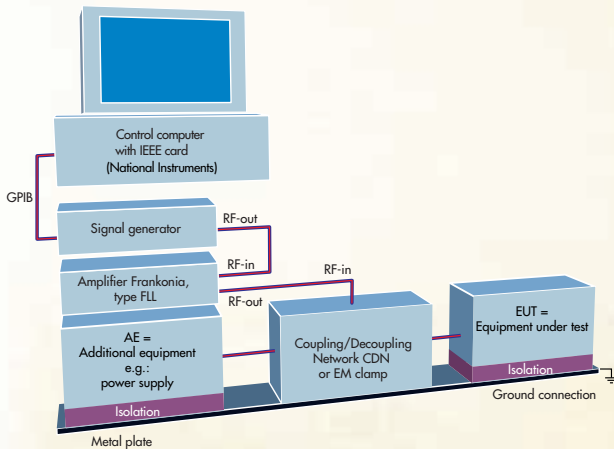
Main features:

- ◆ Type: Frankonia PMS
- ◆ Frequency range: 100 kHz to 1 GHz
- ◆ Measuring range, at least: 100nW - 0.5W (-40dBm...+27dBm)
- ◆ Impedance: 50 Ohm
- ◆ Interface: RS 232



## Reference Run

The components of the testing set-up (amplifier, cables, coupling unit) show non-linearities over the frequency range 150 kHz to 80 MHz (230 MHz). For this reason, a reference run has to be performed once for each equipment combination required, as well as for each desired test voltage. The set-up for the reference run is shown in block diagram 1. To perform this run, a calibration unit is required which has been adjusted to the respective coupling unit. During the reference run the respective output level of the signal generator is determined, at which the requested test voltage (without modulation) is available at the coupling unit. This is done in step width of 1 %, defined in the Standard, over the whole frequency range. A new reference run must be performed only if new components are to be used in the test system, or within defined calibration intervals. As an alternative to this, we offer a calibration service.



Block diagram 2: Set-up of a test system acc. to IEC 61000-4-6.

## Test run

The testing set-up is described in block diagram 2. On the basis of the reference data determined for the testing set-up, the required test level and/or test voltage is adjusted reproducibly in the test run by means of the control software for each frequency step. For this purpose, the signal is amplitude-modulated with a sine wave 1 kHz / 80 %. The verification of the EUT's function is performed manually (optically) or, if possible, automatically. In the latter case the EUT's function is tested by means of max. 4 measuring values with respect to its compliance with preset tolerance values. The determined data, the results, a description of the test system as well as a comment regarding the measurement are summarized by the software in a measuring record. The output is realized by a printer connected to the PC. The data can be exported for further processing in other data processing programs, e.g. Microsoft Word and Microsoft Excel.

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