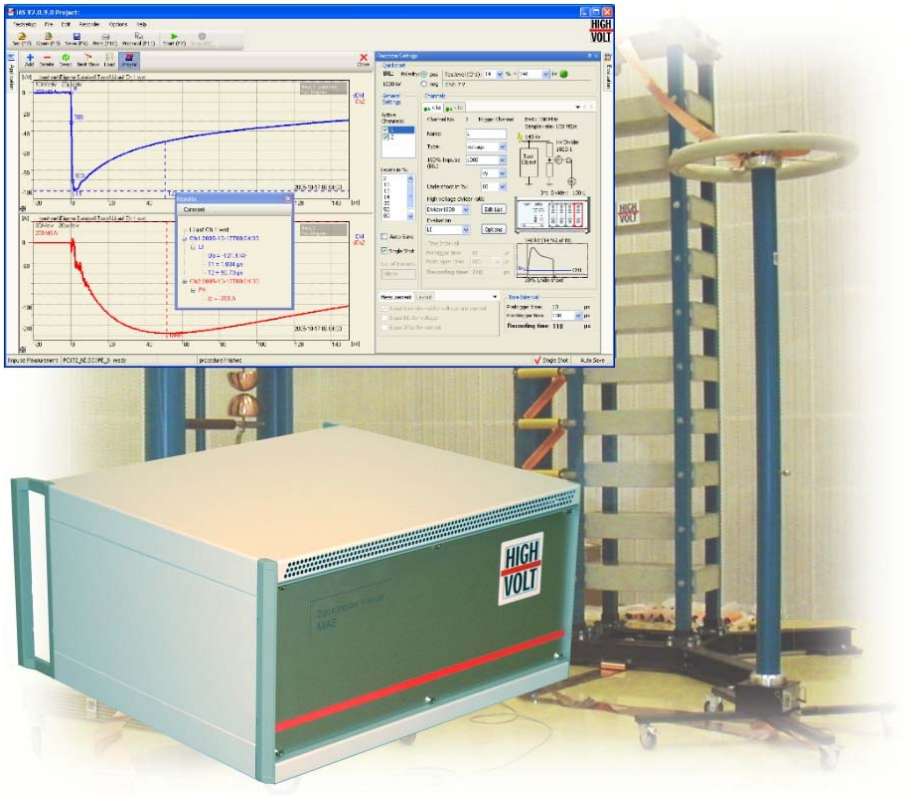
Digital Impulse Analyzers
Types MIAS … B, C



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Application

Today transient phenomena in very different fields of engineering and service are measured by digital oscilloscopes or recorders. The digital impulse analyzer of the types MIAS can be adapted to very different measurement, but both, hardware and software, are especially designed for measurements in high-voltage, high-current and high-power technology. Therefore they are full in line with the IEC standards 61083-1 & 2. This includes the application for impulse voltage and impulse current testing with complete parameter evaluation, for testing with combined and composite voltages, for transient processes in special tests with alternating and direct voltage and for synthetic high-power tests. The digital impulse analyzer, type MIAS, can also be applied for the adjustment of circuit breakers, tap changers and similar electromechanical processes.

Advantage of MIAS and related standards:

- MIAS fulfills or exceeds all requirements of the HV testing standards IEC 60060-1 & 2 as well as IEC 61083-1 & 2 or equivalent IEEE standard 4.
- MIAS is successfully applicable to all tests according to IEC 60060 (general), IEC 60044 and IEC 60076 (instruments and power transformers), IEC 60099 (arrester), IEC60694 and IEC 62271 (switchgear), etc.
- MIAS is available in reference quality for calibrations and calibration service providers.
- MIAS is well adapted for any research work and students training.
- MIAS has been EMP/EMC as well as mechanically tested successfully according to relevant standards and carries the necessary certificates (e.g. CE,C-Tick, EN 61010-1)

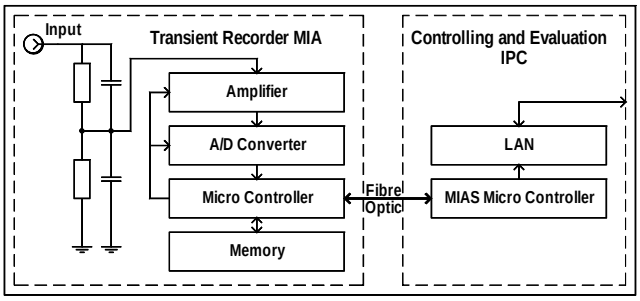

Fig. 1: Principal circuit diagram of a digital impulse analyzer MIAS

Operation

In connection with high-voltage and high-current converting devices (voltage dividers, voltage or current transformers, sensors, shunts, etc.) the digital impulse analyzer forms a measuring system. Measurements are visualized on an industrial personal computer (IPC) monitor or optionally on a laptop (LPC). The voltage and current waveform is represented graphically. The digital recorder directly displays the measured value under consideration of the scale factor of the converting devices. Voltages with peak values up to 1000 V (optionally 2000 V) can be measured without any external voltage divider. An internal testing procedure enables a rapid check of the device.

The operation is explained by the circuit diagram (Fig. 1). The voltage to be measured is transferred from the input of the digital recorder, type MIA, via the internal divider and the programmable amplifier to the A/D converter (analog-digital converter). The A/D converter scans the input signal with a high frequency. The digital values are gained by the A/D converter and are immediately written in the digitizer memory. The micro controller sends - on request - the digital data to the controlling and evaluation IPC. A fiber optic connection is applied as interface between transient recorder and controlling IPC.

Software

All wave shapes are evaluated, displayed and stored. Further data comparison and the processing of all measured data are made by the impulse analyzer software package, type IAS.

The basic software, type IAS, is delivered to all MIAS types. It contains the “Graphically User Interface”, the data recording, the automatic evaluation of all impulse parameters for lightning and switching impulse voltages according to IEC 60060-1 as well as the maximum value of the current, the manual parameter measurement by cursors, zooming, viewing channels, the data storage and the preparation of test reports. For further software packages, see Data Sheets on our website (www.highvolt.de) “Components and Systems for Voltage and Current Measurement”.

Design

Digital impulse analyzers, type MIAS, consist of the digital recorder with one up to four channels, type MIA, an IPC or LPC and a related software package, type IAS (see Data Sheet 5.63). Based on those, two basic variants are available:

Type MIAS … B is based on plug-in units to an operator rack (Fig.2) or desk, which contains both, the recorder, type MIA, and the IPC. Both components are connected by a fiber optic link. The IPC (with the necessary software package, type IAS) overtakes not only the processing and the evaluation of the recorder raw data, but it can also be used for the control of the high-voltage or high-current generation circuit (see Data Sheet 3.51). By using the remote diagnostic and access module RDA (see Data Sheet 1.56), the digital impulse analyzer can be connected to a local computer network (LAN) or even via internet to the HIGH-VOLT Service Center for software updates or trouble shooting.

Type MIAS … C consists of a transient recorder, type MIA together with a computer, in one compact, EMP proofed housing. There are the following two variants for operation:
The compact unit MIAS … C is completed by a TFT display, cordless keyboard and mouse (Fig.3), or by a separate laptop PC (Fig.4) or any other computer connection. This stand alone version is especially useful for flexible test arrangements, high-voltage on-site testing or calibration service.

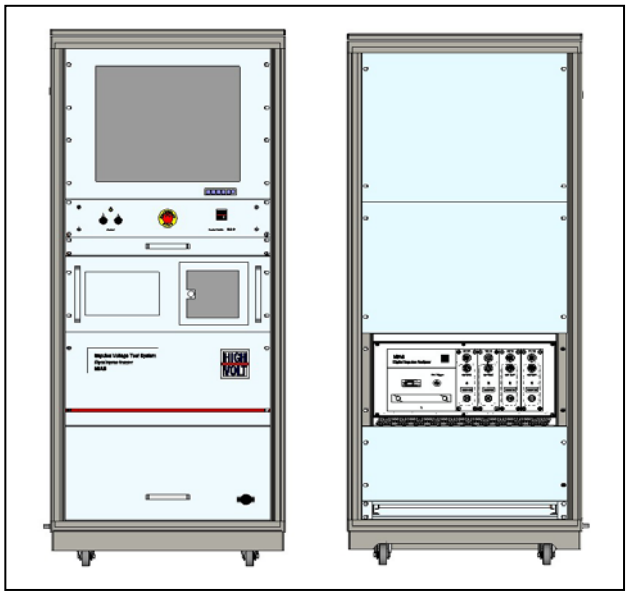

Fig. 2: MIAS … B
built in an operator rack (OR)

Main Parameters

Each of the mentioned MIAS design types can be supplied with different electrical parameters as follows:

Sampling rates:
200 MS/s down to 3.0 kS/s
100 MS/s down to 1.6 kS/s
5 MS/s down to 1.0 kS/s (AC/DC testing)
or others on request
Resolution:
12, 14 bit or 16 bit (on request)
Programmable memory length:
up to128 kS or 4 MS (Samples)
Maximum input voltage:
100 mV up to 1000 V (2000 V or other on request)
Input impedance:
1 MΩ || 45 pF
Channels:
1 up to 4 (more on request)
(For more details see following page)

The type designation is depending on the design types and the main parameters as follows:

MIAS a–b/c X
a = sampling rate in mega samples per second
b = resolution in bits
c = number of channels
X = design type B or C

Example: MIAS 100-14/2 C means a stand alone digital impulse analyzer with 100MS/s, 14bit, 2 channels.

Fig. 3: MIAS … C (front side)
with TFT display and keyboard/ mouse

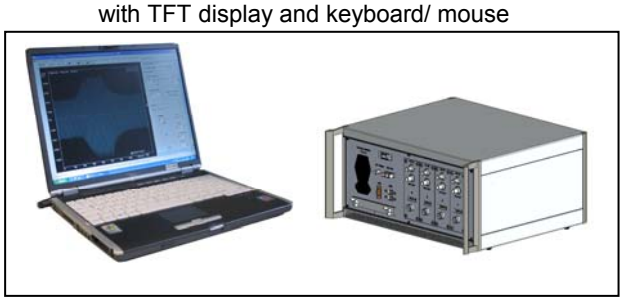

Fig. 4: MIAS … C (back side)
with a laptop for controlling the MIAS

Parameters of the main types

digital impulse analyzer	**MIAS 100-14/…**	**MIAS 200-12/…**
design type	B or C	B or C
	ADC analog digital converter	
sampling rate	100 MS/s down to 1.6 kS/s	200 MS/s down to 3.2 kS/s
resolution	14 Bit => 0.0061 %	12 Bit => 0.0244 %
number of channels	1 / 2 / 3 / 4	1 / 2 / 3 / 4
	other configurations on request	other configurations on request
random interleave sampling	2 GS/s (repetitive signals only)	4 GS/s (repetitive signals only)
sample points	up to 4 Mega samples memory	up to 4 Mega samples memory
time base accuracy	±25 ppm	±25 ppm
total sample clock jitter	< 2 ps	< 2 ps
triggering	internal, external, slope or window	internal, external, slope or window
	input divider 1000 V (div1000)	
ratio	100:1	100:1
input impedance	1 MΩ || 45 pF	1 MΩ || 45 pF
analogue bandwidth (-3dB)	> 100 MHz	> 140 MHz
measuring range for impulse	1000 -10 V	1000 -10 V
full scale input range	1000 V down to 20 V	1000 V down to 20 V
AC measuring range	500 V	500 V
over voltage protection	1 kVpp	1 kVpp
over voltage tested	4 kVpp	4 kVpp
	input divider 2000 V (div2000) optional	
Ratio	200:1	200:1
input impedance	1 MΩ || 45 pF	1 MΩ || 45 pF
analogue bandwidth (-3dB)	> 100 MHz	> 140 MHz
measuring range for impulse	2000-10 V	2000 -10 V
full scale input range	2000 V down to 40 V	2000 V down to 40 V
AC measuring range	1000 V	1000 V
over voltage protection	2 kVpp	2 kVpp
over voltage tested	8 kVpp	8 kVpp
	direct input (10 V)	
measuring range	0-10 V	0-10 V
analogue bandwidth (-3dB)	10 V down to 0.4 V : > 90 MHz 0.2 V : > 70 MHz	10 V down to 0.4 V: > 140 MHz 0.2 V : > 70 MHz
full scale input range	10 V down to 100 mV	10 V down to 100 mV
input impedance	1 MΩ || 45 pF	1 MΩ || 45 pF
	filter, coupling, connectors	
filter (-3dB)	20 MHz, 35 MHz, 100 MHz	20 MHz, 60 MHz, 150 MHz
coupling	AC, DC	AC, DC
connector	N-type	N-type
expanded measuring uncertainty for LI and SI at 22°C	peak value ≤ ±0.9 % (opt. ±0.6 %) time parameter ≤ ±2.2 % (opt. ±1.8 %)	peak value ≤ ±0.9 % (opt. ±0.6 %) time parameter ≤ ±2.0 % (opt. ±1.8 %)
expanded measuring uncertainty of front chopped LIC voltage at 22°C	peak value ≤ ±1.8 % (opt. ±1.5 %) time parameter ≤ ±3.0 %(opt. ±2.5 %)	peak value ≤ ±1.5 % (opt. ±1.2 %) time parameter ≤ ±2.5 %(opt. ±2.0 %)
internal performance check	scale factor, offset, frequency response, triggering and timing	scale factor, offset, frequency response, triggering and timing
	IPC / LPC	
personal computer	State-of-the-art, Windows XP ®, MS Office ®	

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