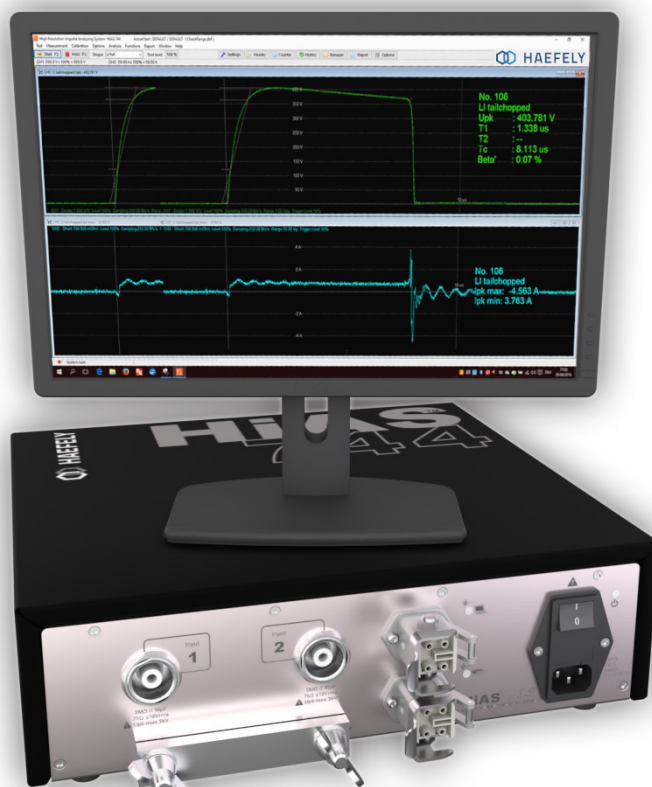


# HIAS 744 & HIAS 744-REF

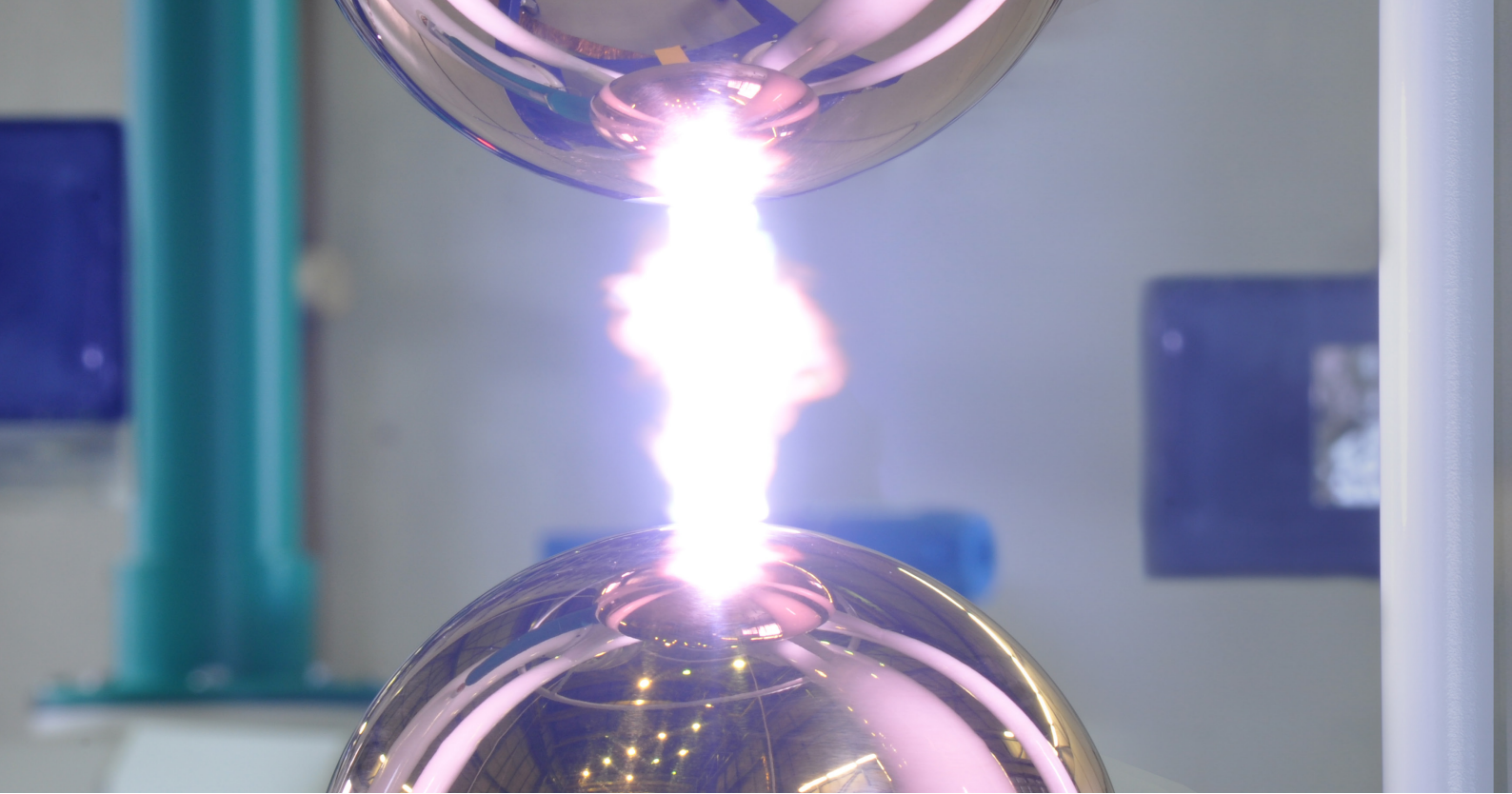
Highest Resolution  
Impulse Analyzer

Leaflet



## HAEFELY

Current and voltage – our passion



## HIGHEST RESOLUTION IMPULSE ANALYZER

Dielectric tests with impulse voltage are done to confirm the quality of insulation for HV equipment and are mandatory as per international standards. A defined impulse wave shape is applied to the test object and changes in the wave shape caused by the test object are used for detection of insulation faults. Determining these changed parameters exactly makes it absolutely necessary to have a fast and accurate measuring system. This procedure is commonly used for routine testing of transformers, cables, bushings, etc.

### Unique device - Tailor made for the industry

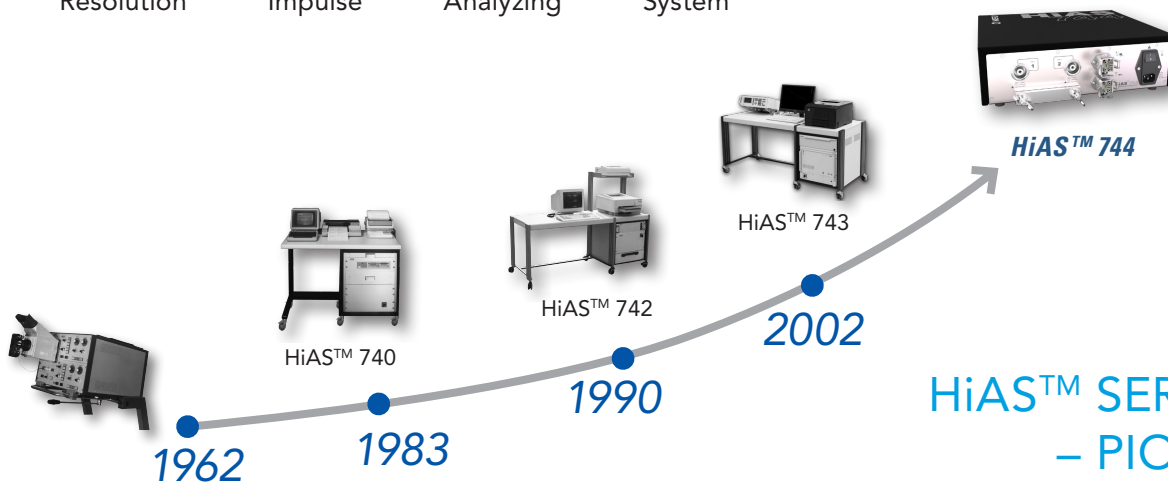
HAEFELY, the pioneer company for impulse testing since 1904, has been continuously developing and upgrading application specific high-voltage impulse measuring/analyzing solutions over the years. The latest in a long line of distinguished impulse analyzers is the Highest Resolution Impulse Analyzing System

HiAS™ 744. HAEFELY has set a new highwater mark with unmatched performance. The new front-end solution provides a 16-bit resolution at 250 MS/s with the highest measurement accuracy.

Software, which has been upgraded to suit the new hardware, retains the comfortable interface proven and tested by hundreds of satisfied users. Furthermore, it remains compatible with all previous versions of HiAS™ data files, allowing for comparison to older measurements.

### Galvanic isolation

The optically decoupled front end provides complete galvanic isolation between control room and test field. It thus affords the personnel the highest safety level and in addition minimizes ground loop, resulting in a reduced interference coupling.



## FEATURES

16-bit resolution at 250 MS/s,  
100 MHz analog bandwidth

Optically decoupled front-end solution

$\pm 2000$  Vpk down to  $\pm 5$  Vpk analog input range with  
LEMO 4S connector

2 Channels digitizer unit, can be cascaded

Exceeds latest IEC 61083-1, -2, IEC 60060-2,  
IEEE Std. 4 and related standards

4<sup>th</sup> Generation digitizer

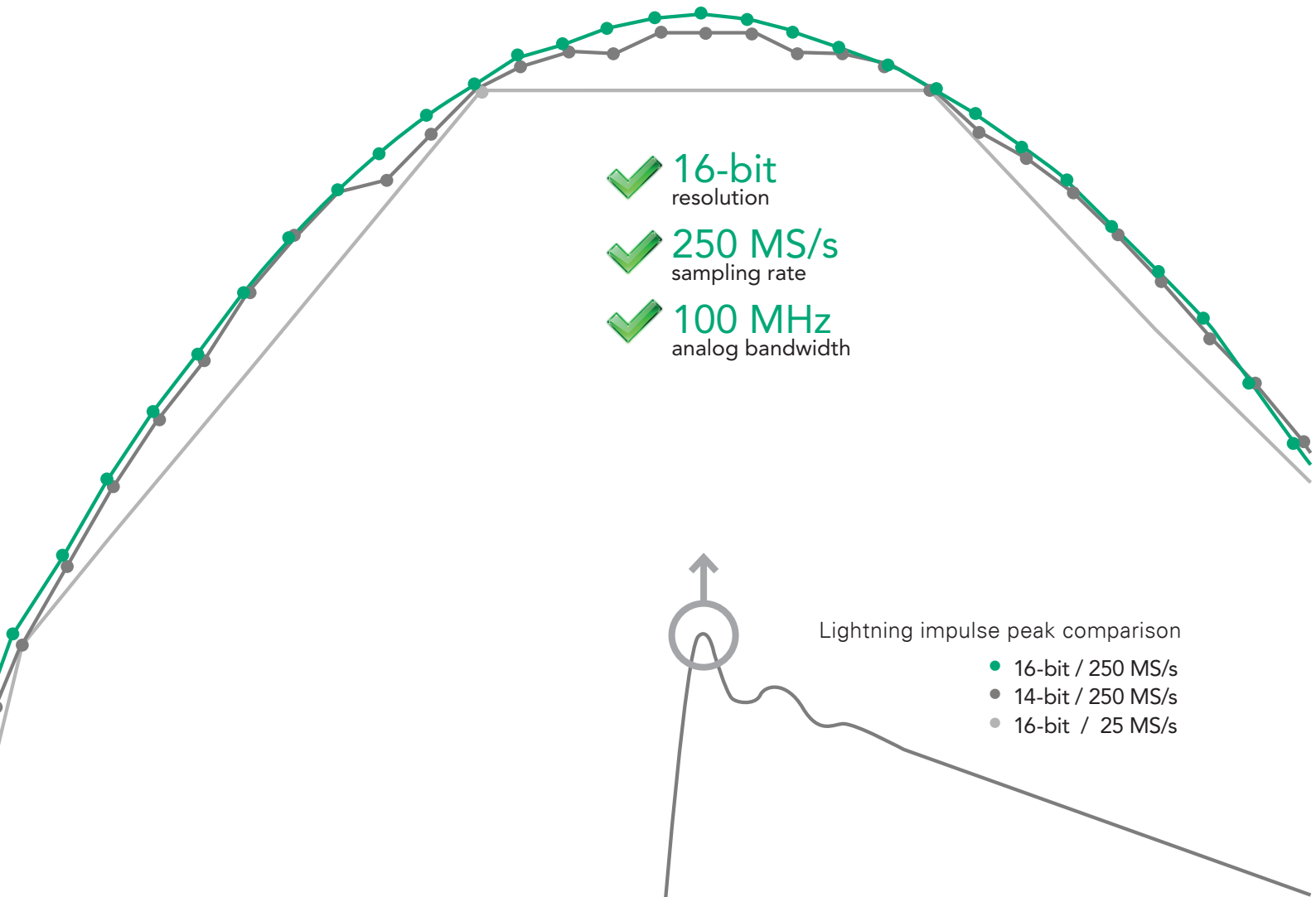
Mains powered

## ADVANTAGES

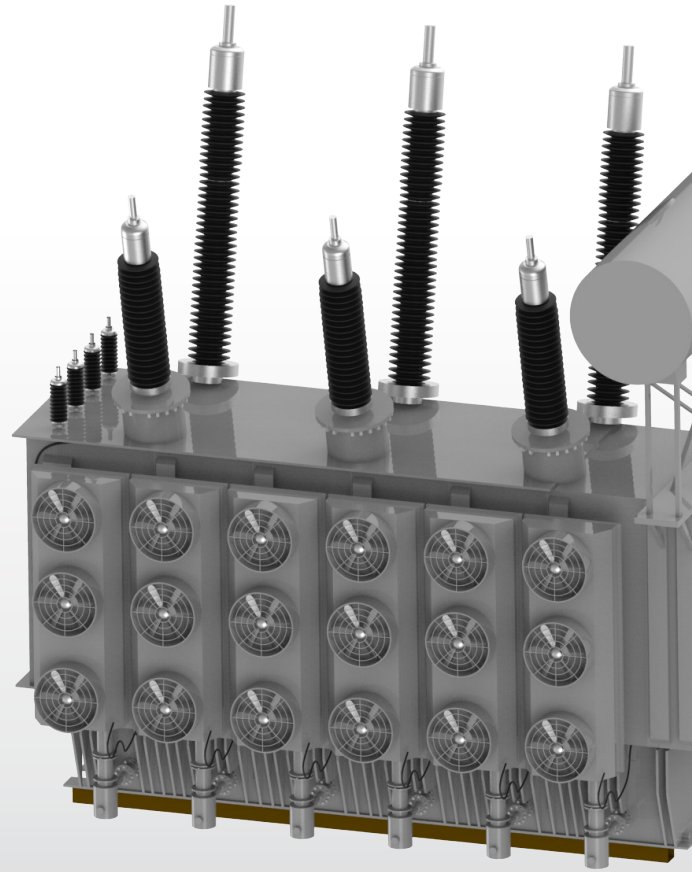
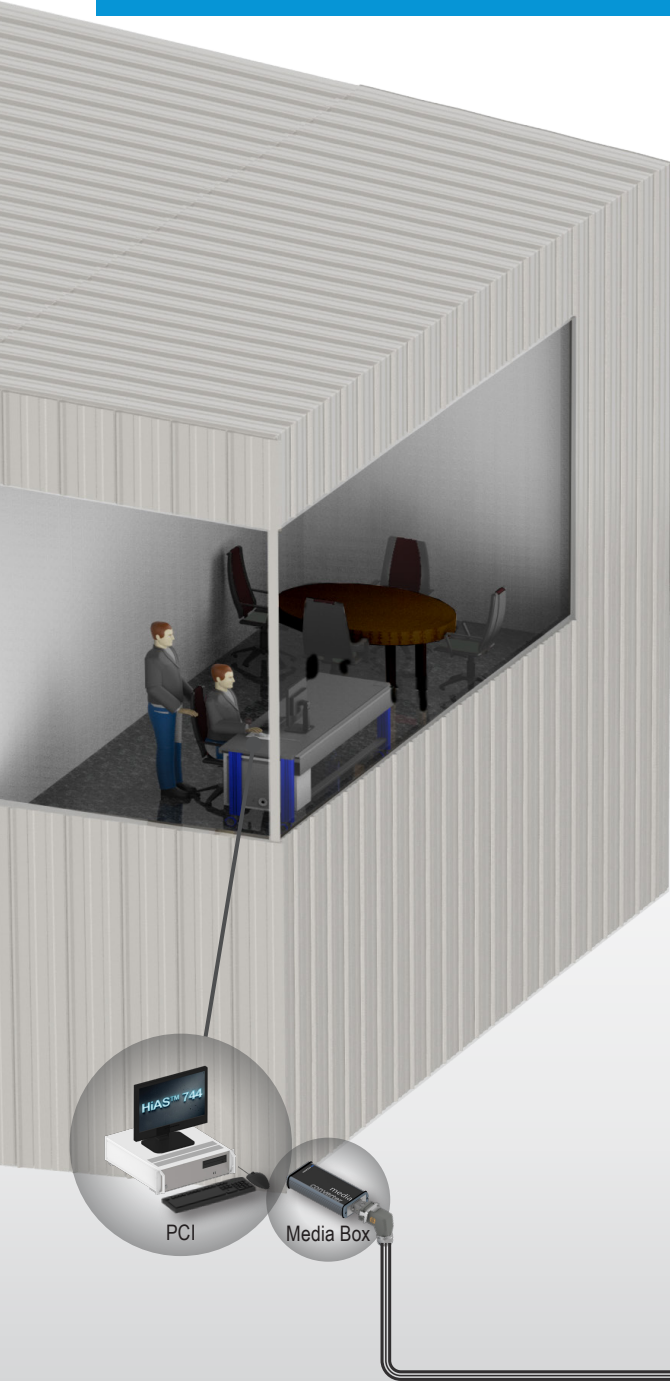
- The highest measurement accuracy in the market
- Excellent interference immunity & safe operation
- Integrated solution, no additional divider necessary, compatible with any divider ratio
- Synchronous multi-channel record
- Compliant, advanced state-of-the-art solution
- Software & solution proven by many hundreds of satisfied users
- No battery pack or recharge needed

## PEAK PERFORMING ANALYZER – UNBEATEN!

Real wave shape captured and displayed by means of the highest resolution and an outstanding sampling rate

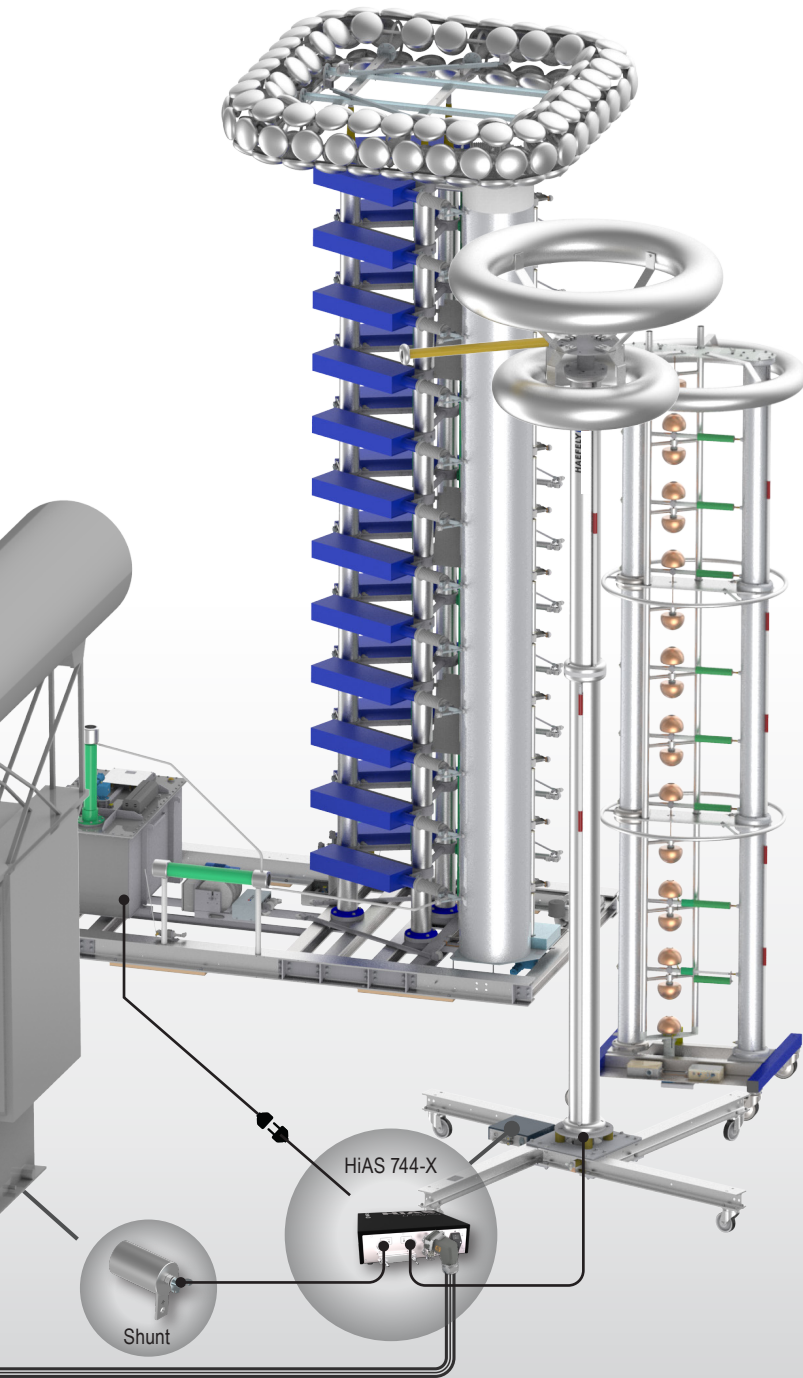


# HIGH VOLTAGE IMPULSE LABORATORY EXAMPLE



*RUGGED fiber optic link cable*





## GALVANIC ISOLATION

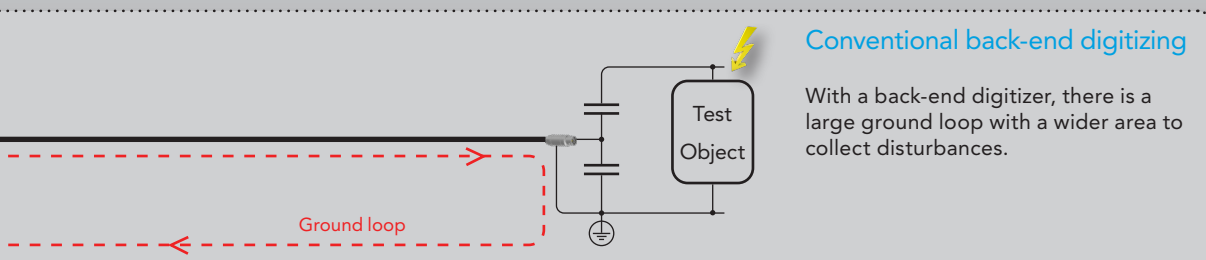
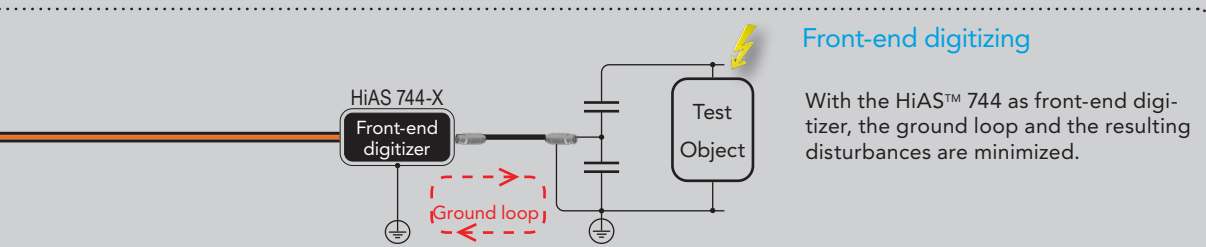
Fiber optic link between the HiAS™ 744 and the control PC provides a complete galvanic isolation, with the following benefits:

- The length of the fibre optic cable does not impact the divider load, its ratio or the calibration.
- The galvanic isolation fully ensures safety of personnel. With the HiAS™ 744, there is no electrical connection between the control room and the high voltage test room.

## INTERFERENCE

Electromagnetic Interference (EMI) is reduced to the absolute minimum by:

- Limiting the active ground loop area.
- Using a direct 2 kV input range (there is no need of a second low voltage divider with additional cabling).
- Perfectly shielding the digitizer.





## SOFTWARE

### Automatic parameter evaluation and impulse type recognition of all common voltage and current impulse shapes

After an impulse test the software collects, stores, calculates, normalizes and displays all measured signals. This allows the user to see the final result of the actual impulse test step without need of any interaction.

### Multi-functional curve display

Raw data points, mean curves, reference points and lines etc. are automatically visualized in one window for intuitive understanding and handling of the parameter calculation. A toolbox can be opened by a mouse-click to access all curve related functions such as zooming, print preview, recalculation, manual evaluation, smoothing, cursors, grid normalization, grid optimization, editing curve information, add memos, save measurement and save as ASCII.

### Software built according to internationally accepted standards

The software fulfills the latest IEC 60060, IEC 61083-2, IEEE Std. 4 and other related standards.

Combined testing (impulse on DC) is implemented by a special setup to automatically calculate all requisite impulse and DC parameters according to the latest recommendations and standards committee drafts (IEC CDV 62895: 2015). Also ODT (Operating duty testing) and composite testing (impulse and AC) are supported.

Users who upgrade from the older versions of HiAS™ get to keep using data from previous tests. Older HiAS™ 743 data can be loaded and the IEC parameter evaluation according to older editions is possible for comparison purposes with archived measurements.

### Easy to use, intuitive, proven graphical user interface

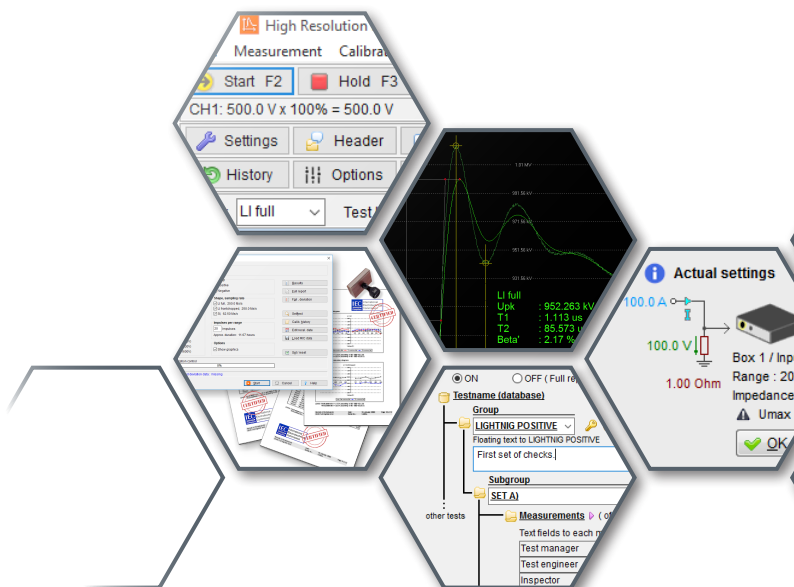
All needed operation functions are operable on the top level of the multilingual software by dedicated buttons. The setup, supported by interactive graphics and visualization hints, is done with a single dialog and helps the user to easily check the setup and thereby avoid failures.

### Approved database structure

All measurements and data are stored in a database structure. This enables easy documentation, sorting, searching and recognition of the saved tests. Export of data to ASCII format is also supported for further evaluation in third party analysis tools.

### Automatic report generator

Connected to the database is the integrated reporting tool with predefined and user definable layouts and styles. Over the data



# HiAS™ 744 SOFTWARE

## – HIGHLY ADVANCED & PROVEN

manager one can easily preview and select desired single impulses or full tests, groups or sub groups to report and print.

### Loaded with supporting tools

Software comes loaded with tools like sequencer, step-response calculation, curve import, IEC software calibration check, history stack, windows arrangement, header information, data manager, pop-up counter, calibration information and password protection and more. In addition the software supports automatic hardware calibration when used together with our optional calibrator RIC 422.

### Loaded with diagnosis tools

- Parameter Tolerance Analysis (PTA). Impulse curves can be manually chosen from the database or can be predefined and auto calculated with a pass/fail output.
- Difference Analysis Function (DAF). Enables auto-fit and auto-zoom. Impulse curves can be manually selected from the database or can be predefined and auto calculated with a pass/fail output.
- Fast Fourier Transformation (FFT). Gives an overview of the frequency spectrum of the measured impulse.
- Transfer & Coherence Function (CTF). Useful for advanced power transformer analysis.
- Comparison Tool (CT). Used to determine scale factor of divider and measurement systems by reference method according to IEC 60060-2.

### Divider scale factor matrix

The different scale factors of different voltage dividers in a test field (DC, AC, SI, and LI, according to IEC 60060-2) can be entered into a predefined matrix and will be automatically applied by the software. Up to 10 different dividers with their factors can be defined, labeled, saved and easily selected.

### HF rejection filter

Noise from different sources in the test field can obscure signals of interest, especially when currents are being measured. Variable frequency function performs filtering on the measurement to eliminate unwanted high-frequency instability or noise.

### Selective analysis depth

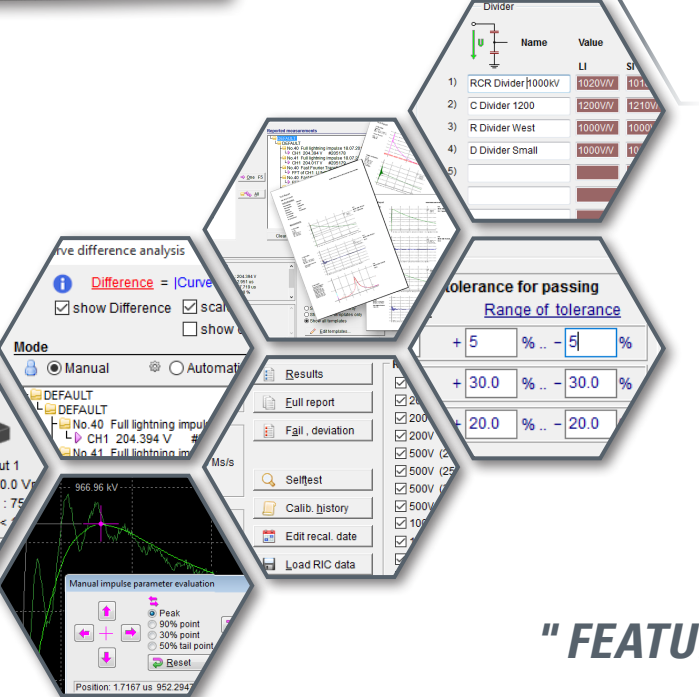
Visualization of only basic analysis information for routine tests or advanced tooling with additional parameters for diagnostic purposes can be easily selected.

### Remote control

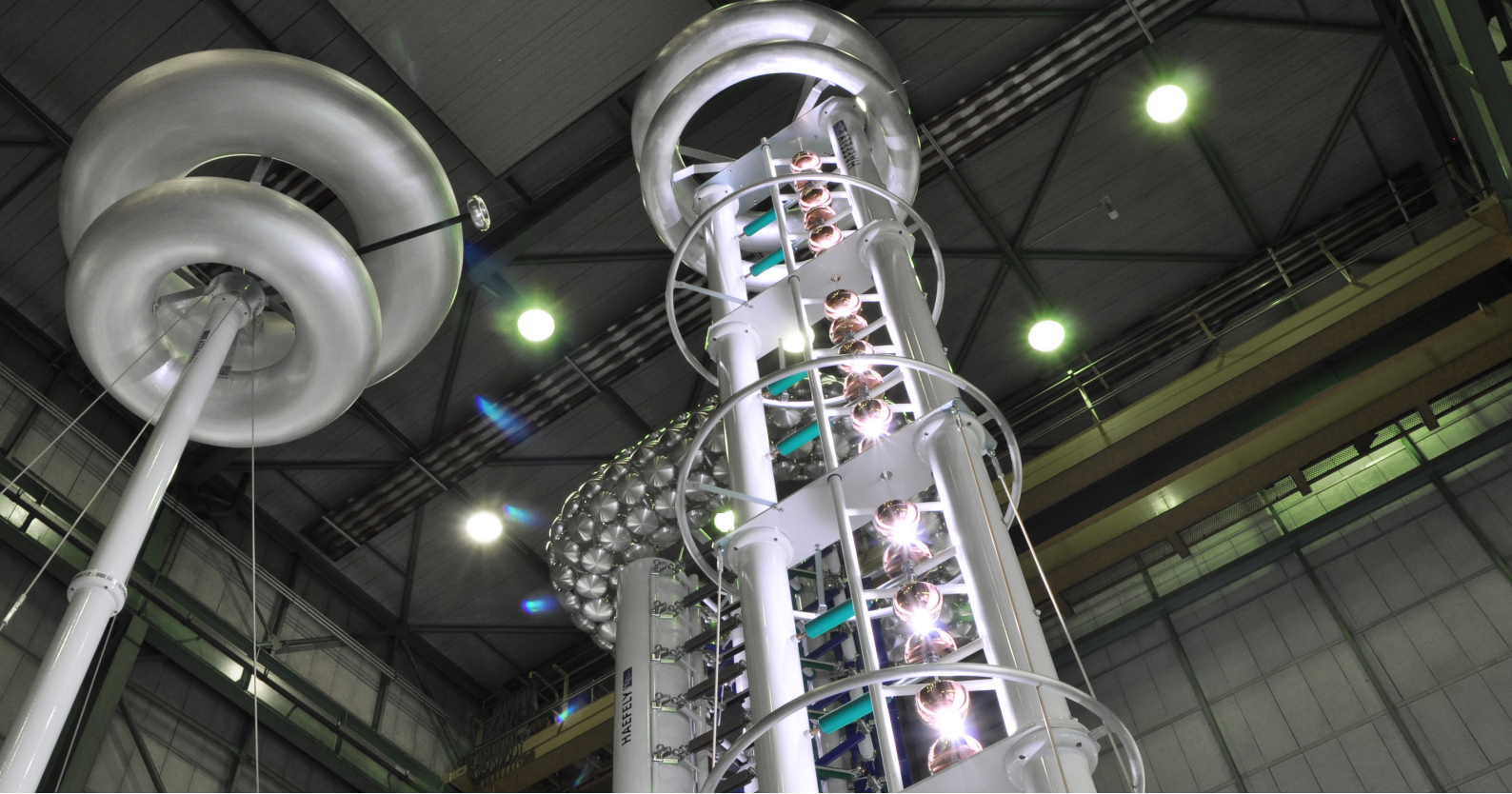
Software and the impulse controls of Haefely- can be connected together. In this combination the HiAS™ can be remote controlled. All impulse and range parameters are set automatically according to the next expected impulse type.

### Office software

The HiAS™ software is also available as an office package that can be run without connected channel hardware, thus enabling preparation of test set ups, accessing data and evaluating parameters from the comfort of one's desk. It is also possible to perform offline diagnostics and prepare reports based on measurements stored in the database.



**" FEATURES DON'T SELL SOFTWARE,  
– EXPERIENCE DOES! "**



## HiAS™ 744 PRODUCT RANGE



**HiAS™ 744**

No. 4490014



**HiAS™ 744-S**

No. 4490015



**HiAS™ 744-REF**

No. 4490016

### Data Acquisition

Amplitude Resolution	<u>11 bit (0.05 %)</u>	<u>16 bit (0.0015 %)</u>	<u>16 bit (0.0015 %)</u>
Sampling Rate	<u>1 .. 125 MS/s</u>	<u>1 .. 250 MS/s</u>	<u>1 .. 250 MS/s</u>
Analog Bandwidth (-3 dB)	<u>≥ 50 MHz</u>	<u>≥ 100 MHz</u>	<u>≥ 100 MHz</u>
DC Accuracy	<u>±0.25 %RD ±0.02 %FS</u>	<u>±0.20 %RD ±0.02 %FS</u>	<u>±0.15 %RD ±0.02 %FS</u>
Rise Time	<u>7 ns</u>	<u>3.5 ns</u>	<u>3.5 ns</u>
Memory Depth	<u>2 MS</u>	<u>2 MS</u>	<u>2 MS</u>
Measuring Input(s)	1 or 2 channels	2 channels	2 channels
Expandable <sup>1</sup>	✗	✓	✓

### Overall System Accuracy<sup>3</sup> according to standard IEC 61083-1:2001 and IEC 61083-2:2013

Full and tail chopped Impulses (SI, LI)	<u>± 1.5 % U<sub>pk</sub></u>	<u>± 1 % U<sub>pk</sub></u>	<u>± 0.7 % U<sub>pk</sub></u>
Front chopped Impulses (LIC)	<u>± 2 % U<sub>pk</sub></u>	<u>± 1 % U<sub>pk</sub></u>	<u>± 1 % U<sub>pk</sub></u>
Time Parameters (T1, Tp, Tc, T2, etc...)	<u>± 3 %</u>	<u>± 2 %</u>	<u>± 1.8 %</u>
Calibration	factory <sup>2</sup>	factory <sup>2</sup>	EN / ISO 17025

<sup>1</sup> Expandable with a second device: 2 + 2 = 4 channels

<sup>2</sup> EN / ISO 17025 calibration optional

<sup>3</sup> Valid for the full input range ± 5 Vpk up to ± 2000 Vpk and for the full temperature range

## HiAS™ 744 /-S /-REF

### Analog Part

Signal Input Connectors	LEMO 4S
Input Voltage Ranges	± 2000, ± 1000, ± 500, ± 200, ± 100, ± 50, ± 20, ± 10, ± 5 Vpk
Overvoltage Protection	3000 Vpk
Overvoltage Tested	6000 Vpk (1.2/50 µs, 10/700 µs)
Input Impedance	2 MΩ // 10 pF (additional 75 Ω termination switchable)
Triggering	Internal slope, level, auto
Filter, HF Rejection	Low pass, Bessel 5th order, adjustable: OFF, 1, 3, 10, 30 MHz

### Operating Conditions

Supply	90 .. 264 VAC, 50/60 Hz, 50 VA
Temperature Range	5 .. 50°C (Reference Conditions 15°C .. 35°C)
Humidity	5 .. 90 % r.h., non-condensing

### Mechanical

Dimensions, weight	34.2 x 31.5 x 8.6 cm, approx. 6 kg
Vibration Tests	IEC 60068-2-64 Spectrum A1 Transportation 1a

### Standards

Fulfills or exceeds the requirements of latest IEC 60060, IEC 61083-1, IEC 61083-2, IEEE Std. 4 and other related standards referenced to the above mentioned

### Parameter Verification

Fully automatic (with optional Reference Impulse Calibrator RIC 422, controlled by HiAS™ software)

### Scope of Delivery with HiAS™ 744 /-S

#### /-REF

Mains cable CH 2.5 m + extension CH 10 m (to CCU), additional set of plugs for custom cable assembly

## Media Box

### Data link

Link HiAS™ 744 to Media Box	Fiber optic with rugged HARTING connector, Han 3A-gw-M20, SC type, IP44
Link Media Box to PC	Ethernet 10/100 (data), USB 2.0 (power)

### Operating Conditions

Temperature Range, Humidity	5 .. 50 °C, 5 .. 90 % r.h., non-condensing
Dimensions, Weight	22 x 8.5 x 3.5 cm, approx. 400 g

### Scope of Delivery with Media Box

Ethernet cable 1 m, USB cable 1 m, RS232 cable & RS232/USB converter (for remote control from GC 257 or GC 223)

## Rugged Fiber Optic Cable



### Cable

4-fiber cable, 50/125 µm OM2, Ø 5.6 mm, PUR jacket, according to IEC 60794-1-2 for harsh environments

### Connector

Rugged HARTING connector, Han 3A-gw-M20, SC type, IP44

## System Software

### Requirements

Platform	Laptop or Industrial PC
Min. Hardware	CPU i3 or better, 8 GB RAM, USB 2.0 (power) and Ethernet 10/100
Operating System	Windows 7, Windows 10



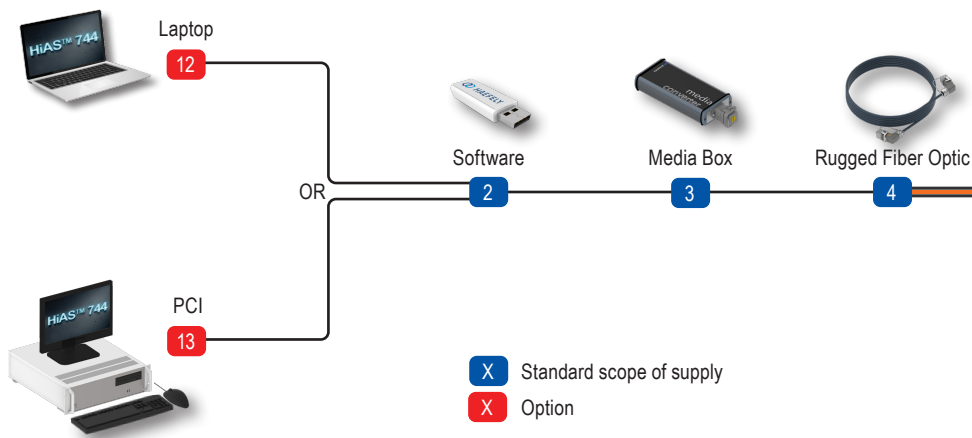


## HiAS™ 744 CONFIGURATION

### STANDARD PACKAGE

- 1 HiAS™ Package
 

HiAS™ 744	No. 4490014
HiAS™ 744-S	No. 4490015
HiAS™ 744-REF	No. 4490016
- Including
- 2 Software Basic Package
- 3 Media Box
- 4 Rugged Fiber Optic Cable, 20 m



## OPTIONS

### 6 Software

Office Package	No. 4771570
Older IEC Ed. Evaluation	No. 4771574
Comparison Tool <sup>1</sup>	No. 4771575
Transfer & Coherence Function	No. 4771576

### 7 Rugged Fiber Optic Cable

Rugged Fiber Optic Cable, 2 m	No. 4844189
Rugged Fiber Optic Cable, 10m	No. 4844025
Rugged Fiber Optic Cable, 20 m	No. 4844026
Rugged Fiber Optic Cable, 40 m	No. 4844028
Rugged Fiber Optic Cable, 60 m	No. 4844030

### 8 HiAS™ 744-S /-REF (extension to 4 channels)

HiAS™ 744-S, 2 channels extension	No. 4771610
HiAS™ 744-REF, 2 channels extension	No. 4771611

<sup>1</sup>Included in HiAS™ 744-2REF package

### 9 Lemo Cable

Lemo Cable, 0.6 m	No. 2404281
Lemo Cable, 1 m	No. 4771625
Lemo Cable, 2.5 m	No. 4770321
Lemo Cable, 10 m	No. 2404283
Lemo Cable, 20 m	No. 2404284
Lemo Cable, 30 m	No. 2404286
Lemo Cable, 40 m	No. 2404287
Lemo T-Piece	No. 0751611
Lemo-Lemo 90° Elbow plug	No. 0410131
Lemo-BNC adapter	No. 0412750

### 10 Divider

Refer to our Divider Series CS, CR, CZ, RCZ, R, RCR

### 11 Shunt

Refer to our Shunt Series SH-H, SH-Q, SH-R

### 12 Laptop Package

Laptop 15"	No. 4771622
24" Screen, Keyboard, Mouse	
HiAS™ Software Installed	

### 13 Industrial PC

Refer Impulse Control System

### 14 Extended Warranty

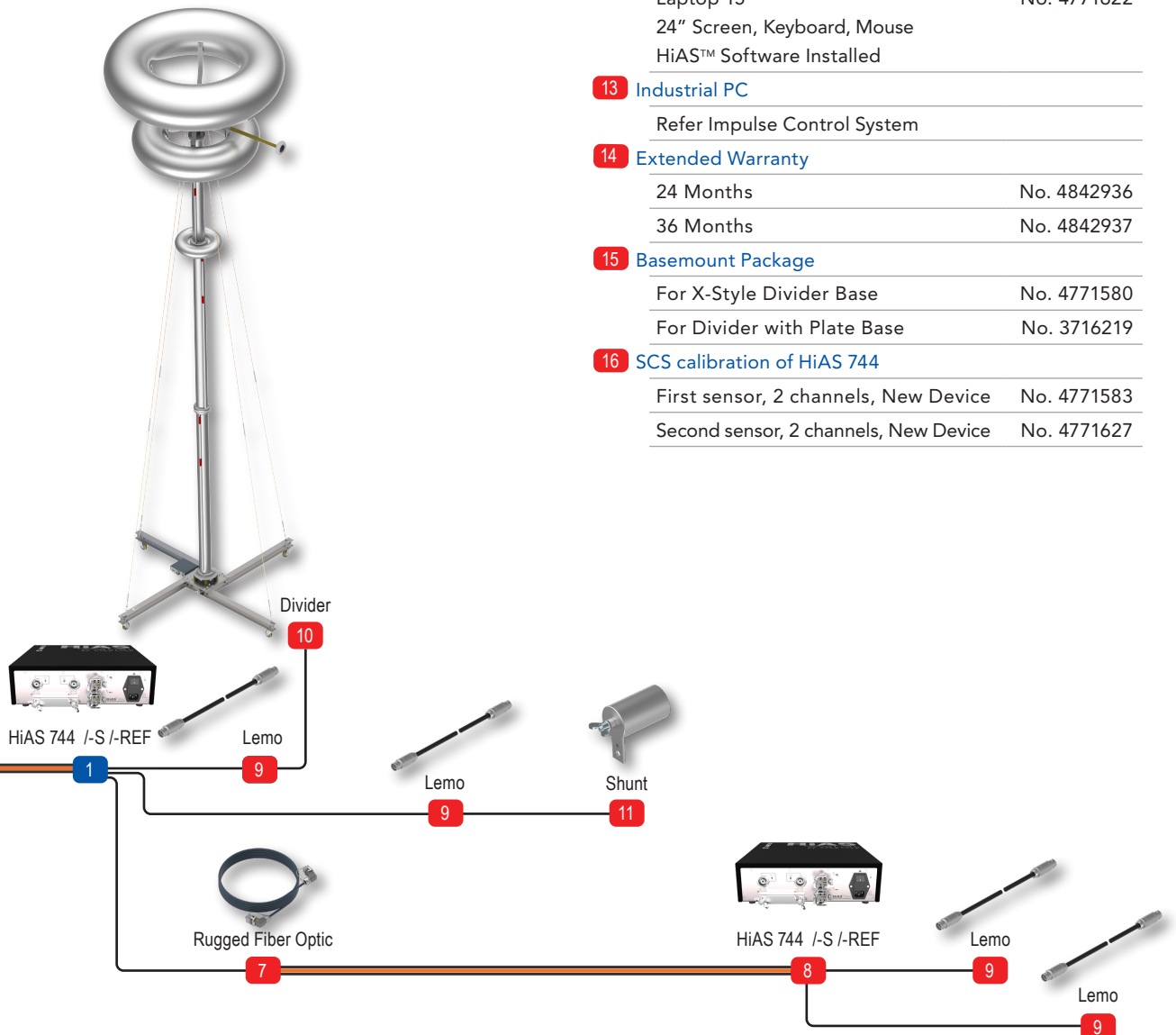
24 Months	No. 4842936
36 Months	No. 4842937

### 15 Basemount Package

For X-Style Divider Base	No. 4771580
For Divider with Plate Base	No. 3716219

### 16 SCS calibration of HiAS 744

First sensor, 2 channels, New Device	No. 4771583
Second sensor, 2 channels, New Device	No. 4771627



## Global Presence

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V2020.06



# HAEFELY

Current and voltage – our passion

HV

HIGH VOLTAGE

IN

INSTRUMENT

EM

EMC

precision.  
  
swiss made.