

# DDX 9160/9161

Partial Discharge  
(PD & RIV) Detector  
Leaflet



DDX 9160



DDX 9161



**HAEFELY**

Current and voltage – our passion

Designed by

**Tetex**  
INSTRUMENTS



## FEATURES

- User-defined measuring band
- Unique flexible high order digital filters
- High-resolution spectrum analyzer with oscilloscope
  
- Modular design, 1 to 4 channels
- Easily upgradable
- Daisy chain support up to 12 detectors
  
- Optically decoupled from computer
- Compact, reliable, and EMC hardened design, IP50
  
- PRPD (Phase Resolved Partial Discharge) pattern (fingerprinting)
- Data acquisition and test report generation
  
- Software layout flexibility and versatility
- Dark software mode
  
- Simultaneous RIV (NEMA or CISPR) and PD reading

## ADVANTAGES

- **Reduced ground noise** - The built-in frequency spectrum analysis and selectable frequency band let the user optimize the setup quick and easy.
- **Optimized investment** - Unit can be easily upgraded (up to 12 simultaneous PD/RIV readings).
- **Galvanic isolation** - Ensures the full safety of the operating personnel. With the DDX 9160 and 9161, there is no electrical connection between the control room and the high voltage test room.
- **PD interpretation** - The phase-resolved analysis and recording capabilities allow future data analysis.
- **Reduced training time** - Modern SW makes the use of the device easier than ever. Operators can start using the device in minutes.
- **Measuring time reduction** - Simultaneous PD and RIV measurement enables users to reduce the testing time.

## HISTORY

### The best team in the business

Since the first PD detector in the 1960s, HAEFELY combined the best of Haefely, Tettex and Robinson experience in the release of the DDX™ 9160 partial discharge detector, powerful yet easy to use. Our partial discharge products range includes all one needs for factory testing. When it comes to partial discharge testing, you can't beat the Haefely instruments team.

### Unique market lead device

HAEFELY, the pioneer company for partial discharge testing has been continuously developing and upgrading application specific high-voltage partial measuring/analyzing solutions over the years. The latest in a long line of distinguished PD detectors is the DDX 9160 and DDX 9161. HAEFELY has set a new benchmark with unmatched performance. The new front-end solution provides a solution with up to 4 PD and Voltage channels in a single compact body with the market leading «weight per channel» solution reaching only 1.3 kg for 4 channel option.

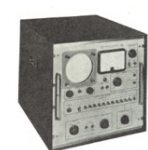
A powerful digital signal processing allows user to select any measuring frequency range within IEC 60270 and far beyond. This with the steepest filter characteristic for the high noise rejection. Unique built-in measuring impedance (AKV) makes the set-up easier and more compact than ever.

New software based on CaMS (HAEFELY's Control and Measurement Studio) provides the most flexible and user-configurable environment on the market. Anything from single meter display up to complex analysis can be configured and displayed, depending on user's experience, application or need.

### 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.

## 60 years of experience!



ERA Model 3



1962



DD5 Model 700/803



1975



Model 9120 & TE 560



1981



TE 571



1995



DDX 7000 / 8003 / 9101



2000



DDX 9121b



2013



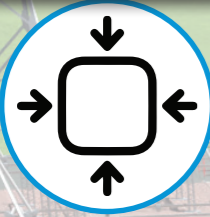
DDX 9160

## APPLICATIONS

- Power and distribution transformers
- Instrument transformers
- Rotating machines
- Switchgear (MV/HV/GIS)
- Surge arresters
- Research and development
- Bushings
- Cables
- Power capacitors
- Components testing

TAILORED SOLUTION

Compact



Battery-operated



DDX 9160



Light-weight



Portable



PORTABLE OR LAB-OPTIMIZED DESIGN

Lab-optimized



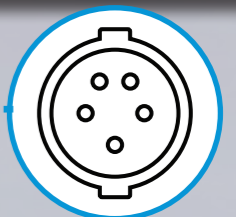
Strong steelcase



DDX 9161



Rugged Fiber Optics



Low-noise AC supply



- 100 % free frequency selection within IEC 60270 range and beyond
- Optimal measuring frequency band settings
- The best signal-to-noise (SNR) ratio

PD measurement up to 20 MHz

- Time-domain analysis
- Optimized scope for PD analysis
- High recording depth of 500  $\mu$ s

Scope view

- PD fault recognition
- Various colour palletes
- High sensitivity, down to 0.01 pC

High-resolution PRPD patterns

- Frequency-domain analysis
- The finest 2.5 kHz resolution up to 50 MHz
- High-order digital filtering

Spectrum (FFT) view

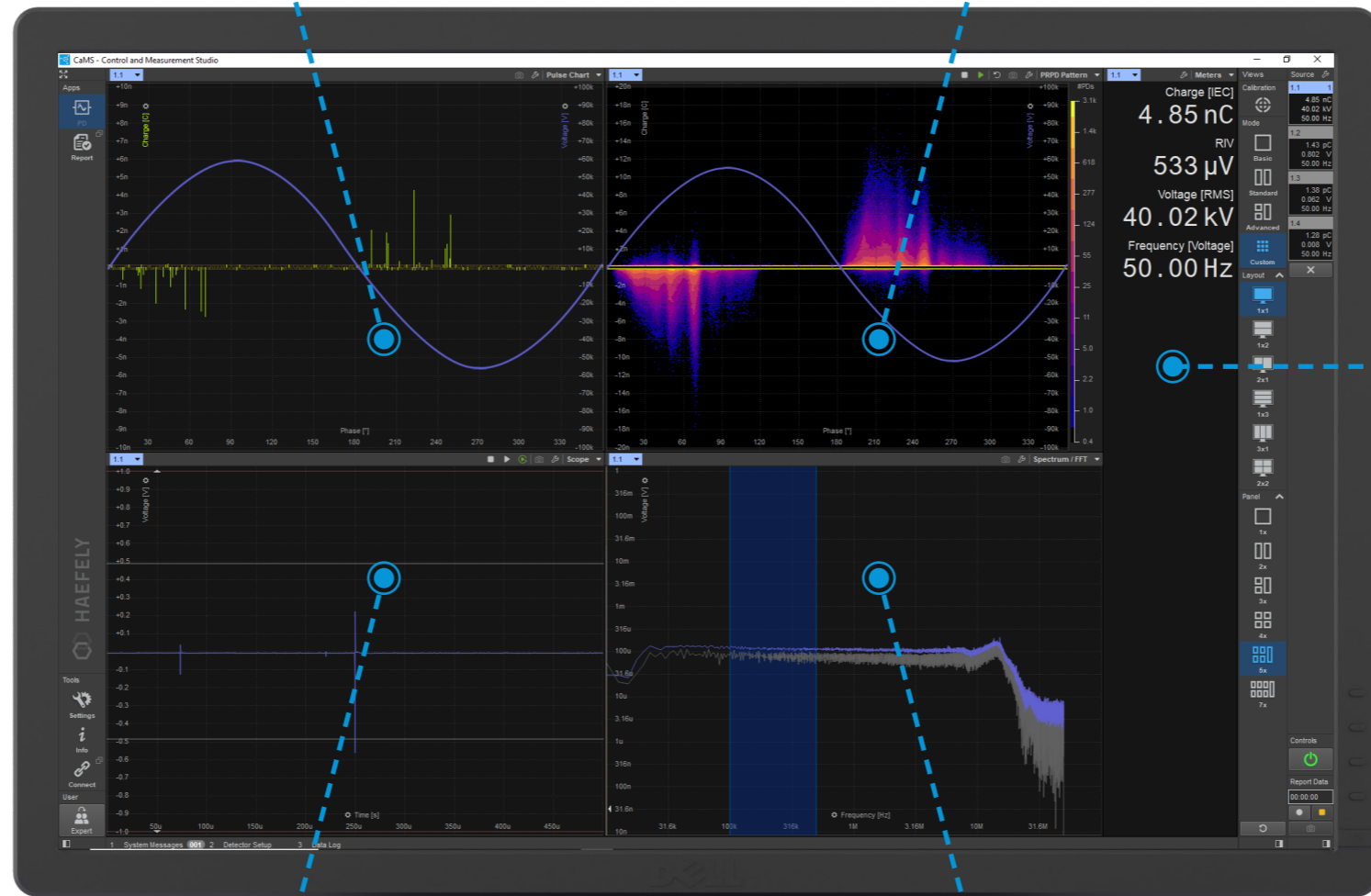
PULSE DIAGRAM

PRPD PATTERN

METERS

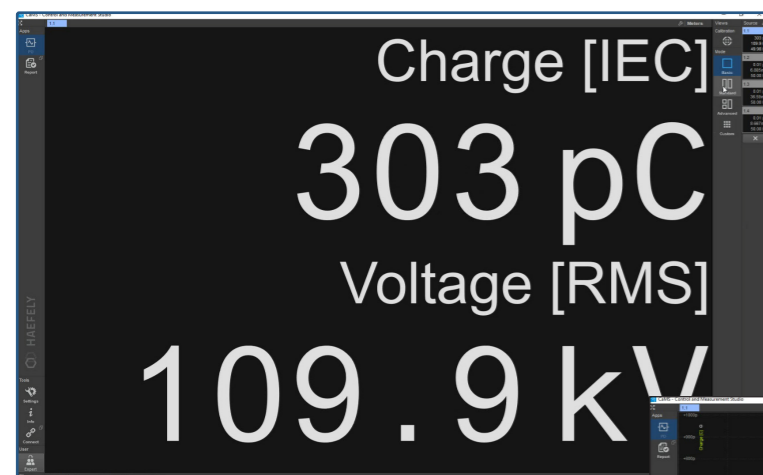
SCOPE

SPECTRUM (FFT)



## OPERATING MODES

HAEEFLY's CaMS™ (Control and Measurement Studio) utilizes the most flexible and user-configurable PD application software available on the market. It enables the controlling of single channel, multi-channel (up to 4 channels per unit) and/or multi-detectors. This modern SW displays a dark-mode and includes all the required PD-tools such as Meters, Pulse Diagram, PRPD pattern (fingerprinting), data recording - logger and more. The number of meter indicators, as well as their size, can be selected.

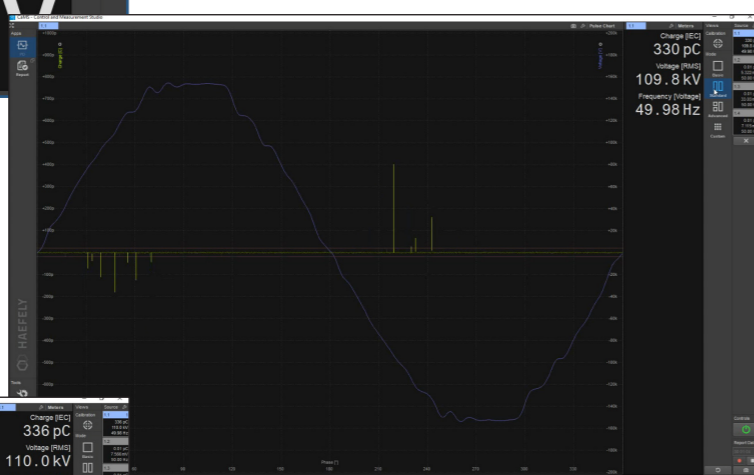


### BASIC VIEW

The user can define the complexity of the GUI display. In the «Basic view», either one single meter (e.g. charge) or multiple meters including voltage, frequency and PD derived quantities (average discharge current, repetition rate, etc.) can be displayed.

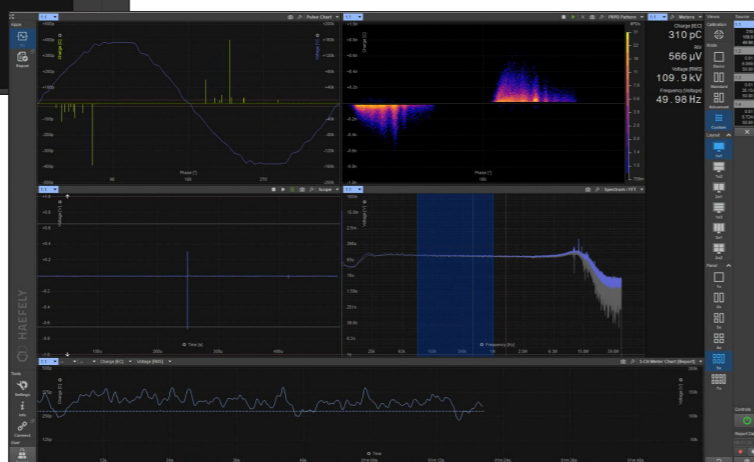
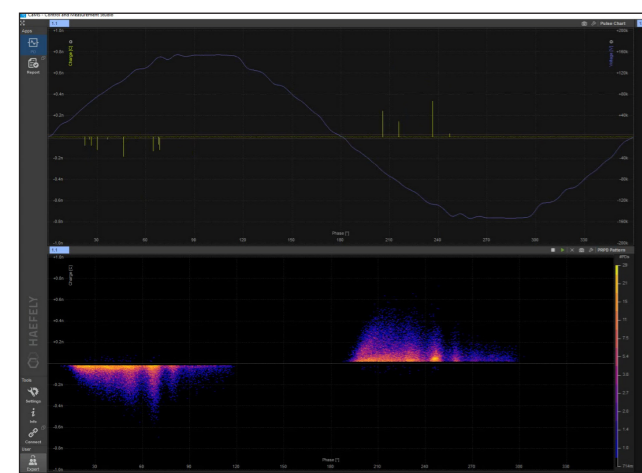
### STANDARD VIEW

The «Standard view» offers Pulse Diagram and Meter widget for more precise PD analysis.



### ADVANCED VIEW

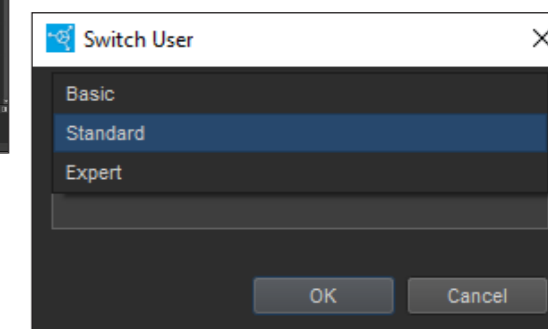
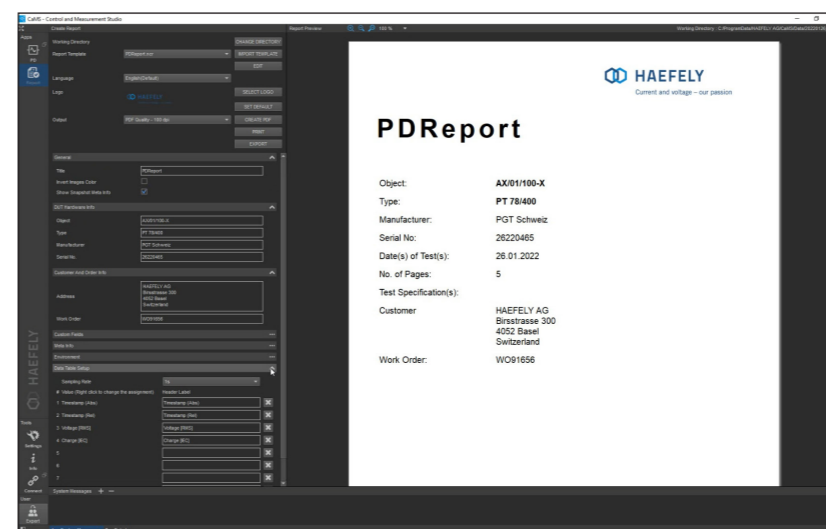
The «Advanced view» allows further analysis using Pulse Diagram, PRPD pattern and Meter widget at the same time.



### CUSTOM VIEW

The «Custom view» enables a user to configure his own view, that best fits his needs and preferences. Any combination of available diagrams and widgets is possible. This applies to a single-channel, multi-channel or multi-detector solution.

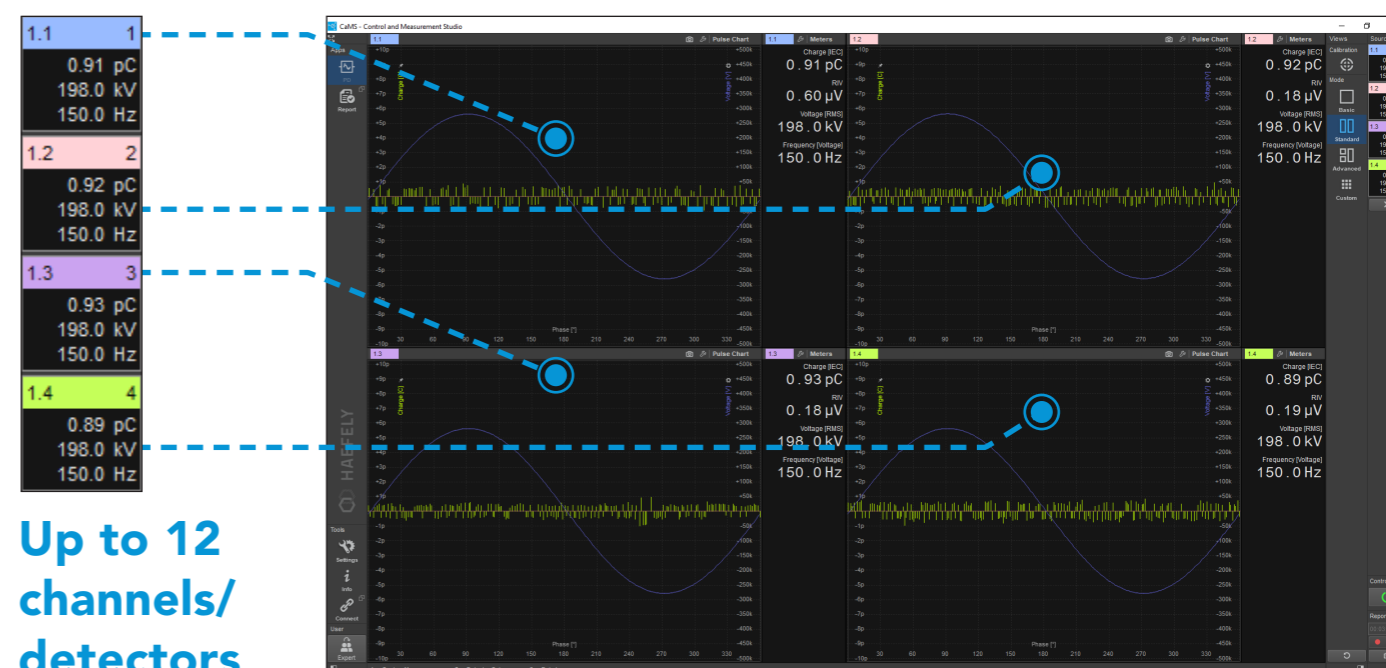
## REPORTING, DATA EXPORT & USER ROLES



- Custom editable templates
- Print or PDF
- SQL database
- CSV and PNG data export

- User Roles
- Password protection
- Limited features and widget access

## SIMULTANEOUS PD MEASUREMENT



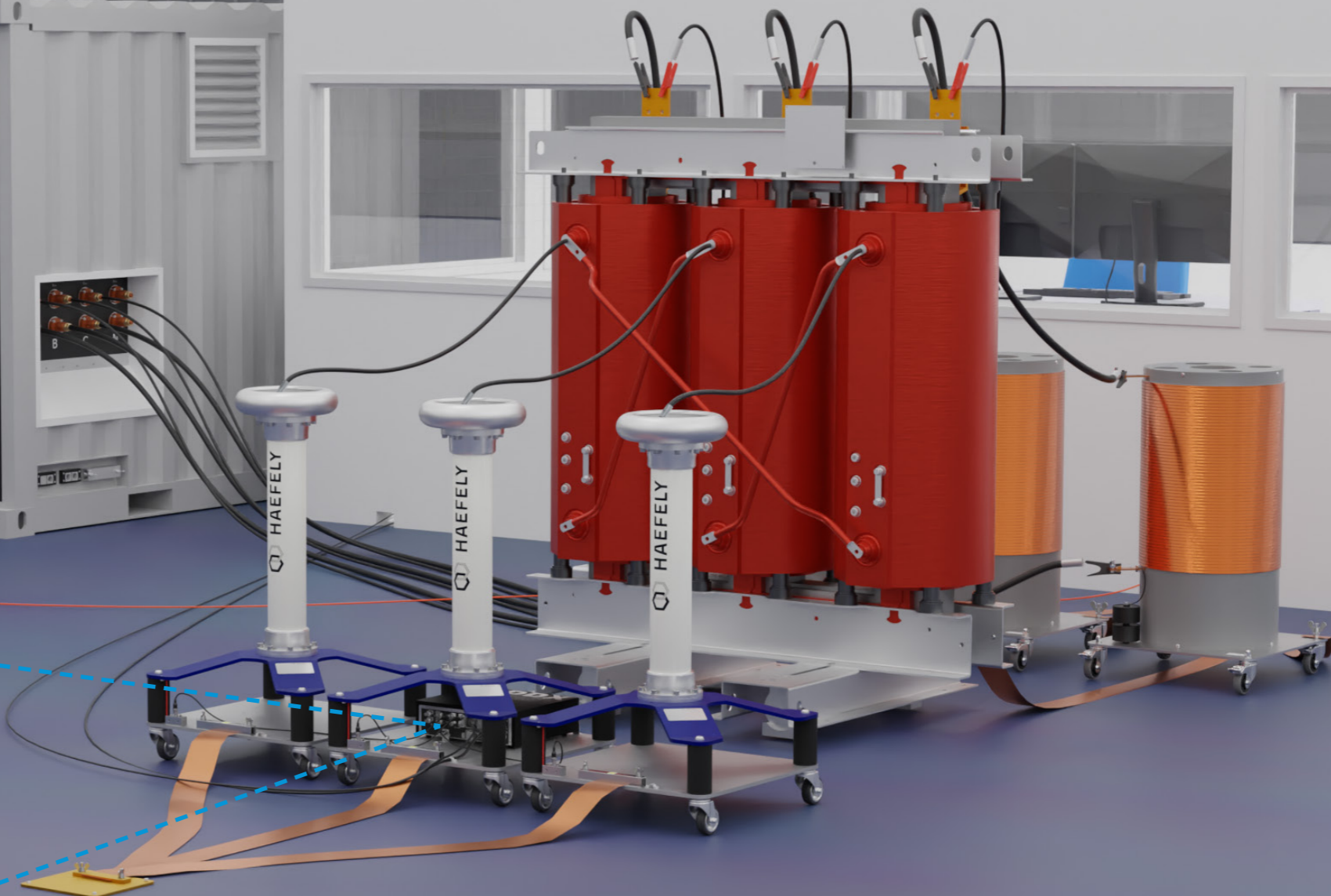
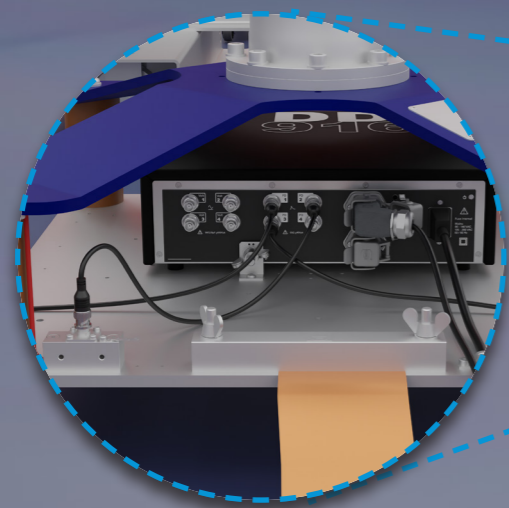
Up to 12 channels/  
detectors



- Built-in measuring impedance
- Plug & Play
- Fiber optic



Learn more about HAEFELY's  
AC Test Sets (ACS)



- Just one detector for simultaneous measurement on all 3 phases
- Quick and easy

Learn more about HAEFELY's Distribution Transformer Test System (DTTS)



Learn more about HAEFELY's Small Power Transformer Test System (SPTTS) and Impulse Voltage Test Systems

- Daisy chain of multiple detectors
- Minimum boxes requirement for maximum performance
  - Up to 4 channels per box
  - Built-in measuring impedances capable of 1 A
- Suited for 12 phases of simultaneous measurement



## PD DETECTOR DDX 9160

DDX 9160-1 PD Detector - Portable version (2-CH HW, 1-CH activated)

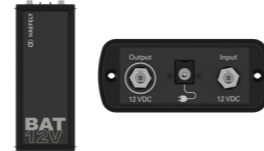


DDX 9160-3 PD Detector with 3 simultaneous PD Input - Portable version (4-CH HW, 3-CH activated)



### DDX 9160 OPTIONS - HARDWARE

DDX 9160/BATT Additional/spare battery pack for DDX 9160. *The capacity of the battery can be extended by connecting multiple batteries in parallel.*



DDX 9160/SUP External PD-free 12 V power supply for DDX 9160



## PD DETECTOR DDX 9161

DDX 9161-1 PD Detector - Rugged laboratory version (2-CH HW, 1-CH activated)



DDX 9161-3 PD Detector with 3 simultaneous PD Input - Rugged laboratory version (4-CH HW, 3-CH activated)

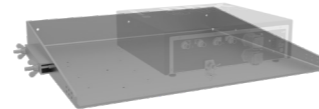


### DDX 9161 OPTIONS - HARDWARE

DDX9161-X-LAB/MSET-19RACK Mounting set 19" 3HE for DDX 9161 laboratory



DDX9161-X-/MSET-UNI Universal mounting set for DDX 9161



### COMMON DDX 916X OPTIONS - ADD ON (SOFTWARE KEY)

DDX 916X-X/SKCH1 Software Key to enable additional PD and V input/channel



DDX 916X-X/SKSWA Software Key to enable Advanced SW package - IEC derived quantities (I, P, D, qa, m, etc.), Scope & FFT, Windowing feature



DDX916X-X/SKRIV Software Key to enable RIV-NEMA and RIV-CISPR (external AKV 9360 required)



### STANDARD PACKAGE

#### DDX 9160 - PORTABLE

- PD detector itself
- FiberLink – LC to USB
- 20 m LC fiber optic cable
- Battery with charger
- USB stick with SW
- PD connection accessories set – per channel
- Manual
- Quick Start Guide
- Rugged transport case

#### DDX 9161 - LABORATORY-OPTIMIZED

- PD detector itself
- FiberLink – Harting to USB
- 20 m Harting fiber optic cable
- USB stick with SW
- PD connection accessories set – per channel
- Manual
- Quick Start Guide

## ACCESSORIES

### Measuring Impedances

AKV 9360-INT AC/DC PD detector built-in measuring impedance 50 Ohm, 1 A; required one AKV per channel.



AKV 9360 The AKV 9360 measuring impedance is a fully passive measurement impedance optimized for use with the DDX 9160 or DDX 9161. It allows simultaneous PD and RIV (NEMA or CISPR) measurement having 300 Ohm input impedance, covering current range up to 5 A.



AKV 9330 The AKV 9330 is used for PD testing of large power capacitors. It is an ideal IEC 60270 compliant solution for this particular application.



### RIV Calibrators

KAL 9531 The RIV calibrator KAL 9531 has been designed to perform an RIV calibration together with our PD detectors. It is a market unique all in one single device which allows calibration according to the latest CISPR 18-2 as well as backward compatible with NEMA 107.



### PD Calibrators

KAL 9511 The KAL 9511 is a family of basic PD calibrator covering most of the common demands. It fulfills IEC 60270 requirements. The output range can be selected among different models according application requirements.



KAL 9510 The KAL 9510 is an intermediate PD calibrator, it includes a wide range (from 1 to 50 000 pC), and a touchpanel control for easy to use.



KAL 9520 The KAL 9520 has been designed to exceed the standard requirements of a PD calibrator. Its wide range (from 100 fC – 50 nC), its small injection capacitor and its advanced features (double pulse, polarity pulse selection, internal and external synchronization, linear range selection, etc.) make the KAL 9520 unique.



### Coupling Capacitors

9231 The coupling capacitor is a part of the partial discharge measuring circuit. A closed loop for the high frequency PD signals is established between the test object and the coupling capacitor. The PD pulses are then captured by the measuring impedance (built-in or external) and processed in the PD detector.



### Computers

LAPTOP Laptop, Intel processor, Windows 10, 15.6" display, Full HD (1920 x 1080)



PCI 811c Industrial PC (EMC tested, suitable for working in HV laboratories) Intel processor, Windows 10, Monitor 24", keyboard and mouse





DISCOVER MORE ABOUT OUR PARTIAL DISCHARGE PRODUCT LINE



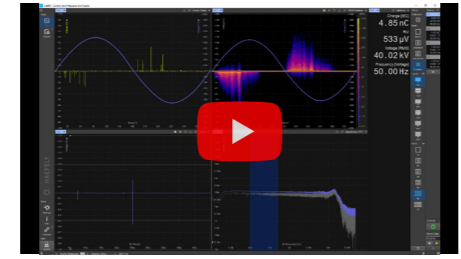
Coupling Capacitors  
9231 Series



Coupling Capacitor 25 kV  
9230/25/1-PD



Hardware Introduction



Software Introduction



Application Examples



Portable & Lightweight PD / RIV Detector  
DDX 9160



Laboratory optimized PD / RIV Detector  
DDX 9161



Hardware introduction video



Software introduction video



Application examples video

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PD & RIV Calibrators  
KAL 9511 - KAL 9531



Measuring Impedances  
AKV 9360 - AKV 9360-SEK - AKV 9330



## Global Presence

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V2303



**HAEFELY**

Current and voltage – our passion

HV

HIGH VOLTAGE

IN

INSTRUMENT

EM

EMC

  
reliable.  
precision.