PARTIAL DISCHARGE
CONTENT

The best team in the business 3
Product line overview 4
Partial discharge measurement 6
Applications 7
DDX9101 Digital PD detector 8
DDX9121b Multichannel Digital PD Detector 10
DDX7000 Advanced digital PD detector 10
DDX8003 Advance digital PD detector with pulse discrimination 14
Partial discharge measuring impedances 16
Partial discharge Calibrators 19
Coupling capacitors 20
Technical specifications 21
Since our merger in 1999, Hipotronics-Robinson and Haefely-Tettex melded the best of both worlds in the release of the DDX™ Series of Partial Discharge Detectors, powerful yet easy to use units. Our partial discharge product offering includes all one needs for factory testing. When it comes to partial discharge testing, you can’t beat the Haefely Hipotronics instruments team.
**PRODUCT LINE OVERVIEW**

<table>
<thead>
<tr>
<th></th>
<th>DDX9101</th>
<th>DDX9121B</th>
<th>DDX7000</th>
<th>DDX8003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Partial discharge AC</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td><strong>Partial discharge DC</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td><strong>Radio Interference Voltage (RIV)</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td><strong>Cable fault location</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
**PARTIAL DISCHARGE MEASUREMENT**

Partial discharge testing is a standard method of determining the quality of electrical insulation. Partial discharges can be caused by poor design, manufacturing faults, mechanical damage, aging, etc. The ability to measure low levels of partial discharges is referred to as sensitivity. As partial discharges happen inside the test object, only indirect effects can be quantified. Back in 60’s the general layout (see beside diagram) and technical specifications of the measuring device were defined. The IEC60270, successor to the earlier standards, specifies today’s requirements to perform a reliable partial discharge test. Special care has to be taken in fulfilling all requirements, because wrong results can be caused by non-conforming test layout or configurations.

**PARTIAL DISCHARGES AND NOISE**

A partial discharge is a small current pulse which circulates inside the circuit created by the test object, the coupling capacitor and the measuring impedance. Electrical interferences, if large enough, could affect the sensitivity of the measuring system. Although several techniques exist for noise reduction, the optimization of the test circuit is the most efficient procedure to increase the sensitivity.

Our long experience of more than 50 years performing partial discharge test will provide you with the best solution to fulfill your particular needs. Under special circumstances, when the test laboratory optimization is not possible or noises are too high, our DDX8003, with its unique noise discrimination possibilities will surely help.

---

**Radiated Noise** picked by the measurement loop. Reducing measuring loop inductance will help.

**Induced noise**, coming through the mains, band-rejecting filters could help.

**Ground Noise**, coming from ground circulating currents, independent earthing could help.
MEASURING BAND

The frequency measuring band affects drastically the partial discharge test. A measurement band which is within the IEC or ANSI requirements has to be selected to get reliable measuring results. All our detectors measure within the IEC/ANSI defined frequency band.

IEC60270 RECOMMENDED VALUES

- $30 \text{kHz} < f_1 < 100 \text{kHz}$
- $f_2 < 500 \text{kHz}$
- $100 \text{kHz} < f < 400 \text{kHz}$

$f_1 =$ Lower limit frequency
$f_2 =$ Upper limit frequency
$f =$ Measurement band

APPLICATIONS

- Power transformers
- Cables
- Instrument transformers
- Distribution transformers
- Rotating machines
- R & D
The DDX 9101 is the ideal solution for pass/fail partial discharge testing; incorporating all the basic functions of an analog detector and meeting all IEC and IEEE/ANSI standards for PD testing. This simple-to-use detector is controlled via 8 control buttons on the front panel. With the data acquisition/remote control software you can record PD pulses and create test reports easily.

**Applications:**
- Distribution Transformers
- Current and Potential Transformers
- Rotating Machines
- Power Capacitors
- Switchgears
- Surge Arrestors
- Research & Development
**ALL IN ONE**

A 3U height rack unit contains all you need to perform a PD test. The digitalizer, the computer, the screen and the control keys are all included. No additional hardware needed beyond the coupling capacitor.

**SIMPLE TO USE**

Calibrate the measurement setup, set the maximum acceptable PD level and you are ready to start the test. Once the voltage is applied, an indicator on the screen tells you if the test object passed or failed the test.

**DATA ACQUISITION & ANALYSIS**

The optional advanced data acquisition and analysis software allows a wide variety of possibilities like recording PD pulses occurring during each and every test voltage cycle and analyzing them both in the time and phase domain.

**DDX9106a 3 CHANNELS MULTIPLEXER**

An optional 3 to 1 manual multiplexer in a separate housing stackable with DDX 9101 allows manual switching, for example while testing distribution transformers.

**TWO GRAPHICAL MODES**

Two graphical modes are available to view the test results: meter mode and scope mode. The threshold shown graphically (in color) together with different meter modes makes monitoring of the test results simple.
**DDX 9121b**

**MULTICHANNEL DIGITAL PD DETECTOR**

The DDX 9121b is the latest in the DDX family for partial discharge & radio interference voltage testing. With the DDX 9121b you can setup, control, test, monitor and generate test reports from a single computer. Its modular design makes the DDX9121b flexible for any application. From single measuring input to simultaneous 9 measuring inputs. From traditional partial discharge according to IEC60270 to RIV measurement or PD under DC. From pass/fail test to advance phase resolution time analysis. The DDX9121b includes all you need, and has all you want.

**Applications:**
- Power and Distribution Transformers
- Instruments Transformers
- Rotating Machines
- Power Capacitors
- Switchgears
- Surge Arrestors
- Research & Development

![Partial discharge AC](image1)
![Partial discharge DC](image2)
![RIV](image3)
**INCREASE THE SENSITIVITY**
The built in frequency spectrum analysis and selectable frequency band let you optimize your setup in seconds.

**MODULAR DESIGN**
For normal partial discharge test on single phase test objects the basic DDX9121b is equipped with one measuring input. For distribution transformers, the DDX9121b-MUX option (enable by software code) add an embedded manual switch with “ALL” option.

For three phases test (for example power transformers), several detectors (up to 9) can be combined and connected to a single computer providing simultaneous PD readings.

**USER ORIENTED INTERFACE**
The user interface has been designed to make PD readings easy. All options are grouped by categories, and the scope window shows all test related information. Even specific colors have been selected to reduce the strain on the user’s eyes during long term testing.
**PD INTERPRETATION**

The advanced data acquisition and analysis software allows a wide variety of possibilities such as recording PD pulses of each and every test voltage cycle and analyzing them both in the time and phase domains.

With the pattern acquisition and analysis module, several two- and three-dimensional PD pulse patterns of all the monitored channels (when equipped with a multiplexer) can be displayed and recorded. Snap shots of the 3D patterns can be saved into a windows gallery for further use like generation of customized test reports.

**SIMULTANEOUS PD AND RIV LEVELS**

Both RIV voltage (mV, according to NEMA 107-1987) and partial discharge (pC, according to IEC 60270) measurements are done simultaneously, therefore both are performed in a single test without overstressing the test object. In addition, real time comparison between PD level and RIV is possible.

**PD UNDER DC**

While measuring with PD on DC test voltage, an accurate recording of each PD event is of maximum importance. The DDX9121b is a trusty device while doing this particular test.
# STANDARD CONFIGURATIONS

<table>
<thead>
<tr>
<th>Options</th>
<th>DDX9121-1</th>
<th>DDX9121-3</th>
<th>DDX9121-3/16</th>
<th>DDX9121-4</th>
<th>DDX9121-4/16</th>
<th>DDX9121-5</th>
<th>DDX9121-5/16</th>
<th>DDX9121-8</th>
<th>DDX9121-9/16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIMULTANEOUS PD INPUTS</strong></td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td><strong>SIMULTANEOUS RIV INPUTS</strong></td>
<td>No</td>
<td>1</td>
<td>No</td>
<td>3</td>
<td>No</td>
<td>4</td>
<td>No</td>
<td>6</td>
<td>Not 8</td>
</tr>
<tr>
<td><strong>NON-SIMULTANEOUS RIV INPUTS</strong></td>
<td>No</td>
<td>Opt. 3</td>
<td>No</td>
<td>Opt. 11</td>
<td>No</td>
<td>Opt. 15</td>
<td>No</td>
<td>Opt. 23</td>
<td>No</td>
</tr>
<tr>
<td><strong>PHASE RESOLVING ANALYSIS</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>SPECTRUM ANALYZER AND SCOPE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>SELECTABLE MEASURING BAND</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Opt. = Option

## OPTIONS

**DDX9121B / MUX**
Software key to enable the embedded non-simultaneous 4 inputs

**DDX9121B / FO**
Fiber optic adapter to connect the DDX9121B and the computer

**DDX9121B / DC**
Software key to enable PD measurement under DC
The DDX7000 Digital Partial Discharge Detector offers the high accuracy and flexibility of digital technology, plus the real-time display and easy operation of an analog instrument. It is everything you want in a digital system with everything you know from an analog system, truly the best of both worlds. The DDX7000 provides the most intuitive and easy to use operator interface of all available digital PD testing systems. Data analysis is fast, easy and requires little training. Its Windows™ based software allows flexible test recording and data export to Word™, Excel™ and other Windows programs.

**Applications:**
- Cables
- Power Transformers
- Current and Potential Transformers
- Rotating Machines
- Power Capacitors
- Switchgears
- Surge Arrestors
- Research & Development
**ADVANCED ANALYSIS SOFTWARE PACKAGE**

The DDX DA3 Software Package is an ideal tool for research and development or evaluation laboratories. It allows a user to collect data on partial discharge activity and display it in several different formats for easy analysis and comparison. Multiple blocks of data can be stored, with the option upon recall of viewing one, several or all of the blocks. Allowable displays include PD Value vs. Phase, PD Value vs. Time, Fingerprint, Intensity, and Fractal Chart and phase domain.

**AUTOMATIC CALIBRATION**

The automated calibration routine ranges over each amplifier range and calibration pulse setting. This process measures the noise contribution from the amplifier and background. It then automatically adjusts the noise floor to be above the combined noise level. Once automated calibration is completed the system calculates and displays a noise floor and allows amplifier ranges to be changed without affecting the system calibration in any way.

**PARTIAL DISCHARGE SITE LOCATION FOR POWER CABLES**

If partial discharge levels exceed acceptable standards, it is necessary to employ modern, advanced techniques to accurately locate the partial discharge sites so that they can be cut out and the remaining cable shipped to the customer. Our patented APDSL Automated Partial Discharge Site Location Software is extremely easy to use. Its patented realtime display window and data averaging functions, allow an operator to optimize the instrument settings and achieve site location at sites that are less than the pass/fail PD level, near the end of cable.

**CUSTOMIZED REPORT GENERATION**

Standard reports cover many QC/QA, process control and product certification needs. The Haefely Hipotronics DDX detector allows transfer of pulse displays and data into commonly used word processors and spreadsheets such as Microsoft Word™ and Excel™.
In factory tests, electrical interference noise can seriously affect sensitive partial discharge measurements. Traditionally, the method of eliminating this noise has been to screen the test area. In some cases, the use of a screened room limits testing flexibility and impedes the free flow of products during manufacture. The DDX 8003 Pulse Discrimination PD Detection System electronically rejects interference noise, allowing complete flexibility of testing together with a flow of production.

Applications:
- Factory test in noisy environments
- Testing two samples simultaneously
**PRINCIPLES OF OPERATION**

Noise can come from conduction through the mains voltage supply, airborne pick-up, and transient coupling. Noise can be caused by pulse interference generated by thyristor controllers, pulse interference from other sources, or continuous radio frequency transmissions. The Pulse Discrimination System will minimize each source and type of noise. Three complementary techniques for suppressing unwanted pulse interference are included in the DDX 8003 detector:

1. **PULSE DISCRIMINATION**

   The DDX 8003 detector receives two pulses from both branches and compares their polarities. If the pulse polarities are the same in channels, then the pulse is defined as an external interference. If the two pulses have opposite polarities, then the source of the pulse is defined as from within the test circuit, i.e., \( C_X \) or \( C_B \).

2. **RADIO INTERFERENCE SUPPRESSION**

   Some radio broadcast frequencies may fall within the measuring bandwidth of the detection system, reducing the sensitivity of the partial discharge test. The DDX 8003 includes a radio frequency suppressor to improve operation under such conditions. The actual sensitivity of a test can be significantly improved.

3. **TRANSIENT SUPPRESSION**

   The intermittent pulses of interference are caused by the switching of heavy machinery in close proximity to the test area. A simple antenna placed close to the test circuit detects any radiated pulses. The DDX will reject pulses detected at A and B while there is also an interference pulse detected on the antenna channel.
PARTIAL DISCHARGE TESTING ACCESSORIES

MEASURING IMPEDANCES

The coupling capacitor together with the coupling impedance separates the PD pulses (high frequency) from the normal AC signal (low frequency).

The AKV9310 measuring impedance is a fully passive measurement system optimized for use with the DDX 9121b. It is equipped with an internal voltage divider and a dedicated 4mm output connector for an external low-arm device.

The AQS9110a measuring impedance is a fully passive measurement system optimized for use with the DDX 9101. It is equipped with a user selectable three positions internal voltage divider.

The AKV568 is an active and passive measuring impedance optimized for cable fault location together with our DDX7000SL.

The AKV9330 is used for PD testing of large power capacitors. It is an ideal IEC 60270 compliant solution for this particular application.

<table>
<thead>
<tr>
<th>Part</th>
<th>AKV9310</th>
<th>AQS9110a</th>
<th>AKV568 &amp; AKV568-1</th>
<th>AKV9330</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDX 9101</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDX 9121B</td>
<td>•</td>
<td></td>
<td></td>
<td>•*</td>
</tr>
<tr>
<td>DDX 7000SL</td>
<td></td>
<td>•</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* only for power capacitors application
**RIV CALIBRATORS**

The RIV calibrator KAL 9530 has been designed to perform an RIV calibration together with our DDX 9121b PD detector. The unit injects a calibration signal at the desired frequency into the test object through a specially designed RIV calibration set (cable set, probe and clamp).

![KAL 9530](image)

**PARTIAL DISCHARGE CALIBRATORS**

The 9216 is a small battery powered PD calibrator for direct coupling of the generated PD signal to the test object according to the related standards IEC 60270 and IEEE 454. Pulse outputs ranges are 10, 100, 1000, 10'000 pC. Triggering of the impulses is done over external light source synchronization.

![9216](image)

The KAL 9520 has been designed to exceed the normal requirements of a PD calibrator. Its wide range (from 100fC to 50nC), 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.

As Haefely Hipotronics is accredited to calibrate and certify PD calibrators according IEC 17025, an SCS certified KAL 9520 can be used by inspectors and quality departments to easily perform a PD installation performance check.

![KAL 9520](image)
**COUPLING CAPACITORS**

Coupling capacitors 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 and brought to the PD detector.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Capacitance</th>
<th>Coupling Impedance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25kV</td>
<td>1nF</td>
<td>AQS 9110a</td>
</tr>
<tr>
<td>25kV</td>
<td>1nF</td>
<td>AKV 9310</td>
</tr>
<tr>
<td>50kV</td>
<td>1nF</td>
<td>AQS 9110a</td>
</tr>
<tr>
<td>50kV</td>
<td>1nF</td>
<td>AKV 9310</td>
</tr>
<tr>
<td>100kV</td>
<td>1nF</td>
<td>AQS 9110a</td>
</tr>
<tr>
<td>100kV</td>
<td>1nF</td>
<td>AKV 9310</td>
</tr>
<tr>
<td>100kV</td>
<td>10nF</td>
<td>AQS 9110a</td>
</tr>
<tr>
<td>100kV</td>
<td>10nF</td>
<td>AKV 9310</td>
</tr>
<tr>
<td>200kV</td>
<td>1nF</td>
<td>AQS 9110a</td>
</tr>
<tr>
<td>200kV</td>
<td>1nF</td>
<td>AKV 9310</td>
</tr>
</tbody>
</table>

*other voltages or capacitances on request*
## Technical Specifications

### DDX 9101

**Amplifier**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain (Attenuation)</td>
<td>0 dB to 75 dB in 5 dB steps</td>
</tr>
<tr>
<td>Attenuator Accuracy</td>
<td>1%</td>
</tr>
<tr>
<td>Gain</td>
<td>3000</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>50 Ω</td>
</tr>
<tr>
<td>System Noise</td>
<td>&lt;12 µV referred to input on highest gain range</td>
</tr>
<tr>
<td>Filters</td>
<td>High Pass–20, 30, 50, 60, 80 kHz</td>
</tr>
<tr>
<td></td>
<td>Low Pass–100, 200, 400, 500 kHz</td>
</tr>
</tbody>
</table>

**PD Measurement**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD Meter Resolution</td>
<td>10 bits displayed</td>
</tr>
<tr>
<td>PD Capture</td>
<td>8 bits (7 plus sign)</td>
</tr>
<tr>
<td>Phase Resolution</td>
<td>0.1%</td>
</tr>
<tr>
<td>Linearity Error</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

**Voltage Measurement**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty of Scale Factor</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Linearity (10-100% FS)</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Resolution</td>
<td>11 bits</td>
</tr>
<tr>
<td>Measurement modes</td>
<td>Peak/√2, true RMS</td>
</tr>
<tr>
<td>Synchronization</td>
<td>Local Mains, HV source (automatic)</td>
</tr>
<tr>
<td>Sync Lock range</td>
<td>20 Hz to 400 Hz</td>
</tr>
</tbody>
</table>

**Mechanical**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weights</td>
<td>5 kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>19” 3U case, 280 mm deep</td>
</tr>
<tr>
<td>Power Supply</td>
<td>100–240 V, 40–70 Hz</td>
</tr>
</tbody>
</table>

### DDX9121b

**Amplifier**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain (Attenuation)</td>
<td>0 -20 dB -40 dB</td>
</tr>
<tr>
<td>Attenuator Accuracy</td>
<td>1%</td>
</tr>
<tr>
<td>Gain</td>
<td>9000</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>50 Ω</td>
</tr>
<tr>
<td>Frequency band</td>
<td>30 kHz–1.5 MHz (-6dB)</td>
</tr>
<tr>
<td>System Noise</td>
<td>&lt;0.1 µC</td>
</tr>
<tr>
<td>Filters (IEC)</td>
<td>Center frequency and band, Available BW</td>
</tr>
<tr>
<td></td>
<td>- 4, 4.5, 9 kHz</td>
</tr>
<tr>
<td></td>
<td>- 10 to 100 kHz in 10 kHz steps</td>
</tr>
<tr>
<td></td>
<td>- 100 to 500 kHz in 50 kHz steps</td>
</tr>
<tr>
<td></td>
<td>- 0.6 to 1 MHz in 100 kHz steps</td>
</tr>
<tr>
<td>Filters (IEEE)</td>
<td>100–300 kHz</td>
</tr>
</tbody>
</table>

**PD Measurement**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD Meter Resolution</td>
<td>10 bits displayed</td>
</tr>
<tr>
<td>PD Capture</td>
<td>8 bits (7 plus sign)</td>
</tr>
<tr>
<td>Phase Resolution</td>
<td>0.1%</td>
</tr>
<tr>
<td>Linearity Error</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>
### Voltage Measurement
- Uncertainty of Scale Factor: \(<1\%\)
- Linearity (10-100% FS): \(<1\%\)
- Resolution: 11 bits
- Measurement modes: Peak/\(\sqrt{2}\) true RMS
- Sync Lock range: 20Hz to 400Hz

### RIV measurement
- Measurement frequency range: 850 to 1150kHz
- Bandwidth: 9kHz (-6dB)
- Output level: 1\(\mu\)V onwards
- RIV system linearity (1 range): \(<2\%\) FSD
- Quasi peak detector response: As per NEMA 107, ANSI C63.2-1996

### Mechanical (per detector)
- Weight: 6.2kg
- Dimensions: 19” 3HU case, 340mm deep
- Power Supply: 90–260V, 47–63Hz

---

### DDX7000SL/DDX8003

#### PD Measurement Unit
- PD Measurement Range: 0…99999pC, in standard notation
- PD Measurement Resolution: 9 bits plus sign
- PD Phase Resolution: 0.35 degrees
- Time Resolution: 12.5ns (80MHz sampling rate)
- Amplitude Capture Accuracy: Better than 1%
- Amplifier Ranges: 12 switched 5dB ranges
- Window Gating: 1 or 2 gates on sine wave

#### PD Amplifier
- PD Amplifier ranges: 6 switched 20dB ranges
- PD Amplifier Fine Adjustment: 10:1 in 200 steps
- PD Amplifier Gain Linearity: \(<1\%\) over whole range
- PD Amplifier Frequency Range: 20kHz to 500kHz
- PD Amplifier Filter Settings: High Pas: 20kHz, 30kHz, 50kHz, 60kHz, 80kHz, Low Pass: 100kHz, 200kHz, 300kHz, 400kHz, 500kHz

#### Voltage Measurement Unit
- Voltage Measurement: peak scaled RMS and true RMS
- Voltage Measurement Accuracy: Better then 0.5% at I/P socket
- Voltage Frequency Sync Range: 5Hz…500Hz
- Voltage Measurement Input: 10V peak

#### Internal calibrator
- Calibrator Maximum Output: 10V step (1000pC into 100pF)
- Calibrator Output Range: 1mV…10V in 13 Ranges
- Calibrator Fine adjustment: 0…range voltage in 256 steps
- Calibrator Output Rise Time: Less then 25ns into 100pF, slower for higher capacitances
- Operating Temperature: 10°C…35°C

#### Mechanical
- Weight: 18 or 23kg (40 or 50Lbs)
- Dimensions: 445mm x 270mm x 460mm (17.5” x 10.5” x 18”)
**ACCESORIES**

**Impedances**

**AKV9310**
- Max. Current: 3 A
- PD upper limit frequency: >8MHz
- Mechanical dimmensions: 90 mm x 160 mm x 80 mm (W x L x H)

**AQS 9110a**
- Max. Current: 6 A
- PD upper limit frequency: >5MHz
- Mechanical dimmensions: 160 mm x 280 mm x 90 mm (W x L x H)

**AKV 568**
- Max. Current: 0.5 A
- PD upper limit frequency: >5MHz
- Mechanical dimmensions: 160 mm x 260 mm x 90 mm (W x L x H)

**AKV 9530**
- Max. Current: 300 A
- PD upper limit frequency: >8MHz
- Mechanical dimmensions: 160 mm x 130 mm x 70 mm (W x L x H)

**Calibrators**

**9216**
- Calibration pulse ranges: 10, 100, 1000, 10'000 pC
- Rise time: <60ns
- Injection capacitor: 18 pF (<100pC)
- Mechanical dimmensions: 67 mm x 110 mm x 42 mm (W x L x H)

**9520**
- Calibration pulse ranges: 100fC to 50nC (any value)
- Rise time: < 20ns
- Injection capacitor: 1 pF (<200pC)
- Mechanical dimmensions: 120 mm x 200 mm x 35 mm (W x L x H)

**Coupling capacitors**

<table>
<thead>
<tr>
<th>VOLTAGE*</th>
<th>CAPACITY</th>
<th>PD LEVEL AT UN</th>
<th>HEIGHT APPROX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25kV</td>
<td>1nF</td>
<td>≤1 pC</td>
<td>619 mm</td>
</tr>
<tr>
<td>50kV</td>
<td>1nF</td>
<td>≤1 pC</td>
<td>619 mm</td>
</tr>
<tr>
<td>100kV</td>
<td>1nF/10nF</td>
<td>≤1 pC</td>
<td>896 mm</td>
</tr>
<tr>
<td>200kV</td>
<td>1nF</td>
<td>≤1 pC</td>
<td>1322 mm</td>
</tr>
</tbody>
</table>

*Voltage ratings above 200kV available on request.

All coupling capacitors include a suitable coupling impedance.
HAEFELY HIPOTRONICS has a policy of continuous product improvement. We therefore reserve the right to change design and specification without notice.