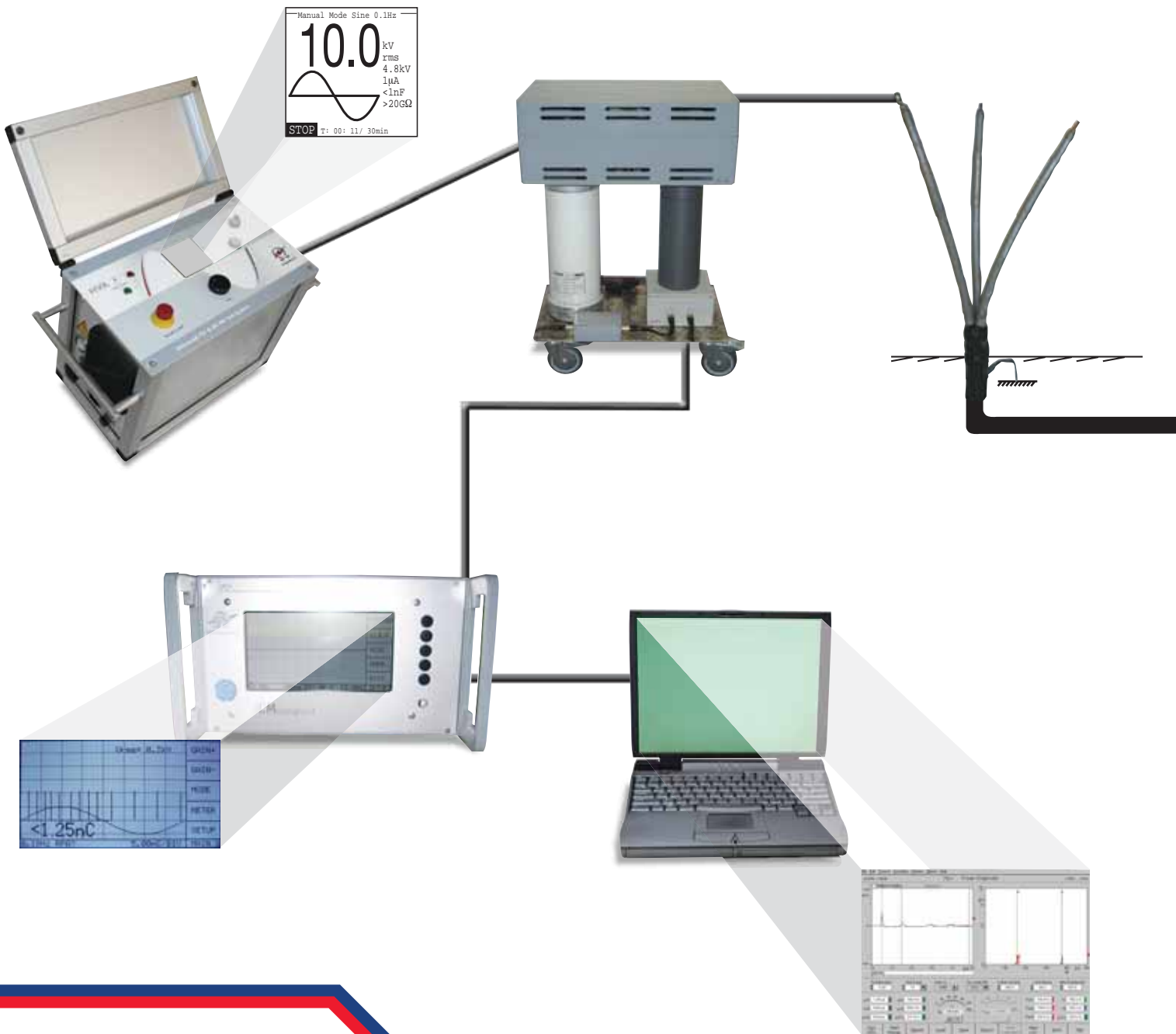


PD30 / PD60

Partial Discharge Detection and Location for MV Cables

▶ PD Detection ▶ PD Phase Angle ▶ PD Mapping ▶ PD Fault Location



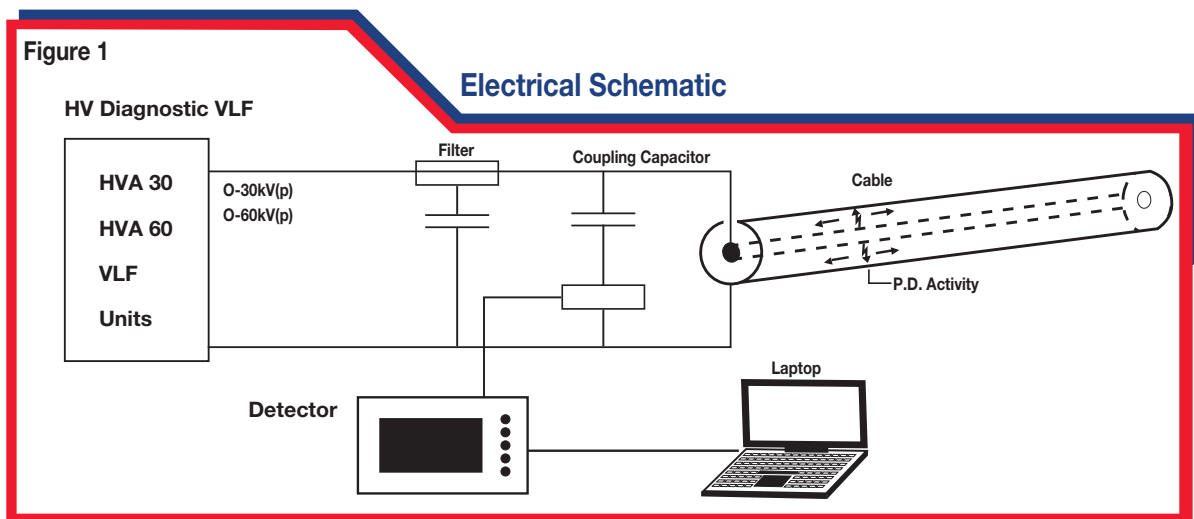
P.D. Measurements

What is a Partial Discharge?

A partial discharge is a partial electrical breakdown in the dielectric material which does not bridge the dielectric between the conductor and the concentric neutral. The unit of partial discharge measurement is the Pico Coulomb (pC). The general factory acceptance criteria for newly manufactures MV XLPE cables is 5pC.

The PD levels during site measurements, depend on type of cable, type of joint/splice/termination. A good PILC oil impregnated insulation may display a PD level of 100pC. A XLPE dielectric on the other hand could not continue operating at this level. Dry type terminations/joints may discharge at 2000pC for years without failing (but they will eventually fail).

Partial Discharge (PD) measurements have traditionally been carried out in a noise free environment such as a Faraday Cage. In the past this made on site P.D. measurement impossible. With the advent of modern electronics and Digital filtering, it is now possible to effectively carry out P.D. measurements in an electrical substation.



Today P.D. diagnostics provides the Technician with a non-destructive means of evaluating the cable and the accessories. These partial discharge locations continue to discharge slowly breaking down the dielectric like a silent cancer. It is just a matter of time, which varies from hours, to days or even years before the cable or accessory will fail.

By locating these P.D. sites timeously, corrective measures can be taken before the cable fails thus avoiding **Power Failures and Customer Outages**.

Figure 2

Concentric Neutral/ Earth P.D. Activity



Equipment

The P.D. activity can be in the form of a single large amplitude or multiple low amplitude discharges.

The following defects could cause P.D. activity:

- ⚡ Outer screen damage on an XLPE cable (Fig 2)
- ⚡ Splice/joint/termination defects
- ⚡ Cable defects (Electrical Trees)
- ⚡ Drying out of PILC cables (draining of the oil)
- ⚡ Concentric neutral damage
- ⚡ Poor installation & workmanship
- ⚡ Voids and delaminating
- ⚡ Moisture Ingress and Tracking

The PD30 and PD60 are designed to operate **in conjunction with the HVA30 & HVA60 products** of H.V. Diagnostics SARL.

Figure 3



Detector

Figure 4

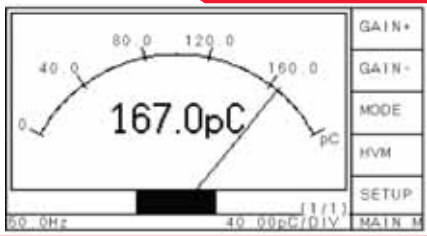


Filter and Coupling Unit

The PD30 and PD60 consist of the following:

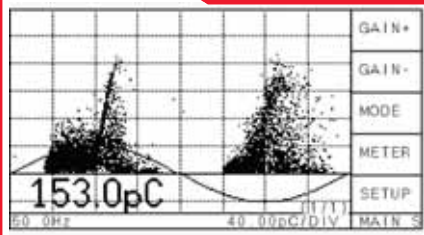
- ⚡ High Voltage Filter (Fig 4)
- ⚡ Coupling Capacitor (Fig 4)
- ⚡ Partial Discharge Detector (Fig 3)
- ⚡ Software for P.D. Diagnostics and P.D. Location (Fig 7)
- ⚡ Cabling & Earthing
- ⚡ HVA High Voltage lead
- ⚡ Corona Rings

Figure 5



P.D. Discharge Meter

Figure 6



Phase Position of P.D. Pulse

The P.D. Detector is a stand alone unit (Lap Top independant) capable of indicating with a backlit LCD the following:

- ⚡ PD Discharge Meter (Fig 5)
- ⚡ Phase position of Discharges (Fig 6)
- ⚡ Scope display. Sine Wave superimposed
- ⚡ PD Mapping – location of partial discharge sites using TDR principles (Fig 7)
- ⚡ Voltage Measurement circuit (Fig 4)
- ⚡ Location of these PD sites is normally done with a laptop due to the higher resolution

Software & Technical Specifications

The enhanced diagnostics, archiving and reporting software is included in the standard package. The PD Detector can be connected and controlled by a remote PC using the Serial RS232/USB port and operating under Microsoft Windows. The software automatically scans, records, edits, replays and allows the printing of the Partial Discharge screens. Zoom and cursor functions provide for the precision P.D. mapping and P.D. location.

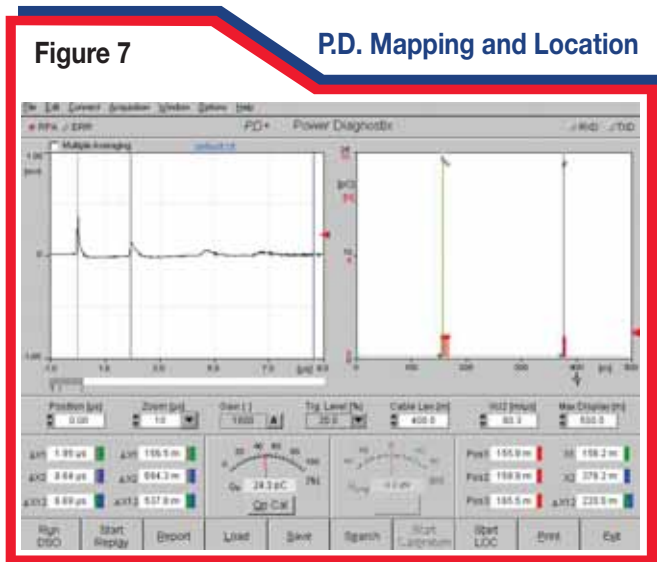
The software will record the:

- ⚡ pC magnitude over time
- ⚡ Plot the P.D. map (location)
- ⚡ Plot the P.D. intensity

The following parameters are recorded:

- ⚡ Calibration Pulse (in accordance IEC60270) and End Detection
- ⚡ Background Noise
- ⚡ PDIV Partial Discharge Inception Voltage
- ⚡ Partial Discharge at 1.7U₀
- ⚡ PDEV partial Discharge extinction voltage

The above parameters will determine if any P.D. activity which is "ignited" by the overvoltage (1.7U₀), extinguishes before U₀. The software results can be archived or exported to Microsoft EXCEL (MS) or WORD (MS) programs.



Technical Data

	PD30	PD60
HV FILTER + Coupling Capacitor		
Rated Voltage kV (peak)	33	62
Rated Current (amps)	1	1
Filter Capacitance (nF)	20	10
Dimension LxHxB (mm)	550 x 680 x 250	550 x 800 x 360
Weight (kg)	30	45
Calibrator		
Display pC	100-> 10.000	100 -> 10.000
Weight (kg)	2	2
Partial Discharge Detector		
Display	Backlit LCD	Backlit LCD
Resolution (Pixel)	128 x 240	128 x 240
Input Impedance	10kΩ / 50pF	10kΩ / 50pF
Lower Cut-off (kHz)	40, 80 or 100	40, 80 or 100
Upper Cut-off (kHz)	250, 600 or 800	250, 600 or 800
Synchronisation (Hz)	0.1, 0.05, 0.02	0.1, 0.05, 0.02
Auto Zero Crossing	Yes	Yes
Triggered Noise	Manual + Auto	Manual + Auto
Dimensions LxHxB (mm)	250 x 150 x 300	250x150x300
Weight (Kg)	3	3
Software		
Windows (Microsoft)	9X/NT/2000/XP	9X/NT/2000/XP
PD Mapping + Location	Yes	Yes



High Voltage Diagnostics S.à.r.l
4, Rue du Lac, Le Bouvert,
CH-1897, Switzerland

Contact Details: Tel: +41 24 481 4733
Fax: +41 24 481 4740
Email: sales@hvdsa.com
Website: www.hvdsa.com