

## PARTIAL DISCHARGE TESTER DAC-PD-7



Partial Discharge measurement is non-destructive tests having higher detection sensitivity than withstanding or high resistance tests, and can be used to find insulation defects and early failures of solid insulations. DAC-PD-7 is ideal for quantitative diagnosis at production and inspection of electrical parts, such as EV motor, Photo-coupler, IGBT, and insulation materials etc.

### Features

- **AII-IN-ONE UNIT.**  
*The tester contains 3000V high voltage source, coupling capacitor, detector and calibrator.*
- **EASY TO USE.**  
*No need cumbersome wirings.*
- **AUTOMATIC CALIBRATION FUNCTION**  
*Depending on the calibration pulse level, the scale is adjusted and adequate range is selected automatically.*
- **LCD DISPLAY TO OBSERVE LIVE DISCHARGE WAVEFORM**  
*Measurement can be conducted while observing discharge waveform. The applied voltage profile can be observed simultaneously.*
- **APPLICABLE TO IEC 60270, IEC 60664-1, IEC 61730-2**  
*Software is included as standard accessory.*

### Test Materials

- Solar Battery Panel Back Sheet.
- Photo-coupler
- IGBT
- EV Motor
- Lithium Ion Battery
- Relay, Circuit Board
- High Frequency Transformer
- Insulation Materials

## Conformity

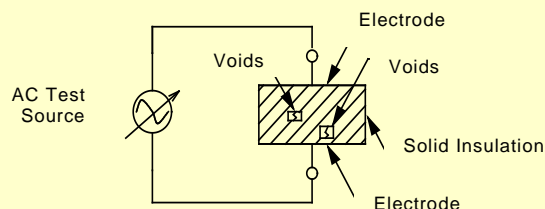
- IEC 60270 High-voltage test techniques – Partial discharge measurements
- IEC 60664-1 Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests
- IEC 61730-2 Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing

## What is partial discharge?

Fig.1 is a general partial discharge occurrence model, and showing an insulation sandwiched by electrodes. In the insulation, there are voids (impurities).

Dielectric constant of the voids is usually lower than that in the surrounding dielectric. Therefore when AC voltage is applied to the insulation, voltage in the voids becomes larger, and as a result, the voids short itself out, while the insulations is not shorted.

The short circuit in the voids leads to small charge-transfers, and this is called partial discharge.



**Fig. 1**

### Points

1. Partial discharge occurs within voids (impurities) due to the lower insulating strength.
2. Electric field tends to concentrate on the voids, because dielectric constant of voids is lower than that of main insulations. As a result, local insulation breakdown in the voids occurs.
3. The insulation strength of voids depends on the type of gas, gas pressure in the void and void dimension.
5. Partial discharge precedes insulator breakdown.
6. Partial discharge is described by the maximum discharged charge (Q-max pC).

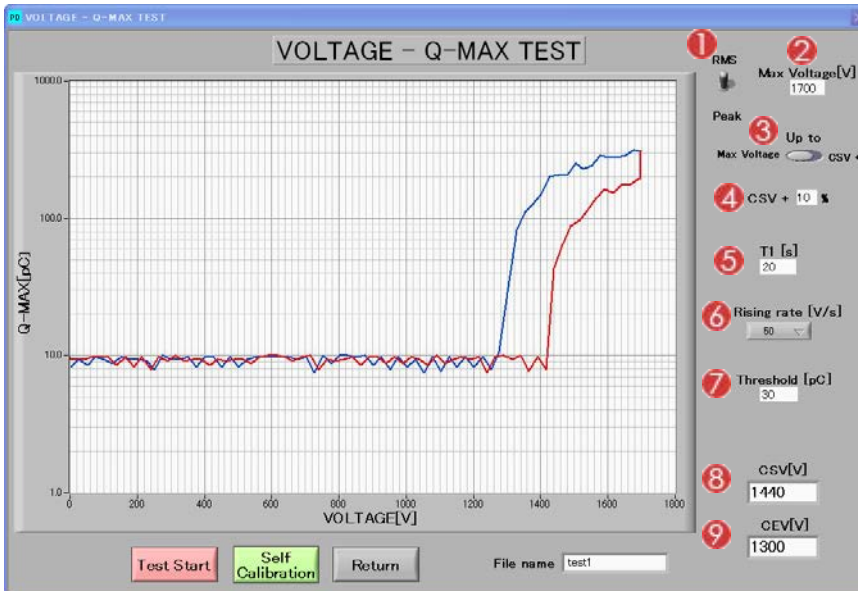
## Why is Partial Discharge Test important?

Even with a stringent manufacturing process, it is not always possible to manufacture solid insulations without creating voids (impurities). Generally, the void in solid insulation is filled with a gas, and it has lower breakdown strength than the main material. In addition, the permittivity of the void is invariably lower than that of main insulation, and electric field tends to concentrate on the void. Thus, even under normal working stress, the voltage across the void may exceed the breakdown value and partial discharge occurs. When partial discharge begins and repeats, it can damage the materials and may lead to failure of the whole high voltage power equipment. To secure safety of electrical appliances, quality of insulations must be regarded as the most important matter. Partial discharge measurements are desirable test to find insulation defects and early failures in insulation materials. Periodic diagnosis enhances safety of electrical appliances, and can help to find symptoms before becoming a failure.

## PC Software

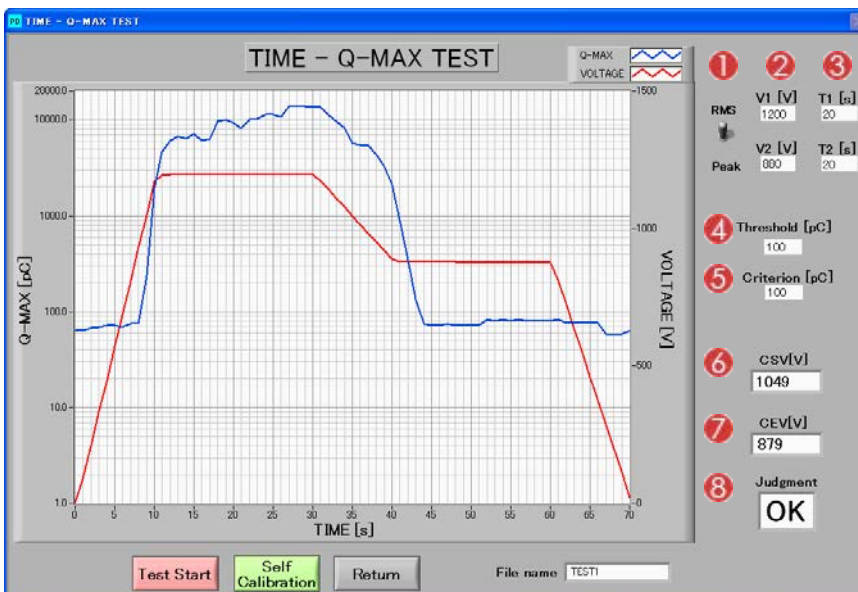
- PD tests according to the applicable international standard (IEC 60270, 60664-1, 61730-2) are available with attached PC Software.
- Measurement results are plotted continuously and PASS or FAIL judgment comes soon after the test completes.
- Measured data are saved in CSV format, and the archives are possible.

## V-Q Measurement



- (1) Select “RMS” or “Peak”
- (2) Max voltage to be applied.
- (3) Select either “Max voltage” or “CSV”. When “Max voltage” is selected, the max voltage is applied to the specimen. When “CSV” is selected, the inception voltage plus ratio coefficient (%) will be applied. (ex. When inception voltage is 1000V and setting ratio is 10%, max test voltage will be determined as 1100V.)
- (4) Ratio coefficient to be added to CSV. (0 – 20%)
- (5) Max voltage duration time.
- (6) Voltage raising rate [V/s]
- (7) Threshold value [pC]
- (8) Inception voltage
- (9) Extinction voltage

## T-Q Measurement



- (1) Select “RMS” or “Peak”
- (2) Test voltage (V1 and V2)
- (3) Hold time  
T1: at voltage in V1,  
T2: at voltage in V2
- (4) Threshold time [pC]
- (5) Criterion [pC]
- (6) Partial discharge inception (starting) voltage
- (7) Partial discharge extinction voltage
- (8) Judgment

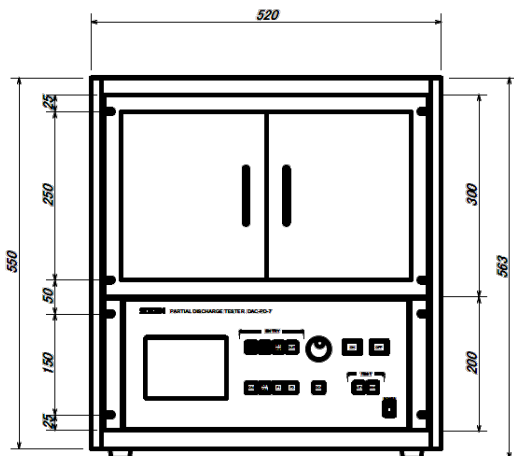
# DAC-PD-7 PARTIAL DISCHARGE TESTER

## Specifications

Input Voltage	AC100V/115V/220V/240V $\pm$ 10%, 50/60Hz
Output Voltage	AC 0 - 3000V
Voltage Ramp Rate	25V/s, 50V/s (10V/s, 25V/s, 50V/s and 100V/s with software)
PD Resolution	0.01pC (Partial discharge in device <1pC at AC3000V)
Frequency	50Hz, 60Hz
Waveform	Sine wave (not depend on waveform of Input Power)
Distortion of waveform	<3%
Fluctuation of Voltage	<1%
Maximum Load Current	10mA
Maximum Capacitance Load	5000pF
Voltage Accuracy	$\pm$ (1%+10digit) of readings
Voltage Setting Range	0 – 3000V in 1V Steps
Gain	0~80dB
Range	1000pC, 10000pC, 100000pC
Response Occurrence Frequency	10 - 9000PPS (Rate)
Calibrator Charge	100pC, 1000pC
Calibration Pulse Injection Capacitor	50pF
Calibration Pulse Voltage	2V, 20V
Calibration Pulse Generation Frequency	50PPS
Internal Coupling Capacitor	1000pF
Interface	RS232C
Size	430x380x200(WxDxH) Weight 15kG
Software	Attached
Option	Shield Case, Electrode

## Options

Partial discharge measurements are sometimes affected by a high background noise level, if no appropriate measures are taken. Depending on the test environment and judgment PD level, a faraday room or a shielded box may be required. SOKEN can offer the tester with a shielded box upon request.



Example of Rack-in type:

Measuring cables are arranged inside of the system rack. Power cable, grounding cable, RS232C cable are pull out from a cable incoming hole on the bottom of the rack. Additional measures to start partial discharge test will not be required.

Dimensions and design are subject to be changed.

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