

LOW FREQUENCY C and Tan δ METER

DAC-LFM-3



Model DAC-LFM-3 is designed to measure $\tan \delta$ and capacitance of test samples by making use of a built-in very-low frequency power source.

Measurement of $\tan \delta$ and electrostatic capacity using a very-low frequency of 0.1 Hz or 0.01 Hz provides accurate results for test samples that are large in electrostatic capacity, such as power cables.

This instrument can be used for various applications at low cost: Precise moisture content control for the purpose of quality assurance of oil-filled cables and mineral insulated cables; failure point identification of optical fiber submarine cables; and insulation diagnosis of commercial frequency power cables.

Applications:

Drying process control of oil-filled or mineral insulated cables

Failure point identification of optical fiber submarine cables

Insulation diagnosis of commercial frequency power cables

Features:

Full digital processing using a 32-bit MPU

Comfortable operation with a TFT LCD and a touch keyboard

Built-in very-low frequency power source

Compact and lightweight

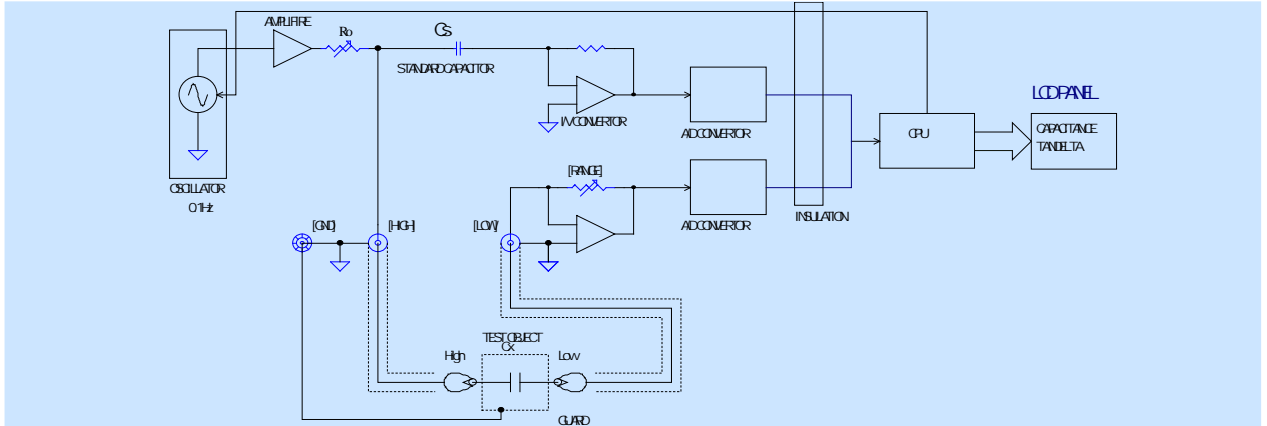
USB interface equipped standard

SOKEN ELECTRIC CO., LTD

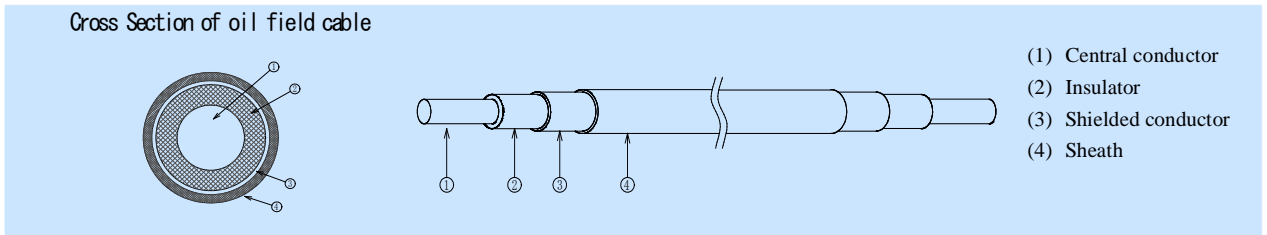
<http://www.soken-jp.com>

Principle of Measurement

The following schematic diagram shows the measuring circuit of Model DAC-LFM-3.



The low frequency signal generated at the oscillator is power-amplified to supply the reference voltage E . The standard capacitor C_s detects the reference current $I_s = j\omega C_s E$. Analog values of the reference current flowing through the C_s and the current flowing through the C_x of a given test sample are converted into digital data. Then, the digital data are multiplied. Finally, parameter analysis of the corresponding equivalent circuit is performed to obtain the true values of $\tan \delta$ and electrostatic capacitance.

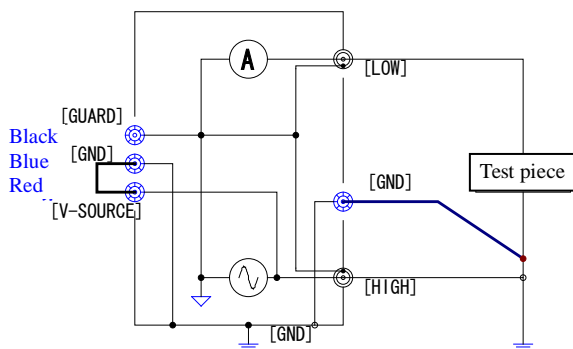


In general, the electrostatic capacitance and $\tan \delta$ are measured with insulator (2) between the central conductor (1) and the shielded conductor (3) as dielectric using either of the following two methods:

Method a: Connect the central conductor (1) to HIGH terminal, and the shielded conductor (3) to LOW terminal.

Method b: Connect the central conductor (1) to LOW terminal, and the shielded conductor (3) to HIGH terminal.

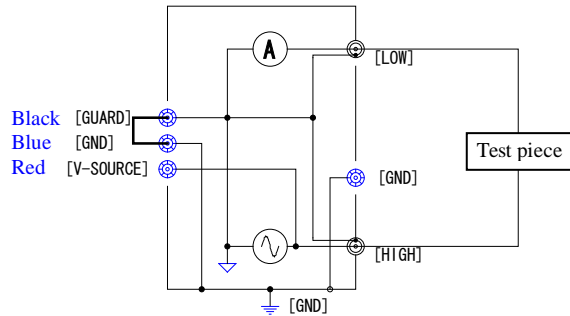
[Measurement of grounded test pieces]



Short circuit the "GND" and "V-SOURCE" terminals for measurement of grounded test pieces.

Note: This instrument must be grounded.

[Measurement of ungrounded test pieces]



Short circuit the "GND" and "GUARD" terminals for measurement of ungrounded test pieces.

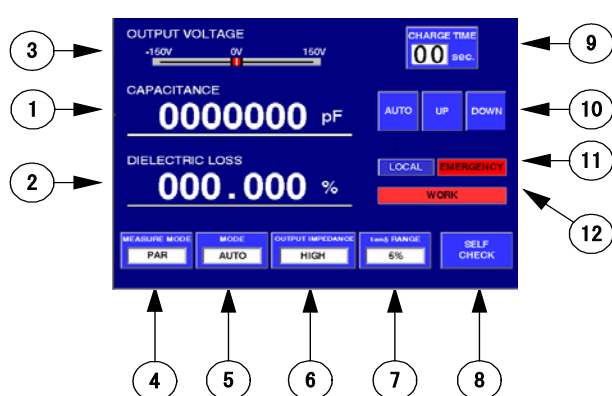
Note: This instrument must be grounded.

Measuring Method

A TFT LCD along with a touch keyboard assures comfortable operation of Model DAC-LFM-3.

On the operation screen, you can see all the information necessary for measurement, and you can readily follow the progress of measurement operation.

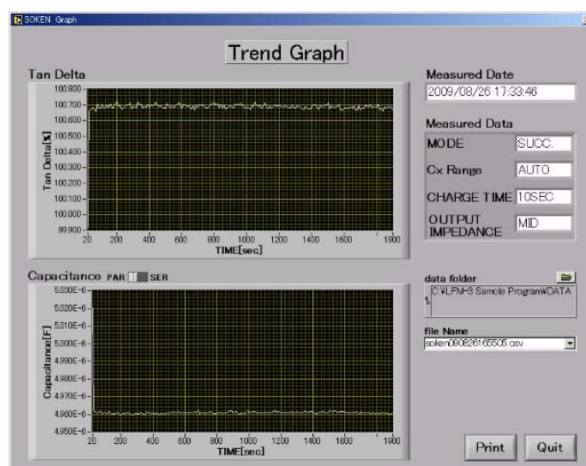
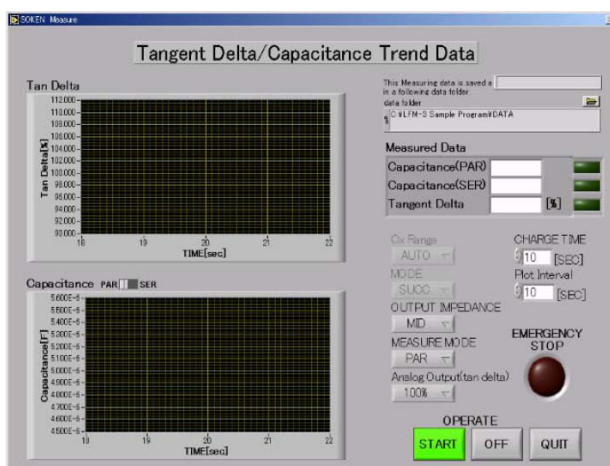
When you touch an operation parameter on the screen, a corresponding pop-up window appears, on which you can readily specify a desired data setup.



- (1) [CAPACITANCE] : Electrostatic capacitance display: Six digits of full scale
- (2) [DIELECTRIC LOSS (%)] : Tan δ display: Six digits of full scale
- (3) [OUTPUT VOLTAGE (V)]
- (4) [MEASURE MODE]: Selection of measuring equivalent circuit
- (5) [MODE]: Selection of measuring mode
- (6) [OUTPUT IMPEDANCE]: Selection of output impedance
- (7) [tan δ RANGE]: Selection of analog data output range of tan δ
- (8) [SELF CHECK]: Self test
- (9) [CHARGE TIME]: Selection and display of charging time
- (10) Selection of measuring electrostatic capacitance range
- (11) [LOCAL / REMORT]
- (12) [WORK]: Displayed in red when the testing voltage is turned on

Option Software

With this optional software, you can display time-series data of tan δ and electrostatic capacitance.



Note: This sample program uses VISA (Virtual Instrument Software Architecture) for the transmission of messages to and from the measuring instrument. VISA is a registered trademark of National Instruments Corporation.

OS: Windows 2000, XP, Vista 32 bits
 Driver: USB Serial Converter from FTDI (Future Technology Devices International Ltd.)

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Specifications

Measurement items:	C (electrostatic capacitance) and D (tan δ)
	(1) Electrostatic capacitance: 100.00 pF - 100.000 μ F Manual and automatic selection of capacitance range
	(2) Tan δ : 0.010% - 999.999%
Measuring frequency:	0.1 Hz \pm 3%, Stability: \pm 500 ppm/ $^{\circ}$ C
Measuring time:	Within 30 s, excluding charging time
Measuring voltage:	100 Vrms \pm 10%, Stability: \pm 0.1%/ $^{\circ}$ C, Output current: Maximum 20 mA
Measuring mode:	Manual selection between parallel equivalent circuit and series equivalent circuit
Measurement terminals:	Two-terminal configuration (HIGH and LOW); TXA104-BR terminals plus a grounding terminal (GND)
Output impedance:	LOW; 10 k Ω \pm 5% MID; 50 k Ω \pm 5% HIGH; 100 k Ω \pm 5%
Output voltage display:	LCD bar graph, Indicating range: \pm 150 VDC
Charging time setting:	0 - 99 s in increments of 1 s on the LCD screen
External analog output:	Electrostatic capacitance and dielectric loss
External interface:	USB
Driving power source:	(100 - 240 VAC) \pm 10%, 50/60 Hz
Power consumption:	Maximum 125 VA, standard about 60 VA
Operating environment:	Operating temperature range; 10 $^{\circ}$ C - 40 $^{\circ}$ C Operating relative humidity range; 0% - 80% (at 35 $^{\circ}$ C or lower)
Dimensions:	200 (H) \times 430 (W) \times 450 (D) mm, excluding projections
Mass:	About 15 kg

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Specifications are subject to change for improvements without prior notice.



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SOKEN ELECTRIC CO., LTD.

<http://www.soken-jp.co>

3-57-124 Kami-Ishihara, Choufu-City, Tokyo 182-0035 JAPAN
TEL +81 42 490 6929 (Export Dept.) FAX +81 42 490 6807
TEL +81 42 490 6925 (Main)