

# *The DB250 System*

## *IRCT Scanner System for Quality Test of Capacitors*

### ***General***

Manual sample testing of capacitors is a very time-consuming and therefore costly process. Standard practice is to connect the capacitors one-by-one to a number of different measuring instruments, and manually register the measured results for report generation and evaluation.

Given that the capacitors are tested for High Voltage, Insulation Resistance (IR), Capacity and Tan  $\delta$ , it is our experience that testing 40 capacitors takes approximately 1 hour.

These important tasks are significantly simplified and made faster by using the Danbridge IRCT Scanner System type DB250. By using the scanner system the same task is accomplished in less than 5 minutes. The scanner system is a semi-automatic test system with a fully automatic test procedure in which up to 40 capacitors can be tested in one single sequence. If a larger sample test is required, the routine is simply repeated, reducing the test time even more.

The measured results are collected automatically in the integrated PC, from there they can be printed directly or exported into a common spreadsheet format, such as MS Excel.

The IRCT Scanner System has been designed to combine high speed and high quality of the following measurements:

- Short circuit test
- Contact check
- High-Voltage (breakdown test)
- Insulation resistance or leakage current
- Capacitance either as absolute values, deviation in percent or deviation in absolute values
- Dissipation factor tests as  $\tan \delta$  or ESR (Equivalent Serial Resistance)
- Resistance
- Inductance
- Q-Value
- Z-Value

### ***Applications***

Some common applications for the Scanner System are:

- Quality Control of samples of capacitors
- Economical test system for small production batches
- Automatic test systems for environment tests for instance in ovens, humidity chamber etc.
- Test of capacitors in research and developing departments
- Acceptance testing of capacitors
- Safety approval testing of XY capacitors
- Test of up to 2000V or up to 5kV by external and optional dual-fixtured HT box
- Test of coils and line filters

## Background

The IRCT Scanner System DB250 is a further development from the well-known DB240 system which is now an essential tool for most of the major European film capacitor manufacturers.

The first system was developed to fulfill the requirements of DEMKO, the Danish Electricity Board for Material Control, now controlled by UL (Underwriters Laboratories Inc.® USA).

Further development of the systems and control software has been carried out in close cooperation between several of the most important European capacitor manufacturers.

## Modular Design

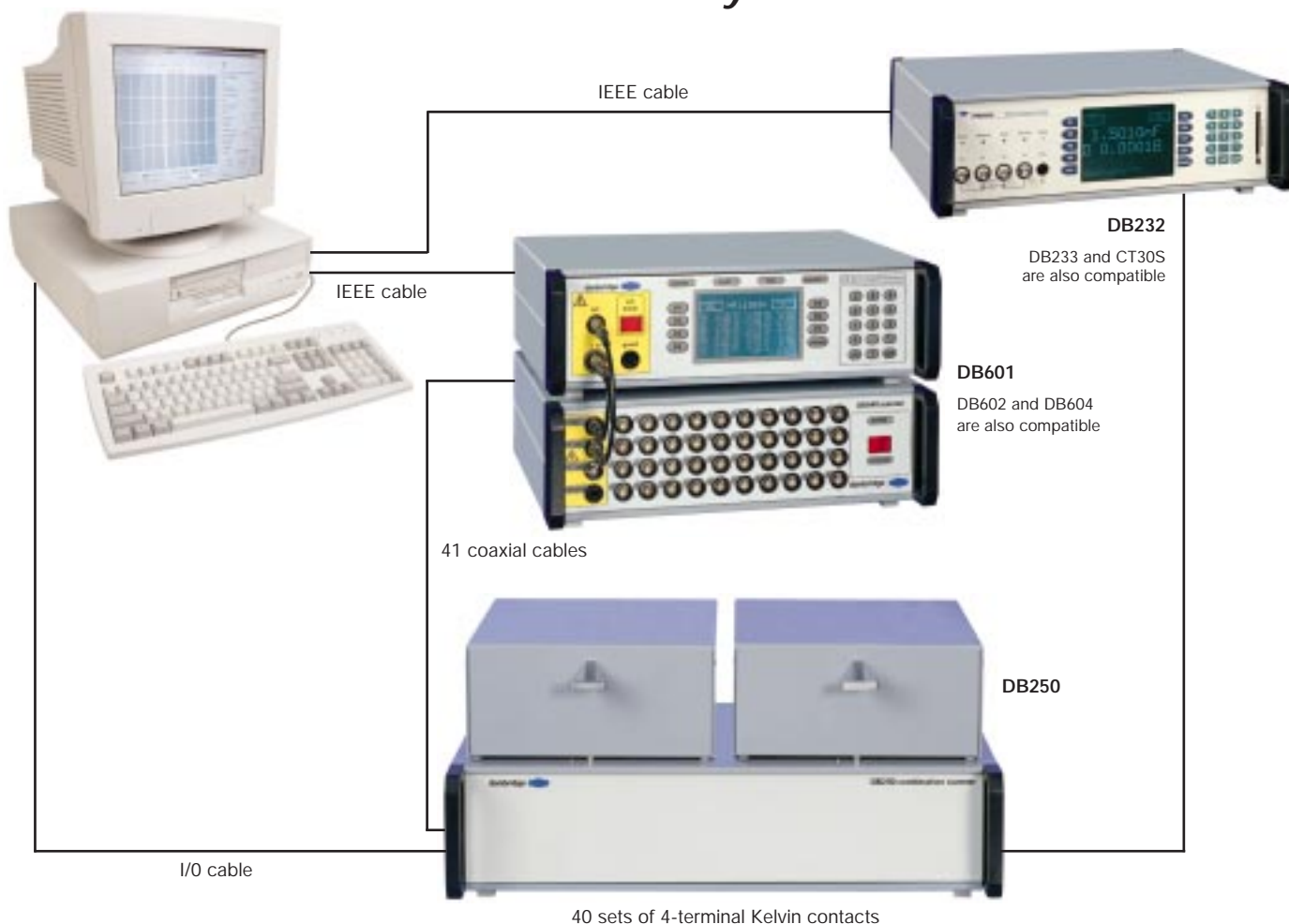
The Scanner System is a modular design. It consists of the following type of instruments:

- CLR bridge (capacitance and dissipation factor), DB232, DB233 or CT30
- Megohmmeter (High Voltage and IR - DC), DB601, DB602 or DB604
- PC including printer
- Combination Scanner where the capacitors are fixtured
- IR scanner that connects the megohmmeter to the combination scanner, DB250.

The capabilities can be slightly changed depending on which version of the above Danbridge products are chosen. The system can be used for radial, axial and SMD components or tailor made for special type capacitors as well.

Please see a schematic representation of a complete Scanner System below:

## The DB250 System



## Measuring Method

The measuring methods are based on the well-known Danbridge CLR testers and megohmmeters, all designed for testing of capacitors.

Depending on the application, the system can be equipped with one of Danbridge's megohmmeters which can handle test voltages from 10V and up to 5kV – the Scanner System itself handles up to 2kV. The megohmmeter controls the IR Scanner DB640 (Insulation Resistance). The DB640 is able to charge up to 40 channels simultaneously and thereafter measure all channels in a fast scan.

The IR part of the system will check for shorted capacitors, perform a voltage test and carry out the IR test itself. Furthermore, the contact check facility can be enabled in order to localize unusable contacts or „open circuit“ capacitors. The capacitance value is measured by one of Danbridge's CLR bridges, either by selecting one single test frequency or up to 4 different frequencies in the same test. Capacitance is tested against a programmed nominal value, and the result can be presented as % deviation from the nominal or as absolute values. Dissipation factor can be measured by one or more test frequencies and the results are presented as  $\tan \delta$  or ESR values.

The scanner system is a semi-automatic test system with a fully automatic test procedure in which up to 40 capacitors or 2 x 20 capacitors can be tested in one sequence. This means that the test time per capacitor can be reduced significantly compared to ordinary bench testing.

## Jig Calibration

As with all high-quality systems, whenever the jigs or fixtures are changed, relocated, etc. the system should be calibrated in order to obtain the highest measuring accuracy.

Scanner calibration is easily selected using the system software and calibration of the instruments is done almost automatically. The system stores the actual offset values for all 40 jigs, thereby providing the normal high Danbridge standard in measurement accuracy.

## User-friendly Interface

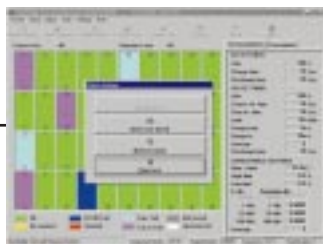


Dedicated and easy to use software with graphical user interface under Windows environment controls the system.

The software is programmed for the MS Windows platform. Standard MS Windows procedures are used and the intuitive user interface helps the operator to understand and use the system almost instantly.

All information is stored in the computer, and test reports are generated and printed easily. It is equally simple to access documentation of the measured results, and to export the results to ODBC supported spreadsheet formats, such as Excel. Consequently, statistical information or

graphic presentation of yield, quality etc. is easily produced. Furthermore, the documentation is easily shared with other PC users - who are not operators of the Scanner System.



Channel	Capacitance	Dissipation Factor	ESR	IR
1	1000	0.001	0.001	1000
2	1000	0.001	0.001	1000
3	1000	0.001	0.001	1000
4	1000	0.001	0.001	1000
5	1000	0.001	0.001	1000
6	1000	0.001	0.001	1000
7	1000	0.001	0.001	1000
8	1000	0.001	0.001	1000
9	1000	0.001	0.001	1000
10	1000	0.001	0.001	1000

Optional modules for other languages than English are available.

## ***Flexible Fixtures***

The DB250 System is optionally equipped with special fixture platforms, such as DB243 where for instance large axial capacitors can be attached and measured. In this case, when testing larger capacitors the number of capacitors in each sequence is reduced to 2 x 10 units.

For optimal flexibility, the fixture platform, such as DB243, can be custom-designed for special capacitors.



## ***Installation and Training***

All hard- and software is preinstalled by Danbridge. Each system is optimised and calibrated before shipment. An expert Danbridge engineer will install the scanner system in your company and will also be responsible for training the operators on site. This ensures that each Scanner System is installed and operated at our customer's premises quickly and efficiently.

## ***Maintenance and Traceable Calibration***

A service contract is available under which it can be established to what extent Danbridge should maintain the supplied Scanner System. This can be done at the customer's premises or at Danbridge as required. Calibration is performed against traceable standards.

If required, calibration of the system can be offered by an accredited laboratory.

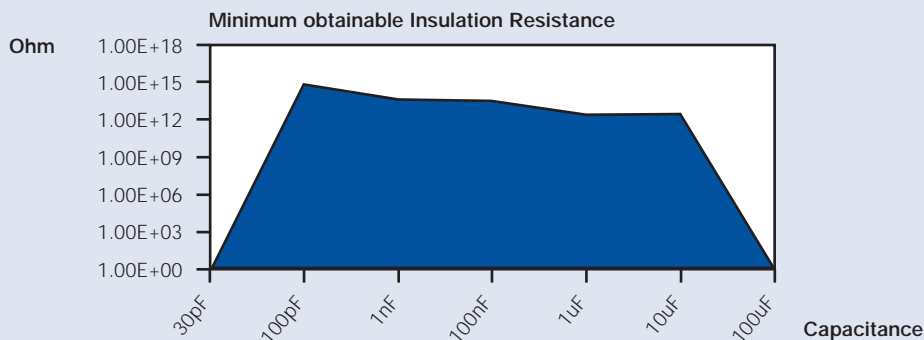
## ***References***

Today many well-known companies benefit from the technology in the Danbridge Scanner Systems. Please ask Danbridge for a reference list or visit our homepage.

# Specifications

<b>Measured parameters</b>	High voltage, Insulation Resistance, Leakage Current, Capacitance Dissipation Factor, Resistance, Inductance, Q-value, Z-value.
<b>Measuring Frequencies</b>	100/120 Hz, 1 kHz, 10 kHz and 100 kHz.
<b>Measuring time</b>	Complete test for 40 capacitors in less than 5 minutes.
<b>Maximum testing voltages</b>	For capacitors with lead distance - $\geq 7.5$ mm: Max 2000 Volts. - $\geq 5$ mm: Max 1000 Volts.
<b>Fixtures</b>	40 sets of 4-terminal Kelvin contacts, for axial, radial and SMD components.
<b>Interfaces</b>	IEEE 448 (GPIB).
<b>Environment</b>	Ambient temperature: 10 - 40 degrees Celsius.
<b>Power</b>	90 - 130V AC / 210 - 250V AC / 50 - 60Hz.
<b>Weight</b>	App. 75 kg / 165 lbs.

## Measurement range for Insulation Resistance



## Accuracy for DC Current Measurements

**Accuracy**  $\pm 2\%$  of value  $\pm 2$ pA

## Accuracy for Capacitance

C	100/120 kHz	1 kHz	10 kHz	100 kHz
30 - 100pF	-	$\pm 0.5\%$	$\pm 0.1\%$	$\pm 0.1\%$
100 - 400pF	$\pm 0.1\%$	$\pm 0.1\%$	$\pm 0.1\%$	$\pm 0.1\%$
400pF - 159 nF	$\pm 0.1\%$	$\pm 0.05\%$	$\pm 0.05\%$	$\pm 0.05\%$
159nF - 1μF	$\pm 0.1\%$	$\pm 0.05\%$	$\pm 0.05\%$	$\pm 0.05\%$
1μF - 10μF*	$\pm 0.5\%$	$\pm 0.1\%$	$\pm 0.1\%$	$\pm 0.1\%$
10μF - 300μF	$\pm 0.5\% \cdot C/C_{min}$	$\pm 0.1\% \cdot C/C_{min}$	$\pm 0.1\% \cdot C/C_{min}$	-

Note: No specifications better than  $\pm 0.1$ pF

## Accuracy for Dissipation Factor

Tan $\delta$	100/120 kHz	1 kHz	10 kHz	100 kHz
30 - 100pF	-	$\pm 0.0005\%$	$\pm 0.0005\%$	$\pm 0.0010\%$
100 - 400pF	$\pm 0.0010\%$	$\pm 0.0002\%$	$\pm 0.0002\%$	$\pm 0.0005\%$
400pF - 159 nF	$\pm 0.0007\%$	$\pm 0.0002\%$	$\pm 0.0002\%$	$\pm 0.0003\%$
159nF - 1μF	$\pm 0.0005\%$	$\pm 0.0002\%$	$\pm 0.0002\%$	$\pm 0.0005\%$
1μF - 10μF*	$\pm 0.0007\%$	$\pm 0.0007\%$	$\pm 0.0007\%$	$\pm 0.0007\%$
10μF - 300μF	$\pm 0.0007\% \cdot C/C_{min}$	$\pm 0.0007\% \cdot C/C_{min}$	$\pm 0.0007\% \cdot C/C_{min}$	$\pm 0.0007\% \cdot C/C_{min}$

\* Average count higher than 4

Data subject to change

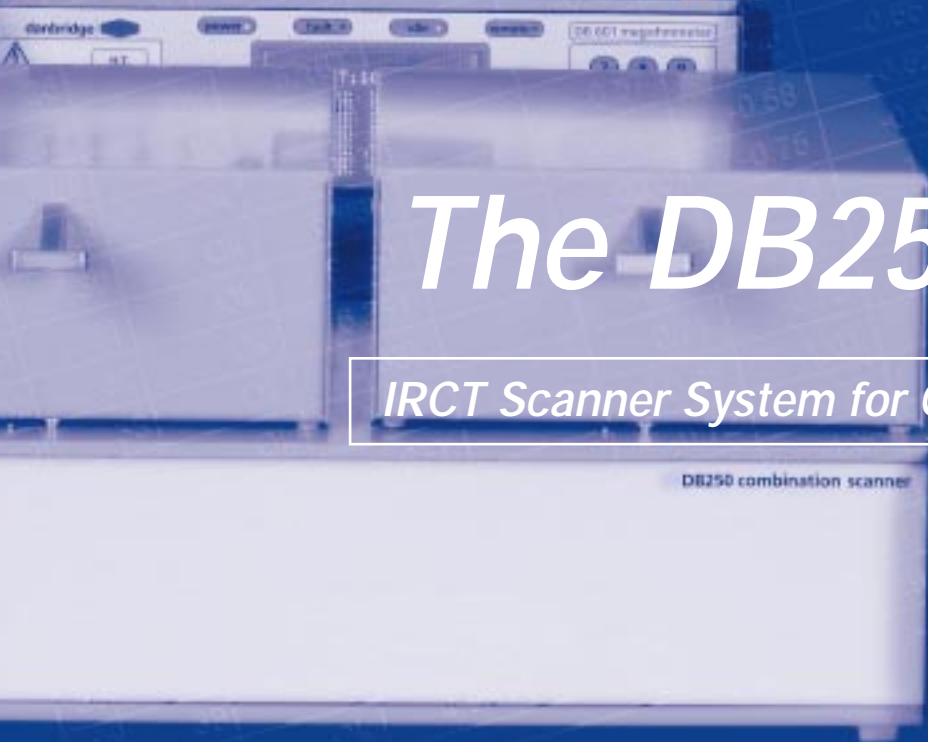
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# *The DB250 System*

*IRCT Scanner System for Quality Test of Capacitors*

DB250 combination scanner