### **DB230 Capacitor Tester**

Quick and accurate testing on automatic production lines



#### General

The DB230 Component Tester is especially designed for high accuracy testing of capacitors on production lines, not least for integration with sorting machines in a production environment. The instrument is reliable, user-friendly and easy to set up to any test.

The DB230 utilises an external bridge module allowing the user to install the measuring bridge very close to the measuring Jig. This ensures high measuring accuracy. Especially when measuring at 100kHz and 1MHz, cables are main causes to noise. When installing an LCR bridge on a production line, some distance between the instrument and the Jig is unavoidable. With the DB230, total cable length of up to 4 m (157 inches) is supplied.

The DB230 utilises a well-proven input protection system to protect the bridge module from damages owing to exposure to charged capacitors. This secures that the DB230 does not break down as easily as other LCR bridges, when exposed to charged capacitors.

Measuring frequencies: 1MHz, 100kHz, 10kHz and 1kHz Overall accuracy better than 0,05% and 2 x 10<sup>-4</sup> for loss factor External bridge module for long cables (3 m or 118 inches) between the instrument and the bridge module Measuring cables: 1 m or 39,3 inch (supplied as standard) Input protection against charged capacitors at 2 Joule up to 1kV. This feature can be extended by an optional Protection Box, PB10 Built-in contact check function ensures that the contact to the device is good, additional 2-6 ms High measuring speed: 6 to 20ms from trig to end of measurement The DB230 can perform dual frequency tests at any combination of frequencies. A popular configuration is to test capacitance at 1kHz and loss factor at 100kHz or 1MHz. As standard, DB230 can sort capacitors into bins according to the measured parameters at two frequencies simultaneously.

Bin sorting with up to 12 bins for capacitance for 1st frequency and up to 4 bins for tan  $\partial$  using 2nd frequency. Or tan  $\partial$  may be measured at several frequencies using the 4 bins for different levels of the dissipation factor.

As standard the instrument has a built-in comparator for deviation measurements, IEEE488 (GPIB) and RS232C data interfaces as well as handler interface (opto-coupler type). All measured data are collectable from the data interfaces. Via the PCMCIA slot it is possible to easily store set-ups to distribute to other instruments quickly, without operator mistakes.

Measuring ranges: 0,1pF to 1mF depending of test frequency

Measures up to 29nF (0,2%) @ 1MHz

Internal bias voltage: Up to ±3VDC on generator terminal, set in 0,1V steps

External bias voltage: Up to ±48VDC

Average: 1 to 99 measurements

Display readings: Direct or deviation capacitance and tan  $\partial$  or ESR for loss measurements and L/Q, Rs, Rp, Z

Optional Jig31 for 4-terminal manual component testing of axial, radial and SMD components

Input Protection Bias Voltage internal Bias Voltage external         2 Joule up to 1kV or 4μF charged 1000V         (internal Up to ±3.0VDC on generator terminal, set in 0.1V steps         (internal Bias Voltage external           Capacitance         Inf         39pF         0.1pF         3.9pF         0.2pF         ±.0010         (internal Bias Voltage external           Capacitance         IkHz         Capacitance         Ian Ø         (internal Bias Voltage external         (internal Bias Voltage external           Capacitance         IkHz         Ookfa/ 4µF         39µF         0.2pF         ±.0010         (internal Bias Voltage external           Capacitance         IkHz         Iokfa/ 4µF         39µF         0.1%F         ±.0002         (internal Bias Voltage external           Ookhtz         10hF         39µF         0.1%F         ±.0007         (internal Bias Voltage external         (internal Bias Voltage external         Inf         0.1%         ±.0007           1µF         9µF         0.1F         3.9NF         0.3%*         ±.0000         (internal Bias Voltage external         (internal Bias Voltage external         Inf         10hF         20hF         9.0%         2.000         10hF         2.000         10hF         2.000         10hF         2.000         10hF         2.000         10hF         2.000	le in 0.1V steps (maximum 1.5V RMS) $\frac{1 \text{ kHz}}{20 \text{ ms}} \frac{10 \text{ kHz}}{6 \text{ ms}} \frac{100 \text{ kHz}}{6 \text{ ms}} \frac{1 \text{ MHz}}{6 \text{ ms}}$ $28 \text{ ms}} 28 \text{ ms}} \frac{14 \text{ ms}}{14 \text{ ms}} \frac{14 \text{ ms}}{14 \text{ ms}}$ $16 \text{ ms}} 28 \text{ ms}} \frac{14 \text{ ms}}{16 \text{ ms}} \frac{14 \text{ ms}}{2 \text{ ms}} \frac{14 \text{ ms}}{2 \text{ ms}}$ $16 \text{ ms}} 16 \text{ ms}} 2 \text{ ms}} 2 \text{ ms}$ $(\text{rom trig to end of measurement}) + 8 \text{ ms for calculation time}$ $(\text{cables supplied by Danbrid}$ V steps $(\text{internally generate})$ $4 \text{ ccuracy } \frac{11 \text{ n}}{7}$ $0.2 \text{ pF} \qquad \pm .0010$ $0.05\%^* \qquad \pm .0002$ $0.1\% \qquad \pm .0010$ $0.05\%^{**} \qquad \pm .0010$ $0.05\%^{**} \qquad \pm .0010$ $0.05\%^{**} \qquad \pm .0010$ $0.05\%^{**} \qquad \pm .0010$ $0.1\% \qquad \pm .0020$ ations require a stable jig with capacitance lower than 30pF $\frac{1 \text{ MHz}}{2 \text{ parameter}} 2 \text{ ccuracy}$ $0.4\Omega^{-}40\Omega^{-}0.1\% \qquad 2 \text{ parameter} \pm (0.2\%+0.05 \text{ xQ})$ $0.4\Omega^{-}40\Omega^{-}0.05\% \qquad 100 \text{ k}\Omega^{-}0.5\%$ $100 \text{ k}\Omega^{-}40\Omega\Omega^{-}0.5\%$ $100 \text{ k}\Omega^{-}0.5\%$ $100 \text{ k}\Omega^{-}1.00 \text{ k}\Omega^{-}1.0\%$ $100 \text{ k}\Omega^{-}1.00  k$	
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Additional time per measurement by average       16ms       16ms       2ms         ') allowing 3ms cortact bounding or 1 mays change       Multiple measurement (some per 1 mays change       (cables supplied b)         Multiple measurement (some per 1 mays change       (massurement) + ams for calculation time       (cables supplied b)         Bias Voltage internal       (massurement) + ams for calculation time       (cables supplied b)       (cables supplied b)         Bias Voltage external       Up to ±3.0VDC on generator terminal, set in 0.1V steps       (massard)       (massard)         Capacitance       18t/2       10kHz       Capacitance       1an ∂         1pF 39pF       0.1pF 3.9pF       0.2 PF       ± .0010       (massard)         4µF 339µF       0.1pF       ± .0010       ± .0000       (apt005%)       ± .0000         1µF - 39pF       0.1pF       1.0010       ± .0000       (apt005%)       ± .0000       (apt007)         1µF9µF       0.1pF       1%       ± .0010       (apt007)       (apt007)       (apt007)       (apt007)         1µF9µF       0.1pF       1.0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0010       ± .0020 <td< td=""><td>16ms16ms2ms2msent (from trig to end of measurement) + 8ms for calculation time(cables supplied by Danbr(cables supplied by DanbrV Steps(internally generalAccuracy ±1 digitAverage ≥2CapacitanceTan ∂0.2 pF± .00100.05%*± .00020.1%± .00071%± .00200.1pF± .00100.05%*± .00070.1%± .00071%± .00200.1%± .00101%± .00201%± .0020ations require a stable jig with capacitance lower than 30pF1MHzAccuracy0.2%± .00101%± .0020ations require a stable jig with capacitance lower than 30pFter 0.1%0.02µH- 0.1H1 parameter 0.1%2 parameter ± (0.2%+0.05x0)0,4Ω-40Ω0,1%40Ω-100kΩ0.05%100kΩ-400kΩ0.5%nstant voltagetrr 2nd parameter by opto-couplerstS232Ctrig ready, fault and statusreand loadingc, 50-60 HzExport Packing Europe:teExport Packing Europe:</td></td<>	16ms16ms2ms2msent (from trig to end of measurement) + 8ms for calculation time(cables supplied by Danbr(cables supplied by DanbrV Steps(internally generalAccuracy ±1 digitAverage ≥2CapacitanceTan ∂0.2 pF± .00100.05%*± .00020.1%± .00071%± .00200.1pF± .00100.05%*± .00070.1%± .00071%± .00200.1%± .00101%± .00201%± .0020ations require a stable jig with capacitance lower than 30pF1MHzAccuracy0.2%± .00101%± .0020ations require a stable jig with capacitance lower than 30pFter 0.1%0.02µH- 0.1H1 parameter 0.1%2 parameter ± (0.2%+0.05x0)0,4Ω-40Ω0,1%40Ω-100kΩ0.05%100kΩ-400kΩ0.5%nstant voltagetrr 2nd parameter by opto-couplerstS232Ctrig ready, fault and statusreand loadingc, 50-60 HzExport Packing Europe:teExport Packing Europe:	
*) allowing inscribes bouncing or 1 ange change Mutiple measurements (average): The sum of each measurement (from trig to end of measurement) + 8ms for calculation time         Measuring Cables Input Protection Bias Voltage internal Bias Voltage internal Bias Voltage external       Im (39.3 inch) from bridge module to fixture (cables supplied b 2000 Up to ±3.0 VDC on generator terminal, set in 0.1V steps (internal Bias Voltage external       Im (39.3 inch) from bridge module to ±4.8V DC         Capacitance       Frequency       Accuracy ±1 digit (apacitance)       Average ≥2 (apacitance)         Infr. 39pF       0.1PF       3.9pF       0.2 pF       ±.0010         40pF       3.9pF       0.2 pF       ±.0002       10007         40pF       3.9pF       0.1PF       1%       ±.0002         100kHz       10kHz       Capacitance       Tan.0       10007         40pF       3.9pF       0.1PF       ±.0010       101         1pF       9pF       0.0PF       0.1PF       ±.0002       100         1pF       9pF       0.1PF       ±.0010       10F       ±.0020       100         1pF       9pF       0.2%       ±.0001       10P       ±.0020       100       10P         1pF       9pF       10hHz       Accuracy       0.0%       0.02PH       11       10 <td< td=""><td>ent (from trig to end of measurement) + 8ms for calculation time (cables supplied by Danbr V Steps (internally generation of the supplied by Danbr Accuracy ±1 digit Average ≥2 Capacitance Tan ∂ 0.2 pF ± .0010 0.05%* ± .0002 0.1% ± .0007 1% ± .0020 0.1pF ± .0010 0.05%** ± .0002 0.1% ± .0007 1% ± .0007 1% ± .0007 1% ± .0010 1% ± .0020 1% ± .0010 1% ± .0020 1% ± .0020 1% ± .0010 1% ± .0020 1% ± .0020</td></td<>	ent (from trig to end of measurement) + 8ms for calculation time (cables supplied by Danbr V Steps (internally generation of the supplied by Danbr Accuracy ±1 digit Average ≥2 Capacitance Tan ∂ 0.2 pF ± .0010 0.05%* ± .0002 0.1% ± .0007 1% ± .0020 0.1pF ± .0010 0.05%** ± .0002 0.1% ± .0007 1% ± .0007 1% ± .0007 1% ± .0010 1% ± .0020 1% ± .0010 1% ± .0020 1% ± .0020 1% ± .0010 1% ± .0020 1% ± .0020	
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Bias Voltage internal Bias Voltage external         Up to ±3.0VDC on generator terminal, set in 0.1V steps         (internal Up to ±48V DC           Capacitance         Frequency         Accuracy ±1 digit         Average ≥2           1kHz         10kHz         Capacitance         Ian ∂           1gF - 39pF         0.1pF - 3.9pF         0.2 pF         ±.0007           40pF - 3.9µF         0.1pF         3.9µF         0.1pF         ±.0007           40pF - 3.9µF         0.1pF         1.1pF         ±.0007           40pF - 3.9µF         0.1pF         ±.0007           40pF - 3.9µF         0.1pF         ±.0007           100kHz         11Hz         10001           100pF - 9µF         0.1pF         ±.0007           100pF - 40µF         30nF         0.1pF         ±.0007           10µF - 40µF         30nF         0.1pF         1.1pF         ±.0010           10µF - 40µF         30nF         99nF         1.3%         ±.0020           10µF - 40µF         10nL         10µHz         Accuracy         10Hz         0.2%+           10µHz         10µF         2µF         te above specifications require a stable ig with capacitance lower than 30pF           Inductance         10µHz         10µAz	Accuracy ±1 digit       Average ≥2         Capacitance       Tan ∂         0.2 pF       ± .0010         0.05%*       ± .0002         0.1%       ± .0007         1%       ± .0020         0.1pF       ± .0010         0.05%**       ± .0002         0.1%       ± .0010         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz       Accuracy         0.2µH- 0.1H       1 parameter 0.1%         2 parameter ± (0.2%+0.05x0)       0.4Ω-40Ω       0,1%         0.4Ω-40Ω       0,1%       0.05%         100kΩ-400kΩ       0.05%       100kΩ-400kΩ         nstant voltage       re       and loading         cr 2nd parameter by opto-couplers       S232C         trig ready, fault and status       re         and loading       C, 50-60 Hz       Export Packing Europe:         Export Packing Europe:       Export Packing Oversease	
Bias Voltage externalUp to $\pm 48V DC$ CapacitanceFrequencyAccuracy $\pm 1$ digitAverage $\pm 2$ CapacitanceInf10F-39pF0.1pF-3.9pF0.2 pF $\pm$ .0010400F-3.9pF0.1pF-3.9pF0.2 pF $\pm$ .0002400F-3.9pF0.1pF $3.9pF$ 0.1% $\pm$ .0007400pF-3.9pF0.1pF $3.9pF$ 0.1pF $\pm$ .0007400pF-3.9pF0.0pF $3.9pF$ 0.1pF $\pm$ .0007400pF-3.9pF0.0pF $3.9pF$ 0.1pF $\pm$ .0007400pF-3.9pF0.0pF $0.55\%^{**}$ $\pm$ .0002100kHz10nF-29nF0.1% $\pm$ .000710pF-9pF10nF-29nF0.2% $\pm$ .001010pF-40pF $30nF-99nF$ $0.2\%$ $\pm$ .0020 $^{1}$ Accuracy10kHz $0.02\%^{**}$ $\pm$ .0020 $^{1}$ Accuracy $\pm 2pF$ 10kHz $0.02\%^{**}$ $\pm$ .001010pF-40pF $30nF-99nF$ $0.2\%$ $0.4\%^{**}$ $2.0020^{**}$ $^{1}$ Accuracy $\pm 2pF$ $10kHz$ Accuracy $10Hz^{**}$ $2.020^{**}$ Inductance1kHz10kHz $0.02\mu^{*-1}H$ $1$ parameter $0.1\%$ $2$ parameter $\pm$ .0.2\%^{**}Inductance10kHz $100kHz$ $Accuracy$ $10kHz$ $402-402$ $0.4\%^{**}$ Inductance10kHz $100kHz$ $Accuracy$ $10kHz$ $0.2\%^{**}$ $2.2\%^{**}$ Inductance $0.402-4002$ $0.402-4002$ $0.4\%^{**}$ $0.402-4002$ $0.1\%^{**}$ $2.2\%^{**}$ Inductance $0.402-4002$ $0.402-4002$ <td>Accuracy ±1 digitAverage ≥2CapacitanceTan ∂0.2 pF± .00100.05%*± .00020.1%± .00071%± .00200.1pF± .00100.05%**± .00070.2%± .00101%± .0020ations require a stable jig with capacitance lower than 30pFIMHzAccuracy0.2%± .0020ations require a stable jig with capacitance lower than 30pFter 0.1%0.02µH- 0.1H1 parameter 0.1%2 parameter 0.1%2 parameter ± (0.1%+0.05xQ)0.4Ω-40Ω0,4Ω-40Ω0,1%40Ω-100kΩ0.05%100kΩ-400kΩ0.5%nstant voltager 2nd parameter by opto-couplersS232Ctrig ready, fault and statusreand loadingC, 50-60 HzLeExport Packing Europe:Export Packing Europe:Export Packing Europe:</td>	Accuracy ±1 digitAverage ≥2CapacitanceTan ∂0.2 pF± .00100.05%*± .00020.1%± .00071%± .00200.1pF± .00100.05%**± .00070.2%± .00101%± .0020ations require a stable jig with capacitance lower than 30pFIMHzAccuracy0.2%± .0020ations require a stable jig with capacitance lower than 30pFter 0.1%0.02µH- 0.1H1 parameter 0.1%2 parameter 0.1%2 parameter ± (0.1%+0.05xQ)0.4Ω-40Ω0,4Ω-40Ω0,1%40Ω-100kΩ0.05%100kΩ-400kΩ0.5%nstant voltager 2nd parameter by opto-couplersS232Ctrig ready, fault and statusreand loadingC, 50-60 HzLeExport Packing Europe:Export Packing Europe:Export Packing Europe:	
CapacitanceFrequencyAccuracy ±1 digitAverage $\geq 2$ CapacitanceIpF. 33.9 pf0.15 pf. 3.9 pf0.2 p F±.001040.pF. 3.9 µF4.9 pf. 3.9 µF0.05%*±.000240.pF. 39.9 µF4.9 µF0.1%±.000740.0 µF. 10 µF3.9 µF0.1%±.000740.0 µF. 11 µF0.1 µF1.9 µF1.0 µF10.0 µF. 40 µF1.9 µF0.1 µF±.000710.0 µF. 40 µF0.9 µF0.1 µF±.001010 µF. 9 µF0.1 µF0.0 µF±.000710 µF. 40 µF1.0 µF0.2%±.001010 µF. 40 µF1.0 µF0.2%±.001010 µF. 40 µF3.0 µF0.1%±.0020-1.0 µF2.0 µF0.2%1 µF. 9 µF1.0 µF. 29 µF0.2%±.00101 µF. 9 µF1.0 µF. 29 µF0.2%±.00101 µF. 9 µF1.0 µF. 20 µF1.0 µZ1 µF. 9 µF1.0 µF. 40 µF1.0 µZ1 µF. 9 µF1.0 µF. 40 µF1.0 µZ1 µF. 9 µF1.0 µZ0.2%1 µF. 9 µF1.0 µZ1.0 µZ1 µF. 20 µF1.0 µZ0.2%1 µZ1.0 µZ1.0 µZ1 µZ1.0 µZ0.2%1 µZ0.0 µZ0.2%1 µZ1.0 µZ0.1%0 µZ0.4 µZ0.4 µZ1 µZ1.0 µZ0.4 µZ1 µZ0.0 µZ0.4 µZ1 µZ0.4 µZ0.4 µZ1 µZ0.4 µZ0.4 µZ1 µZ0.4 µZ<	Capacitance         Tan $\partial$ 0.2 pF $\pm$ .0010           0.05%* $\pm$ .0002           0.1% $\pm$ .0007           1% $\pm$ .0020           0.1pF $\pm$ .0010           0.05%** $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0007           0.2% $\pm$ .0010           1% $\pm$ .0020           ations require a stable jig with capacitance lower than 30pF           IMHz         Accuracy           0.02µH- 0.1H         1 parameter 0.1%           2 parameter 1 (0.1%+0.05xQ)         0,4Ω-40Ω         0,1%           0,4Ω-40Ω         0,1%         2 parameter $\pm$ (0.2%+0.05xd           0,4Ω-40Ω         0,1%         2 5%           nstant voltage         0,4Ω-40Ω         0.5%           nstant voltage         0.05%         0.5%           re         and loading         0.5% <i>C, 50-60 Hz Export</i> Packing <b>Europe:</b> Export Packing <b>Oversea</b>	
Capacitance         INHz         Capacitance         In $\partial$ 1pF: 39pF         0.1pF: 3.9pF         0.2 pF         ±.0010           40pF: 3.9µF         4.pF: 3.9µF         0.05%*         ±.0007           40pF: 3.9µF         4.µF: 39µF         0.1%         ±.0007           400µF: 1mF         40µF: 400µF         1%         ±.0007           400µF: 1mF         40µF: 400µF         1%         ±.0007           100kHz         1MHz         0.05%**         ±.0010           10pF: .9µF         0.1F         0.1%         ±.0002           -         1nF: 9.9µF         0.1F         ±.0010           10µF- 40µF         30nF- 99nF         0.1%         ±.0000           10µF- 40µF         30nF- 99nF         1%         ±.0020           'Accuracy ± 0.2pf **') Accuracy ± 2pF. The above specifications require a stable jig with capacitance lower than 30pF         0.2µH - 0.1H         1 parameter 0.1%           Inductance         1kHz         10kHz         10kHz         0.4Qu - 40Qu         0.4	Capacitance         Tan $\partial$ 0.2 pF $\pm$ .0010           0.05%* $\pm$ .0002           0.1% $\pm$ .0007           1% $\pm$ .0020           0.1pF $\pm$ .0010           0.05%** $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0007           0.2% $\pm$ .0010           1% $\pm$ .0020           ations require a stable jig with capacitance lower than 30pF           IMHz         Accuracy           0.02µH- 0.1H         1 parameter 0.1%           2 parameter 1 (0.1%+0.05xQ)         0,4Ω-40Ω         0,1%           0.4Ω-40Ω         0,1%         2 parameter $\pm$ (0.2%+0.05xQ           0.4Ω-40Ω         0,1%         2 5%           nstant voltage         0.4Ω-40Ω         0.5%           nstant voltage         0.5%           re         and loading         0.5% <i>C</i> , 50-60 Hz <i>Export</i> Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
Capacitance         1kHz         10kHz         Capacitance         Tan $\partial$ 1pF         3pF         0.1pF         3.9pF         0.2 PF         ±.0010           40pF         3.9pF         4.pF         3.9pF         0.05%*         ±.0007           40pF         3.9pF         4.pF         3.9pF         0.05%*         ±.0007           400pF         1mF         40pF         4.00P         1%         ±.0007           400pF         .9pF         0.1pF         ±.0010         100           100kHz         1MHz         .005%**         ±.0002         .0007           1pF<-9pF	Capacitance         Tan $\partial$ 0.2 pF $\pm$ .0010           0.05%* $\pm$ .0002           0.1% $\pm$ .0007           1% $\pm$ .0020           0.1pF $\pm$ .0010           0.05%** $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0002           0.1% $\pm$ .0007           0.2% $\pm$ .0010           1% $\pm$ .0020           ations require a stable jig with capacitance lower than 30pF           IMHz         Accuracy           0.02µH- 0.1H         1 parameter 0.1%           2 parameter 1 (0.1%+0.05xQ)         0,4Ω-40Ω         0,1%           0.4Ω-40Ω         0,1%         2 parameter $\pm$ (0.2%+0.05xQ           0.4Ω-40Ω         0,1%         2 5%           nstant voltage         0.4Ω-40Ω         0.5%           nstant voltage         0.5%           re         and loading         0.5% <i>C</i> , 50-60 Hz <i>Export</i> Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
IpF         39 pF         0.1 pF-         3.9 pF         0.2 pF $\pm$ .0010           40 pF-         3.9 uF         40 pF-         3.9 uF         0.05%* $\pm$ .0002           40 pF-         3.9 uF         40 pF-         3.9 uF         0.05%* $\pm$ .0007           400 uF-         1mF         40 uF-         400 uF-         1% $\pm$ .0002           100 kHz         1mHz         1% $\pm$ .0002         100 uF-         100 uF-           0.30 FF-         .9 uF         0.1 pF $\pm$ .0010         10 uF-         10 uF	0.2 pF       ± .0010         0.05%*       ± .0007         1%       ± .0020         0.1pF       ± .0010         0.05%**       ± .0007         0.1%       ± .0007         0.2%       ± .0010         1%       ± .0010         1%       ± .0007         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         ter 0.1%       0.02µH- 0.1H         1 parameter 0.1%       2 parameter ± (0.2%+0.05x0)         0,4Ω-40Ω       0,1%         40Ω-100kΩ       0.05%         nstant voltage       0,4Ω-400Ω       0,1%         re       and loading <i>C</i> , 50-60 Hz       Export Packing Europe:       Export Packing Oversease	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0.05%*       ± .0002         0.1%       ± .0020         1%       ± .0020         0.1pF       ± .0010         0.05%**       ± .0007         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF <b>1MHz</b> Accuracy         0.02µH- 0.1H       1 parameter 0.1%         2 parameter ± (0.2%+0.05x0)       0,4Ω-40Ω       0,1% $0.04\Omega-400k\Omega$ 0.05%         100kΩ-400kΩ       0.05%         100kΩ-400kΩ       0.5%         nstant voltage       r         r 2nd parameter by opto-couplers $82322C$ trig ready, fault and status       re         and loading       C, 50-60 Hz         Le       Export Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
$4\mu$ F- 399 $\mu$ F $4\mu$ F- 39 $\mu$ F $0.1\%$ $\pm .0007$ $400\mu$ F- 1mF $40\mu$ F- 400 $\mu$ F       1% $\pm .0020$ $100kHz$ 1MHz       1% $\pm .0020$ $.03pF$ 9 $\mu$ F $0.1pF$ $\pm .0010$ 1 $pF$ $.03pF$ 9 $\mu$ F $0.1pF$ $\pm .0007$ $\pm .0007$ $1pF$ 9 $\mu$ F $0.01F$ $0.05\%^{**}$ $\pm .0002$ $ 1nF$ 9. $\mu$ F $0.1\%$ $\pm .0007$ $1\mu$ F9 $\mu$ F $10nF$ . 2.9 $\pi$ F $0.1\%$ $\pm .0007$ $1\mu$ F9 $\mu$ F $10nF$ . 2.9 $\pi$ F $0.1\%$ $\pm .0007$ $10\mu$ F40 $\mu$ F $30nF$ . 99 $n$ F $0.2\%$ $\pm .0010$ $10\mu$ F40 $\mu$ F $30nF$ . 99 $n$ F $0.2\%$ $\pm .0020$ $^{*}$ Accuracy $\pm 2pF$ .**) Accuracy $\pm 2pF$ . The above specifications require a stable jig with capacitance lower than 30 $pF$ $2\mu$ Inductance       1kHz $100kHz$ Accuracy $0.02\mu$ H - $0.1H$ $1\mu$ parameter $0.1\%$ $10\mu$ H-10H $0.1\mu$ H-1H $2\mu$ parameter $1.0.3\%$ $0.02\mu$ H - $0.1H$ $1\mu$ parameter $0.1\%$ $2\mu$ parameter $2(0.2\%$ $0.2\%$ Resistance $0.4\Omega - 40\Omega$ $0.4\Omega - 40\Omega$	0.1% $\pm$ .0007         1% $\pm$ .0020         0.1pF $\pm$ .0010         0.05%** $\pm$ .0007         0.2% $\pm$ .0010         1% $\pm$ .0020         ations require a stable jig with capacitance lower than 30pF         ter 0.1%       0.02µH- 0.1H         1 parameter 0.1%       2 parameter $\pm$ (0.2%+0.05x0         0.4Ω-40Ω       0,1%         40Ω-100kΩ       0.05%         100kΩ-400kΩ       0.5%         nstant voltage       re         and loading <i>L C</i> , 50-60 Hz <i>Export</i> Packing <b>Europe:</b> Export Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1%       ± .0020         0.1pF       ± .0010         0.05%**       ± .0007         0.1%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz       Accuracy         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter 0.1%       2 parameter ± (0.2%+0.05x0)         0,4Ω-40Ω       0,1%         40Ω-100kΩ       0.05%         100kΩ-400kΩ       0.5%         nstant voltage	
100kHz         1MHz           .03pF         .01pF         3.9pF         0.1pF $\pm$ .0010           1pF         .9pF         .01pF         0.9pF         0.05%** $\pm$ .0007           1pF         .9pF         10nF- 29nF         0.1% $\pm$ .0007           1µF         .9µF         10nF- 29nF         0.2% $\pm$ .0010           10µF- 40µF         30nF- 99nF         1% $\pm$ .0020           *) Accuracy ± 0.2pF **) Accuracy ± 2pF. The above specifications require a stable jig with capacitance lower than 30pF           Inductance         10kHz         100kHz         Accuracy         1MHz         Accuracy           10µH-100H         1µH-10H         0.1µH-1H         1 parameter 0.1%         0.02µH- 0.1H         1 parameter 0.1%           2 parameter $\pm$ (0.402-40Ω         0.4Ω-40Ω         0.4Ω-40Ω         0.4Ω-40Ω         0.4Ω-40Ω         0.1%           40Ω-4MΩ         40Ω-4MΩ         0.02-1MΩ         0.05%         40Ω-100kΩ         0.05%           The above specifications are valid for measurements with constant voltage         100kΩ-400kΩ         0.5%           The above specifications are valid for measurements with constant voltage         100kΩ-400kΩ         0.5%           Interfaces         Rear panel         IEEE 4	0.1pF       ± .0010         0.05%**       ± .0007         0.1%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz         Accuracy         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter 0.1%       2 parameter $\pm (0.2\%+0.05x0)$ 0,4Ω-40Ω       0,1%         40Ω-100kΩ       0.05%         100kΩ-400kΩ       0.5%         nstant voltage	
.03pF9pF       .01pF $\pm$ .0010         1pF9µF       4pF- 0.9nF       0.05%** $\pm$ .0002         -       1nF- 9.9nF       0.1% $\pm$ .0007         1µF- 9µF       10nF- 29nF       0.2% $\pm$ .0010         10µF- 40µF       30nF- 99nF       1% $\pm$ .0020         *) Accuracy $\pm$ 0.2% $\pm$ .0010       10µF- 40µF       30nF- 99nF       1% $\pm$ .0020         *) Accuracy $\pm$ 0.2% f**) Accuracy $\pm$ 2pF. The above specifications require a stable jig with capacitance lower than 30pF       1MHz       Accuracy         Inductance       1kHz       10kHz       100kHz       Accuracy       0.02µH- 0.1H       1 parameter 0.1%         2 parameter $\pm$ (0.1%+0.05x0)       0.4Q2-40Q       0.4Q2-40Q       0.1%       0.02µH- 0.1H       1 parameter 0.1%         2 parameter $\pm$ (0.1%+0.05%       0.02µH- 0.1H       1 parameter 0.1%       2 parameter $\pm$ (0.2%+1       0.02µH- 0.1H       1 parameter 0.1%         2 parameter $\pm$ (0.4Q2-40Q       0.4Q2-40Q       0.4Q2-40Q       0.1%       0.02µH- 0.1H       1 parameter 0.1%         10µH-100H       1µH-10H       0.1µH-11H       1 parameter 0.1%       2 parameter ± (0.2%+1       0.02µH-0.1H       1 00kQ2-40Q       0.1%         10µH-2       0.4Q2-40Q       0.4Q2-40Q <td>0.05%**       ± .0002         0.1%       ± .0007         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz         Accuracy         0.02<math>\mu</math>H- 0.1H       1 parameter 0.1%         2 parameter 0.1%       2 parameter ± (0.2%+0.05x0)         0.4<math>\Omega</math>-40<math>\Omega</math>       0,1%         0.02<math>\mu</math>H- 0.1H       1 parameter 0.1%         2 parameter ± (0.2%+0.05x0)       0.02<math>\mu</math>H- 0.1H         0.4<math>\Omega</math>-400<math>\Omega</math>       0,1%         40<math>\Omega</math>-100k<math>\Omega</math>       0.05%         100k<math>\Omega</math>-400k<math>\Omega</math>       0.5%         nstant voltage       82232C         trig ready, fault and status       re         and loading       C, 50-60 Hz         Le       Export Packing Europe:       Export Packing Oversease</td>	0.05%**       ± .0002         0.1%       ± .0007         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz         Accuracy         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter 0.1%       2 parameter ± (0.2%+0.05x0)         0.4 $\Omega$ -40 $\Omega$ 0,1%         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter ± (0.2%+0.05x0)       0.02 $\mu$ H- 0.1H         0.4 $\Omega$ -400 $\Omega$ 0,1%         40 $\Omega$ -100k $\Omega$ 0.05%         100k $\Omega$ -400k $\Omega$ 0.5%         nstant voltage       82232C         trig ready, fault and status       re         and loading       C, 50-60 Hz         Le       Export Packing Europe:       Export Packing Oversease	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0.05%**       ± .0002         0.1%       ± .0007         0.2%       ± .0010         1%       ± .0020         ations require a stable jig with capacitance lower than 30pF         IMHz         Accuracy         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter 0.1%       2 parameter ± (0.2%+0.05x0)         0.4 $\Omega$ -40 $\Omega$ 0,1%         0.02 $\mu$ H- 0.1H       1 parameter 0.1%         2 parameter ± (0.2%+0.05x0)       0.02 $\mu$ H- 0.1H         0.4 $\Omega$ -400 $\Omega$ 0,1%         40 $\Omega$ -100k $\Omega$ 0.05%         100k $\Omega$ -400k $\Omega$ 0.5%         nstant voltage       82232C         trig ready, fault and status       re         and loading       C, 50-60 Hz         Le       Export Packing Europe:       Export Packing Oversease	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.1% $\pm$ .00070.2% $\pm$ .00101% $\pm$ .0020ations require a stable jig with capacitance lower than 30pFIMHzAccuracy0.02µH- 0.1H1 parameter 0.1% 2 parameter $\pm$ (0.2%+0.05x0)0,4Ω-40Ω0,1% 40Ω-100kΩ0,4Ω-400kΩ0.05% 100kΩ-400kΩnstant voltager 2nd parameter by opto-couplers RS232Cctrig ready, fault and status re and loadingC, 50-60 HzLeExport Packing Europe:Export Packing Europe:Export Packing Overseas	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0.2% $\pm$ .00101% $\pm$ .0020ations require a stable jig with capacitance lower than 30pF1MHzAccuracy0.02µH- 0.1H1 parameter 0.1% 2 parameter $\pm$ (0.2%+0.05x0)0,4Ω-40Ω0,1% 40Ω-100kΩ0,4Ω-400kΩ0.05% 100kΩ-400kΩnstant voltager 2nd parameter by opto-couplers RS232Cc. trig ready, fault and status re and loadingc, 50-60 HzLeExport Packing Europe:Export Packing Europe:Export Packing Overseas	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1% $\pm$ .0020ations require a stable jig with capacitance lower than 30pF1MHzAccuracyter 0.1%ter 0.1%0.02µH- 0.1H1 parameter 0.1%2 parameter $\pm$ (0.2%+0.05x0)0,4Ω-40Ω0,4Ω-40Ω0,1%40Ω-100kΩ0.05%100kΩ-400kΩ0.5%nstant voltagereand loadingC, 50-60 HzLeExport Packing Europe:Export Packing Europe:Export Packing Europe:	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	ations require a stable jig with capacitance lower than 30pF $\frac{1 \text{ MHz}}{\text{ter 0.1\%}} \frac{\text{Accuracy}}{0.02 \mu \text{H} - 0.1 \text{H}} \frac{1 \text{ parameter 0.1\%}}{2 \text{ parameter } \pm (0.2\% + 0.05 \text{ x})}$ $\frac{0,4 \Omega - 40 \Omega \Omega}{40 \Omega - 100 \text{ k} \Omega} \frac{0,1\%}{0.05\%}$ $\frac{0,05\%}{100 \text{ k} \Omega - 400 \text{ k} \Omega} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{100 \text{ k} \Omega - 400 \text{ k} \Omega} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$ $\frac{100 \text{ k} \Omega - 400 \text{ k} \Omega}{0.5\%} \frac{0.5\%}{0.5\%}$	
*) Accuracy $\pm 0.2pF$ **) Accuracy $\pm 2pF$ . The above specifications require a stable jig with capacitance lower than 30pF Inductance $\frac{1kHz}{10\muH-100H} \frac{1}{1\muH-10H} \frac{100kHz}{1\muH-1H} \frac{Accuracy}{1} \frac{10Hz}{0.2\muH-0.5x0} \frac{1}{0.02\muH-0.1H} \frac{1}{1} parameter 0.1\%}{2} parameter \pm (0.2\%H) \frac{1}{0.2\muH-0.1H} \frac{1}{1} parameter \pm (0.2\%H) \frac{1}{0.2\muH-0.1H} \frac{1}{1} parameter \pm (0.2\%H) \frac{1}{0.2\muH-0.1H} \frac{1}{1} parameter \pm (0.2\%H) \frac{1}{0.2\muH-0.1H} \frac$	1MHzAccuracyter 0.1% ter $\pm$ (0.1%+0.05xQ)0.02µH- 0.1H1 parameter 0.1% 2 parameter $\pm$ (0.2%+0.05xQ)0,4 $\Omega$ -400 $\Omega$ 0,1% 40 $\Omega$ -100k $\Omega$ 0.05% 100k $\Omega$ -400k $\Omega$ nstant voltage0.5%r 2nd parameter by opto-couplers RS232C trig ready, fault and status re and loading	
Inductance1kHz10kHz100kHzAccuracy1MHzAccuracy10µH-100H1µH-10H0.1µH-1H1 parameter 0.1% 2 parameter $\pm$ (0.1%+0.05x0)0.02µH-0.1H1 parameter 0.1% 2 parameter $\pm$ (0.2%+Resistance0.4Ω-40Ω0.4Ω-40Ω0.4Ω-40Ω0.1%0.4Ω-40Ω0,4Ω40Ω-4MΩ40Ω-4MΩ40Ω-1MΩ0.05%40Ω-100kΩ0.05%The above specifications are valid for measurements with constant voltageBin sorting InterfacesUp to 12 limits for 1st parameter and 4 limits for 2nd parameter by opto-couplers Rear panelIEEE 488-2 (GPIB) and RS232C Control Measure end, data ready, trig ready, fault and status Trig inputMeasure end, data ready, trig ready, fault and status Trig inputEnvironmentAmbient temperature Power0-30 degrees Celsius Minimum 30 minutes PowerMainframe 90-130 and 200-260 V AC, 50-60 HzExport Packing Europe: Sc m or 2.1 inchExport Packing Ov 32 cm or 12.8 incDimensionsMainframe 438 mm or 17.2 inchBridge module 25 mm or 8.1 inchExport Packing Ov 30 cm or 21 inchSc m or 20 inchSc m or 2.4 inc	1MHzAccuracyter 0.1% ter $\pm$ (0.1%+0.05xQ)0.02µH- 0.1H1 parameter 0.1% 2 parameter $\pm$ (0.2%+0.05xQ)0,4 $\Omega$ -400 $\Omega$ 0,1% 40 $\Omega$ -100k $\Omega$ 0.05% 100k $\Omega$ -400k $\Omega$ nstant voltage0.5%r 2nd parameter by opto-couplers RS232C trig ready, fault and status re and loading	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ter 0.1% ter 2 (0.1%+0.05x0) $0.02\mu H- 0.1H$ $1 \text{ parameter 0.1\%}$ $2 \text{ parameter } \pm (0.2\%+0.05x0)$ $0,4\Omega-400k\Omega$ $0.1\%$ $40\Omega-100k\Omega$ $0.05\%$ $100k\Omega-400k\Omega$ $0.5\%$ nstant voltage $C, 50-60 \text{ Hz}$ $C, 50-60 \text{ Hz}$ $C, 50-60 \text{ Hz}$ Export Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ter 0.1% ter 2 (0.1%+0.05x0) $0.02\mu H- 0.1H$ $1 \text{ parameter 0.1\%}$ $2 \text{ parameter } \pm (0.2\%+0.05x0)$ $0,4\Omega-400k\Omega$ $0.1\%$ $40\Omega-100k\Omega$ $0.05\%$ $100k\Omega-400k\Omega$ $0.5\%$ nstant voltage $C, 50-60 \text{ Hz}$ $C, 50-60 \text{ Hz}$ $C, 50-60 \text{ Hz}$ Export Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
Resistance $0.4\Omega-40\Omega$ $0.4\Omega-40\Omega$ $0.4\Omega-40\Omega$ $0.4\Omega-40\Omega$ $0.1\%$ $0.4\Omega-40\Omega$ $0.1\%$ $0.4\Omega-40\Omega$ $0.1\%$ $40\Omega-4M\Omega$ $40\Omega-4M\Omega$ $40\Omega-4M\Omega$ $0.05\%$ $40\Omega-100k\Omega$ $0.05\%$ The above specifications are valid for measurements with constant voltageBin sorting InterfacesUp to 12 limits for 1st parameter and 4 limits for 2nd parameter by opto-couplers Rear panelRear panelIEEE 488-2 (GPIB) and R5232CControlMeasure end, data ready, trig ready, fault and statusTrig inputDC, AC and contact closureFront panelPC card for set-ups, save and loadingAmbient temperature Warm-up timeMinimum 30 minutes Power90-130 and 200-260 V AC, 50-60 HzMainframeBridge moduleExport Packing Europe:Export Packing Europe: <td>ter <math>\pm</math> (0.1%+0.05xQ) 2 parameter <math>\pm</math> (0.2%+0.05xQ) 0,4<math>\Omega</math>-40<math>\Omega</math> 40<math>\Omega</math>-100k<math>\Omega</math> 0.05% 100k<math>\Omega</math>-400k<math>\Omega</math> 0.5% nstant voltage r 2nd parameter by opto-couplers 25232C trig ready, fault and status re and loading C, 50-60 Hz Le Export Packing <b>Europe:</b> Export Packing <b>Overseas</b></br></br></br></br></td>	ter $\pm$ (0.1%+0.05xQ) 2 parameter $\pm$ (0.2%+0.05xQ) 0,4 $\Omega$ -40 $\Omega$ 40 $\Omega$ -100k $\Omega$ 0.05% 100k $\Omega$ -400k $\Omega$ 0.5% nstant voltage r 2nd parameter by opto-couplers 	
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Bin sorting Interfaces       Up to 12 limits for 1st parameter and 4 limits for 2nd parameter by opto-couplers         Rear panel       IEEE 488-2 (GPIB) and RS232C Control       Measure end, data ready, trig ready, fault and status         Trig input       DC, AC and contact closure       Front panel       PC card for set-ups, save and loading         Environment       Ambient temperature Warm-up time       10-30 degrees Celsius       Environment       Every 12 months         Calibration interval       Mainframe       Bridge module       Export Packing Europe:       Export Packing Ov 32 cm or 12.8 inc 52 cm or 20.4 inc 56 cm or 22 inch       Export Packing 5 cm or 21.6 inc	nstant voltage rr 2nd parameter by opto-couplers RS232C trig ready, fault and status re and loading C, 50-60 Hz le Export Packing <b>Europe:</b> Export Packing <b>Overseas</b>	
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	.5 inch 51 cm or 20 inch 52 cm or 20.4 inch	
	.1 inch 56 cm or 22 inch 55 cm or 21.6 inch	
Weight         total 16 kg or 36 lb.         1 kg or 2.3 lb.         21 kg or 47.3 lb.         23 kg or 51.8 lb.	b. 21 kg or 47.3 lb. 23 kg or 51.8 lb.	



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### General

The DB232 Component Tester is especially designed for high accuracy testing of capacitors on production lines, not least for integration with sorting machines in a production environment. The instrument is reliable, user-friendly and easy to set up to any test.

The DB232 utilises an external bridge module allowing the user to install the measuring bridge very close to the measuring Jig. This ensures high measuring accuracy. Especially when measuring at 100kHz cables are main causes to noise. When installing an LCR bridge on a production line, some distance between the instrument and the Jig is unavoidable. With the DB232, total cable length of up to 4m (157 inches) is supplied.

The DB232 utilises a well-proven input protection system to protect the bridge module from damages owing to exposure to charged capacitors. This secures that the DB232 does not break down as easily as other LCR bridges, when exposed to charged capacitors.

The DB232 can perform dual frequency tests at any combination of

frequencies. A popular configuration is to test capacitance at 1kHz and loss factor at 100kHz. As standard, it can sort capacitors into bins according to the measured parameters at two frequencies simultaneously.

Bin sorting with up to 12 bins for capacitance for 1st frequency and up to 4 bins for tan  $\partial$  using 2nd frequency. Or tan  $\partial$  may be measured at several frequencies using the 4 bins for different levels of the dissipation factor.

As standard the instrument has a built-in comparator for deviation measurements, IEEE488 (GPIB) and RS232C data interfaces as well as handler interface (opto-coupler type) All measured data are collectable from the data interfaces.

Via the PCMCIA slot it possible to easily store set-ups to distribute to other instruments quickly, without operator mistakes.

# Measuring frequencies: 100kHz, 10kHz, 1kHz and 100Hz

Overall accuracy better than 0,05% and 2  $\times$  10  $^{-4}$  for loss factor

External bridge module for long cables (3m or 118 inch) between the instrument and the bridge module

Measuring cables: 1m or 39,3 inch (supplied as standard)

Input protection against charged capacitors at 2 Joule up to 1kV. This feature can be extended by an optional Protection Box, PB11

Built-in contact check function ensures that the contact to the device is good, additional 2-6 ms0

High measuring speed: 20 to 180ms from trig to end of measurement

Measuring ranges: 0,1pF to 3mF depending of frequency

Measures up to  $9\mu F$  (0,2%) @ 100kHz

Internal bias voltage: Up to  $\pm 3$ VDC on generator terminal, set in 0,1V steps

External bias voltage: Up to ±48VDC

Average: 1 to 99 measurements

Display readings: Direct or deviation capacitance and tan  $\partial$  or ESR for loss measurements and L/Q, Rs, Rp, Z

Optional version of DB232 with the test frequencies: 100kHz, 10kHz 1kHz and 120Hz

Mangurad Daramaters										
Measured Parameters	C, L, R, Z (sr	erial or paralle	el) tan $\partial$ , E	SR, Rs, Rp, L/Q, R-X	(, Z- O (deg or rad)					
Measuring Frequencies				vith multiple fre		v				
5 .					1 5 .	5				
Measuring Voltages	1 V RMS u	p to 100µF	at 100H	Z						
		ip to 10μF a		-						
		ip to 10µF at								
		ip to 1,1µF		47						
						(				
	Above: (tineart	ty decreasing w	nth the im	pedance) Programma	able in 0.1V steps	(maximum 1.5V RMS)				
							100Hz	1kHz	10kHz	100kHz
Measuring Speed	Erom tria	to end of m		ont*			100H2 180ms	20ms	20ms	20ms
measuring speed	_			ent				20ms		2011s
	_	to data read	-				190ms		28ms	
		-		ient by average			160ms	16ms	16ms	16ms
	*) allowing 3m				mont (from trig to	end of measurement)	, ome for e	alculation t	mo	
	Muttiple measu	arements (avera	age). The s	uni or each measure		end of measurement,			line	
Measuring Cables	•		-	dule to fixture				(cal	bles supplied	by Danbridg
Input Protection	2 Joule up									
Bias Voltage internal		-	erator te	rminal, set in 0	.1V steps				(interna	lly generate
Bias Voltage external	Up to ±48V	DC								
	Frequency				Accuracy ±	1 digit	Average	≥2		
Capacitance	100Hz	1	.kHz		Capacitance	e	Tan ∂			
	300pF- 3	nF 1	.pF- 39p	ρF	0.5%*		± .0010			
	-	4	0pF- 3.	9µF	0.05%*		± .0002			
	3nF- 30µ	F 4	μF- 399	θμF	0.1%		±.0007			
	30µF- 30				0.1%		±.0010			
	300µF- 3	•	00µF- 1	mF	1%		± .0020			
	10kHz		.00kHz		1,0		1.0020			
	0,1pF- 3.		03pF9	n F	0.1%		±.0010	_	_	_
	4pF- 3.9µ	•	.pF9μ	•	0.05%**		± .0010			
			.pr9µ	1			_			
	4μF- 39μ		Г 0 Г	-	0.1%		± .0007 ± .0010			
					0.2%		$\pm 0010$			
	-		.μF- 9μF							
	- 40µF- 40	0μF 1	.0μF- 40	DμF	1%		±.0020			
	•	0μF 1	.0μF- 40	DμF	1%	a stable jig with capa	±.0020	er than 30pl	Ŧ	
	*) Accuracy	0μF 1 ± 0.2pF **) Ac	.0μF- 40	DμF ,1pF. The above spe 	1% cifications require		±.0020	er than 30pl	-	
Inductance	*) Accuracy =	0μF 1 ± 0.2pF **) Ac 1kHz	.0μ <b>F-</b> 40 ccuracy ± 0	DµF ,1pF. The above spe 10kHz	1% cifications require 100kHz	Accuracy	± .0020 acitance lowe			
Inductance	*) Accuracy	0μF 1 ± 0.2pF **) Ac 1kHz	.0μ <b>F-</b> 40 ccuracy ± 0	DμF ,1pF. The above spe 	1% cifications require		± .0020 acitance lowe			05×Q)
	*) Accuracy = 100Hz 10μH- 100	ΟμF 1 ± 0.2pF **) Ac 1kHz OH 1μH-	OμF- 4C ccuracy ± 0 10H	DμF ,1pF. The above spe 10kHz 0.1μH- 1H	1% cifications require 100kHz 0.1µH- 1H	Accuracy 1 parameter 0	± .0020 acitance lowe			05xQ)
Inductance Resistance	*) Accuracy = 100Hz 10μH- 100 0,4Ω- 40	0μF 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω-	0μF- 40 ccuracy ± 0 10H - 40Ω	ΟμF ,1pF. The above spe <u>10kHz</u> 0.1μH- 1H 0.4Ω- 40Ω	1% cifications require 100kHz	Accuracy 1 parameter 0	± .0020 acitance lowe			05xQ)
	*) Accuracy = 100Hz 10μH- 100	0μF 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω-	0μF- 40 ccuracy ± 0 10H - 40Ω	DμF ,1pF. The above spe 10kHz 0.1μH- 1H	1% cifications require 100kHz 0.1µH- 1H	Accuracy 1 parameter 0	± .0020 acitance lowe			05xQ)
	*) Accuracy : 100Hz 10μH- 100 0,4Ω- 40 40Ω- 4M	0μF 1 ± 0.2pF **) Ad 1kHz 0H 1μH- Ω 0.4Ω- Ω 40Ω-	0μF- 40 ccuracy ± 0 10H - 40Ω 4MΩ	ΟμF ,1pF. The above spe <u>10kHz</u> 0.1μH- 1H 0.4Ω- 40Ω	1% cifications require <u>100kHz</u> 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ	Accuracy 1 parameter 0 0.1%	± .0020 acitance lowe			05xQ)
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	*) Accuracy = 100Hz 10µH- 100 0,4Ω- 40 40Ω- 4Ms The above sp	0μF         1           ± 0.2pF         **) Ad           1kHz         1kHz           0H         1μH-           0Ω         0.4Ω-           Ω         40Ω-           pecifications are	$0\mu$ F- 40 ccuracy ± 0 10H 40 $\Omega$ 4M $\Omega$ e valid for	DμF ,1pF. The above spe 10kHz $0.1\muH- 1H$ $0.4\Omega- 40\Omega$ $40\Omega- 4M\Omega$ measurements with	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage	Accuracy 1 parameter 0 0.1%	± .0020 acitance lowe			05xQ)
Resistance	*) Accuracy = 100Hz 10µH- 100 0,4Ω- 40 40Ω- 4Ms The above sp	0μF         1           ± 0.2pF         **) Ad           1kHz         1kHz           0H         1μH-           0Ω         0.4Ω-           Ω         40Ω-           pecifications are	0μF- 40 ccuracy ± 0 10H - 40Ω 4MΩ e valid for paramet	DμF ,1pF. The above spe 10kHz $0.1\muH- 1H$ $0.4\Omega- 40\Omega$ $40\Omega- 4M\Omega$ measurements with	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param	Accuracy 1 parameter 0 0.1% 0.05%	± .0020 acitance lowe			05xQ)
Resistance Bin sorting	*) Accuracy : 100Hz 10µH- 100 0,4Ω- 40 40Ω- 4Ms The above sp Up to 12 lir	0μF         1           ± 0.2pF         **) Ad           1kHz         1kHz           0H         1μH-           0Ω         0.4Ω-           Ω         40Ω-           pecifications are	$0\mu$ F- 40 ccuracy ± 0 10H - 40 $\Omega$ 4M $\Omega$ e valid for paramet <i>IEEE</i> 48	D $\mu$ F 10kHz $0.1\mu$ H- 1H $0.4\Omega$ - $40\Omega$ $40\Omega$ - $4M\Omega$ measurements with ter and 4 limits 88-2 (GPIB) and	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>RS232C</i>	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting	*) Accuracy : 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4MS The above sp Up to 12 lin Rear panel Control	0μF         1           ± 0.2pF         **) Ad           1kHz         1kHz           0H         1μH-           0Ω         0.4Ω-           Ω         40Ω-           pecifications are	$0\mu$ F- 40 ccuracy ± 0 10H 40 $\Omega$ 4 $M\Omega$ e valid for paramet <i>IEEE 48</i> <i>Measur</i>	DμF (10  Hz) (10  Hz)	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>t RS232C</i> dy, trig ready, f	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting	*) Accuracy : 100Hz $10\mu$ H- $100$ $0,4\Omega$ - $40$ $40\Omega$ - $40M$ The above sp Up to 12 lin Rear panel Control Trig input	$0\mu$ F1 $\pm$ 0.2pF**) Ad $1kHz$ $0H$ $1\mu$ H- $0\Omega$ $0.4\Omega$ - $0\Omega$ $40\Omega$ -pecifications armits for 1st	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 42</i> <i>Measur</i> <i>DC, AC</i>	DμF (10  Hz) (10  Hz) $(0.1 \mu \text{H} - 1 \text{H})$ $(0.4 \Omega - 40 \Omega)$ $(40 \Omega - 4M \Omega)$ measurements with there and 4 limits (88-2) (GPIB) and (69  Hz) and (69	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>RS232C</i> dy, trig ready, f sure	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting Interfaces	*) Accuracy = 100Hz $10\mu$ H- $10\mu$ $0,4\Omega$ - $40\mu$ $40\Omega$ - $4Ms$ The above sp Up to 12 lin Rear panel Control Trig input Front panel	$0\mu$ F     1 $\pm$ 0.2pF     **) Ad       IkHz     1kHz       0H     1 $\mu$ H-       0Ω     0.4Ω-       0Ω     40Ω-       pecifications and       mits for 1st	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 48</i> <i>Measur</i> <i>DC, AC</i> <i>PC cara</i>	DμF (10  Hz) (10  Hz) $(0.1 \mu \text{H} - 1 \text{H})$ $(0.4 \Omega - 40 \Omega)$ $(40 \Omega - 4M \Omega)$ measurements with there and 4 limits (38-2) (GPIB) and (38-2) (GPIB) (GPI	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>RS232C</i> dy, trig ready, f sure	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting	*) Accuracy = 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4MS The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten	$0\mu$ F 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω- Ω 40Ω- pecifications ar mits for 1st	$0\mu$ F- 40 ccuracy ± 0 10H - 40 $\Omega$ 4M $\Omega$ e valid for paramete <i>IEEE</i> 48 <i>Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 <i>d</i>	DμF (10  Hz) (10  Hz) $(0.1 \mu \text{ H} - 1 \text{ H})$ $(0.4 \Omega - 40 \Omega)$ $(40 \Omega - 4M \Omega)$ measurements with ter and 4 limits (38-2) (GPIB) and (38-2) (GPIB) (GPI	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>RS232C</i> dy, trig ready, f sure	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting Interfaces	*) Accuracy : 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4Ms The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin	$0\mu$ F 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω- Ω 40Ω- pecifications ar mits for 1st	$\begin{array}{c} 0\mu F- 40\\ ccuracy \pm 0\\ 10H\\ - 40\Omega\\ 4M\Omega\\ e valid for\\ paramet\\ IEEE 48\\ Measur\\ DC, AC\\ PC cara\\ 10-30 o\\ Minimu\\ \end{array}$	$D\mu$ F (1 pF. The above spectrum) 10 kHz $0.1 \mu$ H- 1H $0.4 \Omega$ - 40Ω $40 \Omega$ - 4MΩ measurements with there and 4 limits 88-2 (GPIB) and the end, data read and contact close if for set-ups, saw degrees Celsius im 30 minutes	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd paramit <i>RS232C</i> dy, trig ready, f sure ve and loading	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05xQ)
Resistance Bin sorting Interfaces Environment	*) Accuracy : 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4MS The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin Power	$0\mu$ F 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω- Ω 40Ω- pecifications ar mits for 1st	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 42</i> <i>Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 <i>G</i> <i>Minimu</i> 90-130	DµF (10  Hz) (10  Hz)	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd paramit <i>RS232C</i> dy, trig ready, f sure ve and loading	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05×Q)
Resistance Bin sorting Interfaces	*) Accuracy : 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4Ms The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin	$0\mu$ F 1 ± 0.2pF **) Ac 1kHz 0H 1μH- 0Ω 0.4Ω- Ω 40Ω- pecifications ar mits for 1st	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 42</i> <i>Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 <i>G</i> <i>Minimu</i> 90-130	$D\mu$ F (1 pF. The above spectrum) 10 kHz $0.1 \mu$ H- 1H $0.4 \Omega$ - 40Ω $40 \Omega$ - 4MΩ measurements with there and 4 limits 88-2 (GPIB) and the end, data read and contact close if for set-ups, saw degrees Celsius im 30 minutes	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd paramit <i>RS232C</i> dy, trig ready, f sure ve and loading	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou	± .0020 acitance lowe			05×Q)
Resistance Bin sorting Interfaces Environment	*) Accuracy : 100Hz $10\mu$ H- $100$ $0,4\Omega$ - $40$ $40\Omega$ - $4Ms$ The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin Power Minimum	0μF 1 ± 0.2pF **) Ad 1kHz 0H 1μH- Ω 0.4Ω- Ω 40Ω- pecifications ar mits for 1st	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 42</i> <i>Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 <i>G</i> <i>Minimu</i> 90-130	$ $	1% cifications require 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd param <i>RS232C</i> dy, trig ready, f sure ve and loading AC, 50-60 Hz	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou <i>fault and status</i>	± .0020 acitance lowe .1% · 2 p plers	arameter	± (0.1%+0.	
Resistance Bin sorting Interfaces Environment Calibration interval	*) Accuracy = 100Hz $10\mu$ H- $100$ $0,4\Omega$ - $40$ $40\Omega$ - $4Ms$ The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin Power Minimum	0μF 1 ± 0.2pF **) Ad 1kHz 0H 1μH- Ω 0.4Ω- Ω 40Ω- pecifications an mits for 1st mperature me Mainframe	0μF- 40 ccuracy ± 0 10H 40Ω 4MΩ e valid for paramet <i>IEEE 48 Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 ( <i>Minimu</i> 90-130) <i>Every</i> 1	$ $	1% cifications require 100kHz 0.1μH- 1H 0.4Ω- 40Ω 40Ω- 1MΩ constant voltage for 2nd paramu <i>RS232C</i> <i>dy, trig ready, f</i> <i>sure</i> <i>re and loading</i> <i>AC, 50-60 Hz</i> dule	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou <i>fault and status</i> Export Packing <b>E</b>	± .0020 acitance lowe .1% · 2 p plers	Export	± (0.1%+0.	verseas:
Resistance Bin sorting Interfaces Environment	*) Accuracy = 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4MS The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ten Warm-up tin Power Minimum	$0\mu$ F 1 $\pm 0.2pF$ **) Ac 1kHz $0H$ 1 $\mu$ H- $0\Omega$ 0.4 $\Omega$ - $\Omega$ 40 $\Omega$ - pecifications ar mits for 1st mperature me Mainframe 140 mm or $\frac{1}{2}$	$0\mu$ F- 40 ccuracy ± 0 10H - 40 $\Omega$ 4M $\Omega$ e valid for paramet <i>IEEE</i> 48 <i>Measur</i> <i>DC, AC</i> <i>PC cara</i> 10-30 <i>G</i> <i>Minimu</i> 90-130 <i>Every</i> 1	DµF (10  Hz) (10  Hz)	1% cifications require 100  kHz $0.1 \mu \text{H}$ 1H $0.4 \Omega$ - 40 Ω 40 Ω- 1M Ω constant voltage for 2nd parama <i>t</i> RS232C dy, trig ready, <i>f</i> sure <i>t</i> and loading <i>AC</i> , 50-60 Hz dule 1.4 inch	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou <i>Fault and status</i> Export Packing <b>E</b> 30 cm or 11.7 in	± .0020 acitance lowe .1% · 2 p plers plers	Export 32 cm	± (0.1%+0.	verseas: ch
Resistance Bin sorting Interfaces Environment Calibration interval	*) Accuracy = 100Hz $10\mu$ H- $100$ $0,4\Omega$ - $40$ $40\Omega$ - $4Ms$ The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ter Warm-up tin Power Minimum	0μF       1         ± 0.2pF       **) Added         0H       1μH-         0Ω       0.4Ω-         0Ω       40Ω-         obecifications are         mits for 1st         mmerature         me         Mainframe         140 mm or 1         438 mm or 1	$\begin{array}{c} 0\mu F- 40\\ ccuracy \pm 0\\ 10H\\ - 40\Omega\\ 4M\Omega\\ e valid for\\ paramet\\ IEEE 48\\ Measur\\ DC, AC\\ PC cara\\ 10-30 c\\ Minimu\\ 90-130\\ Every 1\\ 5.5 inch\\ 17.2 incl\\ \end{array}$	$ $	$1\%$ cifications require $100 \text{ kHz}$ $0.1\mu\text{H}$ - $1H$ $0.4\Omega$ - $40\Omega$ - $40\Omega$ - $1M\Omega$ constant voltagefor 2nd parameterfor 2nd parameter <i>RS232Cdy, trig ready, f suree and loadingAC, 50-60 Hz</i> dule1.4 inch7.5 inch	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou <i>fault and status</i> Export Packing <b>E</b> 30 cm or 11.7 in 51 cm or 20 inch	± .0020 acitance lowe .1% · 2 p plers plers	Export 32 cm 52 cm	± (0.1%+0.	verseas: ch
Resistance Bin sorting Interfaces Environment Calibration interval	*) Accuracy : 100Hz 10 $\mu$ H- 100 0,4 $\Omega$ - 40 40 $\Omega$ - 4MS The above sp Up to 12 lin Rear panel Control Trig input Front panel Ambient ter Warm-up tin Power Minimum Height 1 Width 2 Depth 3	$0\mu$ F 1 $\pm 0.2pF$ **) Ac 1kHz $0H$ 1 $\mu$ H- $0\Omega$ 0.4 $\Omega$ - $\Omega$ 40 $\Omega$ - pecifications ar mits for 1st mperature me Mainframe 140 mm or $\frac{1}{2}$	$0\mu$ F- 40 ccuracy ± 0 10H - 40Ω 4MΩ e valid for paramet <i>IEEE</i> 48 <i>Measur</i> <i>DC</i> , <i>AC</i> <i>PC cara</i> 10-30 <i>G</i> <i>Minimu</i> 90-130 <i>Every</i> 1 5.5 inch 17.2 incl 14.2 incl	DµF (10  Hz) (10  Hz)	1%cifications require100kHz0.1 $\mu$ H-1H0.4 $\Omega$ -40Ω-40Ω-1MΩconstant voltagefor 2nd paramatic <i>RS232Cdy, trig ready, fsuree and loadingAC, 50-60 Hz</i> dule1.4 inch7.5 inch8.1 inch	Accuracy 1 parameter 0 0.1% 0.05% eter by opto-cou <i>Fault and status</i> Export Packing <b>E</b> 30 cm or 11.7 in	± .0020 acitance lowe .1% · 2 p plers plers	Export 32 cm 52 cm 55 cm	± (0.1%+0.	verseas: ch ch ch



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#### General

The DB233 Component Tester is specially designed for manual as well as automatic high-speed high accuracy testing of capacitors or other CLR applications. The instrument is reliable, user-friendly and easy to set up to any test application on production lines, in quality control departments or in laboratories.

The DB233 is well suited for mounting on sorting machines or other automatic test applications where the distance between the front panel of the DB233 and the Jig is less than 50 cm, 19.6 inch. When the distance is longer, the DB232 should be preferred to provide maximum accuracy.

The DB233 performs capacitance and loss factor tests at any of the 4 standard frequencies. Dual, triple and quadro frequency tests are popular to give an immediate presentation of capacitance and loss factor measurements over a range of frequencies.

As standard the instrument has a built-in comparator for deviation measurements, IEEE488 (GPIB) and RS232C data interfaces as well as handler interface (opto-coupler type) with 12+4 bins for

4 measuring frequencies: 100kHz, 10kHz, 1kHz and 100Hz
Overall accuracy better than 0.05% and 2 x $10^{-4}$ for loss factor
Especially suitable for film, foil, tantalum and electrolytic capacitors, as well as all other CLR applications
Built-in contact check function, additional 2-6 ms
High measuring speed: 20 to 180ms from trig to end of measurement, depending on frequency
Input protection: 2 Joule up to 1kV

Measuring ranges: 0.1pF to 3mF depending on frequency

Measures up to  $9\mu F$  (0.2%) @ 100kHz

production sorting. The high-speed data interfaces may be used for an external computer in order to control the system, or for collection of data for statistics and analysis.

Bin sorting with up to 12 bins for capacitance for 1st frequency and up to 4 bins for tan  $\partial$  using 2nd frequency. Or tan  $\partial$  may be measured at several frequencies using the 4 bins for different levels of the dissipation factor.

The standard fitted PCMCIA card is the smart way of storing set-ups. Fail-safe loading of set-ups to several instruments will be done fast and efficient.

The test cables are as standard connected to the front panel of the instrument. Another possibility is to order the DB233 in the version MCR in order to have the test cables connected to the rear panel only. Optional protection box PB10 protecting the instrument against charged capacitors is available.

Measuring cables: 1m or 39.3 inch (supplied as standard)

Internal bias voltage: Up to ±3VDC on generator terminal, set in 0.1V steps

Average: 1 to 99 measurements

Display readings: Direct or deviation capacitance and tan  $\partial$  or ESR for loss measurements and L/Q, Rs, Rp, Z

Focused strategy on component testing for more than 50 years

Optional Jig32 for 4-terminal manual component testing of axial, radial and SMD components

Optional version of DB233 with the test frequencies: 100kHz, 10kHz 1kHz and 120Hz

Measured Parameters	C, L, R, Z (serial							
leasuring Frequencies	100k, 10k and 2	LkHz and 100 H	z with multiple	frequency facil	ity			
Measuring Voltages	1 V RMS up to	100µF at 100H	17					
reasoning rottages	1 V RMS up to	•						
	1 V RMS up to	•						
		0.1µF at 100k	Hz					
	-	-		able in 0.1V steps (	maximum 1.5V RMS)			
		, in the second s	,		······,			
					100Hz	1kHz	10kHz	100kHz
Measuring Speed	From trig to e	nd of measurem	nent*		180ms	20ms	20ms	20ms
5 1	From trig to d				190ms	28ms	28ms	28ms
	-	-	nent by average		160ms	16ms	16ms	16ms
	*) allowing 3ms cor	-						
	Multiple measureme	nts (average): The s	sum of each measure	ement (from trig to o	end of measurement) + 8ms for ca	alculation ti	me	
Measuring Cables	1m (39.3 inch)	from front nan	el to fixture			(cat	les supplied	hy Danhrid
Input Protection	2 Joule up to 1					(car	ites supplied	by ballblic
Bias Voltage internal	Up to $\pm 3.0$ VDC			1V stons			(intorna	lly generat
Capacitance	Frequency 100Hz	1kHz		Accuracy ±1 Capacitance		≥2		
Capacitance	300pF- 3nF	1pF- 39	-E	0.5%*	±.0010	_	_	_
	-	40pF- 3.		0.05%*	± .0010 ± .0002			
	3nF- 30µF	4µF- 39	•	0.1%	± .0002			
	30µF- 300µF	- μι 55.	σμī	0.1%	± .0007			
	300µF- 3mF	400µF- 1	mF	1%	± .0010			
	10kHz	100kHz		170	1.0020			
	0,1pF- 3.9pF	.03pF	9pF	0.1%	±.0010			
	4pF- 3.9μF	1рF9µ		0.05%**	± .0002			
	4μF- 39μF	-		0.1%	± .0007			
	-	1μF- 9μ	F	0.2%	± .0010			
	40µF- 400µF	10µF- 40		1%	± .0020			
			•	cifications require a	a stable jig with capacitance lowe	r than 30pF		
Inductance	100Hz	1kHz	10kHz	100kHz	Accuracy			
Inductance	100HZ 10µH- 100H	1μΗ- 10Η	0.1µH- 1H	0.1µH- 1H	1 parameter 0.1% · 2 p	arameter -	+ (0.1%+0.	05xQ)
								~/
				0.10 100				
Resistance	0.4Ω- 40Ω 40Ω- 4ΜΩ	0.4Ω- 40Ω 40Ω- 4ΜΩ	0.4Ω- 40Ω 40Ω- 4ΜΩ	0.4Ω- 40Ω 0.4Ω- 1ΜΩ	0.1% 0.05%			

Din Solding	op to 12 times for 1st parameter and 4 times for 2nd parameter by opto-couplers					
Interfaces	Rear panel	IEEE 488-2 (GPIB) and RS232C				
	Control	Measure end, data ready, trig ready,	fault and status			
	Trig input	DC, AC and contact closure				
	Front panel	PC card for set-ups, save and loading	1			
Environment	Ambient temperature	10-30 degrees Celsius				
	Warm-up time	Minimum 30 minutes				
	Power	90-130 and 200-260 V AC, 50-60 Hz				
Calibration interval	Minimum	Every 12 months				
	Mainframe		Export Packing <b>Europe:</b>	Export Packing <b>Overseas:</b>		

		Mainframe	Export Packing <b>Europe:</b>	Export Packing <b>Overseas:</b>
Dimensions Heigh		140 mm or 5.5 inch	30 cm or 11.7 inch	32 cm or 12.3 inch
	Width	438 mm or 17.2 inch	51 cm or 20 inch	52 cm or 20.4 inch
	Depth	360 mm or 14.2 inch	56 cm or 22 inch	55 cm or 21.6 inch
	Weight	total 16 kg or 36 lb.	20 kg or 45 lb.	22 kg or 49,5 lb.



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Quick and accurate testing on automatic production lines



- Measuring frequencies: 100kHz, 10kHz, 1kHz and 100Hz (120Hz)
- Overall accuracy better than 0,05% (C & Z)  $2 \times 10^{-4}$  for tan  $\delta$  and ESR 0.1m $\Omega$
- Especially suitable for film, tantalum and electrolytic capacitors and other high capacitance applications
- Special facility for capacitance @ 100Hz (120Hz) and Z @ 100kHz almost simultaneously
- Measures Z and ESR @ 1kHz, 10kHz or 100kHz up to >3mF
- Built-in contact check function
- High measuring speed: 20 to 180ms from trig to end of measurement, depending of frequency.
- External bridge module for long cables (2m / 78.6inch) between the instrument and the bridge module
- Measuring cables: 1m or 39.3 inch (supplied as standard)
- Internal bias voltage: Up to ±3V DC on generator terminals, set in 0.1V steps.
- External bias voltage: Up to ±48VD

#### General

The DB236 High Capacitance Tester is specially designed for high accuracy and automatic highspeed testing of large capacitance's such as metallized film, tantalum and aluminium capacitors. The instrument is reliable, user-friendly and easy to set up to any test application on production lines, in quality control departments or in laboratories.

The DB236 performs capacitance and loss factor tests at any of the 4 standard frequencies. Dual frequency tests at any combination of frequencies are possible as well. Or the user may set up a test sequence in order to perform multiple frequencies testing, easily and quickly. Combinations of Cap and tan  $\delta$  and or ESR @ 100Hz (120Hz) and impedance @ 100kHz is easy to set up and fast to measure.

As standard the instrument has a built-in comparator for deviation measurements, IEEE488 (GPIB) and RS232C data interfaces as well as handler interface (opto-coupler) with 12+4 bins for production sorting.

The high-speed data interfaces may be used for an

external computer in order to control the system, or for collection of data for statistics and analysis.

Bin sorting with up to 12 bins for capacitance for  $1^{st}$  frequency and up to 4 bins for Z, ESR or tan  $\delta$  using  $2^{nd}$  frequency. Or Z, ESR and tan  $\delta$  may be measured at several frequencies using the 4 bins for different levels of the loss factor.

The standard fitted PCMCIA card is the easy way of storing setups and measuring data. Fail-safe loading of set-ups to several instruments will be done fast and efficient.

The external bridge module allowing the user to install the DB236 in applications where long distance between the instrument and the contacts is unavoidable. Total cable length of more than 3m or 118 inches is possible.

The DB236 is designed for industrial production environments and is well protected against charged capacitors. Should the built in protection of  $4\mu$ F 1kV not be sufficient, an external extra protection box PB11 available as an optional item. Further the instrument is available in versions with 120Hz, order DB236 – 120 and/or in a high-speed version, order DB236 HS

Measured Parameters: C, L, R, Z (serial or parallel)  $\delta$ , ESR, Rs, Rp, L/Q, Z- $\theta$  (deg or rad) Measuring Frequencies: 100k, 10k, 1k and 100Hz with multiple frequency facility Measuring Voltages: 1 V RMS up to 100µF at 100Hz 1 V RMS up to 10µF at 1kHz 1 V RMS up to 1µF at 10kHz 1 V RMS up to 0.1µF at 100kHz Above: (linearly decreasing with the impedance) Programmable in 0.1V steps (maximum 1.5V RMS) 100Hz (120Hz) 1kHz 10kHz 100kHz Measuring Speed: From trig to end of measurement 180ms 150ms 20ms 20ms 20ms From trig to data ready: 190ms 160ms 28ms 28ms 28ms Add. time per meas. by average 160ms 135ms 16ms 16ms 16ms \*) Allowing 3ms contact bouncing or 1 range change Multiple measurements The sum of each measurement (from trig to end of (average): measurement) + 8ms for calculation time Measuring Cables: 1m (39.3 inch) from bridge module to fixture (Cables supplied by Danbridge) Input Protection: 2 Joule up to 1kV or 4µF charged 1000V Bias Voltage Internal: Up to ±3.0VDC on generator terminal, set in 0.1V steps (internally generated) Bias Voltage External: Up to ±48V DC Frequ 100Hz (120Hz) 1kHz Accuracy ±1 digit ency Capacitance Tan δ Accuracy C & tan  $\delta$ : 300pF -3.9nF 10pF 390pF 0.5%  $\pm .0010$ 400pF 3.9µF 0.05% ±.0002 3nF -30µF 4μF 0.1% 399µF ±.0007 0.1% 30µF -300µF ±.0010 1%\* 400µF -300µF 1mF 3mF ±.0020 >3mF C: (C measured / 0.3mF) \* 0.1% Tan d: (C measured / 0.3mF) \* 0.002 100kHz 10kHz 0,05% 39pF 3.9µF 3.9pF -.9µF ±.0002 4μF 39µF 0,1% ±.0007 1μF -0,2% 9μF ±.0010 1% 10µF -40µF -400µF 40µF ±.0020 tan d ESR = ESR: Accuracy  $2 \pi f Cs$ 1 Ζ: Accuracy Zc =  $2\pi fC$ Accuracy decreases linear from 0,1% to 1% **Bin Sorting:** Up to 12 limits for 1<sup>st</sup> parameter and 4 limits for 2<sup>nd</sup> parameter by opto-couplers Interfaces: Rear panel: IEEE 488 (GPIB) and RS232C Control: Measure end, data ready, trig ready, fault and status Trig input: DC, AC and contact closure Front panel: PC card for set-ups, save and loading Environment: Ambient temp.: 10-30 degrees Celsius Minimum 30 minutes Warm-up time: Power: 90-130 and 200-260 V AC, 50-60 Hz, Calibration Interval: Minimum: Every 12 months Export Packing **Dimensions:** Mainframe: Bridge Module: Europe Overseas 35mm or 1.4 inch 30cm 32cm - 12inch Height: 140mm or 5.5 inch



Width:

Depth:

Weight:

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192mm or 7.5 inch

205mm or 8.1 inch

1kg or 2.2 lb

51cm

56cm

21kg

52cm - 20inch

55cm - 22inch

23kg or 51 lb

438mm or 17.2 inch

360mm or 14.2 inch

Total 16kg or 36 lb.