

Automatic and computer controlable LCR-Databridges



TINSLEY

MINISTRY OF DEFENCE DEF STD 05-59
ISO 9002 APPROVED

RESISTOR



INDUCTANCE



CAPACITOR



QUALITY FACTOR



DISSIPATION FACTOR



Proved for many years...



The model 6401 is an economically priced, automatic and microprocessor controlled LCR bridge with a basic accuracy of 0.25%. It's useful features and realistic price make it ideally suitable in many applications.

- Measures R, L, C and Q automatically.
- 0.25% of reading, basic accuracy.
- Eight decades of LCR measurement.
- 2 selectable measurement frequencies: 100/120* Hz or 1 kHz.
- 4-digit LED display with automatic decimal point.
- User prompt facility for best accuracy.
- Selectable series or parallel measurement modes.
- Automatic indication for overrange or underrange.
- Easy operation by means of only 6 keys.
- Automatic selection of measurement range (lockable if many components in the same range are to be measured) and automatic distinction between L and C.
- Validity of measurement after 1 second maximum.
- 2 measurements per second.
- An adaptor for axial lead components is provided with the unit.
- Selectable internal 2 V bias voltage for measurements of electrolytic capacitors.

- Integral 4-terminal test fixture.
- External bias voltage up to 50 V possible.
- Input protection against charged capacitors up to 10 mF and 50 V.
- Model 6403 is equipped with an interface for the limits comparator model 6422. Test limits can be defined either of two ways. In the first of these, the upper and lower acceptable values are set in the two banks of thumbwheel

switches. Alternatively the PASS band can be determined using a nominal value and upper and lower percentage tolerance. Three indicators are available to show where the measured value lies with respect to the upper and lower pass band limit. The same information is also available 3 floating relay contacts of the 6422 comparator.

- Detailed operation manual.

Ordering Information

Model	Description
6401	Automatic 0.25% LCR Databridge
6401/6403	Complete with Interface for Comparator
6401/6403/6422	Complete with Interface and Comparator

Accessories

Models 6601, 6602, 6603, 6604, 6613 (for use with 6604), 6615 to 6623

* 120 Hz measurement frequency available as factory-fitted option.

High basic accuracy...



The model 6451 is a well designed, automatic and microprocessor controlled LCR bridge with a basic accuracy of 0.1%. It's practical features, optional IEEE-488/RS232 interface and limits comparator make the 6451 ideal for the laboratory as well as for applications in ATE systems.

- Measures R, L, C, Q and D automatically.
- 0.1% of reading basic accuracy.
- Twelve decades of LCR measurement.
- 3 selectable measurement frequencies: 100/120* Hz, 1 kHz or 10 kHz.
- 5-digit LED display with automatic decimal point.
- User prompt facility for best accuracy.
- Selectable series or parallel measurement modes.
- Automatic indication for overrange or underrange.
- Easy operation by means of only 8 keys.
- Full auto ranging and automatic component identification. The instrument itself distinguishes between L, C or R after the component is connected. A manual override enables the minor term to be displayed.
- Capacitance up to 99.9 pF in test leads or adaptors can be compensated for.
- Validity of measurement after 1 second maximum.
- 2 measurements per second.
- Actual measured value can be frozen on the display with the HOLD function.
- Integral 4-terminal test fixture.
- An adaptor for axial lead components is provided with the unit.
- Selectable internal 2 V bias voltage for measurement of electrolytic capacitors.
- External bias voltage up to 50 V possible.
- Input protection against charged capacitors up to 10 mF and 50 V.
- Model 6451/6452 is equipped with IEEE-488 and RS232 interface. It enables full control and measurement readout from a computer.
- Model 6451/6452 is equipped with an interface for the limits comparator model 6422. Test limits can be defined in either of two ways. In the first of these, the upper and lower acceptable values are set in the two banks of thumbwheel switches. Alternatively the PASS band can be determined using a nominal value and upper and lower percentage tolerance. Three indicators are available to show where the measured value lies with respect to the upper and lower pass band limit. The same information is also available at 3 floating relay contacts of the comparator 6422.
- Detailed operation manual.

Ordering Information

Model	Description
6451	Automatic 0.1% LCR Databridge
6451/6452	Complete with IEEE-488/RS232 Interface
6451/6424	Complete with Interface for Comparator
6451/6424/6422	Complete with Interface and Comparator

Accessories

Adaptor 6601, 6602, 6603, 6604, 6613 (for use with 6604)
Application software package 6453
Calibration units 6615 and 6616 to 6623

NOTE: Type 6472 Comparator can also be used in place of Type 6422. This enables capacitors of 10000 uF to be measured.

In 19" rackmounting...



The model 6458 is an economically priced, automatic and microprocessor controlled LCR bridge with a basic accuracy of 0.1%. It offers three measurement frequencies and is housed in a 19"/2U case. The rackmountability and the IEEE-488 and RS232 interface make it ideal for any automatic test system.

- Measures R, L, C, Q and D automatically.
- 0,1% of reading basic accuracy.
- Twelve decades of LCR measurement.
- 3 selectable measurement frequencies: 100/120* Hz, 1 kHz or 10 kHz.
- 5-digit LED display with automatic decimal point position.
- User prompt facility for best accuracy.
- Selectable series or parallel measurement modes.
- Automatic indication for overrange or underrange.
- Easy manual operation by means of 8 keys on the front panel.
- Full auto ranging and automatic component identification. The instrument itself distinguishes between L, C and R when the component is connected. A manual override enables the minor term to be displayed.
- Capacitance residue up to 99.9 pF in the test leads or adaptors can be compensated for.

- Validity of measurement after 1 second maximum.
- 2 measurements per second.
- Actual measured value can be frozen on the display with the HOLD function.
- Connection to the instrument can be via either the 4 integral BNC sockets on the front panel or those on the rear panel for easy system cabling.
- Selectable internal 2 V bias voltage for measurement of electrolytic capacitors.
- External bias voltage up to 50 V possible.
- Input protection against charged capacitors up to 10 mF and 50 V.
- IEEE-488 and RS232 interface with address selector is provided at the instrument's rear as standard.
- Detailed operation manual.

Ordering Information

Model	Description
6458	Automatic 0.1% LCR Databridge in 19" case

Accessories

Adaptor 6612, 6613
Application software package 6453

* 120 Hz measurement frequency available as factory-fitted option.

High frequency capability (up to 100 kHz)...



The model 6471 is a realistically priced, automatic, microprocessor controlled LCR bridge with a basic accuracy of 0.1%. It offers four measurement frequencies, of which the highest is 100 kHz. This higher frequency, the accuracy of measurement and the optional IEEE-488/RS232 interface make this instrument ideally suitable for almost any application.

- Measures R, L, C, Q, D automatically.
- 0.1% of reading basic accuracy.
- Twelve decades of LCR measurements.
- 4 selectable measurement frequencies: 100/120* Hz, 1 kHz, 10 kHz, 100 kHz.
- 5-digit LED display with automatic decimal point position.
- User prompt facility for best accuracy.
- Selectable series or parallel measurement modes.
- Automatic indication for overrange or underrange.
- Easy operation by means of only 8 keys.
- Full auto ranging and automatic component identification. The bridge itself distinguishes between L, C or R when the component is connected. A manual override enables the minor term to be displayed.
- Trim function for R, L and C allows compensation for component, fixtures or leads.
- Percentage deviation of a component from a nominal value can be displayed.
- Validity of measurement after 1 second maximum.
- 2 measurements per second.
- Alternatively to the usual repetitive measurement operation, a single measurement can be made each time a button is pressed.
- Actual measured value can be frozen on the display with the HOLD function.
- Integral 4-terminal test fixture.
- An adaptor for axial components is provided with the unit.
- Selectable internal 2 V bias voltage for measurement of electrolytic capacitors.
- External bias voltage up to 50 V possible.
- Input protection against charged capacitors up to 10 mF and 50 V.
- Model 6473 is equipped with an interface for the limits comparator model 6472. Test limits can be defined in either of two ways. In the first of these, the upper and lower acceptable values are set in the two banks of thumbwheel switches. Alternatively the PASS band can be determined using a nominal value and upper and lower percentage tolerance. Three indicators are available to show where the measured value lies with respect to the upper and lower pass band limit. The same information is also available at 3 floating relay contacts of the comparator 6472.
- Detailed operation manual.

Ordering Information

Model	Description
6471	Automatic 0.1% LCR Databridge with 100 kHz
6472	Limits Comparator for 6473 (or can be used on 6451/6424 or 6401/6403)
6473	6471 with Comparator Interface fitted
6475	6471 with IEEE/232 Interface fitted

Accessories

Adaptor 6601, 6602, 6603, 6604, 6613
 Application software package 6453
 Calibration unit 6615 and 6616 to 6623

Model Survey

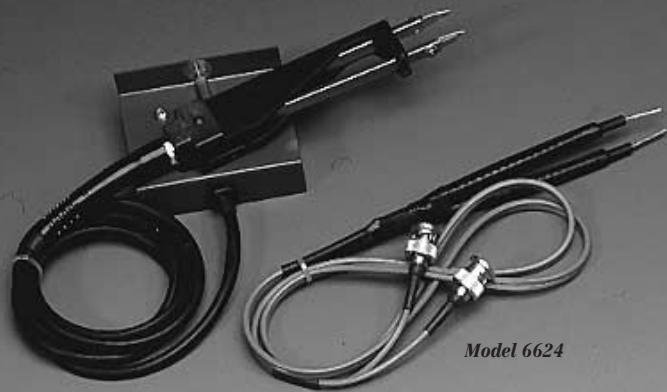
	Model 6401	Model 6401 with 6404 interface and 6422 comparator	Model 6451	Model 6451 with 6452 interface
				
Variables Measured	R, L, C and Q		R, L, C, Q and D	
Basic Accuracy	0.25 % of reading ± 1 digit		0.1 % of reading ± 1 digit	
Display	4-digit LED with automatic decimal point		5-digit LED with automatic decimal point	
Interfaces	Retrofittable	6404 (Limits comparator)	Retrofittable	6452 (IEEE-488 / RS 232)
Measurement Frequencies	100/120* Hz – 1 kHz, selectable		100/120* Hz – 1 kHz – 10 kHz, selectable	
Accuracy of Measurement Frequencies	0.025 % of nominal frequency		0.01 % of nominal frequency	
R	Measurement Range	0.001 Ohm – 100 MOhm	0.1 mOhm – 990 MOhm	
	Ultimated Resolution	0.001 Ohm	0.1 mOhm	
	Conditions for Basic Accuracy	100 Hz: 1 Ohm – 2 MOhm / 1 kHz: 1 Ohm – 2 MOhm	100 Hz: 2 Ohm – 1 MOhm / 1 kHz: 2 Ohm – 500 kOhm / 10 kHz: 2 Ohm –	
L	Measurement Range	0.1 μ H – 9900 H	0.001 μ H – 9900 H	
	Ultimated Resolution	0.1 μ H	0.001 μ H	
	Conditions for Basic Accuracy	100 Hz: 2 mH – 2000 H / 1 kHz: 200 μ H – 200 H	100 Hz: 4 mH – 2000 H / 1 kHz: 400 μ H – 200 H / 10 kHz: 40 μ H – 10 H	
C	Measurement Range	0.1 pF – 9900 μ F	0.001 pF – 99 mF	
	Ultimated Resolution	0.1 pF	0.001 pF	
	Conditions for Basic Accuracy	100 Hz: 2 nF – 2000 μ F / 1 kHz: 200 pF – 200 μ F	100 Hz: 4 nF – 2000 μ F / 1 kHz: 400 pF – 200 μ F / 10 kHz: 40 pF – 10 μ F	
Q	Measurement Range	0 – 99	0.001 – 999	
	Ultimated Resolution	0.001	0.001	
	Conditions for Basic Accuracy	0.25 – 4	0.25 – 4	
D	Measurement Range	not available	0.001 – 999	
	Ultimated Resolution	not available	0.001	
	Conditions for Basic Accuracy	not available	0.25 – 4	
Maximal Voltage on Component	0.3 V rms			
DC-Bias Voltage	2 V international (selectable) or up to 50 V external			
Measurement Modes	Series or parallel equivalent circuit			
Measurement Update Rate	2 per second			
Power/Temperatur Range	95 V to 125 V or 195 V to 255 V, 48 – 63 Hz 0° C – 50° C			
Width x Depth x Hight/Weight	440 x 250 x 42 mm / 5.6 kg		445 x 260 x 100 mm / 6.5 kg	

The technical specification of this catalogue may be changed without notice.

* 120 Hz measurement frequency available as factory-fitted option.

Model 6451 with 6424 interface and 6422 comparator	Model 6458	Model 6471	Model 6471 with 6452 interface	Model 6471 with 6424 interface 6472 comparator
 		  		
R, L, C, Q and D				
100/120 Hz*: 0.15 % ±1 digit / 1 kHz: 0.1 % ±1 digit / 10 kHz: 0.45 % ±1 digit / 100 kHz: 0.25 % ±1 digit				
5-digit LED with automatic decimal point				
6424 (Limits comparator)	6452 (IEEE-488 / RS 232)	Retrofittable	6452 (IEEE-488/RS 232)	6424 (Limits comparator)
100/120* Hz – 1 kHz – 10 kHz – 100 kHz, selectable				
0.01 % of nominal frequency				
0.1 mOhm – 990 MOhm				
0.1 mOhm				
100 kOhm	100/120 Hz*: 2 Ohm-1 MOhm / 1 kHz: 2 Ohm-500 kOhm / 10 kHz: 2 Ohm-100 kOhm / 100 kHz: 2 Ohm-50 kOhm			
0.001 μH – 9900 H				
0.001 μH				
100/120 Hz*: 4 mH – 2000 H / 1 kHz: 400 μH – 200 H / 10 kHz: 40 μH – 10 H / 100 kHz: 10 μH – 10 mH				
0.001 pF – 99 mF				
0.001 pF				
100/120 Hz*: 4 nF – 2000 μF / 1 kHz: 400 pF – 200 μF / 10 kHz: 40 pF – 10 μF / 100 kHz: 40 pF – 0.1 μF				
0.001 – 999				
0.001				
0.25 – 4				
0.001 – 999				
0.001				
0.25 – 4				
19" x 302 mm x 2 U / 5.6 kg		445 x 260 x 100 mm / 6.5 kg		

Accessories



Model 6602

Chip component tweezers, models 6602, 6612 and 6624

The 6602 chip component tweezers are designed specifically for measuring surface mount (chip) components. They are supplied prewired to 6601 test leads and measurements are four-terminal. Interchangeable tips are available for the 6602. The 6612 have BNC connections and is used for LCR bridge 6458. The chip component tweezers, model 6624 is used in conjunction with a modified Type 6604 BNC adaptor box. The type 6624 is a two-terminal device and can be used with the 6401, 6451 and 6471 LCR databridges.



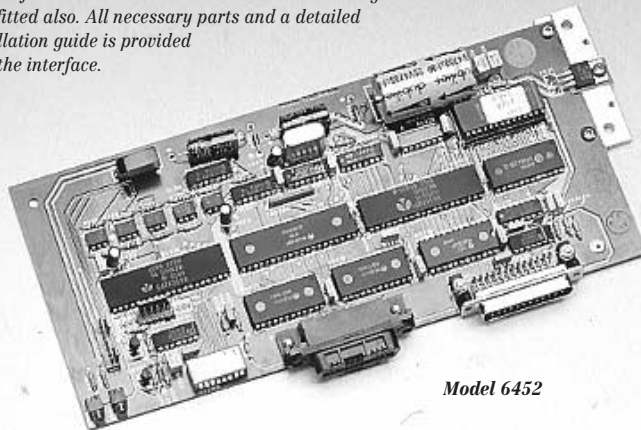
Model 6603

Remote test leads, models 6601, 6603 and 6611

The 6601 remote test leads enable four-terminal connection to be made to purpose-built test fixtures and probes. They comprise four screened cables. The screens are connected via the adaptor box retaining screw to the common point of the databridges measuring circuit. The 6603 comprises a set of 6601 remote test leads terminated in a pair of kelvin clips. The 6611 comprises 4 screened leads with BNC connections at one end, unterminated at the other end.

Retrofittable interface kits for databridges

All interfaces which are described with the databridges can be retrofitted also. All necessary parts and a detailed installation guide is provided with the interface.



Model 6452

Model 6404 Interface card to retrofit limits comparator interface to the model 6401

Model 6424 Interface card to retrofit limits comparator interface to the model 6451 or 6471

Model 6452 IEEE-488 and RS232 interface kit to retrofit to model 6451 or 6471

BNC adaptor box, model 6604

The 6604 is a shielded adaptor box fitted with four BNC connectors to enable connection to be made to purpose-built fixtures.

Application software package, model 6453

This software package enables full control of the databridges which are equipped with a computer interface. The 6453 application software package runs all computers which fulfil or exceed the following requirements: IBM or compatible computer with MSDOS or PC DOS version 2.11 or greater and with serial interface. The software uses the RS232 interface of the bridge only.

Following functions are available:

- Full software control of the databridge and measurement readout
- Measurement and display of the major and minor terms
- Display of results on the screen and output to printer and/or disc storage
- Grading into limits bands by major and/or minor terms
- Statistical analysis of results including mean, standard deviation and coefficient of variance

Calibration accessories



Capacitors

6615 10 uF capacitors

Resistors

6616 2 ohm resistors
 6617 20 ohm resistors
 6618 500 ohm resistors
 6619 2 kohm resistors
 6620 20 kohm resistors
 6621 50 kohm resistors
 6622 100 kohm resistors
 6623 2 Mohm resistors

Kelvin leads adaptor, model 6613



The 6613 is a measurement lead equipped with 4 BNC connectors on the one side and 4 kelvin clips on the other side. The 4 BNC connectors are connected to the databridge by means of the model 6604, or directly when LCR 6458 is used.



H. TINSLEY & COMPANY

A Division of the Tinsley Group Ltd

275 King Henry's Drive
 New Addington
 Croydon, Surrey CRO OAE
 England

Telephone 0689/800799
 Telefax 0689/800405
 Telex 8952453