

**ROBIN**

**FLUKE®**

**The future of installation testing is here**

**The 1650 Series Multifunction Testers**



# 1650 Series

## Safer, easier installation testing.

Robin and Fluke joined forces in 1999 to become the largest supplier of hand-held test and measurement equipment in Europe. These breakthrough products are the result of a combined experience of over 50 years in instrument design and development.

The 1650 Series testers verify the safety of electrical installations in domestic, commercial and industrial applications. They can ensure that fixed wiring is safe and correctly installed to meet the requirements of IEC 60364 and BS 7671 16th Edition IEE Wiring Regulations.

The unique ergonomic design, low weight, and padded neck-strap to free your hands, make operating a 1650 Series multifunction tester a pleasure. With easy-to-operate controls and a large display with exceptionally wide viewing angle, it's also comfortable and safe to use.

### Select from two models

**1652:** Performs all basic installation tests including continuity/insulation/loop impedance, RCD tripping time, RCD tripping current level and RCD auto-testing

**1653:** As 1652 but with earth resistance and phase sequence measurement. Has internal memory and a PC interface for documentation and reporting

*(see back page for a comparison chart)*

**1652**



**1653**



- 1 Phase/Earth Voltage warning indicator
- 2 On/off button
- 3 Press to test button
- 4 Function buttons to assist easy navigation
- 5 Memory mode button
- 6 Scroll memory locations button
- 7 Backlight button
- 8 Test lead resistance zero button



## Learn in minutes, test in seconds. Save time on every installation.

- **Easy:** simply turn the knob, press the button and see the results
- **Efficient:** measure loop impedance without tripping RCDs, eliminating the need to bypass them
- **Rugged:** withstands a one-meter drop for demanding field use.
- **Safe:** slim probe with test button keeps your eyes on the panel while probing hard to reach points
- **Comfortable:** compact and lightweight (less than 1.2 kg) for all day testing
- **Compliant:** meets all relevant standards including BS EN 61557



*The unique curved shape, ergonomic control layout and padded neck-strap ensure comfort in use.*

## Performs all electrical installation tests including



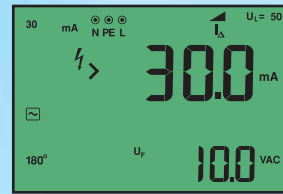
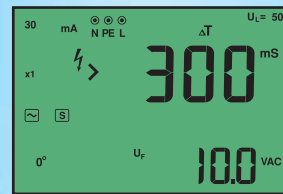
- 1 Voltage and frequency
- 2 Insulation resistance
- 3 Continuity
- 4 Loop impedance (with patented non-trip technology)
- 5 RCD tripping time
- 6 RCD tripping current
- 7 Earth resistance (model 1653)
- 8 Phase sequence (model 1653)



### Continuity ( $R_{L0}$ )

Test continuity of live and protective conductors

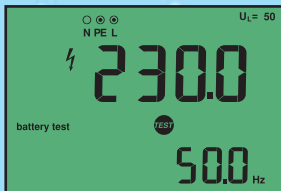
- Time-saving 'auto-null' feature subtracts lead resistance from measurements (and stores it in memory even after power-down)
- Wiring connection check indication and live circuit detection for added safety
- High-resolution measurements down to 0.01  $\Omega$



### RCD

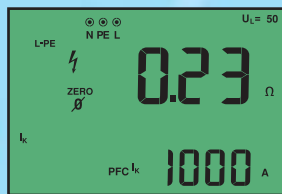
Carry out functional trip testing and current tripping level tests

- Test wide range of RCDs (both models)
- Test DC-sensitive and delayed-response RCDs
- Automated test sequence function for rapid RCD testing
- RCD Tripping Current Test (ramp test)
- Wiring connection check indication for added safety
- Phase selector switch



### Voltage and frequency (V)

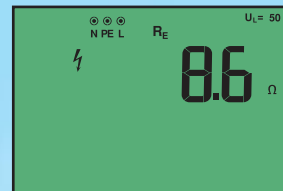
- Dual display gives simultaneous readout of mains voltage and frequency



### Loop impedance ( $Z_1$ )

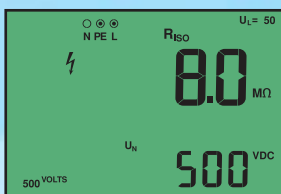
Measure earth-loop or line impedance

- Advanced and patented loop measurement technology prevents RCD tripping and guarantees consistent readings after multiple tests
- 0.01  $\Omega$  resolution on loop measurements
- Auto-null to remove test-lead resistance from measurement



### Earth resistance ( $R_E$ ) (1653 only)

- Measure resistance to earth of electrodes, stakes and earthing mats
- Test with auxiliary earth spikes in the ground
  - Three-wire tests for accurate measurement
  - User selectable safety voltage level of 50 or 25 V



### Insulation resistance ( $R_{ISO}$ )

Test the insulation resistance of live and protective conductors

- Insulation test voltages of 50, 100, 250, 500 and 1000 V cover all applications including telecom (depending on model)
- Clear indication of applied voltage
- Auto discharge allows fast and safe discharge of electrical energy in capacitive circuits
- Added safety through live circuit detection, to check and inhibit test if circuit under test is live

### Prospective short-circuit/fault current (PSC/PFC)

Measure the potential fault current between phase/neutral and earth/neutral conductors

- Simultaneous read-out with loop impedance
- 1 A resolution on measurements



### Phase sequence (1653 only)

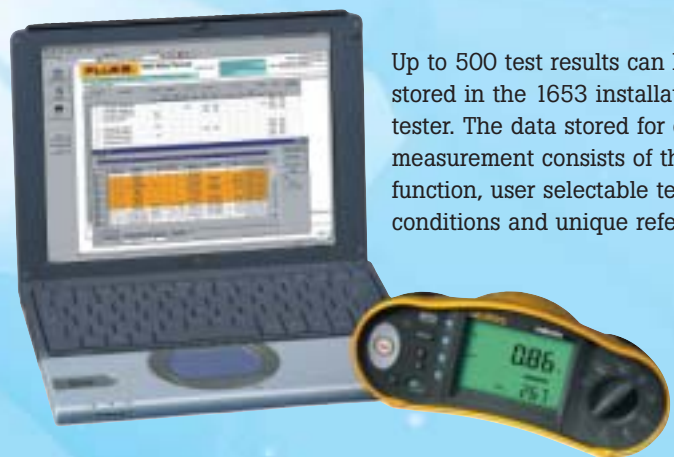
- Test phase sequence rapidly on three phase systems



### Slim probe design

Thanks to its slim probe with integral test button, you can safely make one-handed measurements on hard to reach points, while keeping your eyes on the panel.

## Professional reports



Up to 500 test results can be stored in the 1653 installation tester. The data stored for each measurement consists of the test function, user selectable test conditions and unique references.

Model 1653 has an IR port and adaptor to enable the results to be uploaded to a computer for preparing professional reports using (optional) FlukeView™ Forms software. Reports can easily be customized to suit individual requirements. Standard formats are also available.

# More functions in one tool

## AC Voltage Measurement

Range	Resolution	Accuracy 50 Hz - 60 Hz	Input Impedance	Overload Protection
500 V	0.1 V	0.8% + 3	3.3 M $\Omega$	660 Vrms

## Continuity Testing

Range (autoranging)	Resolution	Test Current	Open Circuit Voltage	Accuracy
20 $\Omega$	0.01 $\Omega$	> 200 mA	> 4 V	$\pm$ (1.5%+3 dgt.)
200 $\Omega$	0.1 $\Omega$			
2000 $\Omega$	1 $\Omega$			

## Insulation Resistance Measurement

Model	Test Voltages	Accuracy of Test Voltage (at rated test current)
1652	250 - 500 - 1000 V	+10%, -0%
1653	50 - 100 - 250 - 500 - 1000 V	+10%, -0%

Test Voltage	Insulation	Resolution Resistance Range	Test Current	Accuracy
50 V	10 k $\Omega$ to 50 M $\Omega$	0.01 M $\Omega$	1 mA @ 50 k $\Omega$	$\pm$ (3%+3 dgt.)
100 V	100 k $\Omega$ to 20 M $\Omega$ 20 M $\Omega$ to 100 M $\Omega$	0.01 M $\Omega$ 0.1 M $\Omega$	1 mA @ 100 k $\Omega$	$\pm$ (3%+3 dgt.) $\pm$ (3%+3 dgt.)
250 V	100 k $\Omega$ to 200 M $\Omega$	0.1 M $\Omega$	1 mA @ 250 k $\Omega$	$\pm$ (1.5%+3 dgt.)
500 V	100 k $\Omega$ to 200 M $\Omega$ 200 M $\Omega$ to 500 M $\Omega$	0.1 M $\Omega$ 1 M $\Omega$	1 mA @ 500 k $\Omega$	$\pm$ (1.5%+3 dgt.) + 10%
1000 V	100 k $\Omega$ to 200 M $\Omega$ 200 M $\Omega$ to 1000 M $\Omega$	0.1 M $\Omega$ 1 M $\Omega$	1 mA @ 1 M $\Omega$	$\pm$ (1.5%+3 dgt.) + 10%

Auto Discharge	Discharge time constant, 0.5 second for C = 1 $\mu$ F or less.
Live Circuit Detection	Inhibits test if terminal voltage > 30 V prior to initiation of test.
Maximum Capacitive Load	Operable with the 5 $\mu$ F load

## Loop Impedance Measurement

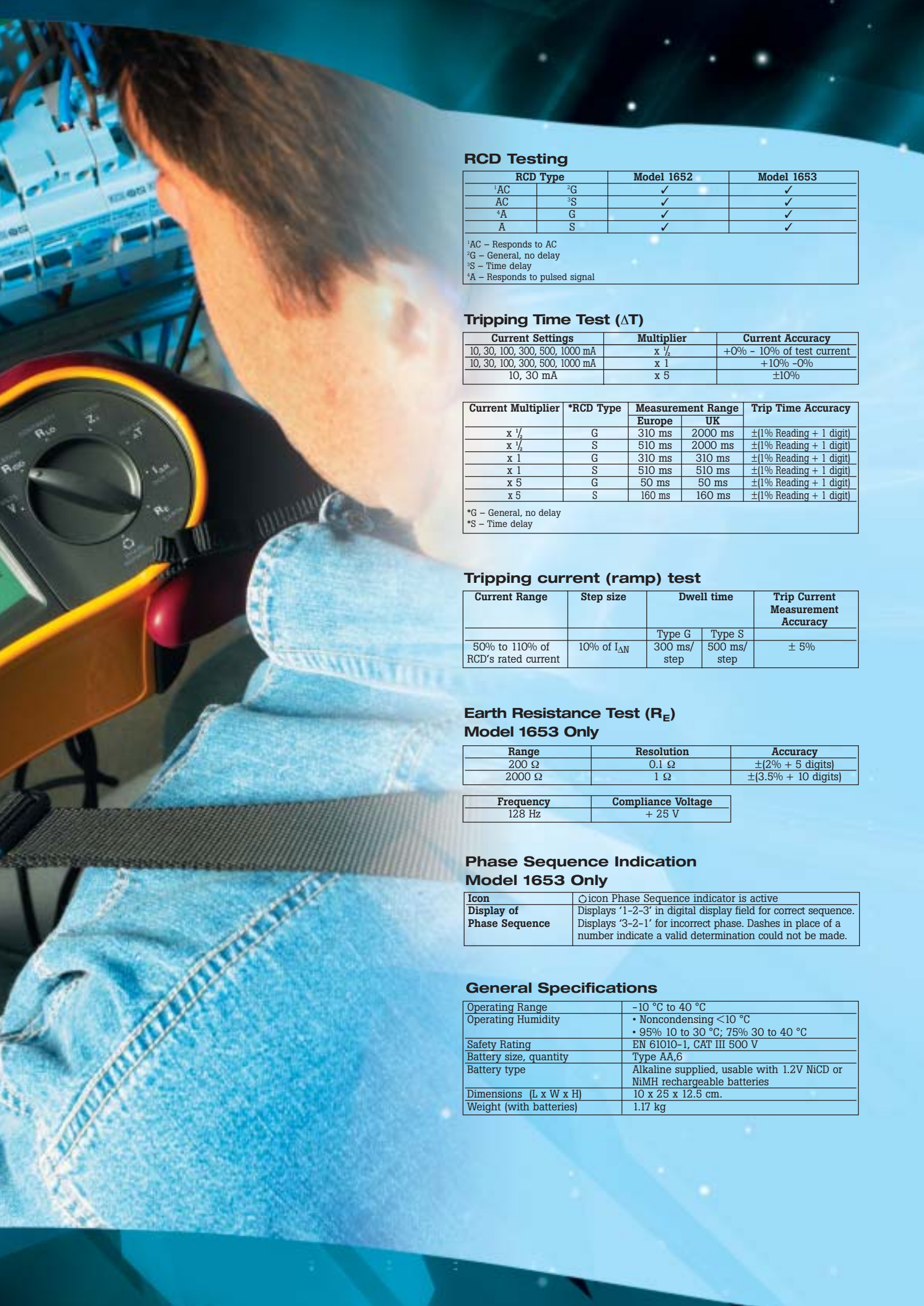
<b>Measuring Range</b>	100 - 500 V AC (50/60 Hz)
<b>Input connection</b> (soft key selection)	Loop Impedance: phase to earth Line impedance: phase to neutral
<b>Limit on consecutive tests</b>	Automatic thermal shutdown after 50 consecutive tests at 10 second intervals (typical)

Range	Resolution	Accuracy
20 $\Omega$	0.01 $\Omega$	$\pm$ (3%+10 digits)
200 $\Omega$	0.1 $\Omega$	
2000 $\Omega$	1 $\Omega$	

## PFC, PSC Test

Computation	PFC or PSC determined by dividing measured mains voltage by measured loop (L-PE) resistance or line (L-N) resistance
Range	0 to 10 kA
Resolution and Units	$I_k < 1000$ A      1 A $I_k \geq 1000$ A      0.1 kA
Accuracy	Determined by accuracy of loop resistance and mains voltage measurements.





## RCD Testing

RCD Type		Model 1652	Model 1653
<sup>1</sup> AC	<sup>2</sup> G	✓	✓
AC	<sup>3</sup> S	✓	✓
<sup>4</sup> A	G	✓	✓
A	S	✓	✓

<sup>1</sup>AC – Responds to AC

<sup>2</sup>G – General, no delay

<sup>3</sup>S – Time delay

<sup>4</sup>A – Responds to pulsed signal

## Tripping Time Test ( $\Delta T$ )

Current Settings	Multiplier	Current Accuracy
10, 30, 100, 300, 500, 1000 mA	x 1/2	+0% - 10% of test current
10, 30, 100, 300, 500, 1000 mA	x 1	+10% -0%
10, 30 mA	x 5	±10%

Current Multiplier	*RCD Type	Measurement Range		Trip Time Accuracy
		Europe	UK	
x 1/2	G	310 ms	2000 ms	±(1% Reading + 1 digit)
x 1/2	S	510 ms	2000 ms	±(1% Reading + 1 digit)
x 1	G	310 ms	310 ms	±(1% Reading + 1 digit)
x 1	S	510 ms	510 ms	±(1% Reading + 1 digit)
x 5	G	50 ms	50 ms	±(1% Reading + 1 digit)
x 5	S	160 ms	160 ms	±(1% Reading + 1 digit)

\*G – General, no delay

\*S – Time delay

## Tripping current (ramp) test

Current Range	Step size	Dwell time		Trip Current Measurement Accuracy
		Type G	Type S	
50% to 110% of RCD's rated current	10% of $I_{\Delta N}$	300 ms/step	500 ms/step	± 5%

## Earth Resistance Test ( $R_E$ )

### Model 1653 Only

Range	Resolution	Accuracy
200 $\Omega$	0.1 $\Omega$	±(2% + 5 digits)
2000 $\Omega$	1 $\Omega$	±(3.5% + 10 digits)

Frequency	Compliance Voltage
128 Hz	+ 25 V

## Phase Sequence Indication

### Model 1653 Only

<b>Icon</b>	Icon Phase Sequence indicator is active
<b>Display of Phase Sequence</b>	Displays '1-2-3' in digital display field for correct sequence. Displays '3-2-1' for incorrect phase. Dashes in place of a number indicate a valid determination could not be made.

## General Specifications

Operating Range	-10 °C to 40 °C
Operating Humidity	• Noncondensing <10 °C • 95% 10 to 30 °C; 75% 30 to 40 °C
Safety Rating	EN 61010-1, CAT III 500 V
Battery size, quantity	Type AA,6
Battery type	Alkaline supplied, usable with 1.2V NiCD or NiMH rechargeable batteries
Dimensions (L x W x H)	10 x 25 x 12.5 cm.
Weight (with batteries)	1.17 kg

## 1650 Series



Measurement functions	Fluke/Robin 1652	Fluke/Robin 1653
Voltage & Frequency	•	•
Wiring polarity checker	•	•
Insulation Resistance	250, 500, 1000 V	50, 100, 250, 500, 1000 V
Continuity	•	•
Loop & Line Resistance	•	•
PFC/PSC (fault/short-circuit current)	•	•
RCD tripping time	•	•
RCD tripping current level	•	•
	ramp test	ramp test
Automatic RCD test sequence	•	•
Test DC-sensitive RCD's	•	•
Earth Resistance	•	•
Phase Sequence Indicator	•	•
<b>Other features</b>		
Self-test	•	•
BS/EN 61557* VDE 0413 compliant	•	•
Illuminated Display	•	•
Live voltage indicator	•	•
Battery indicator and battery test function	•	•
<b>Memory, Interface</b>		
Memory (500 measurements)		•
Computer interface		•
Time stamp (with FlukeView® Forms)		•
Software		Option

\*1652: sections 1,2,3,4,6,10  
1653: sections 1,2,3,4,5,6,7,10



BS 7671 16<sup>th</sup> Edition  
IEE Wiring Regulations



### Complete kit

The 1652 and 1653 are equipped with detachable leads that can be replaced in case of damage or loss. A durable hard carrying case will protect your instrument in tough field conditions. A probe with built-in test button comes with every instrument.

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### Accessories and Ordering Information

#### Included Accessories

TP165X Remote Control Probe  
TL165X/UK Fused Test Lead Set  
C1600 Hard Carrying Case  
Mains Test Cord  
Padded Carrying Strap  
Quick Reference Guide  
6 AA Cell batteries

#### Optional Accessories

ES165X Earth Spike Test Kit  
FlukeView® Forms and Cable

#### Ordering Information

Fluke 1652 Multifunction Installation Tester  
Fluke 1653 Multifunction Installation Tester