Time Electronics
Calibration, Test and Measurement

User Manual

1071
Capacitance Decade Box

Version 1.2
10-22

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This also applies to any schematics, drawings and diagrams contained herein.

This manual provides operating and safety instructions for the Time Electronics product. To ensure correct operation and safety, please follow the instructions in this manual.

Time Electronics reserves the right to change the contents, specifications and other information contained in this manual without notice.

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1 Introduction



High accuracy and wide range makes the 1071 capacitance decade box suitable for applications in industry and education. It is both compact and robust, housed in a metal case that provides complete screening, with a protective rubber cover to guard the 1071 against everyday wear and tear.

The 7-digit thumbwheel switch enables simple and precise setting of the capacitance value. Clear Visual Indication: To make selecting and reading the setting easy the 1071 incorporates colour coded digits: µF - red, nF - white, pF - yellow.

Special attention has been given to maximize the reliability of operation. A special multiple gold contact switch arrangement ensures that a back-up contact is always available to take over should a failure occur.

For connections the unit features safety terminals that are compatible with 4 mm shrouded plugs, as well as standard plugs, bare wires, and spade terminals.

The 1071 comes fitted with an ergonomic rubber cover providing increased protection and durability. It has a textured grip for comfortable handling, and side openings to place labels. It is easy to remove if you prefer a stand-alone unit or to use the optional 9026 carry case.

Features

- 10 pF to 100 µF
- 1 % accuracy
- Clear visual indication
- Bi-polar working
- 55 pF residual capacitance
- Safety terminals
- Removable protective cover
- Suitable for industry or education

2 Specifications

Capacitance Range ..... 10 pF to 100 µF in 10 pF steps

Decade (9 steps each)	10 pF	100 pF	1 nF	10 nF	100 nF	1 µF	10 µF
Accuracy @ 1 kHz	1 % ± 5 pF	1 % ± 5 pF	1 % ± 5 pF	1 %	1 %	1 %	5 %
Capacitor type	Silver mica	Silver mica	Silver mica	Silver mica	Polycarbonate	Polycarbonate	Polyester
Max voltage	300 V DC 200 V AC	300 V DC 200 V AC	300 V DC 200 V AC	100 V DC 72 V AC	100 V DC 72 V AC	100 V DC 115 V AC	63 V DC 50 V AC
Max temp coefficient	200 ppm/°C	200 ppm/°C	50 ppm/°C	50 ppm/°C	75 ppm/°C	75 ppm/°C	300 ppm/°C
Power factor @ 1 kHz	< 0.0025	< 0.0015	< 0.002	< 0.01	< 0.01	< 0.01	< 0.01
Insulation resistance	> 50 GΩ	> 50 GΩ	> 50 GΩ	> 30 GΩ	> 30 GΩ	> 30 GΩ	> 30 GΩ

Residual Capacitance ..... Approximately 55 pF.

Operating Temperature Range ..... 0 °C to + 70 °C

Connections ..... 2 x 4 mm active safety terminals. A third safety terminal is to enable the case to be earthed or connected to either output.

Dimensions ..... W200 x H75 x D110 mm
(215 x 100 x 120 mm including protective cover).

Weight ..... 0.6 kg (1.0 kg including protective cover).

Options ..... Calibration certificates, carry case.

Country of Origin ..... United Kingdom.

Ordering Information

1071 ..... Capacitance Decade Box

9026 ..... Carry case (replaces protective cover)

C161 ..... Traceable calibration certificate (Factory)

C114 ..... Accredited calibration certificate (ISO 17025)

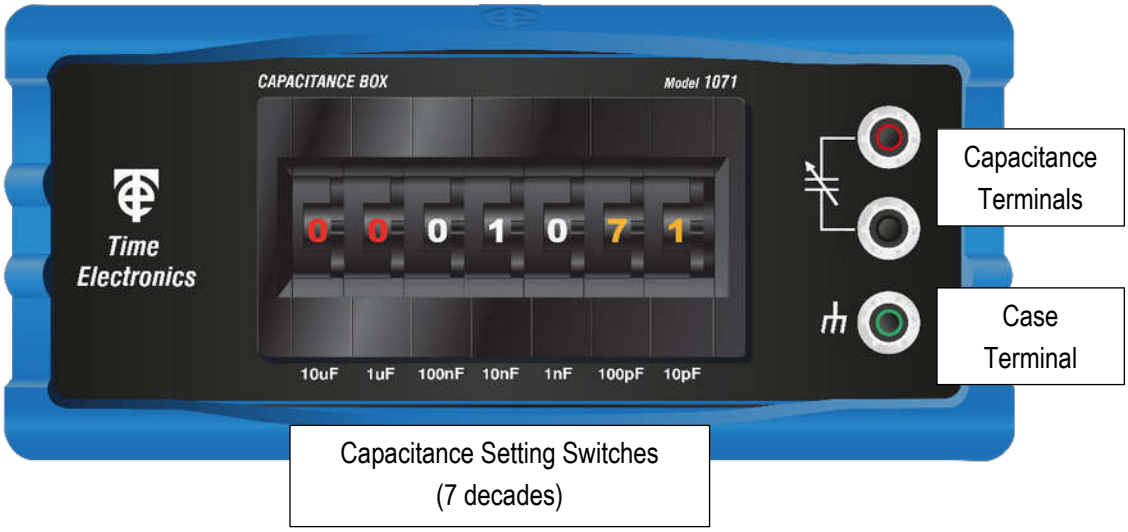
3 Operation

3.1 Safety Precautions



Observe proper safety operational guidelines when working with high voltages. To minimize shock hazard connect the case terminal to an electrical ground. Always take precautions to avoid and prevent contact with live components. Handle the unit with care and use as per the instructions in this manual.

3.2 Front Panel Controls and Connections



- **Capacitance Terminals:** Capacitance is connected via the safety terminal binding posts that are suitable for twisted stripped wire compression connection, spade terminals, or by 4 mm shrouded or normal plug insertion.

- **Case Terminal:** The case terminal is isolated from the two active capacitance terminals. When connected to ground/earth, it may be used as a guard or shield connection, this can help to reduce unwanted electrical noise pickup, and help maintain the case at a safe voltage in certain modes of use.

- **Capacitance Setting Switches:** Used for selecting the required capacitance by setting the thumbwheel digit switches to the value of the decade range. Each decade can be set from 0 to 9.

3.3 Operating Instructions

3.3.1 Connections



Connection to the decade box is via 4 mm safety terminal posts, using 4 mm shrouded or standard plugs. Alternatively, crocodile clips or stripped wire connections can be used.

Whatever method is used, the connection must be tight to the terminal posts to avoid introducing unwanted instability to the capacitance reading.

The red and black active terminals connect to the capacitance elements, and the green terminal is connected to the case for screening purposes.



For certain applications, the user may want to connect the case terminal to either of the active terminals. This can be done, but the case would then be at the same potential as the active terminals. The user should be aware that this could be hazardous and safety precautions must be taken to prevent electric shock.

3.3.2 Setting Capacitance



Before use it is recommended that all the digit thumbwheels are rotated completely 2 times. This will ensure the contacts are self-cleaned. This is particularly beneficial if the decade box has not been used for a long time.

The 1071 features colour-coded digits to help provide a clear indication of the set values.

- µF (10 µF, 1 µF decades) = Red.
- ηF (100 ηF, 10 ηF, 1 ηF decades) = White.
- ρF (100 ρF, 10 ρF decades) = Yellow.

To set capacitance, use the thumbwheel digit switches to set the required values according to the decade ranges.

For example - to set 2.746 µF:

- Set 2 on the 1 µF decade.
- Set 7 on the 100 ηF decade.
- Set 4 on the 10 ηF decade.
- Set 6 on the 1 ηF decade.
- Set 0 on the unused decades.

For a quick reference to the setting values of the 1071, please see the Capacitance Setting Table on the following page.

Note: All capacitance boxes have a residual capacitance, i.e. even when the dials are set to zero there is still a capacitance value across the output. If you are making precision measurements or recalibrating the instrument this residual value must be subtracted from all measurements.

Typical values of residual capacitance are shown in the specifications.
For precise values relating to your specific unit, refer to calibration certificate (if ordered).

3.4 Capacitance Setting Table

The below table shows the settings of each capacitance decade using the switches.

													
10 µF Decade		**1 µF Decade**		**100 ηF Decade**		**10 ηF Decade**		**1 ηF Decade**		**100 ρF Decade**		**10 ρF Decade**	
Digit	**F**	**Digit**	**F**	**Digit**	**F**	**Digit**	**F**	**Digit**	**F**	**Digit**	**F**	**Digit**	**F**
0	0 µF	0	0 µF	0	0 ηF	0	0 ηF	0	0 ηF	0	0 ρF	0	0 ρF
1	10 µF	1	1 µF	1	100 ηF	1	10 ηF	1	1 ηF	1	100 ρF	1	10 ρF
2	20 µF	2	2 µF	2	200 ηF	2	20 ηF	2	2 ηF	2	200 ρF	2	20 ρF
3	30 µF	3	3 µF	3	300 ηF	3	30 ηF	3	3 ηF	3	300 ρF	3	30 ρF
4	40 µF	4	4 µF	4	400 ηF	4	40 ηF	4	4 ηF	4	400 ρF	4	40 ρF
5	50 µF	5	5 µF	5	500 ηF	5	50 ηF	5	5 ηF	5	500 ρF	5	50 ρF
6	60 µF	6	6 µF	6	600 ηF	6	60 ηF	6	6 ηF	6	600 ρF	6	60 ρF
7	70 µF	7	7 µF	7	700 ηF	7	70 ηF	7	7 ηF	7	700 ρF	7	70 ρF
8	80 µF	8	8 µF	8	800 ηF	8	80 ηF	8	8 ηF	8	800 ρF	8	80 ρF
9	90 µF	9	9 µF	9	900 ηF	9	90 ηF	9	9 ηF	9	900 ρF	9	90 ρF

4 Warranty and Servicing

Warranty

Time Electronics products carry a one-year manufacturer's warranty as standard.

Time Electronics products are designed and manufactured to the highest standards and specifications to assure the quality and performance required by all sectors of industry. Time Electronics products are fully guaranteed against faulty materials and workmanship.

Should this product be found to be defective, please contact us using the below details. Inform us of the product type, serial number, and details of any fault and/or the service required. Please retain the supplier invoice as proof of purchase.

This warranty does not apply to defects resulting from action of the user such as misuse, operation outside of specification, improper maintenance or repair, or unauthorized modification. Time Electronics' total liability is limited to repair or replacement of the product. Note that if Time Electronics determine that the fault on a returned product has been caused by the user, we will contact the customer before proceeding with any repair.

Product Registration

You can register your product at: www.timeelectronics.com/contact/product-registration. Registering your product will enable us to maintain a record of purchase for your warranty. You can also use the web form to provide feedback about our products and services.

Calibration and Repair Services

Time Electronics offers repair and calibration services for all the products we make and sell. Routine maintenance by the manufacturer ensures optimal performance and condition of the product. Periodic traceable or accredited calibration is available.

Contacting Time Electronics

Online:
Please visit www.timeelectronics.com and select Technical Support from the Contact links. From this page you will be able to send information to the Time Electronics service team who will help and support you.

By phone:
+44 (0) 1732 355993

By email:
mail@timeelectronics.co.uk

Returning Instruments

Prior to returning your product please contact Time Electronics. We will issue a return merchandise authorization (RMA) number that is to accompany the goods returning. Further instructions will also be issued prior to shipment. When returning instruments, please ensure that they have been adequately packed, preferably in the original packing supplied. **Time Electronics Ltd will not accept responsibility for units returned damaged.** Please ensure that all units have details of the service required and all relevant paperwork.

Send the instrument, shipping charges paid to:

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Web Site: www.timeelectronics.com

Disposal of your old equipment



1. When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
2. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
3. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
4. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or return to Time Electronics.