



***Time Electronics***  
*Calibration, Test and Measurement*

# User Manual

7015

Dual Channel Pressure Calibrator

Version 2.1

7-24

## **Time Electronics Ltd**

Unit 5, TON Business Park, 2-8 Morley Road,  
Tonbridge, Kent, TN9 1RA, United Kingdom.

T: +44 (0) 1732 355993 | F: +44 (0) 1732 350198  
mail@timeelectronics.co.uk | www.timeelectronics.com

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Nothing from this manual may be multiplied, or made public in any form or manner, either electronically or hard copy, without prior written consent from Time Electronics Ltd.

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



## 1.1 Description

The 7015 is a fully integrated dual channel pressure test and calibration system. It is suitable for on-site test and calibration of both pressure and electrical process loop signals. Pressure ranges are specified on ordering. The minimum range is 0.2bar, maximum is 600bar (700 bar special order). With the 2bar option, vacuum down to  $-850\text{mB}$  is available.

Best accuracy is 0.04% of range and max display resolution is 0.005% of range. The excellent resolution allows higher accuracies to be achieved under controlled lab conditions when accurate pressure standards such as dead-weight pressure testers are available for transfer calibration.

The 7015 can operate for 24 hrs of typical use from the internal batteries. Full recharge can be done overnight - connect the mains power and the internal charger will recharge the battery. The robust resin case is weatherproof and provides protection from the harsh treatment when used in the field. The 7015 comes with manual, hoses and test leads.

The internal precision piezo-resistive pressure transducer has a stainless-steel diaphragm. This allows use in gas or hydraulic systems. Over-pressure on the inputs is indicated on the display and by an internal buzzer sounding. It is set to operate at 120% of full span pressure. On ranges of up to 20 bar the pressure transducer can tolerate a maximum over-pressure of 2x range, above this 1.5x range applies. Pressure connections are made via Minimesh or Quick Release type, located on the side of the case. Minimesh connectors for high pressure above 20bar are chosen for their high strength, reliability and ease of connection. For 700 bar a 1/4" BSP is used.

The 7015 allows switch selection of five pressure units on channel one and four pressure units on channel two where mA is also shown. Common pressure units are configured as standard (see specifications), but user-specified units can be requested:- bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm<sup>2</sup>, atm. Both pressure and loop current are displayed on 4.5 digit LCD displays.

## 1.2 Electrical Signals

The **Loop Drive Supply** is switch selectable to provide 24V, OFF, or 36V. It is rated up to 50mA and is isolated from the other internal circuits. It has a short circuit protection which limits the current to approximately 100mA.

The **Loop Current calibration function** is suitable for currents up to 200mA. It does not need zeroing and has an accuracy of 0.05% of reading  $\pm 1$  digit and a display resolution of 10 $\mu$ A. Its excellent accuracy allows precise calibration of 4 - 20mA pressure transmitters. The input resistance is only 5 ohm which provides minimal load on the loop.

The **Continuity Tester** function can be used to test many types of cabling, to and from the sensors. Continuity threshold is 100 ohms and values below this are indicated by an internal buzzer and by 'CONTINUITY' appearing on the mA display.

All electrical connections to the 7015 are via colour coded industry standard 4mm terminal posts. These allow a 4mm plug to be inserted or alternatively conventional bare wire connection by clamping under the terminal posts.

Two **RS232** jack sockets are provided, one for each channel, these facilitate re-calibration and read-back when used with the correct software.

The **backlights** can be controlled from the front panel switch.

## 1.3 Options

For the 7015, input pressure can be generated by external hand pumps. In the field the 7090 pneumatic (vacuum to 40 bar), or 7095 hydraulic (0 to 700 bar) pumps are suitable. Also available are a range of pumps suitable for workshop use, that feature an ergonomic mode of operation. These models include the 7193 (vacuum to 40 bar pneumatic) and 7194A (vacuum to 200 bar pneumatic). For hydraulic pressure generation the 7195 pump (vacuum to 700 bar) is ideal for supplementing pressure to the testing applications.

For process control signal simulation a practical tool like the Time Electronics handheld 7006 Loop-Mate is available as an option. It is a low cost, simple operation unit that provides 4 - 20 mA and 0 - 10 V signals at levels of 0 %, 10 %, 25 %, 50 %, 75 %, 90 %, 100 %.

It can also step through these set points automatically to allow hands free calibration. It is battery powered and compact, pocket sized and easy to carry in the field.

### EasyCal Calibration Software

The 7015 can be controlled with readback via Time Electronics EasyCal software to automate the calibration process. This provides increased speed of calibration and consistency of results. Produce traceable calibration certificates and test reports for quality standards with additional uncertainty information for ISO 17025 conformance.

## 1.4 Ordering Information

7015 .....Dual Channel Pressure Calibrator (+ pressure range code as shown below).

Range (bar)	0.2	Vac to 2	5	10	20	35	70	100	200	400	600
Option Code	7100	7101	7102	7103	7104	7105	7106	7107	7108	7109	7110

### Calibration Certificates and Accompanying Products

7090 .....Pneumatic Hand Pump (vacuum to 40 bar)

7095 .....Hydraulic Hand Pump (0 to 700 bar)

7198 .....Pressure calibration adaptors/fittings kit

7006 .....Loop-Mate 1: Loop Current Simulator

ECFL ..... EasyCal Calibration Software

C178 .....Traceable calibration certificate (Factory)

C190 .....Accredited calibration certificate (ISO 17025)

*Other pumps and accessories are available, see Time Electronics website for details.*

## 1.5 Technical Specifications

### 1.5.1 Pressure

<b>Range (bar)</b>	Vac	0.2	2	5	10	20	35	70	100	200	400	600
<b>Resolution</b>	.0001	0.01	.0001	0.001	0.001	0.001	0.01	0.01	0.01	0.01	0.1	0.1
<b>Accuracy % ± 1 digit</b>	0.04	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.1	0.1	0.1
<b>Temp Stability</b>	< 70 ppm per °C, over range of 0 - 40 °C											
<b>Units</b>	bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm <sup>2</sup> , atm. *											
<b>Max Pressure</b>	2 x range or 1.5 x range for 20 bar and above											
<b>Sensor</b>	Piezo-resistive - diaphragm stainless steel											
<b>Over Pres.</b>	1.2 x range full scale - audio and visual on display warning											
<b>Fittings</b>	BSP 700 bar, Minimes 600 bar or Quick release (<20 bar)											

\* Specify on ordering: 4 off for channel one and 4 off for channel two.

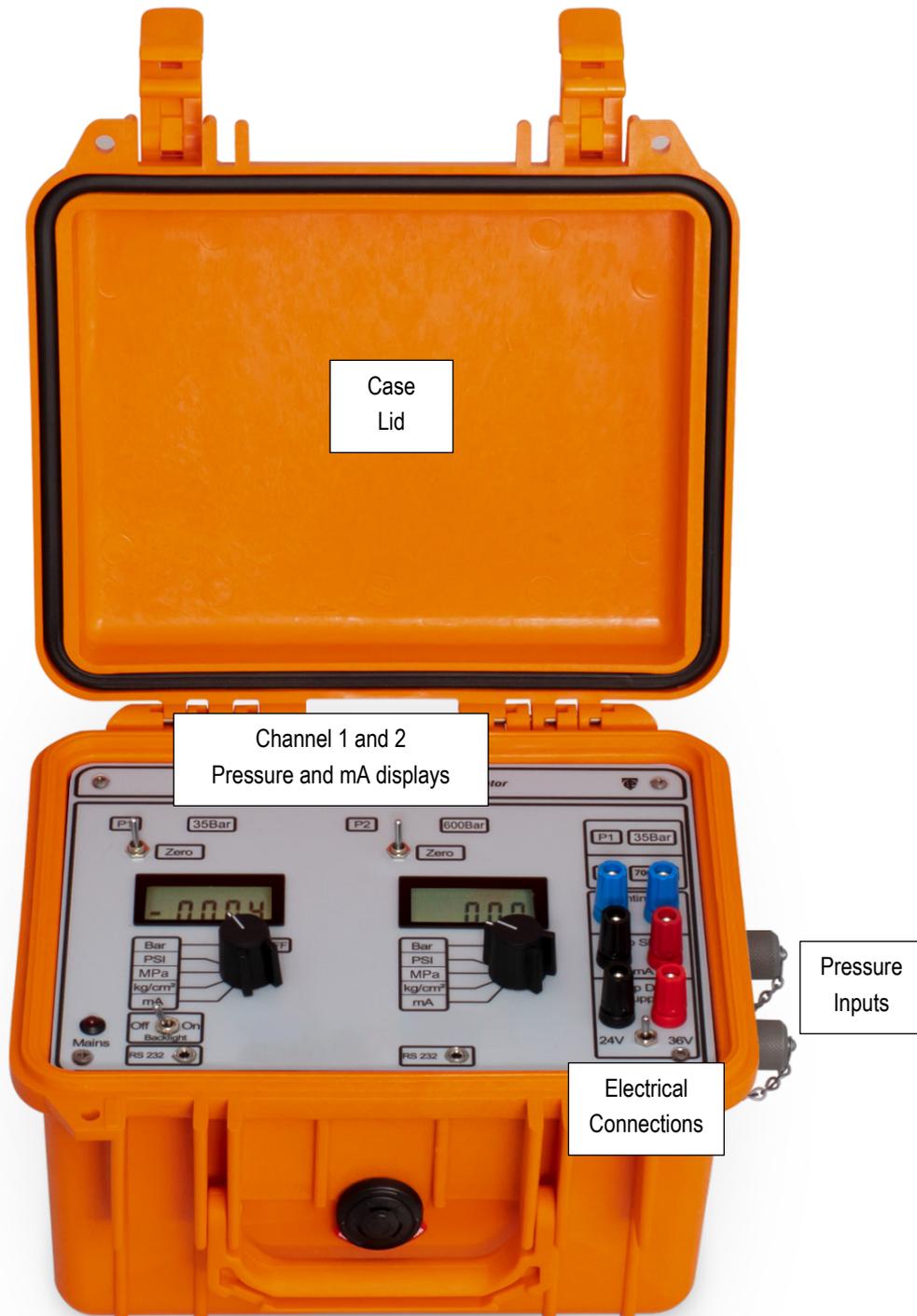
### 1.5.2 Electrical

Range ..... Loop current measurement 0 to 200 mA.  
 Resolution ..... 10 µA.  
 Resistance ..... Loop load 5 Ω.  
 Accuracy ..... 0.05 % of reading ±1 digit.  
 Loop drive ..... 24 V or 36 V switch selectable, 50 mA max - isolated and with short circuit protection.  
 Continuity ..... Threshold: 100 Ω with audio and visual warning.  
 Terminals ..... 4 mm industry standard terminal posts.

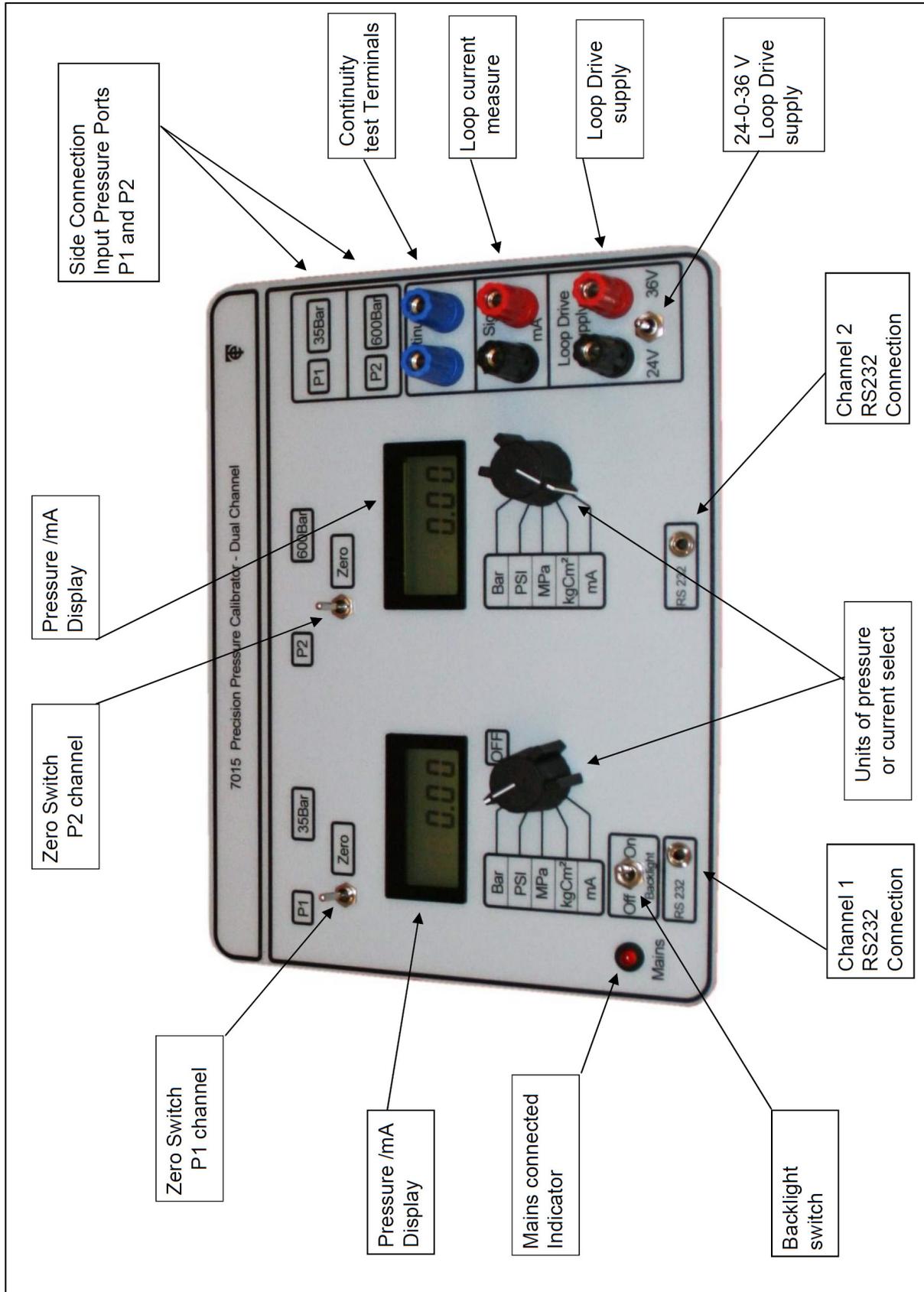
### 1.5.3 General Specifications

Power source ..... Internal rechargeable NiMH batteries  
 or mains supply (230 V or 110 V 50/60 Hz).  
 Battery life ..... 24 hrs of typical usage between charges.  
 Display ..... 7 segment LCD display with 'Low Battery' warning indicator.  
 Interfaces ..... RS-232 for readback and re-calibration (software not supplied).  
 Case ..... Structural resin which is weather-proof to IP66 standard.  
 Dimensions / Weight ..... W 270 x H 175 x D 250 mm / 3 kg  
 Supplied with ..... Pressure hoses and fittings. Electrical Test Lead:  
 Twin flexible lead, terminated with 4 off 4mm gold plated plugs.  
 Electrical probes: 2 low voltage probes and 2 crocodile clips.  
 Mains power lead.

## 2 Controls

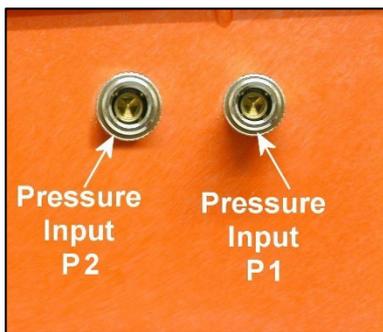


## 2.1 Main Controls and Displays



## 2.2 Pressure Connections

The pressure connections are situated on the side of the instrument case.



Dual Pressure  
**Quick Release**

Pressures of 20 bar and below



Dual Pressure  
**Minimess**

Pressures of above 20bar

## 3 Operation

**WARNING:** An automatic over pressure relief system is **not** fitted.  
Always take care when connecting/disconnecting pressure systems.

### 3.1 Pressure Measurement

There are two separate pressure channels built into the 7015 (P1 and P2). Operation is the same for both channels and they can be used simultaneously if required.

Power on the unit by turning the switch on channel P1 from OFF to the desired units of pressure. If channel P2 operation is also required, select units on P2 switch.

Now operate the individual pressure channels as described below:

Note: Ensure that the applied pressure does not exceed the maximum allowed pressure (see specification).

1. Rotate the units of pressure switch from OFF to the desired units.
2. Ensure that the pressure input port is open and at atmospheric pressure:  
For Minimes or BSP connector, unscrew and remove the protective cap.  
For Quick Release connectors (self-sealing). Plug in an open-ended male QR fitting.
3. Press and release the zero toggle switch to zero the display. Do not press the zero toggle switch for more than 2 seconds.
4. Connect the external pressure source using a suitable test hose.
5. For pressures above 20bar it is recommended that external isolating and de-compression valves are used. Slowly open the external isolating valve and record the pressure reading.
6. Apply pressure to the unit under test and the 7015. Compare the readings.
7. After completing the calibrations, disconnect the test hose.
8. With high pressure use the isolating and de-compression valves before disconnecting the hose.

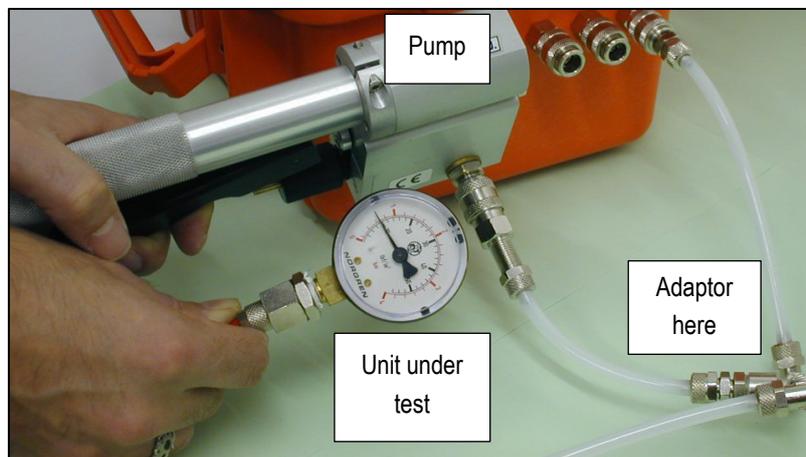
### 3.2 Using the 7015 with an External Hand Pump

The 7015 can be used with a hand pump up to the maximum pressure/vacuum of the unit.

If you are using the Time Electronics 7090 or 7095 pump, it features 2 output ports. Connect one side to the 7015 and the other to the unit under test.



If the pump has a single output, it should be connected using a Tee connection adaptor to allow the item to be calibrated and the 7015 to have a common pressure - see below.



### 3.3 Current Loop Calibration

Process control loop currents can be measured and calibrated using the 'Loop Signal' mA terminals. Connect the loop current drive supply in series if the loop needs power.

The loop signal can be measured on channel P2.

Set P2 'Units of pressure' switch to 'mA'.

Connect the loop signal to the 'Loop Signal' terminals. Ensure you have the correct polarity. Check that the display is showing zero  $\pm 1$  digit before connecting the loop signal.

### 3.4 24/36V Loop Drive Supply

The Loop Drive Supply is switch selectable to provide either 24V or 36V. It is rated for up to 50 mA and is isolated from the other internal supplies. It is short circuit protected and limits the maximum current to about 100mA max.

The loop drive supply can be switched off independently to conserve battery power.

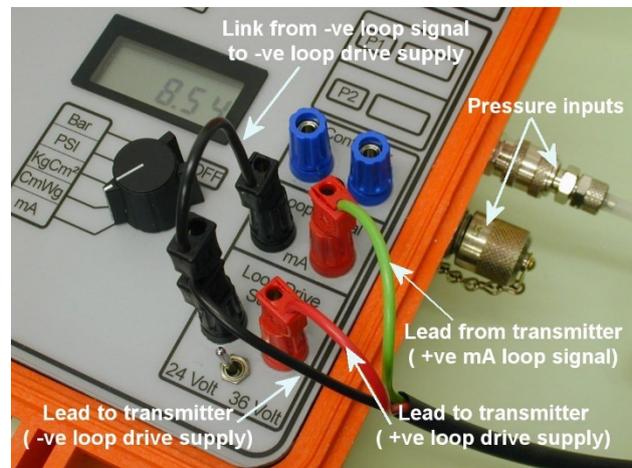


## 3.5 Pressure Transmitter Calibration

When calibrating using the 7015 the loop signal display is selected using the 'Units of pressure' switch on channel P2.

The example opposite shows a typical connection configuration for calibrating a transmitter. The loop drive supply is being used to power the transmitter.

The transmitter signal output is connected to the positive (red) 'Loop Signal' input. A link connects the negative (black) loop signal to the negative loop drive supply.



### Calibrating:

Using the switch on the 'Loop drive supply', select 24 or 36V as required.

Apply the calibrating pressure required using the hand pump. Note the loop current on the display.

## 3.6 Continuity Tester

The 7015 is fitted with blue coloured continuity terminals. When an electrical connection of less than 100 ohms is made between the two terminals, the internal buzzer will sound, and 'CONTINUITY' will appear in the display. The continuity tester can be used to check signal/control cabling in process control loops and other general purpose signal wiring.

## 3.7 Power OFF (auto power down)

To switch the 7015 off, rotate pressure select switch to OFF. Ensure the 'Loop Drive Supply' switch is also set to centre OFF. The 7015 should always be switched OFF after use to prevent battery discharge.

### 3.7.1 Auto power down

This will occur automatically after approximately 20 minutes after the last movement of the 'Units select switch'.

### 3.7.2 To disable auto power down

Press and hold the for the P1 channel ZERO toggle switch while turning on the unit select switch (rotating switch from OFF to pressure unit).

**NOTE:** Auto power down disabled mode is cancelled when the 7015 is turned off.

## 4 Power - Mains and Battery

The 7015 can be operated from the internal battery pack or mains power. An internal charger re-charges the battery when the mains is connected.

### Operation from external mains supply:

When the 7015 is connected to the mains supply, the mains connected indicator will light.

### Operation from internal batteries

For field use the instrument can be powered from the internal batteries. Approximately 24hrs of typical use is available from fully charged batteries. When the battery level falls to a level when re-charging is necessary a 'LOW BATTERY' indication appears on display. Please note that approx 0.5 hour of use is available after the low battery indication first appears.

### Battery Re-Charging

When the 7015 is connected to a mains supply, the batteries will be charged. (This applies even if the 7015 is switched off). It is important to ensure that the ambient temperature is less than 30 degC for efficient battery charging. The batteries require a charging time of 14 to 16 hours from fully discharged. It is not possible to over-charge the batteries and therefore the 7015 can be left connected permanently to the mains without damage

### Mains Supply Voltage Setting

The mains supply voltage is set according to the position of the fuse carrier which is located in the mains inlet socket. To select the mains voltage, remove the fuse carrier and rotate it so that the required mains voltage required is next to the 3 pins of the plug.

AC Mains Supply	Fuse Carrier
220V, 230V, 240V	240
110V, 115V	110



**IMPORTANT:** If a mains supply of 230V is connected to the 7015 when it has been set for 110V operation, the fuse in the fuse carrier will blow. If a mains supply of 110V is connected to the 7015 when it has been set for 230V operation, it will not operate correctly. However, no fuses will blow.

## Fuses

There are three fuses fitted as protection in the 7015, they are standard 20 x 5mm diameter types. Ensure that the correct type and value are fitted as listed below.

### Mains fuse

Type : 20 x 5mm diameter, 1A Quick blow.

Located in the fuse carrier/voltage selector section of the mains inlet socket.

### Charging circuit fuse (F1)

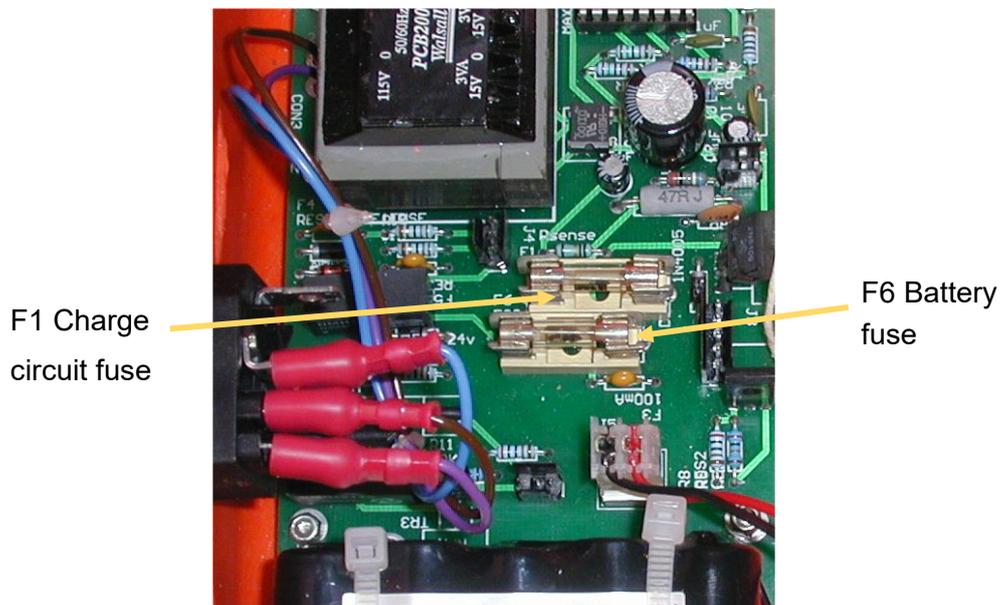
Type: 20 x 5mm diameter, 0.5A Quick blow.

Located on the power supply PCB, this PCB is mounted at the bottom of the case.

### Battery fuse (F6)

Type: 20 x 5mm diameter, 0.5A Quick blow.

Located on the power supply PCB, this PCB is mounted at the bottom of the case.



Please note that 2 of each type of fuse are supplied with the accessory items.

## 5 Operating Precautions and Recommendations

### LCD Displays

These should not be exposed to strong sunlight for prolonged periods.

### Usage and Storage Temperature/Humidity

Operating:	-10 to +50 °C
Storage:	-30 to +70 °C
Operating/Storage humidity:	10-90%, non-condensing

### Pressure Systems:

The 7015 pressure inputs are suitable to work with both Gas and Hydraulic systems. Pressure input(s) are on the right side of the case. To provide quick and flexible test hose connections Minimes, or Quick Release connectors are used. They are both self-sealing and do **not** require special tools to connect. Quick Release is a push on snap fit and is used for gas below 20 bar. Minimes is used for both gas and hydraulic above 20 bar. If you need any additional connections, please contact Time Electronics or their authorized dealer.

#### **Bleeding hydraulic systems:**

When working with hydraulic systems, it is important to ensure air trapped in the system is minimized by 'bleeding'. Air can be bled out of the connecting hose at the 7015 end by carefully letting a little fluid dribble out under control of the external cut off valve before connecting the hose to the 7015. The 7015 pressure transducer is mounted immediately behind the Minimes input to ensure the minimum requirement of fluid.

After use, place Minimes protective cap back on to prevent damage or contamination. This also ensures that any fluid left in the Minimes does not leak.

**WARNING:** An automatic pressure relief system is not fitted to the 7015.  
Always take care when connecting/disconnecting high pressure systems.

### Electrical connections

The electrical functions on the 7015 are via standard 4mm terminals. These must **NEVER** be connected to mains or other high voltages. The loop current indicator must only be used with current of loops with 36V drive or less. The 24/36V loop supply and continuity tester must never be connected into any other power source.

## 6 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.

### 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](http://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](mailto: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:

### **Time Electronics Ltd**

Unit 5, TON Business Park, 2-8 Morley Road,  
Tonbridge, Kent, TN9 1RA.  
United Kingdom.

Tel: +44(0)1732 355993

Fax: +44(0)1732 350198

Email: [mail@timeelectronics.co.uk](mailto:mail@timeelectronics.co.uk)

Web Site: [www.timeelectronics.com](http://www.timeelectronics.com)

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## 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.