Time Electronics
Calibration, Test and Measurement

User Manual

7040
Digital Pressure/Current Calibrator

Version 1.2
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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.

Contents

1 Introduction

1.1 Description

The 7040 is a hand-held pressure/vacuum calibrator suitable for workshop, laboratory and field use. It also has the provision to measure process loop current. This allows pressure transmitters and converters to be calibrated directly.

Pressure ranges are 0.2, 2, 5, 10 and 20 bar. These are specified on ordering.

The display is 4.5 digit LCD. Power is via a 9V PP3 battery.

Basic accuracy is 0.04% for pressure.

Pressure can be displayed in any of nine popular engineering units. Loop current is displayed in mA, or percentage of span (4-20mA).

A leak rate function is also provided and displays leakage, either in pressure units per second, or per minute as selected in the ‘User Set-Up’.

Additionally maximum and minimum pressure (or loop current) can be displayed.

1.2 Contents list

The 7040 is supplied with carrying pouch and the following accessories:

1. Pneumatic fittings kit and hose
2. Test leads
3. Technical manual
4. RS-232 lead

1.3 Pressure fittings

The 7040 is equipped with a standard 1/8 “ BSP female pneumatic port manifold for connection of the pressure to be measured. A range of adaptors and fittings are available to fit the 1/8 “ BSP port. Should you have difficulty in obtaining a suitable adaptor, contact Time Electronics or their authorized agent. For many applications it is a good idea to fit a quick release fitting to the 7040’s port. Then various adapters can be assembled to match each type of connection required. This overcomes the need to keep changing the fitting in the manifold and this prolongs its life and prevents the possibility of accidental damage during fitting.

Mounting the pressure fitting:

The fitting used should be a 1/8 “ BSP parallel thread. It is recommended that a flat faced fitting be used so that a Dowty seal can be used to mate with the flat face of the 7040’s manifold.

Locate the pressure fitting into the manifold and tighten by hand. Use the correct sized spanners to finally tighten the pressure fitting to the manifold.

The manifold has been machined with square faces so that a 16mm (5/8”) AF spanner may be used to allow proper tightening. **Warning:** always use two spanners (one for the manifold and one for the fitting) and do not hold the instrument base while tightening the connector since this will cause internal damage to the 7040.

1.4 Loop Current connection

Two 4mm sockets next to the pressure port are provided to allow connection into a process current loop.

2 Specifications

2.1 Pressure Calibration

Pressure Range:	0.2, 2, 5, 10, or 20 bar (specified on ordering)
Vacuum:	Available on 2 bar range. Measures vacuum to - 1 bar
Accuracy:	0.04% of range +/-1dig (0.2bar ver 0.1% +/-1dig)
Resolution:	4.5 digit (0.2bar ver 3.5 digit)
Filter:	Off (4 rdgs/sec), 1sec (av 4rdg), 4sec (av 16rdg)
Temp. Stability:	Less than 0.005% per degC
Sensor:	Piezoresistive
Pressure connection:	1/8” BSP female in stainless steel manifold
Overpressure:	3 x full scale, or 35 bar, 1.2 x FS sounds alarm
Wetted parts:	Stainless steel & silicon (contaminated media version - stainless steel only)
Units:	Bar, PSI, Kg/cm2, inHg, mmHg, cmWg, inWg, kPa, Atm

2.2 Loop Current Calibration

Range	+/- 200mA , or % of 4 - 20mA
Display:	-199.99 to +199.99mA, or -25% to +200%
Accuracy:	0.05% of reading +/- 2digit (0.1% for %4-20mA)
Resolution:	10 uA (200mA range), (0.1% for %4-20mA)
Loop resistance:	Less than 2 ohms
Protection:	250 mA automatic reset Poly-Fuse
Sockets:	4mm industry standard

2.3 Main Functions

- Pressure display in one of 9 user selectable units
- Loop current display in mA, or % of 4 - 20mA
- Leak rate display in pressure units per sec, or per minute
- Max/Min display either pressure, or loop current value.

2.4 RS-232 Serial Interface

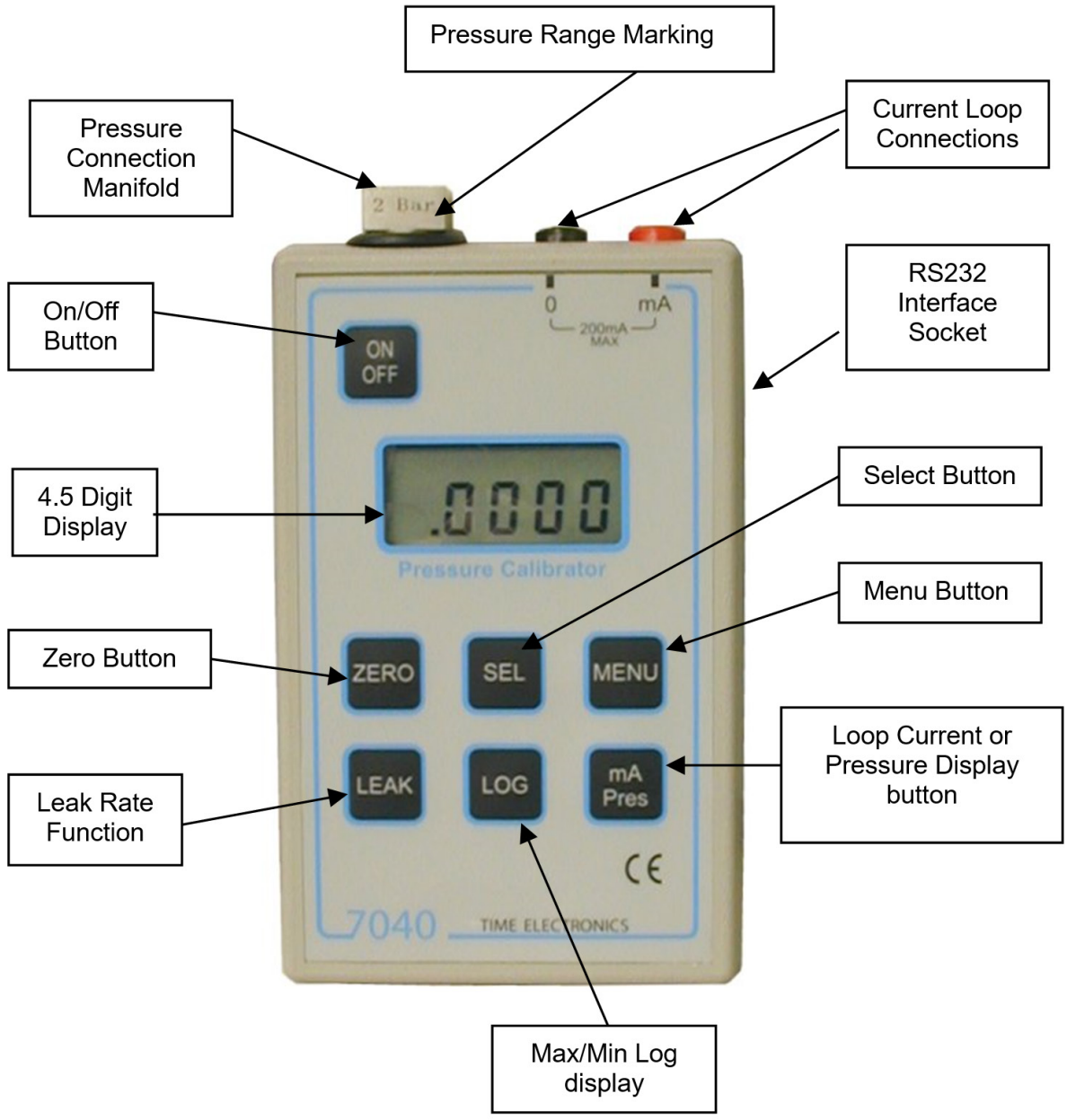
Using a PC or laptop computer and an interface program (contact TE or authorised dealer) most of the 7040's displayed parameters can be read back – Pressure, Loop Current, Max Value, Min Value. By arranging for the PC to store these values in a database a full data logging function is available. Alternatively, by using a calibration software package such as Time Electronics' EasyCal, pre-written calibration procedures can be executed and the results recorded automatically. Calibration certificates can then be printed on site or back in the lab as required.

2.5 General Specifications

Power:	PP3 battery, Life, 100hr continuous use
Front panel:	Polycarbonate membrane keypad
Case:	Impact resistant ABS
Operating temp:	0 to 50 degC
Storage temp:	-10 to 60 degC
Accessories:	Carry case, Pneumatic fittings kit, Test lead, RS232 serial lead
Size:	157 x 90 x 33 mm (6 x 3.5 x 1.2 inch)
Weight:	0.29kg (10oz)

3 Operation

3.1 Front Panel Controls



3.2 Operation

To power up the 7040, press the ON/OFF button for one second. To check the display is functioning correctly it shows all segments of the LCD while the button is being pressed. On releasing the ON/OFF button, the pressure units that were being used previously are displayed briefly. The display then shows the pressure applied to the input. To power down, press the ON/OFF button for 2 seconds.

Note: When powering up, if both the ON/OFF and ZERO buttons are pressed the software version number is shown.

3.2.1 Display selection - mA/Pres button

This button toggles the display between pressure and loop current. Note that the loop current display has two modes, it will either be displayed as mA (-200 to +200 mA), or percentage (%) of 4-20 mA (4mA = 00.0, 20ma = 100.0). The user can select which mode in the ‘User Set-Up’ described later in the manual.

Immediately after pressing the mA/Press button, the pressure units or loop current mode will be displayed briefly before the value is displayed.

3.2.2 The ZERO button

With zero applied pressure (vented) press the ZERO button to zero the display. Small variations in the 7040’s zero value occur due to changes in barometric pressure and temperature. The 7040 should always be zeroed before making precision pressure calibrations.

The ZERO button can also be used to null out pressures where a differential pressure calibration is required.

3.2.3 The Leak button

Please note that the leak rate function is for pressure only.

Pressing the Leak button will initially display LEAk. The leak rate is then displayed as the currently selected pressure units per second, or per minute (as selected in ‘User Set-Up). Periodically the display flashes ‘LEAk’ to remind the user in which mode the 7040 is operating. When ‘per minute’ rate is selected there is a short delay before the first leak rate is displayed.

To exit leak function, press the Leak button again. The display returns to the normal display.

3.2.4 The Log button

The log function (Minimum and Maximum recording) works for both pressure and loop current (both mA & %4-20mA).

Pressing the log button initially displays the minimum symbol (∪∪∪) before displaying the minimum pressure or loop current.

Pressing the log button again initially displays the maximum symbol (∩∩∩) before displaying the maximum pressure or loop current.

Pressing the log button a third time returns to the pressure or loop current display.

Note: Pressing and holding the log button for more than two seconds clears the maximum/minimum logging - this is indicated by 'Clr' on the display and a beep from the alarm sounder. The recorded max and min values are updated continuously and can be monitored by leaving the display showing either the max or min as required.

3.2.5 User Setup

The user options are selected using the Menu and Select buttons.

3.2.6 MENU and SELECT buttons

The MENU button is used to step through the main menu items:

Units (Unit)	
Loop (Loop)	
Filter (Filt)	
Auto Power (A.off)	
Leak Time (Lea.t)	

To select a menu item, press the SEL button. The display will then show the options. The menu button is used to scroll through the options. When the desired option is displayed press the SEL button to select and save it. The display then returns to the normal pressure or loop current mode.

Note: Pressing the 'SEL' button at any time apart from after the 'MENU' button will display the units/mA/% being used. This is very convenient and allows the user to confirm the 7040 status.

The menu option lists are as follows:

Units: This menu contains the nine pressure units.

Bar -  PSI -  Kg/cm^2 -  inHg - 

mmHg -  cmWg -  inWg - 

kPa -  Atm - 

Loop: Contains either current (mA) '**Curr**' or percentage (%) '**o|o**' of 4-20mA.

Filter: Filter '**off**' updates the display at a rate of 4 per second. '**1**' is

a 1 sec filter, and '**4**' is a 4 sec filter.

Auto Off: With Auto Power '**yes**' selected, the unit will automatically switch off after 20 minutes. '**no'** disables the Auto Power off function.

Leak Time: This specifies the period over which the leak rate is calculated '**1 S**' (1 second) or '**60 S**' (1 minute)

3.2.7 RS-232 Serial Interface

The connection is via a 3.5mm jack socket located on the side of the unit. A connection lead is supplied as standard and terminates with a 9 pin female D connector. The interface protocol is 4800 baud N,8,1 . Read back is initiated via control commands sent to the unit.

Using a PC or laptop computer and an interface program (available from Time electronics or their authorised agent), all of the 7040's displayed parameters can be read back – Pressure, Loop Current, Leak Rate, Max Value, Min Value. By arranging for the program to store these values in a database a full data logging function is available. Alternatively, by using a calibration software package such as Time Electronics' EasyCal a complete calibration procedure can be executed and the results recorded. Calibration certificates can then be printed on site or back in the lab as required.

EasyCal software is available as an optional extra. Please contact Time Electronics or their authorized dealer for further information.

3.2.8 RS-232 Serial commands

Format: 4800 baud, N, 8, 1. DTR must be held high at all times to supply power for the interface.

Command format :

<c1><c2><params><CR>

c1,c2 are command bytes – mostly ASCII.. <params> are command dependent. <CR> is carriage return

COMMAND ASCII	DESCRIPTION	
ID<CR>	Returns firmware version as ASCII string (x.xx<CR>)	
RS<CR>	Resets the 7040 to the power up state	
RVn<CR>	Returns pressure or current reading, as ASCII string (‘as displayed on 7040’<CR>). ‘n’ determines the value read. The units are those currently selected by the user, or by the UN command.	
	0	Pressure
	1	Minimum Pressure
	2	Maximum Pressure
	4	Current
	5	Minimum Current
	6	Maximum Current
UN<u><CR>	UN<CR> reads back the currently set units number as X<CR> The value of ‘u’ set the units. 1=bar, 2=psi, 3=kg/cm^2, 4=inHg, 5=mmHg, 6=cmWg, 7=inWg, 8=kPa, 9=Atm	

3.2.9 Battery replacement

When the 7040's battery is low the "Battery Low" sign will show on the display. The battery is a standard 9V PP3 type. The Nicad rechargeable version may be used.

To replace the battery, turn the power off, remove the battery compartment cover at the rear of the instrument, and plug the battery into the polarized snap connector provided (see picture below).

If required a 9V (100mA) mains power unit with a PP3 type connector may be used to power the unit.

3.2.10 Pressure to current transmitter application note:

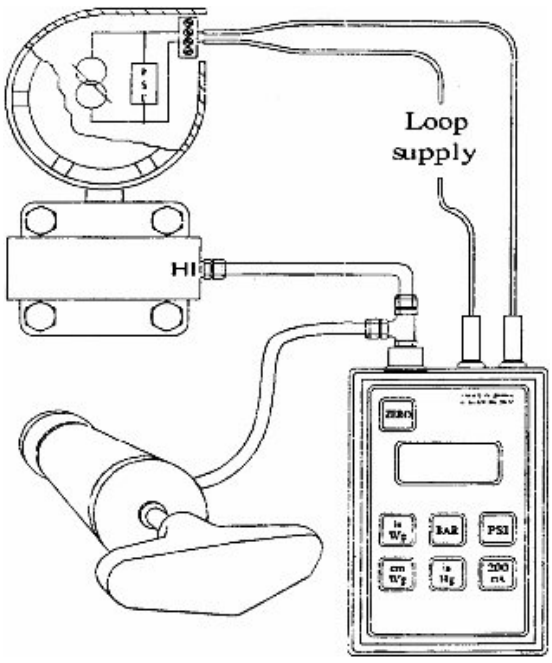
The 7040 can calibrate a 2-wire pressure transmitter as follows:

Set up:

- Connect the 7040 as shown in the following diagram. Use a suitable pressure pump, such as Time Electronics' type 7090.
- Ensure that the pressure connection to the transmitter is vented to atmosphere. Select the required pressure units and current loop mode on the 7040.
- Press the '**ZERO**' button to set zero the 7040 to zero.
- Press the '**mA/Press**' button to select loop current display.
- Switch on the Loop power supply (usually 24V). The 7040 display should now show approximately 4mA , or 0% (if '%4-20mA' display mode is being used).

Calibration:

- With the pressure input line vented to atmosphere, adjust the transmitter's Zero control until exactly 4mA (or 0%) is displayed.
- Press the '**mA/Press**' button to display pressure.
- Close the input line pressure vent.
- Increase the pressure using the hand pump to the full scale value for the transmitter.
- Press mA/Pres button to check the pressure is correct
- Press the mA/Pres button again to display current, then adjust the transmitter's Span control until the display reads exactly 20mA (or 100%).
- Vent the pressure and confirm that the zero is still correct.
- Close the vent and use the pump to check the intermediate pressures e.g. 25%, 50%, 75% of the full scale pressure.
- For each of these toggle the display using the '**mA/Press**' button and confirm that the displayed value is within the required specification.



4 Fault Conditions

Various indications will appear on the display if the 7040 is malfunctioning, or being subjected to overload conditions:

“EE”: On powering up, if display shows “EE” then the internal memory, which contains the calibration and configuration factors for the unit is corrupted. The unit then needs re-calibration and initial

set-up configuration.

“OVLD”: If the applied pressure is greater than full scale the display shows “Ovld”. If the applied pressure exceeds 1.2x full scale, an audible alarm also sounds.

Low Battery Voltage: When the internal battery voltage falls below 7.5V, a sign on the display shows the “LOW BATTERY” and there is an audible alarm. The 7040 can still be used while “LOW BATTERY” is showing but the battery should be changed as soon as possible. Operation with low battery status may affect the accuracy of calibration and therefore is not recommended.

5 Re-Calibration

The 7040 should be re-calibrated at regular intervals in order to ensure it remains within specification. The recommended re-calibration interval is 12 months.

Re-calibration of the unit is via the RS-232 serial port. Please contact Time Electronics or their authorized agent for further information.

6 Warranty and Servicing

Warranty

The 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** and select Support Request 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.

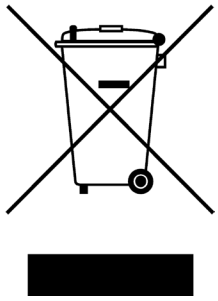
Send the instrument, shipping charges paid to:

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
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.