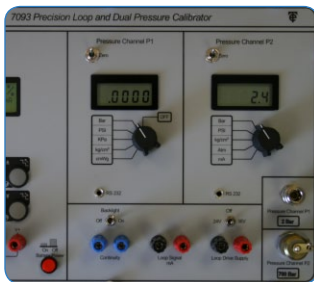




- Vacuum to 600bar versions available
- Pressure accuracy 0.04% of full scale
- 0.025% high accuracy version available
- Pneumatic or hydraulic
- Current measure: 125mA, Source: 50mA
- Voltage measure: 25V, Source: 21V
- Voltage/Current accuracy 0.01%
- RS-232 serial interface
- EasyCal software compatible
- Mains or battery powered

DESCRIPTION

Pressure Section



The 7093 is a fully integrated dual channel pressure test and calibration system, coupled with a independent micro-processor based voltage and current loop calibrator. The instrument is therefore suitable for on-site test and calibration of both pressure and electrical process loop signals.

For pressure two channels with the ranges specified on ordering are available. Standard ranges for each channel are; 0.2, 2, 5, 10, 20, 35, 70, 100, 200, 400, and 600bar. Vacuum down to -850mbar is possible on the 2bar version.

The standard model best accuracy is 0.04% of range. A high accuracy version is available with a best accuracy 0.025% of range under lab conditions.

The internal precision piezo-resistive pressure transducer allows the use in either non corrosive gas or hydraulic (demineralised water or oil) liquid. Over-pressure warning is provided on the display and by an audible sounder. Pressure connections are made via Quick release or Minimes connectors located on the control panel. Quick release are fitted for pressure ranges Vacuum to 20bar and provide a convenient push-on connection to devices under test. Minimes are fitted for pressure ranges 35bar up to 600bar, and provide easy leak-proof connection via a finger tight thread.

Two rotary switches provide pressure units selection and a separate switch is used for zeroing each channel. The pressure displays comprise of two 4.5 digit, 7 segment LCD's, with back lighting. Additionally the pressure section offers a supplementary independent 24/36V loop supply, loop current measurement as well as a continuity function for testing for pressure switches and circuit loops.

In field use input pressure for the 7093 may be generated by externally via the 7090 pneumatic (vac to 40bar), or 7095 hydraulic (0 to 700bar) hand pump. In the lab the 7193 (vac to 40bar), 7194 (vac to 100bar), and 7195 (vac to 600bar) desktop pumps are ideal for precision pressure control.

7194 Pneumatic Pump



7195 Hydraulic Benchtop Pump



7090 and 7095 Handheld Pumps



7093 Description

Loop Calibrator Section



The loop calibrator section is a high accuracy integral current and voltage loop calibration instrument. This can be used for the calibration of voltage loops up to 21V and current loops up to 50mA.

Three operating modes provide a fast and easy solution to process applications: Source for simulating a transmitter as well as the loop supply, Sink for simulating a transmitter with external loop power and Measure for measurement of the loop.

Four 4mm terminals provide connection to the loop under test. A dot matrix LCD screen with back lighting displays loop values to 5 digits of resolution as well as user setup.

Summary of Functions

Source Mode

- User programmable ranges - any values between 0 and 50mA or 0 and 21V.
- Fixed ranges are available: 4 to 20mA, 0 to 20mA, sqrt 4 to 20mA, sqrt 0 to 20mA.
- Fine adjustment (inching) is available for precise deviation from the calibration point.
- Manual step output - five calibration points 0%, 25%, 50%, 75%, and 100%
- Automatic step output (up/down) - five cal points with programmable dwell period.
- Ramp output - programmable ramp rate (0 to 20mA/sec or 0 to 20V/sec). Programmable dwell period (0 to 1000 seconds)

Measure Mode

- Voltage and current measuring capability with 5 digit resolution.
- Ranges: 0 to $\pm 5V$ and ± 5 to $\pm 25V$, 0 to $\pm 25mA$ and ± 25 to $\pm 125mA$.
- Signal can also be measured as a % of span on ranges: 4-20mA, 0-20mA, square root 4-20mA, square root 0-20mA.
- For all measurements a Min/Max recording function is available on demand.

General Information

The 7093 is designed to maximise battery operation time by allowing the user to activate only the components required. The 2700mAh internal NiMH battery pack provides a typical of 20 hours operation when calibrating current up to a maximum of 190 hours.

Full recharge from the battery takes a maximum of 20 hours from an internal mains power supply and charger, and can operate whilst under charge. The robust resin case is weatherproof to IP66 standard and provides protection from the harsh treatment when used in the field. The 7093 is supplied complete with manual, hoses and test leads.

The 7093 pressure channel are fitted with RS-232 connection as standard to enable readback using EasyCal calibration software. With comprehensive features EasyCal can simplify and speed up calibration procedures. Easily produce calibration certificates and reports to international quality standards.

Further options include the 7198 pressure accessories kit, a carry case with adaptors, fittings, connectors, and hoses to provide a quick solution to pressure component requirement in both the field and laboratory.

EasyCal Calibration Software



7198 Pressure Accessory Kit



7093 Specifications

TECHNICAL SPECIFICATIONS

Pressure Section

Specifications are for 1 year at 23°C ±5°C (±2°C on HA models). Accuracy includes linearity and long term effects. All accuracies are ±1 digit after zero is applied. For operation outside specified temperature range, apply 70ppm per °C

Range (bar)	0.2	Vac to 2	5	10	20	35	70	100	200	400	600
Accuracy (% of fs)	0.1 ^{HA1}	0.04 ^{HA}	0.04	0.04	0.04 ^{HA}	0.04	0.04	0.04	0.1 ^{HA1}	0.1	0.1
Resolution (bar)	0.01mb	0.0001	0.001	0.001	0.001	0.01	0.01	0.01	0.01	0.1	0.1

^{HA} 0.025% accuracy model available. Specify HA on order.

^{HA1} 0.05% accuracy model available. Specify HA on order.

Units	0.2bar = mbar, PSI, kPa, kg/cm ² , cmWg 2, 5, 10 & 20bar = bar, PSI, kPa, kg/cm ² , cmWg. 35bar and above = bar, PSI, MPa, kg/cm ² , Atm.
Over Pressure	1.2x range. Audio and visual warning
Fittings	20bar and below = Quick Release. 35bar and above = Minimesh
Interface	RS-232

Pressure Section - Electrical

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

Loop Calibrator Section

DC VOLTAGE SOURCE

Range	Resolution	Accuracy	Output Current	Output Resistance
0 to 21V	1mV	±0.01% of setting ±4mV	50mA	< 1Ω

DC VOLTAGE MEASURE (0 to ±25V, Auto-ranging)

Range	Resolution	Accuracy	Measure Load
0 to 5V	0.1mV	±0.01% of reading ±0.4mV	10MΩ
5 to 25V	1mV	±0.01% of reading ±2mV	10MΩ

DC CURRENT SOURCE

Range	Resolution	Accuracy	Output Voltage	Loop Resistance
0 to 50mA	1µA	±0.01% of setting ±2µA	22V Max	1100Ω @ 20mA max

DC CURRENT MEASURE (0 to ±125mA, Auto-ranging)

Range	Resolution	Accuracy	Measure Load
0 to 25mA	1µA	±0.01% of reading ±2µA	24.5Ω
25 to 125mA	10µA	±0.01% of reading ±20µA	24.5Ω

DC CURRENT SINK

Range	Resolution	Accuracy	Min external drive	Max external drive
0 to 50mA	1µA	±0.01% of setting ±2µA	4V	40V

General Specifications

Power Source	Rechargeable 2700mAh NiMH batteries or mains (230V / 110V 50 / 60Hz)
Battery Life	8 - 190hrs depending upon operational requirements
Display	7 segment LCD displays with 'Low Battery' warning indicator
Interfaces	RS-232 for pressure readback and re-calibration (software not supplied)
Case	Structural resin which is weather-proof to IP66 standard
Dimensions	41 x 32 x 17.5cm / 16.1" x 12.6" x 7"
Weight	4.08kg / 10.6 lbs approx.
Supplied with	2 pressure hoses: Quick release for 20bar and below. Minimesh for 35bar and above. Electrical Test Lead: Twin flexible lead, terminated with 4 off 4mm gold plated plugs Electrical probes: 2 off low voltage probes and 2 crocodile clips. Mains power lead.
Optional Extras	Pneumatic & hydraulic pumps, gauges, EasyCal software, and calibration certificates

Ordering Information

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

7093	Loop & Dual Channel Pressure Calibrator (+ 2 pressure range codes for each channel)
Pressure Pumps	7090/7095 hand pumps, 7193/7194/7195 benchtop pumps. See separate datasheets for information.
ECFLA	EasyCal Calibration Software. See separate datasheet for information.
C178	Factory Calibration Certificate (NPL traceable)
C190	UKAS Calibration Certificate (ISO 17025)

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.