

Spec-Cal[®]

Eclipse II

PROCESS CALIBRATOR



3 modes of cold junction compensation-
internal, external and manual

LCD display indicating generated and
measured values simultaneously

20 selectable functions

Programme keys for ramp functions and
datalogging of calibration results

Switchable backlight

Separate measurement and generation
colour-coded terminals

24V integral DC supply

External cold junction probe socket

Features

- Accuracy 0.007% of reading.
- UKAS Certificate at no extra cost - mutually accepted in Europe through EAL*
- Simultaneous measurement and generation of mV, mA, V and Ω .
- Measures and simulates 12 different thermocouple types and 7 RTD signals to selectable international standards (BS/JIS/DIN/ANSI).
- Unique RTD emulation capability - precision RTD simulation whether used with DC, AC or pulsed waveform excitation currents.
- Automatic remote cold junction compensation.
- Multi-lingual - operates in 5 different selectable languages.
- Pressure Calibrator - plug-in modules available to measure pressures from -14.7 to 500 psi.
- Integral 24V DC supply.
- Spec-Link[®] Windows[®] - based calibration software with RS232 interface and data logging facility.
- Portable, bench and panel mounted versions available.

The Haven Spec-Cal[®] Eclipse II multi-function process calibrator represents a culmination of 30 years experience in calibrator design and manufacture.

The Spec-Cal[®] Eclipse II measures and simulates 12 thermocouple types to any of four selectable international standards (BS, JIS, DIN and ANSI) as well as simultaneously measuring or generating mV, mA or volts. In addition, the Spec-Cal[®] Eclipse II measures and generates ohms, and measures and simulates 7 different RTD types.

The hand-held, battery powered Spec-Cal[®] Eclipse II is protected by a tough, EMC shielded, aluminium case with a durable, splash-proof, polycarbonate keypad which has excellent tactile and audible feedback, a high contrast super twist LCD display and switchable backlight. It is also available as a bench or panel mounted version, mains powered with a permanent backlit display.

Used in conjunction with the Haven Multical Pressure Module, the Spec-Cal[®] Eclipse II offers the capability of measuring pressures from -14.7 up to 500psi. Spec-Link[®] Windows[®] - based software provides an automated calibration management facility to assist compliance with ISO9000 quality systems.



Haven Automation Limited

*EAL- European co-operation for Accreditation of Laboratories- International acceptance and mutual recognition agreements of UKAS calibration certificates throughout Denmark, Finland, France, Germany, Ireland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, Australia, Hong Kong and New Zealand.

Simple To Operate Yet Powerful

The Spec-Cal® Eclipse II Calibrator is menu-driven for ease of use, the sequence of options is simple, logical and intuitive. The non-volatile memory will store up to 50 ramp programmes and 500 calibration values even when your Spec-Cal® Eclipse II is switched off or the batteries removed. For each ramp programme you can enter values for units, step time and increment and define high and low limits. The programme can be manually stepped or auto-cycled, it can even be controlled remotely from a PC or stopped by remote contact closure. Three modes of cold junction compensation are available, including Haven's patented external remote CJ measurement system, eliminating the need to use error inducing compensating cable.

The Spec-Cal® Eclipse II is supplied with a set of 6 high capacity NiMH batteries, which will power the instrument for up to ten hours. Alternatively, you can use disposable AA cells or power directly from the mains supply using the battery charger/ eliminator. A low battery indicator will tell you when your Spec-Cal® Eclipse II needs to be charged giving reasonable advance warning of instrument power down. To save power an automatic function is available to power down your instrument if a key has not been pressed for approximately 10 minutes. An isolated 24 Volt integral supply is provided for loop power.

Multi-Functional Combined with High Performance

Calibrate temperature, voltage, current, resistance and pressure instruments. Use either ITS-90 or IPTS-68 temperature scales, select between °C and °F, work in % of range, mA or Volts, display square root values of measured current, detect open-circuit thermocouples or even use your Spec-Cal® Eclipse II as a highly accurate digital thermometer.

The Spec-Cal® Eclipse II is multi-lingual, operating in English, French, German, Italian and Spanish. Other useful functions include password protection, preventing unauthorised use of your instrument, an owner details display and calibration date to remind you when your Spec-Cal® Eclipse II is itself due for recalibration.

The Spec-Cal® Eclipse II offers a basic accuracy of 0.007% of reading and each instrument is supplied with a UKAS calibration certificate as standard. This ensures full traceability through an unbroken chain to National Measurement Standards and so meet the requirements of ISO9000 quality management systems.

The Spec-Cal® Eclipse II is so accurate it is often used as a transfer laboratory standard. Due to increased customer demand, other models are now available; a free standing bench version ideal for laboratory use and a panel mounted bench version for inclusion in our range of custom-designed test benches.

Unique RTD Emulation

The Spec-Cal® Eclipse II uses an innovative circuit design providing precision RTD emulation whether used with DC, AC or pulsed waveform excitation currents. This is unlike other RTD simulators / process calibrators available on the market which are limited to simulating RTDs for instruments with restricted DC or low frequency AC excitation currents.

RTD simulators generate a voltage, the value of which is a function of the excitation current of the instrument under test and the resistance to be simulated. However, excessive variations in the value or rate of change of excitation current can cause the simulation to become unstable and/or inaccurate. This problem is eliminated in the Spec-Cal® Eclipse II by the use of our unique resistance emulation circuitry which uses an array of real, switchable resistors to provide the required resistance value. The Spec-Cal® Eclipse II is in effect an intelligent resistance emulator.

Cold Junction Compensation

Haven Automation invented thermocouple simulation techniques for use in portable calibrators over 20 years ago and the competition is still trying hard to catch up. Our remote cold junction sampling idea was so unique we took out a patent - no need to search around for the correct thermocouple cable to carry out your calibration, no chance of introducing massive errors by using compensation cable (a common mistake) - just copper conductors and no errors.



Haven Automation Limited

Supports ISO9000 Calibration

The Spec-Cal® Eclipse II can be used in the field to store up to 500 measured and generated values along with the identity of the instrument under test. Later, this data can be downloaded to your PC using an RS232C interface and Spec-Link™ software.

Spec-Link™ Windows™ supported software enables straightforward printing of calibration certificates with custom-designed header information and facilities to export your calibration information to other word-processing and spreadsheet applications.

Complete calibration management and analysis features are available when used with the Autocal Management Calibration Software (ask for our Autocal brochure).



Pressure Measurement

Haven Multical plug-in Pressure Modules turn your Spec-Cal® Eclipse II into a highly accurate pressure calibrator enabling direct pressure indication in up to 9 engineering units, and vacuum and pressure generation when used in conjunction with a Haven Hand Pump.

Haven Multicals are Rugged and Reliable - the silicon pressure sensor is protected by a stainless steel diaphragm and the sensor housing is teflon coated. The non-corrosive structure provides excellent resistance against contaminants when used in the field.

Haven Multicals are Universal - they can be used with any instrument that reads millivolts.

Haven Multicals are Pocket-Sized - with an overall length of 12.6cm and weight of 84g and powered by a single 9V battery giving over 400 hours of use.



Multical Specifications

Model	Ranges (Gauge Pressure)	Accuracy	Pressure units
A	0 to 30 psi 30 to 50 psi 0 to -14.7 psi Max Pressure	± (0.05% of reading + 0.01 psi) ± (0.25% of reading) ± (0.5% of reading + 0.02 psi) 100 psi	50 psi module: psi, in H ₂ O, cmH ₂ O, inHg, mmHg, kPa, mbar, bar and kg/cm ² (9 units)
B	0 to 500 psi 0 to -14.7 psi Max Pressure	± (0.1% of reading + 0.02 psi) ± (0.25% of reading + 0.02 psi) 1000 psi	500 psi module: psi, mH ₂ O, inHg, cmHg, kPa, MPa, bar and kg/cm ² (8 units)

General Specifications

24 V DC Supply:25mA maximum output
Terminal Type:4mm binding posts to accept wire or 4mm plug
Isolation:The MEASURE, GENERATE and 24V terminals are mutually isolated
Over Voltage Protection:30 Volt AC and DC

Cold Junction (int/ext):
Accuracy:±0.1°C at 23°C (±0.2°F at 73°F),
 0.1 degree resolution
Range:-50 to +136°C (-58 to +276°F)
Error:Add 0.01°C per degree difference from 23°C (0.02°F from 73°F)

Environmental:
Temperature:-5 to +50°C (23 to 122°F)
Relative Humidity:10 to 80% non condensing.
 <70% recommended.
Storage Temperature:-20 to 60°C (-4 to 140°F)
Int Reference Drift:<7 ppm per °C from 23°C (73°F)

Dimensions:
ProductSpec-Cal® Eclipse II
(L, W, H)246x105x57mm
Weight1kg
Free Standing Bench Version:292x530x110mm (6.5kg)

Ramp Specification
Ramp UNITS available:V, mV, mV%, mA, mA%, °C, °F
Min Ramp Increment:least significant digit of range
Ramp Step Time:5 sec to 9999.9 sec
Ramp Delay:1 sec to 5 min (before start of cycle)
Modes:auto single cycle, auto continuous cycle, manual



Supplied complete with carry case, battery charger, standard accessories, and UKAS Calibration Certificate issued by Haven Automation Ltd.

Laboratory No: 0295

Electrical Signals

Function	Range	Display Resolution	Internal Resolution	Accuracy
Measure	-100 to 100mV	1µV	0.19µV	0.007% Reading + 5µV
	-55 to 55mA	1µA	0.19µA	0.007% Reading + 5µA
	-30 to 30V	1mV	0.06mV	0.007% Reading + 3mV
	0 to 400Ω (lexc = 1mA)	10mΩ	1mΩ	0.007% Reading+ 20mΩ
	400 to 4000Ω (lexc=0.1mA)	100mΩ	10mΩ	0.007% Reading+200mΩ
Generate	-25 to 100mV	1µV	0.19µV	0.007% Reading + 5µV
	0 to 22 mA	1µA	0.04µA	0.007% Reading+5µA
	-2.5 to 10V	1mV	0.02mV	0.007 Reading +3mV
	18 to 400Ω*	10mΩ	1mΩ	0.007%Reading + 20mΩ
	400 to 4000Ω**	100mΩ	10mΩ	0.007% Reading+200mΩ

*Excitation current (DC/AC/pulsed) from -10 to +10mA

**Excitation current (DC/AC/pulsed) from -1 to +1mA. All resistance specification are for 4 wire configuration only.

Thermocouple Measurement and Simulation

Simulation			
T/C Type	Range C	Worst Case Accuracy* +/- C	Best Case Accuracy** Mid Range +/- C
T	-250 to -200	1.1	0.2
	-200 to -140	0.3	
	-140 to 400	0.2	
E	-250 to -200	0.9	0.2
	-200 to 800	0.2	
	800 to 1000	0.3	
K	-250 to -180	1.7	0.2
	-180 to 550	0.3	
	550 to 1372	0.4	
R	-50 to 100	1.4	0.4
	100 to 1740	0.7	
	1740 to 1767	2.0	
J	-210 to -110	0.3	0.2
	-110 to 700	0.2	
	700 to 1200	0.3	
S	-50 to 0	1.3	0.5
	0 to 120	0.9	
	120 to 1740	0.7	
	1740 to 1767	1.9	
B	300 to 600	1.7	0.5
	600 to 1000	1.1	
	1000 to 1820	0.7	
N	-250 to -220	1.9	0.2
	-220 to -150	0.7	
	-150 to 1300	0.3	
PR (JIS)	0 to 250	1.9	0.6
	250 to 1600	0.8	
	1600 to 1770	0.7	
U (DIN)	-200 to -120	1.0	0.2
	-120 to 180	0.4	
	180 to 600	0.2	
L (DIN)	-200 to -120	0.6	0.2
	-120 to 900	0.3	
	-18 to 1310	0.2	

Measurement			
T/C Type	Range C	Worst Case Accuracy* +/- C	Best Case Accuracy** Mid Range +/- C
T	-270 to -150	1.1	0.2
	-150 to -400	0.2	
E	-250 to -200	0.8	0.2
	-200 to 800	0.2	
	800 to 1000	0.3	
K	-250 to -180	1.8	0.2
	-180 to 1372	0.4	
R	-50 to 100	1.6	0.4
	100 to 1700	0.7	
	1700 to 1767	1.9	
J	-210 to -100	0.3	0.2
	-100 to 1200	0.2	
S	-50 to 20	1.2	0.5
	20 to 160	0.9	
	160 to 1720	0.7	
	1720 to 1767	2.0	
B	300 to 750	1.5	0.5
	750 to 1020	0.8	
	1020 to 1820	0.6	
N	-250 to -160	1.9	0.2
	-160 to 150	0.5	
	150 to 1300	0.3	
PR (JIS)	0 to 250	1.9	0.6
	250 to 1600	0.8	
	1600 to 1770	0.7	
U (DIN)	-200 to -140	1.2	0.2
	-140 to 100	0.5	
	100 to 600	0.3	
L (DIN)	-200 to -120	0.9	0.2
	-120 to 900	0.5	
	-18 to 1310	0.3	

* Worst case accuracy: calculated at 0°C manual CJ using worst case electrical accuracy and worst case linearization errors over specified range.

** Best case, mid range accuracy: calculated at 0°C manual CJ using worst case electrical accuracy and worst case linearization errors. Resolution for all ranges: 0.1°C.

RTD Measurement and Simulation

Simulation			
RTD Type	Range C	Worst Case Accuracy* +/- C	Best Case Accuracy** Mid Range +/- C
Pt50	-155 to 300	0.15	0.15
	300 to 850	0.23	
Pt100	-200 to 360	0.10	0.10
	360 to 850	0.16	
Pt200	-200 to 10	0.04	0.06
	10 to 260	0.07	
	260 to 850	0.43	
Pt500	-200 to -60	0.02	0.15
	-60 to 300	0.15	
	300 to 850	0.23	
Pt1000	-200 to 10	0.02	0.10
	10 to 260	0.09	
	260 to 850	0.16	
Ni100	-60 to 110	0.05	0.04
	110 to 180	0.04	
Ni120	-80 to 150	0.10	0.03
	150 to 260	0.07	

Measurement			
RTD Type	Range C	Worst Case Accuracy* +/- C	Best Case Accuracy** Mid Range +/- C
Pt50	-155 to 280	0.15	0.16
	280 to 850	0.26	
Pt100	-200 to 310	0.10	0.10
	310 to 850	0.19	
Pt200	-200 to 60	0.05	0.07
	60 to 260	0.07	
	260 to 850	0.46	
Pt500	-200 to -60	0.03	0.16
	-60 to 330	0.16	
	330 to 850	0.26	
Pt1000	-200 to -150	0.02	0.10
	-150 to 310	0.10	
	310 to 850	0.19	
Ni100	-60 to 150	0.06	0.04
	150 to 180	0.07	
Ni120	-80 to 120	0.12	0.04
	120 to 260	0.09	

* Worst case accuracy: calculated using worst case 4 wire electrical accuracy and worst-case linearization errors across specified range

** Best case, mid-range accuracy: calculated using worst case 4 wire electrical accuracy and worst-case linearization errors. Resolution for all ranges: 0.01°C

Spec-Cal[®] Eclipse II has been designed to maintain its specification over a period of 1 year.



Measurement House, Kingsway,
Fforestfach, SWANSEA SA5 4EX, UK.
Tel: +44 (0)1792 588722
Fax: +44 (0)1792 582624
e-Mail: sales@haven.co.uk
www.haven.co.uk

Authorised Representative:

