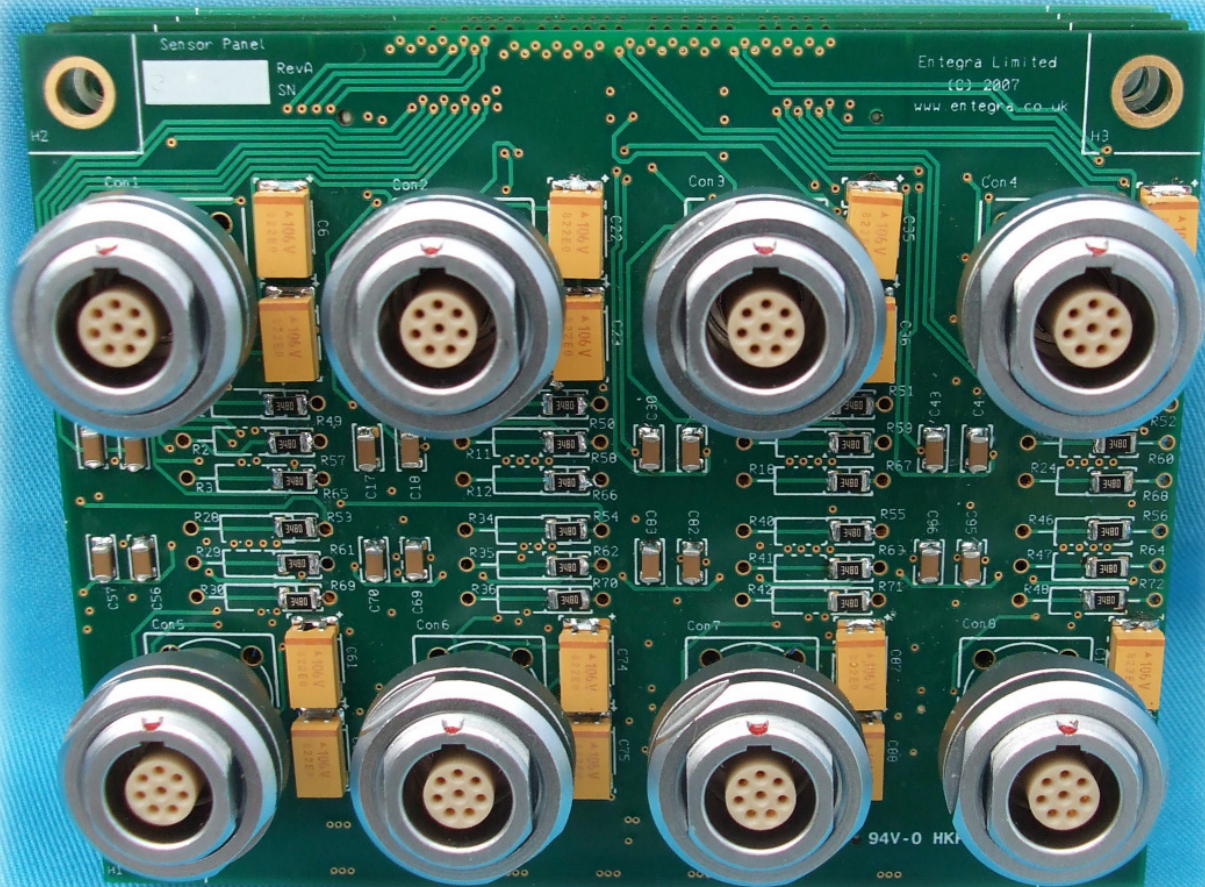


8 Channel Signal Conditioning Brick



Description

The Signal Conditioning “Brick” offers 8 fully independent channels of sensor excitation and amplification. The brick consists of 3 boards; the front sensor board with bridge resistors and sensor connectors (Lemo or UTP), an amplifier/excitation board, and a rear board with power supplies and the controlling PIC.

Each channel has an independently programmable constant voltage/constant current supply for sensor excitation. The noise floor of these supplies is below 40 μ V rms ⁽¹⁾. Each channel has an independently programmable amplifier, with a voltage gain of x1/x10/x100. Each channel can be dc or ac coupled, and has a bandwidth from dc to 100kHz. The amplifiers are very low noise, even with a shorted input and in x100 gain mode, the noise at the output is below 250 μ V rms ⁽²⁾.

There are no jumpers for channel configuration, everything is controlled via an I2C interface. The brick stores it’s own calibration values for dc offset correction and sets it’s dc offset correction depending on chosen gain mode.

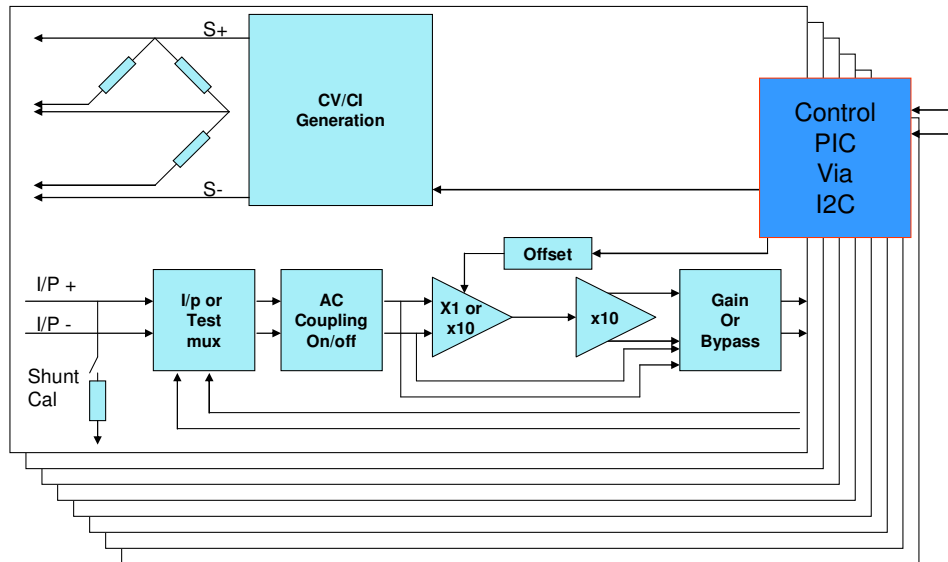
Notes.

- (1) Measured by connecting the supply to a 1k Ω load and the inputs of the amplifier. The amplifier was set to x10 and the output digitised using a 24 bit Adc. The RMS value of the samples, ignoring DC

was <400uV rms, which includes some noise due to the amplifier and Adc. Dividing this by the gain of the amplifier suggests <40uV rms noise from the supply.

- (2) Measured by connecting a 1kΩ resistor across the inputs of the amplifier. The amplifier was set to x100 and the output digitised using a 24 bit Adc. The RMS value of the samples, ignoring DC was <250uV rms.

Signal Conditioning – Block Diagram



General

Number of Channels	8
Input Connectors	UTP or Lemo
Dimensions	80mm x 100mm x 50mm (UTP)

Sensor Support

Strain Gauge/Load cell

Bridge Completion	1/4, 1/2, full (by connector configuration)
Configuration	Dynamic and Static (by connector configuration)
Impedance	350Ω, (120Ω be special order (CI only))
Excitation	Constant Current or Constant Voltage, software controlled
Calibration	Standard 59.0kΩ upper and lower arms, software controlled

ICP®

Current	0-20mA (continuously variable, controlled by s/w)
Voltage	1-24v max
Impedance	4k Ω max

Excitation

Constant Voltage Mode

Range	1-10v max, software programmable, 16 bit resolution.
Current	20mA max
Noise	< 40uV rms
Error	< 0.5%
Protection	short circuit shut down
Output impedance	<0.1 Ω

Constant Current Mode

Range	0-20mA, software programmable, 16 bit resolution.
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Compliance	0-20v max
Noise	< 40uV rms
Error	< 0.5%
Protection	short circuit shut down

Amplifier

Gain	x1 (pass-through), x10, x100
Gain error	< 1%
Frequency response	1Hz - 100kHz (-3dB) (AC coupled) DC - 100kHz (-3dB) (DC coupled)
Noise	< 140uV rms (r.t.o) (x10 mode) < 250uV rms (r.t.o) (x100 mode)
Offset voltage	< 100mV (r.t.o)
Offset voltage drift	< 400uV (r.t.o) in 1 hour (x10 mode) < 500uV (r.t.o) in 1 hour (x100 mode)
Offset Null	±1v
Common Mode Range	±13v
Common Mode Rejection	> 85dB (r.t.o. @50Hz, x10 mode) > 95dB (r.t.o. @50Hz, x100 mode)
Adjacent Channel Crosstalk	> 90dB (r.t.o. @50kHz, x10 mode) > 80dB (r.t.o. @50kHz, x100 mode)
Input configuration	Fully differential
Output configuration	Fully differential, ±12v max into 750Ω
Coupling	AC/DC, software selectable, 1 second TC.
Input impedance	> 1MΩ 100pF
Output impedance	50Ω
Input protection	±40v power off, ±36v power on
Channel to Channel Phase Diff	< 1 degree below 50kHz. < 5 degrees below 100kHz.

Connections

Sensor Input (8 way UTP or Lemo)

S+	Excitation +ve
S-	Excitation -ve (0v)
P	Amplifier +ve input
N	Amplifier -ve input
CT	½ bridge completion centre tap
¼	¼ bridge completion
GND	Shield ground
TEDS	Electronic Data Sheet chip

Digital Interface

SerialComms	Serial Data i/o (I2C)
CommsCLK	Serial Clock (I2C)
CommsGND	Digital Ground
PicReset	Active low PIC reset

Analogue Interface

VCMIn	Analogue Ground
ADP[n]	Positive output channel
ADN[n]	Negative output channel

Power Connection

+12v	+12v DC supply, 650mA typical, 1100mA max (8 channels).
GND	Power Ground
VCMIn	Analogue Ground

