

Charge Amplifier for On-board applications (Champion-6B)

Revision 3 – June 24th, 2014

Description

The charge amplifier is designed for monitoring cylinder pressure of engines, especially in those applications where compactness is required (i.e. on-board vehicle and racing use).

The amplifier gain is selectable in 4 step by means of a rotary switch on the side of the unit. A dedicated software or interface is not needed.

The time constant is 5s and allow for accurate measurement of the indicating parameters (e.g. IMEP) even at low engine speed. This value can be modified on order, based upon the customer specific requirements.

The maximum range of the amplifier is $\pm 5000\text{pC}$.

The amplifier circuit is designed to minimize distortion and non-linearity while having a high signal bandwidth and low noise.

The amplifier nominal accuracy is $\pm 1\%$. Precise calibration constants are provided for each channel giving allowing for $\pm 0.1\%$ accuracy.

The amplifier housing is made of machined steel, designed to guarantee a reliable operation over time.

The sensor connectors and signal outputs are BNC type, dedicated or exotic cables are not required.

The power supply connector is a Switchcraft/Conxall Micro-Con-X (p/n 17282-3SG-300). The mating part is 1628x-3PG-3xx.

The device is conforming to EC according to the EC directive 2004/108/CE.

Absolute maximum ratings

| | Min | Typical | Max |
|-----------------------------------|--------|--------------------------|-------|
| Supply voltage (low noise) | 4.5Vdc | 5Vdc/12Vdc | 16Vdc |
| Temperature operating | -40°C | 25°C | 85°C |
| Temperature storage | -40°C | 25°C | 70°C |
| Power consumption | | 1.25W @5Vdc 3W @12Vdc | 6W |



Dimensions

110x100x30mm

Weight

340g

Technical data

| Characteristic | Conditions | | Value |
|---------------------------------|--------------------------|---------|---|
| Nominal measuring range | Full scale output | Range 1 | 5000pC ($\pm 5V$ output) |
| | | Range 2 | 5000pC |
| | | Range 3 | 2500pC |
| | | Range 4 | 1250pC |
| Nominal sensitivity | | Range 1 | 1mV/pC |
| | | Range 2 | 2mV/pC |
| | | Range 3 | 4mV/pC |
| | | Range 4 | 8mV/pC |
| Output voltage range | | | $\pm 10V$ (Range 2,3,4) $\pm 5V$ (Range 1) |
| Output impedance | | | $\approx 200\Omega$ |
| Time constant | | 25°C | 5s |
| Small signal frequency response | 100pC peak-to-peak input | | 180kHz |
| Large signal frequency response | 1000pC peak-to-peak | Range 1 | 180kHz |
| | | Range 2 | 170kHz |
| | | Range 3 | 110kHz |
| | | Range 4 | 60kHz |
| Group delay | | | 3 μ s |
| Output noise | 1Hz->400kHz | | <1mV RMS |
| Equivalent output noise | 1Hz->400kHz | Range 1 | <0.5pC RMS typ. |
| | | Range 2 | <0.3pC RMS typ. |
| | | Range 3 | <0.2pC RMS typ. |
| | | Range 4 | <0.15pC RMS typ. |
| Accuracy | Nominal sensitivity | | $\pm 1\%$ |
| | Calibrated sensitivity | | $\pm 0.1\%$ |

Frequency response

