SONDERENTWICKLUNGEN
MESSTECHNIK

CA2

General

The charge amplifier CA2 amplifies the signal of a charge sensor. With its compact size, low power consumption and noiselessness, the CA2 is an ideal amplifier for mobile measurement applications.
The CA2 can be directly connected to an analog input of signal converter SICO2 or data logger DL16, since the corresponding connection cable is part of the CA2.
The output voltage range of CA2 can be chosen to be either bipolar or unipolar.

Figure 1: Charge amplifier CA2.

Input Signal

The charge sensor is connected to the CA2 via a miniature coaxial (microdot) socket.

Output Signal

The output signal V_{out} is given by

$$V_{out}(Q) = a \cdot g \cdot Q + V_{DC}$$

where Q is the input charge and g is the gain which is set by the user. The additional amplification a and the voltage offset V_{DC} depends on the voltage which is connected to pin 5 of the output plug (refer to lookup table).

Pin 5	Effect
Unconnected	$a = 1$; $V_{DC} = 0$ V; $R_i = 10$ kΩ $V_{out}(Q) = g \cdot Q$ Output range: -4.5 V...4.5 V
Connected to ground (0 V)	$a = ½$; $V_{DC} = 0$ V; $R_i = 5$ kΩ $V_{out}(Q) = ½ \cdot g \cdot Q$ Output range: -2.25 V...2.25 V
Connected to pin 4 (5 V)	$a = ½$; $V_{DC} = 2.5$ V; $R_i = 5$ kΩ $V_{out}(Q) = ½ \cdot g \cdot Q + 2.5$ V Output range: 0.25 V...4.75 V
Connected to SICO2 or DL16 (5.12 V)	$a = ½$; $V_{DC} = 2.56$V; $R_i = 5$kΩ $V_{out}(Q) = ½ \cdot g \cdot Q + 2.56$ V Output range: 0.31 V...4.81 V
Connected to external reference voltage V_R	$a = ½$; $V_{DC} = V_R/2$; $R_i = 5$ kΩ $V_{out}(Q) = ½ \cdot g \cdot Q + V_R/2$

Charge Range

Switch position	Amplification g in mV/pC	Charge range in pC
1	0.2	±22500
2	0.4	±11250
3	0.8	±5625
4	1	±4500
5	2	±2250
6	4	±1125
7	8	±562.5
8	10	±450
9	20	±225
10	40	±112.5
11	80	±56.25
12	100	±45
13	200	±22.5
14	400	±11.25
15	800	±5.625
16	1000	±4.5

Circuit Diagram of CA2 Output

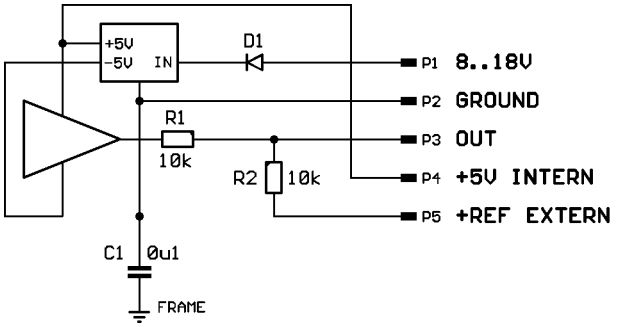

Figure 2: Circuit diagram of CA2 output.

Technical Data

Power supply:	8...18 V DC
CA2 case:	80 mm × 40 mm × 15 mm Aluminium about 60 grams
Frequency band (-3dB):	Without low pass: 4 Hz...10 kHz With default low pass: 4 Hz...5 kHz
Consumption:	typically 10 mA
Noise for g = 1000 mV/pC:	0.01 pC rms (at 4 Hz...5 kHz)
Gain error:	< 2 % (at 20 Hz...1 kHz)
Default low pass:	f_{-3dB} = 5 kHz Changeable to values from 500 Hz up to 10 kHz by replacing the corresponding module.

Pin Assignment

The plug of the CA2 output is manufactured by Binder and part of Binder Series 719. It is assigned as follows:

Pin	Assignment
1	Supplying Voltage V_B (8...18 V DC)
2	Ground (0 V)
3	Output signal
4	Internal reference voltage V_{RI} = 5 V DC
5	External reference voltage V_R (which is 5.12 V if CA2 is directly connected to signal converter SICO2 or data logger DL16)