C20 Development Kit

On/Off

C20 Gas Sensor

Zero

RS232 Connection

External PSU (9v)
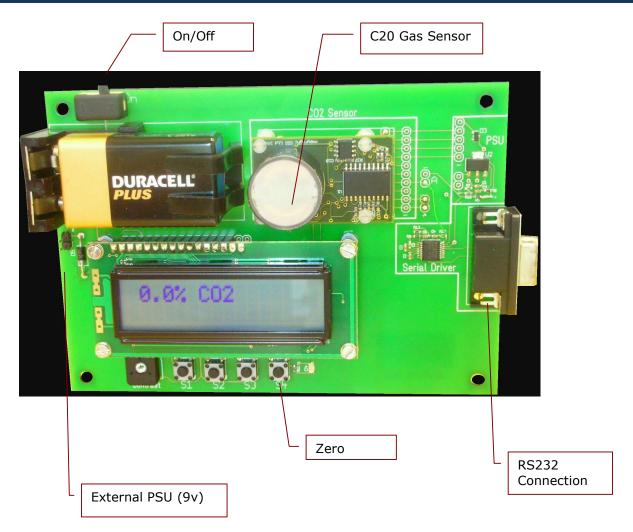
Getting Started

Install a 9V PP3 battery in the battery socket, making sure that the polarity is correct.

The LED will flash and the display will switch on. After a welcome message, the display will show the current CO_2 readings measured in percentage. This is updated with a fresh reading twice per second.

We recommend that the unit is switched on for two minutes before any readings are taken, to allow the temperatures to stabilise.

For optimum results, we recommend using an external 9v power supply. This must be capable of supplying a peak current of 250mA.

If a battery is used, please ensure that the battery is replaced before the voltage drops below 8v.

Zeroing

The zero for the sensor should be set periodically. It is stored in non-volatile memory, so does not need to be set every time the unit is switched on.

Zeroing in Nitrogen (recommended)
- Flow Nitrogen (or another gas free of CO2) over the sensor for 30s.
- Press and hold switch S4 until display shows "Zero Cal".

One the zeroing message disappears (approx 1s) the unit is ready for use.

Power

The C20 Sensor can also be supplied using an external DC power supply. This must be 7.5V minimum (9V recommended) and be capable of supplying a peak current of 250mA. The power connection is located just below the battery holder. The battery life of a typical alkaline cell is approximately 6 hours, so we recommend using an external power supply.

Display

There is a two line display showing the two measurement outputs from the sensor.

The top line shows the reading after digital filtering. This has a slower response but better resolution. This can be tuned to optimise the response for particular applications (see *advanced settings*).

The lower line shows the instantaneous output from the sensor. This has an extremely fast response (T90 < 4s) and is ideal for situations where rapid changes in gas concentrations must be detected.

Connection to a PC

The C20 Demonstrator has an RS232 serial driver to allow connection to a PC. The unit automatically outputs readings twice per second. These can be viewed using a serial communication application (eg Hyper Terminal).

Serial Protocol

The format is set as follows:
9600 baud
8 bit
no parity
1 stop bit
There is no hardware flow control.

Output Format

Each output record consists of a number of field characters followed by their value and terminated with a \r\n (carriage return, line feed).

Z # # # # # z # # # # # \r \n

For example:

Z 00017 z 00020 \r\n

This would indicate a reading of 170ppm on the high resolution output and 200ppm on the fast response output.

Other data fields can be accessed by configuring the unit. These fields include ADC outputs of PCB and gas head temperature sensors, and an LED signal strength output (see *advanced features*).

Advanced Features

Software Zeroing

The C20 sensor can be zeroed remotely by sending a zero command over the serial link. The serial protocol is the same as for receiving data from the sensor.

The command format is an upper case "U".

U <CR><LF>

The C20 sensor will respond by:

N ##### <CR><LF>

The five digit number must not be used as a CO2 reading.

Output Options

The serial output from the unit can be altered to give different fields. To alter the output fields, send an 'M' command followed by the total of the mask value for each output required.

Field	Mask Value	Output	Description
Fast Reponse CO2	2	z #####	In ppm/10
Filtered CO2	4	Z #####	In ppm/10
LED Signal Strength	32	O #####	ADC Output – Not Calibrated
PCB Temperature Sensor	64	T #####	ADC Output – Not calibrated
Gas Cell Temperature Sensor	128	V #####	ADC Output – Not calibrated

Eg

M 2<CR><LF>   Fast Output Only   z #####
M 6<CR><LF>   Fast and Filtered Output   Z ##### z #####
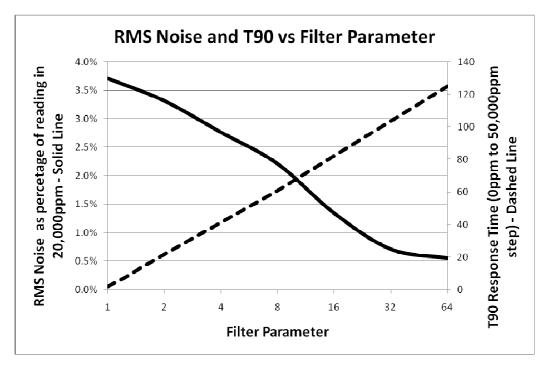
Filter Response

The filter response can be tuned to optimise for a particular application. This is done by passing a parameter (1 to 128) to the unit using the 'A' command.

Eg

A 32<CR><LF>

The filter works broadly as a low pass filter - increasing the parameter reduces the noise, but slows the response. The filter parameter must be a power of two – 2,4,8,16 etc. Other values will be interpreted as the next lowest power of two.

The following graphs show the trade-off between signal to noise and speed of response for various values of the filter parameter.

RMS Noise and T90 vs Filter Parameter

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Draft Specifications

Item	Value	Comments
Detection limits	200ppm	
Noise at zero	20ppm	Filter setting at 32
Warm Up	120s	For full accuracy.
Temperature Range	-25C to 55C	
Storage Temp	-30C to +70C	
Supply Voltage	5v	3.3v version available. 5v preferred.
Supply Current	22mA	Average at 5v. Peak is 220mA
Range	Up to 65%	Available as 5%, 20% and 65%
Output	TTL Level RS232	9600,n,8,1

C20 Sensor Unit Connections for Production Sensor

The C20 sensor can be removed from the technology demonstrator and used as a stand-alone sensor.

Connection to the sensor is via a Molex 533981071 locking header socket.

The pin connections are:

Pin	Use	Comments
1	+5V	Positive supply 4.7v to 5.5v
2	GND	
3	Zero	Pull low to zero the unit
4	N/C	Factory calibration use only
5	Serial Transmit	NB inverted
6	Serial Receive	NB inverted
7	N/C	Factory calibration use only
8	N/C	Factory calibration use only
9	Air Zero	Pull Low to zero the unit in ambient air.
10	GND	0V

For further information, please refer to the GSS C20 Datasheet.