

Connecting DAC01 to J1939/CAN Bus

The PGN values (Parameter Group Numbers) defined by the J1939 standard indicate the information held in a J1939 CAN message. CAN Bus uses a system of 'Identifiers' which are attached to the beginning of a message. J1939 uses 29 bit CAN identifiers and the value for each identifier includes the source address of the transmitting ECU, the PGN and other flags indicating message type. Therefore for a given PGN, the CAN identifier will change depending on which ECU sends the data.

Example J1939 CAN Identifier

| CAN Identifier Bits 29 to 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|----|----|----|----|--------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|--------------------------------|---|---|---|---|---|---|
| 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Misc Flags | | | | | PGN | | | | | | | | | | | | | | | | | Source Address | | | | | | |
| Eg: 0x0C | | | | | Eg: 0xF004 (for EEC1 engine message) | | | | | | | | | | | | | | | | | Eg: 0x00 for engine controller | | | | | | |

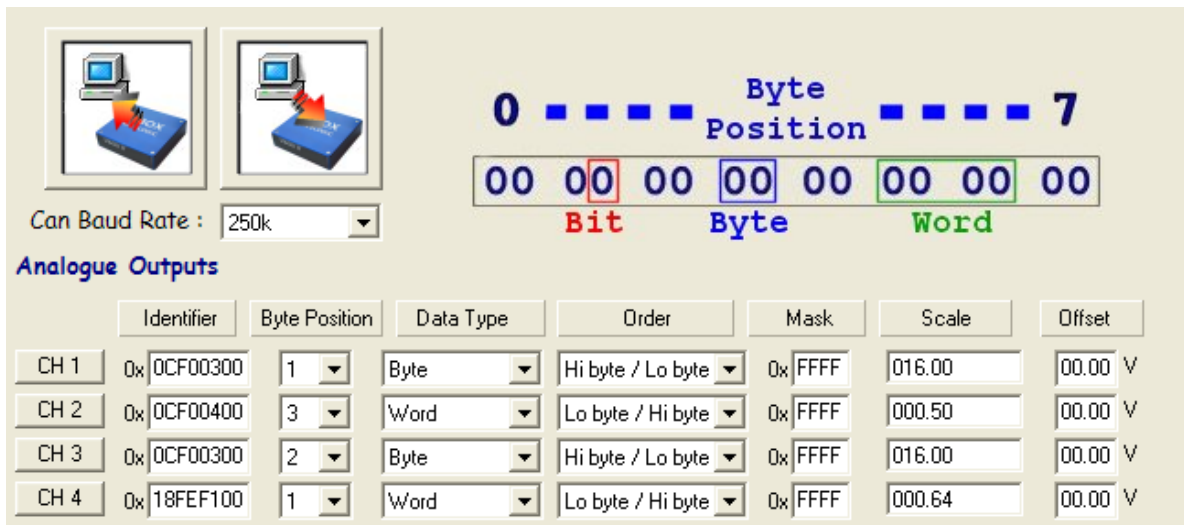


Example CAN Identifier = 0x0CF00400

For a message such as the EEC1 message (PGN 0xF004), the source address will generally be 0x00, corresponding to the engine controller. Therefore, the CAN identifier for the EEC1 message is generally going to be 0x0CF00400. This is not however the case for all PGNs. This is because there are some vehicle functions which may be controlled by different ECUs. For example PGN 0xFE1 corresponds to cruise control functions. In this case, the source address could be 0x00 if the engine controller is also controlling the cruise function, or it could be another address if there is a dedicated cruise control ECU.

The DAC01 is a CAN Bus device and can be programmed to accept any CAN identifier. However, it only looks at the complete CAN identifier and not individual parts of it (ie; the PGN number) so it is important to determine the correct identifier based on the source addresses used. This information can normally be confirmed with the vehicle manufacturer or by analysing the Bus data with a CAN analyser.

Below are example settings for analogue output of some common J1939 parameters using the DAC01.



The screenshot shows the DAC01 configuration software. At the top, there are two icons of the device and a 'Can Baud Rate' dropdown set to '250k'. Below this is a 'Byte Position' diagram showing a sequence of bits from 0 to 7, with '00 00' highlighted in red (Bit), '00 00' in blue (Byte), and '00 00' in green (Word). The main section is titled 'Analogue Outputs' and contains a table with the following data:

| Channel | Identifier | Byte Position | Data Type | Order | Mask | Scale | Offset |
|---------|------------|---------------|-----------|-------------------|--------|--------|---------|
| CH 1 | 0x0CF00300 | 1 | Byte | Hi byte / Lo byte | 0xFFFF | 016.00 | 00.00 V |
| CH 2 | 0x0CF00400 | 3 | Word | Lo byte / Hi byte | 0xFFFF | 000.50 | 00.00 V |
| CH 3 | 0x0CF00300 | 2 | Byte | Hi byte / Lo byte | 0xFFFF | 016.00 | 00.00 V |
| CH 4 | 0x18FEF100 | 1 | Word | Lo byte / Hi byte | 0xFFFF | 000.64 | 00.00 V |

The channels are set as follows:-

- Channel1 – Accelerator pedal from PGN 0xF003
- Channel2 – Engine speed from PGN 0xF004
- Channel3 – Engine load from PGN 0xF003
- Channel4 – Vehicle speed from PGN 0xFE1

For the DAC01, a full-scale output of approx 10V is obtained with a DAC value of 4096. Therefore, the scale values have been chosen to give full-scale output at the corresponding maximum CAN value.

Example:

Accelerator pedal. J1939 spec defines 0 to 100% with 0.4% per bit. The CAN data will therefore range from 0 to (100/0.4 = 250). A scale of 16 gives a DAC value of 4000 (approx 10v output) at full throttle.