**LFEV-Y5-2017**

v1

**LFEV-Y5-2017**

CAN Bus ICD

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This document describes how the CAN Bus worked in the LFEV car.

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**Fall**

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# Overview

The CAN Bus network is used to talk between all sensors and VSCADA. Devices jabber on the network with each sensor having a unique ID. VSCADA accepts sensor packets and decodes the raw bytes into useful values. The largest ID can be 0x7FF.

# Hardware interface

There are 2 hardware connection options; a 6-pin and a 9-pin connector. These are documented in the appendix. Any traces on a PCB should be 120 ohms and differentially routed. The cable should be twisted pair.

# ID allocation by subsystem

## Tractive System Voltage sensors

### IDs

|  |  |
| --- | --- |
| Device ID | Description |
| 0x100 | Pack 1 state |
| 0x101 | Pack 1 voltage |
| 0x102 | Pack 1 current |
| 0x103 | Pack 1 SOC |
| 0x104 | Pack 1 Coulombs |
| 0x110 | Pack 1 cell status 1 |
| 0x111 | Pack 1 cell status 2 |
| 0x112 | Pack 1 cell status 3 |
| 0x113 | Pack 1 cell status 4 |
| 0x114 | Pack 1 cell status 5 |
| 0x115 | Pack 1 cell status 6 |
| 0x116 | Pack 1 cell status 7 |
| 0x120 | Pack 1 cell voltage 1 |
| 0x121 | Pack 1 cell voltage 2 |
| 0x122 | Pack 1 cell voltage 3 |
| 0x123 | Pack 1 cell voltage 4 |
| 0x124 | Pack 1 cell voltage 5 |
| 0x125 | Pack 1 cell voltage 6 |
| 0x126 | Pack 1 cell voltage 7 |
| 0x130 | Pack 1 cell temp 1 |
| 0x131 | Pack 1 cell temp 2 |
| 0x132 | Pack 1 cell temp 3 |
| 0x133 | Pack 1 cell temp 4 |
| 0x134 | Pack 1 cell temp 5 |
| 0x135 | Pack 1 cell temp 6 |
| 0x136 | Pack 1 cell temp 7 |
| 0x200 | Pack 2 state |
| 0x201 | Pack 2 voltage |
| 0x202 | Pack 2 current |
| 0x203 | Pack 2 SOC |
| 0x204 | Pack 2 Coulombs |
| 0x210 | Pack 2 cell status 1 |
| 0x211 | Pack 2 cell status 2 |
| 0x212 | Pack 2 cell status 3 |
| 0x213 | Pack 2 cell status 4 |
| 0x214 | Pack 2 cell status 5 |
| 0x215 | Pack 2 cell status 6 |
| 0x216 | Pack 2 cell status 7 |
| 0x220 | Pack 2 cell voltage 1 |
| 0x221 | Pack 2 cell voltage 2 |
| 0x222 | Pack 2 cell voltage 3 |
| 0x223 | Pack 2 cell voltage 4 |
| 0x224 | Pack 2 cell voltage 5 |
| 0x225 | Pack 2 cell voltage 6 |
| 0x226 | Pack 2 cell voltage 7 |
| 0x230 | Pack 2 cell temp 1 |
| 0x231 | Pack 2 cell temp 2 |
| 0x232 | Pack 2 cell temp 3 |
| 0x233 | Pack 2 cell temp 4 |
| 0x234 | Pack 2 cell temp 5 |
| 0x235 | Pack 2 cell temp 6 |
| 0x236 | Pack 2 cell temp 7 |
| 0x300 | Pack 3 state |
| 0x301 | Pack 3 voltage |
| 0x302 | Pack 3 current |
| 0x303 | Pack 3 SOC |
| 0x304 | Pack 3 Coulombs |
| 0x310 | Pack 3 cell status 1 |
| 0x311 | Pack 3 cell status 2 |
| 0x312 | Pack 3 cell status 3 |
| 0x313 | Pack 3 cell status 4 |
| 0x314 | Pack 3 cell status 5 |
| 0x315 | Pack 3 cell status 6 |
| 0x316 | Pack 3 cell status 7 |
| 0x320 | Pack 3 cell voltage 1 |
| 0x321 | Pack 3 cell voltage 2 |
| 0x322 | Pack 3 cell voltage 3 |
| 0x323 | Pack 3 cell voltage 4 |
| 0x324 | Pack 3 cell voltage 5 |
| 0x325 | Pack 3 cell voltage 6 |
| 0x326 | Pack 3 cell voltage 7 |
| 0x330 | Pack 3 cell temp 1 |
| 0x331 | Pack 3 cell temp 2 |
| 0x332 | Pack 3 cell temp 3 |
| 0x323 | Pack 3 cell temp 4 |
| 0x324 | Pack 3 cell temp 5 |
| 0x325 | Pack 3 cell temp 6 |
| 0x326 | Pack 3 cell temp 7 |
| 0x400 | Pack 4 state |
| 0x401 | Pack 4 voltage |
| 0x402 | Pack 4 current |
| 0x403 | Pack 4 SOC |
| 0x404 | Pack 4 Coulombs |
| 0x410 | Pack 4 cell status 1 |
| 0x411 | Pack 4 cell status 2 |
| 0x412 | Pack 4 cell status 3 |
| 0x413 | Pack 4 cell status 4 |
| 0x414 | Pack 4 cell status 5 |
| 0x415 | Pack 4 cell status 6 |
| 0x416 | Pack 4 cell status 7 |
| 0x420 | Pack 4 cell voltage 1 |
| 0x421 | Pack 4 cell voltage 2 |
| 0x422 | Pack 4 cell voltage 3 |
| 0x423 | Pack 4 cell voltage 4 |
| 0x424 | Pack 4 cell voltage 5 |
| 0x425 | Pack 4 cell voltage 6 |
| 0x426 | Pack 4 cell voltage 7 |
| 0x430 | Pack 4 cell temp 1 |
| 0x431 | Pack 4 cell temp 2 |
| 0x432 | Pack 4 cell temp 3 |
| 0x433 | Pack 4 cell temp 4 |
| 0x434 | Pack 4 cell temp 5 |
| 0x435 | Pack 4 cell temp 6 |
| 0x436 | Pack 4 cell temp 7 |

### Data packet formats

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sensor | Buffer(7) | 6 | 5 | 4 | 3 | 2 | 1 | Buffer(0) |
| 0x100  0x200  0x300  0x400 |  |  |  |  |  |  |  | Pack state |
| 0x101  0x201  0x301  0x401 |  |  |  |  |  |  | Pack voltage  [15:8]  (Volts) | Pack voltage  [7:0]  (Volts) |
| 0x102  0x202  0x302  0x402 |  |  |  |  | Pack Current [31:24] (Amps) | Pack Current  [23:16] (Amps) | Pack Current  [15:8] (Amps) | Pack Current  [7:0] (Amps) |
| 0x104  0x204  0x304  0x404 |  |  |  |  | Pack coulombs [31:24]  (coulombs) | Pack coulombs [23:16]  (coulombs) | Pack coulombs [15:8]  (coulombs) | Pack coulombs [7:0]  (coulombs) |
| [0x110:  0x116]  [0x210:  0x216]  [0x310:  0x316]  [0x410:  0x416] |  |  |  |  |  |  |  | Cell State |
| [0x120:  0x126]  [0x220:  0x226]  [0x320:  0x326]  [0x420:  0x426] |  |  |  |  |  |  | Cell Voltage [15:8]  (Volts) | Cell Voltage [7:0]  (Volts) |
| [0x130:  0x136]  [0x230:  0x236]  [0x330:  0x336]  [0x430:  0x436] |  |  |  |  |  |  | Cell Temp [15:8]  (°C) | Cell Temp [7:0]  (°C) |

## Tractive System Interface sensors

|  |  |
| --- | --- |
| Device ID | Description |
| 0x070 | TSI state |
| 0x071 | IMD |
| 0x072 | Brake |
| 0x073 | Throttle position |
| 0x074 | TSV Voltage |
| 0x075 | TSV Current |

## Cooling sensors

|  |  |
| --- | --- |
| Device ID | Description |
| 0x0F0 | Cooling state |
| 0x0F1 | outlet fluid temp |
| 0x0F2 | fluid flow rate |
| 0x0F3 | inlet fluid temp |

## Grounded Low Voltage

GLV does not use the CAN Bus for data. The Raspberry Pi can connect directly to sensors and parse information as required.

# Appendix A - Hardware Interfaces

## 6 pin connector



Figure 1 - 6 pin connector

## 9 pin connector

