CCGM – Centralized CAN Cell Group Module (CCGM024B)

INTRODUCTION

EMUS Centralized Cell Group Module (CCGM) is a battery cells communication adapter (or "Slave unit") equipped with two CAN connectors for easy BMS system assembly and integrated proprietary EMUS software that allows data transfer within 100ms frequency. The CCGM performs all cell data measuring by itself, so the product allows saving space by reducing the need of having cell modules and three-way connectors. The CCGM increases the speed of the cell data broadcasting and provides for each connected battery cell balancing functionality.

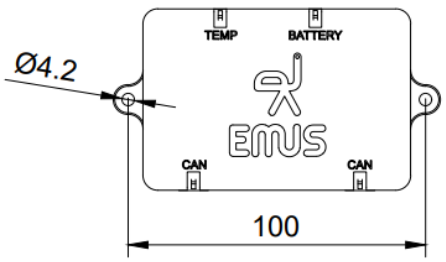
APPLICATIONS

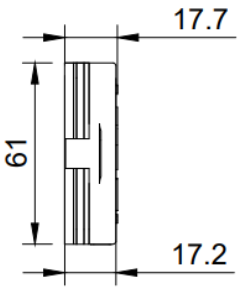
- Any lithium chemistry, series-connected battery pack, or a pack of multiple parallel strings, of up to 512 cells total if using 32 EMUS Centralized CAN Cell Group Modules with connected 16 cells on each. (centralized cell monitoring)

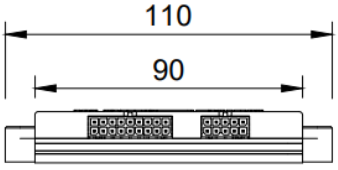
FEATURES

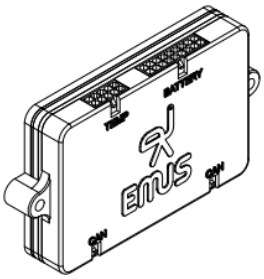
- 2x CAN connectors. Enables communication with CAN equipped EMUS G1 Control Unit and EMUS Centralized Cell Group Modules.
- Supports from 6 up to 16 lithium cells.
- 5x external temperature sensors.
- Using Temperature Breakout (or Extender) Boards (TBB011A), it is possible to extend up to 30 temperature sensors.
- Balancing of cells, 400mA per cell.
- Supports 50, 125, 250, 500, 800 kbit/s and 1 Mbit/s CAN baud rates.

MECHANICAL INFORMATION









CONNECTION LAYOUT

Cells Layout: Ext. Temperature Sensors Layout:

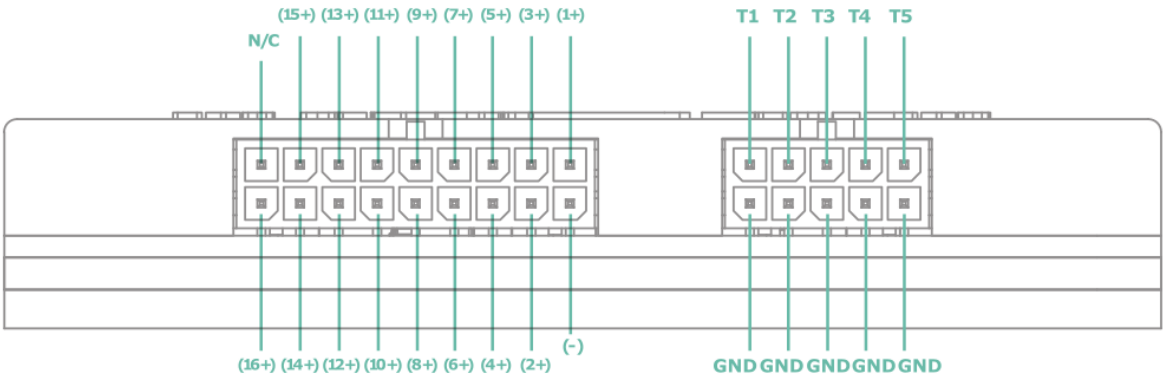


Table 1. CCGM pin assignment

Assignment	Mating Housing	Terminal
(-)*	Micro-Fit 43025-1800 cell connector	43030-0003Molex Micro-latch crimps (recommended crimp tool Molex Hand Crimp Tool P/N: 638190000)
1+		
2+		
3+		
4+		
5+		
6+		
7+		
8+		
9+		
10+		
11+		
12+		
13+		
14+		
15+		
16+		
N/C		
5XGND*	Micro-Fit 43025-1000 Temp connector	43030-0003 (recommended crimp tool Molex Hand Crimp Tool P/N: 638190000)
T1		
T2		
T3		
T4		
T5		

CAN Connection Layout:

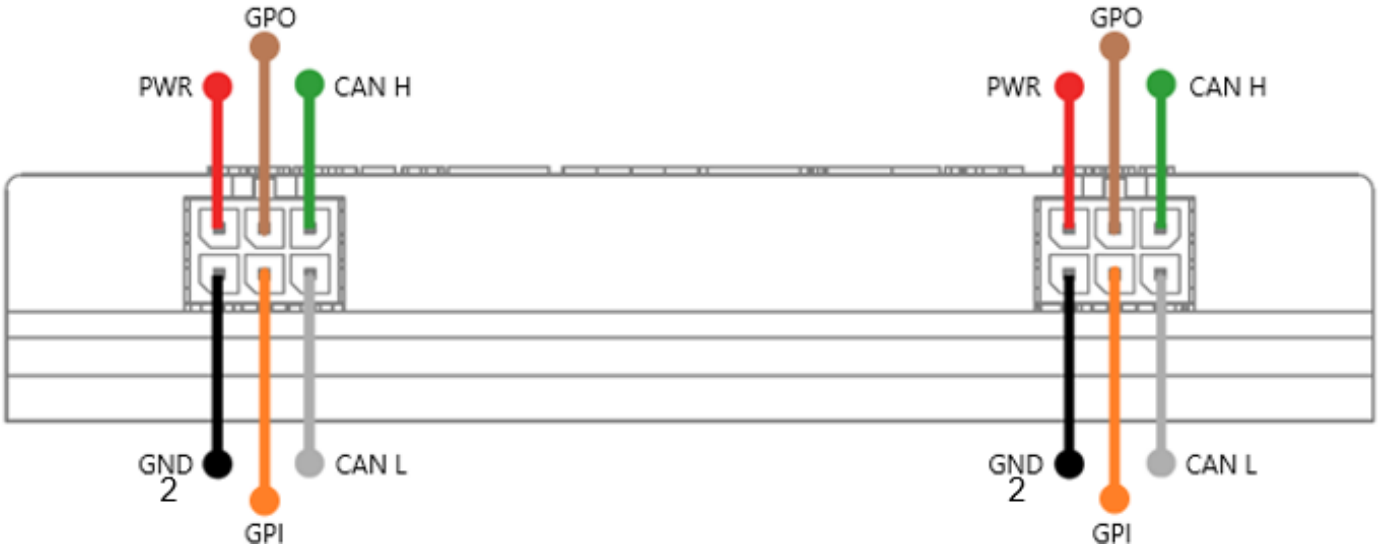


Table 2. CCGM CAN side pin assignment

Assignment	Mating Housing	Terminal
PWR	2x Micro-Fit 43025-0600	43030-0003 (recommended crimp tool Molex Hand Crimp Tool P/N: 638190000)
GND2*		
GPO**		
GPI**		
CAN_H		
CAN_L		

*GND & GND2 are independent Grounds / GND1 and (-) are the same electrical point
**GPO & GPI are not energized. They require to be powered from the same power source as the CCGM (consult Table 3 voltage ranges)

ELECTRICAL CHARACTERISTICS

Table. 3 CCGM electrical characteristics

Item	Conditions	Value
Supply voltage		8-72V
Battery voltage		12.0V to 79.2V
Power supply reverse protection		Yes
Current consumption on CAN side		2.2 mA @ 68V - 8.7 mA @ 12V
Current consumption on battery side	Sleep	35uA @ 57.6V
	Active	5mA @ 57.6V
Maximum Balancing Current	Per Cell	400mA*
Maximum Repetitive Peak Isolation Voltage	V_{IORM}	1050V
Maximum Withstand Isolation Voltage	V_{ISO} (duration = 60s)	5000V

Item	Conditions	Value
Transient/overvoltage protection between CAN H/CAN L and GND (and vice versa)		24V
Absolute Cell Voltage Limits		0 – 4.95V
General purpose output max sinking current (resettable fuse trip current)		0.75A
General purpose output pin (GPO) max. voltage		32VDC
General purpose input (GPI) ON voltage		5 to 72 VDC

*Depending on thermal conditions

OTHER SPECIFICATIONS

Table. 4 CCGM other specifications

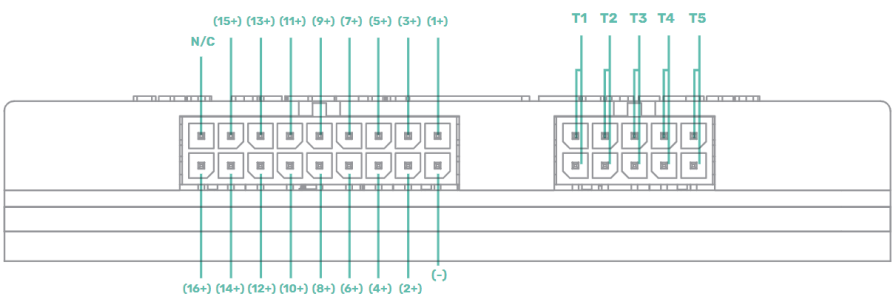
Item	Conditions	Value
Cell Count	Other Li chemistries	6-16
	LTO cell chemistry	8-16
CAN Speed		50kbps, 125kbps, 250kbps, 500kbps, 800kbps, 1Mbps (by default, 250kbps)
Reserved CAN IDs		0x1FFFFEE5 0x1FFFFEE6 0x1FFFE5E5 0x1FFFE5E6
Operating Temperature		-40 to +85 °C
IP rating		IP50
Weight	Without Quick Start Kit	120g
	With Quick Start Kit	160g
Cell communication wire length	In our Quick Start Kit	45cm
Temperature sensors wire length	In our Quick Start Kit	45cm
Cell Voltage	General Firmware	2.01 – 4.54V
	LTO Firmware	1.01 – 3.54V

*Minimum Cell Count equals the number of cells required to provide 12V. Check Installation chapter for further information

INSTALLATION

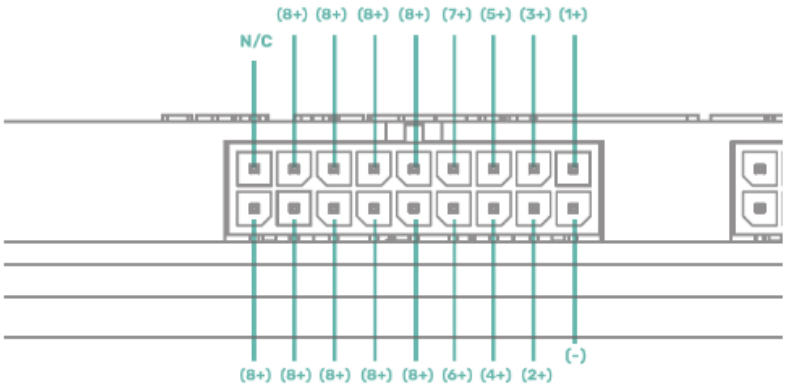
To set up the 16 cells and 5 external temperature sensors please refer to figure below.

Cells Layout: Ext. Temperature Sensors Layout:



To set up less than16 cells please refer to figure below. Example picture for 8 cells.

Cells Layout: (using other amount of cells)



Minimum cell count depends on the cell chemistry used. The lowest supported battery pack voltage by internal CCGM parts is 12V, therefore if LTO cells are used then the minimum cell count should be calculated accordingly.
E.g., if LTO cell's expected lowest voltage is 1.5V then the minimum number of cells required would be 8 [12V / 1.5V = 8 cells].

$$12\text{V} \div V_{CellMin} = MinimumNumOfCells$$

NOTE: the absolute minimum total battery pack voltage is 9V, however it is not guaranteed that the device will sense cell voltages correctly.

NOTE: Connection must start from the most negative cell to the most positive. In cases when cells number is less than 16, e.g., 8 cells, then free cells connection wires (dedicated for 9th-16th cells) must ALL be connected to the last 8th (most positive cell).