



# G1 Control Unit

Product Code: CU021F

## Introduction

EMUS **G1 Control Unit** (or simply **Control Unit**) is the main controller that autonomously executes all core and utility functions of battery management. It interacts with all other first party and third-party components in the system using various inputs, outputs, and interfaces that are populated on its main 22 pin and secondary 8 pin connectors. The device is also flexible and allows by using EMUS Control Panel, to monitor and configure more than 300 battery management system parameters.



## Applications

- Any lithium chemistry, series connected battery pack of up to 80 cells if using serial cell communication. (distributed regular)
- Any lithium chemistry, series connected battery pack, or pack of multiple parallel strings, of up to 24 CGM or CCGM slaves.

## Features

- USB data interface for quick connection to a host device when configuration, diagnostics, or maintenance is needed
- RS232 data interface for continuous BMS activity monitoring by using third party or first party EMUS G1 BMS devices
- Serial interface for cell communication with TOP/BOT isolators (Distributed Regular)
- Non isolated CAN 2.0 A/B data interface. Enables to communicate with CAN equipped EMUS G1 BMS components, control third party charging devices
- State of Charge (SOC), State of Health (SOH) calculations

## Mechanical Information

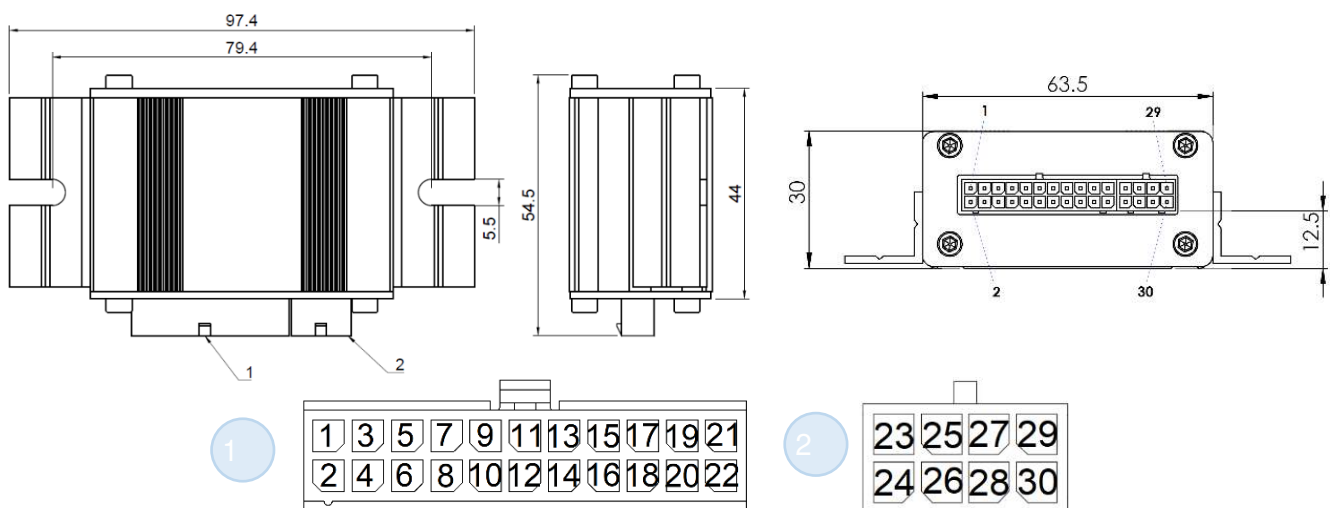


Table 1. CU021F pin assignment

Pin No.	Assignment	Mating Housing	Terminal
1	PWR	43025-2200 Microfit 22 Pin	43030-0003 (recommended crimp tool Molex Hand Crimp Tool)
2	GROUND		



# G1 Control Unit

Product Code: CU021F

Pin No.	Assignment	Mating Housing	Terminal		
3	CELL RX+	Header or equivalent	P/N: 638190000)		
4	CELL RX-				
5	CELL TX+				
6	CELL TX-				
7	USB PWR				
8	GROUND				
9	USB D+				
10	USB D-				
11	DISP.TX				
12	DISP.RX				
13	HEATER				
14	BAT.LOW			43025-2200 Microfit 22 Pin Header or equivalent	43030-0003 (recommended crimp tool Molex Hand Crimp Tool P/N: 638190000)
15	BUZZER				
16	CHG.IND.				
17	CHARGER				
18	FAST CHG.				
19	IGN.IN				
20	AC SENSE				
21	CAN+				
22	CAN-				
23	SPEED IN	43025-0800 Microfit 8pin Connector or equivalent			
24	SOC OUT				
25	+5V OUT				
26	GROUND				
27	INPUT 4				
28	INPUT 3				
29	INPUT 2				
30	INPUT 1				

## Electrical Characteristics

Table 2. CU021F electrical characteristics

Item	Conditions	Value	
Operating voltage	Nominal	9 to 64 VDC	
	Absolut min/max	7 to 72 VDC	
Power supply reverse polarity protection	-	Yes	
Current consumption	At typical supply voltage nothing else connected	12 VDC typical 26 mA	24 VDC typical 13.6 mA
Current consumption	At typical supply voltage, with Current Sensor connected (CS013A)	12 VDC typical 39 mA	24 VDC typical 19 mA
General purpose output max sinking	-	0.5 A	



# G1 Control Unit

Product Code: CU021F

Item	Conditions	Value
current (resettable fuse trip current)		
General purpose output max transient sinking current	100ms	0.75A
General purpose output max voltage	-	32 VDC*
General purpose input ON voltage	-	5 to 32 VDC
General purpose input OFF voltage	-	0 VDC
Current sensor input ON voltage	Applies when pin is mapped with function other than PF14 Current	5 VDC
Current sensor input OFF voltage		0 VDC
SOC OUT output voltage range	Sensor Input	0 to 5 VDC
SOC OUT output resistance	-	1 kOhm
SOC OUT output PWM signal frequency	Applies when pin is mapped with function PF11 State of Charge Output or function PF18 Analog Charger Control Output	7.8125 kHz
SPEED IN input signal frequency range	Applies when SPEED IN input is mapped with function PF1 Speed Sensor Input	7kHz
SPEED IN input ON voltage	-	5 to 32 VDC
SPEED IN input OFF voltage	-	0 VDC
USB interface controller	-	FT232R
USB power supply data line transient/overvoltage protection	-	5 VDC
USB/RS232 interface galvanic isolation	-	None
USB interface duplexity	-	Full duplex (send and receive)
RS232 interface duplexity	USB not connected	Full duplex (send and receive)
	USB connected	Half duplex (send only)
USB/RS232 interface baud rate	-	57.6kbps
USB/RS232 interface data bits	-	8 bits
USB/RS232 interface parity	-	None
USB/RS232 interface stop bits	-	1 bit

\*GPO pins are not protected against transient reversed voltage, connected devices must be properly protected next to coil terminals

## Electrical Characteristics

Table 3. CU021F other specifications

Item	Condition	Value
Max number of Cell Modules in cell communication daisy chain when using Top and Bottom Isolators	-	80
Max number of CAN Cell Group Modules on CAN bus	-	24
Max number of Centralized CAN Cell Group Modules on CAN bus	-	24
Operating temperature	-	-40 to +85°C
IP rating	-	IP54
Weight	With quick start kit	181 g
	Without quick start kit	94 g



# G1 Control Unit

Product Code: CU021F

## Compatible chargers and inverters

Table 4. CU021F compatible chargers and inverters

Inverter	Communication Protocol
Afore	CAN
Atess	CAN
Deye	CAN
Goodwee	CAN
Growatt	CAN
SERMATEC	CAN
SMA Sunny Island	CAN
SolArk	CAN
Victron	CAN
Charger	Communication Protocol
ADY	CAN J1939
Analog Controlled Charger	I/O Controlled
ATIB HTC & HTUD	CAN
Brusa NLG644	CAN
Delta-Q	CANOpen
EDN	CAN
Elcon	CAN J1939
Eltek Valere EV Power	CAN
Enpower	CAN J1939
G-Power EV33	CAN
HF/PFC	CAN J1939
IEB	CAN J1939
Ingeteam	CAN
Micropower Group Lion	CAN
Non-CAN	I/O Controlled
PYLON	CAN
Powerfinn Robust and PAP3200	CAN
Shinry	CAN
Stercom	CAN
TC	CAN J1939
TSM	CAN
Zivan RE protocol	CAN
ZVU	I/O Controlled



**NOTE:** For all chargers recently supported please refer to <https://emusbms.com>  
For more information on each charger communication protocol, contact the charger manufacturer.