



CURTIS

Motor Controllers



Brushed DC Permanent Magnet Motor Controller

Model 1212E



CE
UL
UK
CA



1212E



The Curtis Model 1212E Motor Controllers provide efficient, optimal control of Brushed Permanent Magnet (PM) motors for battery powered vehicles. The 1212E is optimized for use on light duty Class III pallet trucks and floor care machines such as sweepers and scrubbers. The Model 1212E controllers are highly programmable, enabling OEMs to integrate the controllers into any low-power PM motor application.

FEATURES

Fit for Purpose

- ▶ Rugged housing with a small footprint for the power rating.
- ▶ Heavy-duty M4 busbars for motor and battery connectors.
- ▶ Impervious to most oils, solvents, degreasers and other chemicals often encountered by industrial vehicles.
- ▶ Tyco Mini-Universal Mate-N-Lok connectors, with an option to add sealed mating connectors.
- ▶ Internal main relay.
- ▶ Internal temperature sensor provides overtemperature and undertemperature protection.

Smooth and Secure Control

- ▶ Advanced speed regulation maintains precise speed over varied terrain, obstacles, curbs and ramps.
- ▶ Boost Current feature enhances performance with transient loads, such as starting on a hill and climbing obstacles.
- ▶ Linear cutback of current ensures smooth control with no sudden loss of power during overvoltage, undervoltage, or overtemperature.
- ▶ Emergency reverse inputs.
- ▶ Dynamic throttle fault detection (open/short wiring fault detection).
- ▶ Adjustable EM brake holding voltage reduces heating of the brake coil.
- ▶ Hydraulic lift lockout protects the batteries from damaging levels of discharge.
- ▶ Charger inhibit input.
- ▶ Lift inhibit input.
- ▶ Inputs are protected against shorts to B+ and B-.
- ▶ Short-circuit protected outputs.
- ▶ A switchable high side driver (Coil Supply).



Flexible I/O

- ▶ I/O can be configured to provide up to:
 - Five digital inputs
 - Five analog inputs
 - One potentiometer input
 - Two 1.5A coil drivers for pump contactor and lower valve
 - One 1.5A coil driver for electromagnetic brake
 - One 30mA horn driver



FEATURES continued

Comprehensive CANopen Capabilities

- ▶ Plug and play support for the Curtis Model 3150R CAN display and a variety of CAN tiller heads.
- ▶ Fully compliant with CANopen protocol CiA 301.
- ▶ Preconfigured PDOs for communicating with a commander node such as a CAN tiller head.

Powerful, High Performance Dual Microprocessors

- ▶ Dual-micro architecture achieves category 2 functional safety under EN ISO 13849-1:2015 and EN 1175:2020.
- ▶ Ultra-fast processor speeds provide precise control and regulation of voltage and current.

Get More Out of Your Battery—Regardless of the Technology

- ▶ High-efficiency means more of your battery's energy is converted to motor output power.
- ▶ Configurable overvoltage and undervoltage protection parameters.
- ▶ Wide operating voltage range allows use with cell chemistries such as lithium ion.
- ▶ Preconfigured CANopen RPDO allows communications with Battery Management Systems (BMS) typically found on lithium battery packs.

CAN-based Programming

- ▶ Model 1212E is programmable over the CANbus. This allows vehicle level communication with many of the CAN-based service tools used by the major industrial truck manufacturers worldwide.
- ▶ Allows use of the Curtis Integrated Toolkit development tool.

Diagnostics

- ▶ Status LED for at-a-glance troubleshooting.
- ▶ Thermal cutback, warning, and automatic shutdown provide protection to motor and controller.
- ▶ Error logging, fault history tables and CAN emergency messages.

Valuable Additional Features

- ▶ Two programmable speed modes (indoor/outdoor modes).
- ▶ Configurable Battery Discharge Indicator (BDI) function that uses data from the controller's internal BDI, a BMS, or the CANbus.
- ▶ Creep mode for vehicles operating in narrow spaces such as containers.
- ▶ Sleep mode preserves charge by powering down the controller after a programmable period of inactivity.
- ▶ Inching mode with a programmable maximum speed allows the vehicle to move in forward or reverse when the interlock is off.
- ▶ Five flexible inputs that can be configured as digital or analog inputs.
- ▶ The flexible inputs can be used for a variety of functions, including hydraulic lift, lower valve, lift lockout, horn, creep mode, and more.



Meets or Complies with Relevant US and International Regulations

- ▶ EMC: Designed to the requirements of EN 12895:2015+A1:2019.
- ▶ Safety: Designed to the requirements of EN ISO 13849-1:2015 and EN 1175:2020.
- ▶ UL583 recognized component.
- ▶ Electronics sealed to IP65 per IEC 60529 (connectors can optionally be sealed to IP54).
- ▶ TÜV Certified. Certificate number AK 50624859 0001.

Regulatory compliance of the complete vehicle system with the controller installed is the responsibility of the vehicle OEM.



Curtis Model 3150

A CAN-based color LCD vehicle status display in a rugged 52 mm diameter housing is the ideal partner to Model 1212E.

- ▶ Battery Discharge Indicator, Service (Hours) Counter and Diagnostic/Message Center functions.
- ▶ Sealed to IP67 front and IP65 rear.
- ▶ CE/UKCA compliant.
- ▶ UL583 recognized component.
- ▶ Optional heater.
- ▶ For more information, see the [Curtis Instrumentation](#) page.

The Curtis Integrated Toolkit

The Curtis Integrated Toolkit (CIT) provides a suite of development and diagnostic tools for working with CAN systems that use Curtis and third-party CAN devices. CIT consists of the following tools:

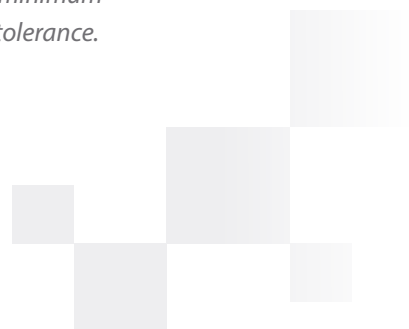
- ▶ **Launchpad**
Starting point and project editor.
- ▶ **Programmer**
Configure parameters, view monitor values, and view active faults and the fault history.
- ▶ **TACT**
Stand-alone oscilloscope and data-logging tool.
- ▶ **VCL Studio**
Editor and compiler for VCL software.
- ▶ **Menu Editor**
Create and modify programming menus.
- ▶ **Package & Flash**
Load your software into CAN devices.

The Curtis Integrated Toolkit is compatible with many leading USB>CAN interface dongles from Peak, Kvaser, iFAC, Sontheim, etc. For more information, see the [Curtis Programming](#) page.

MODEL CHART

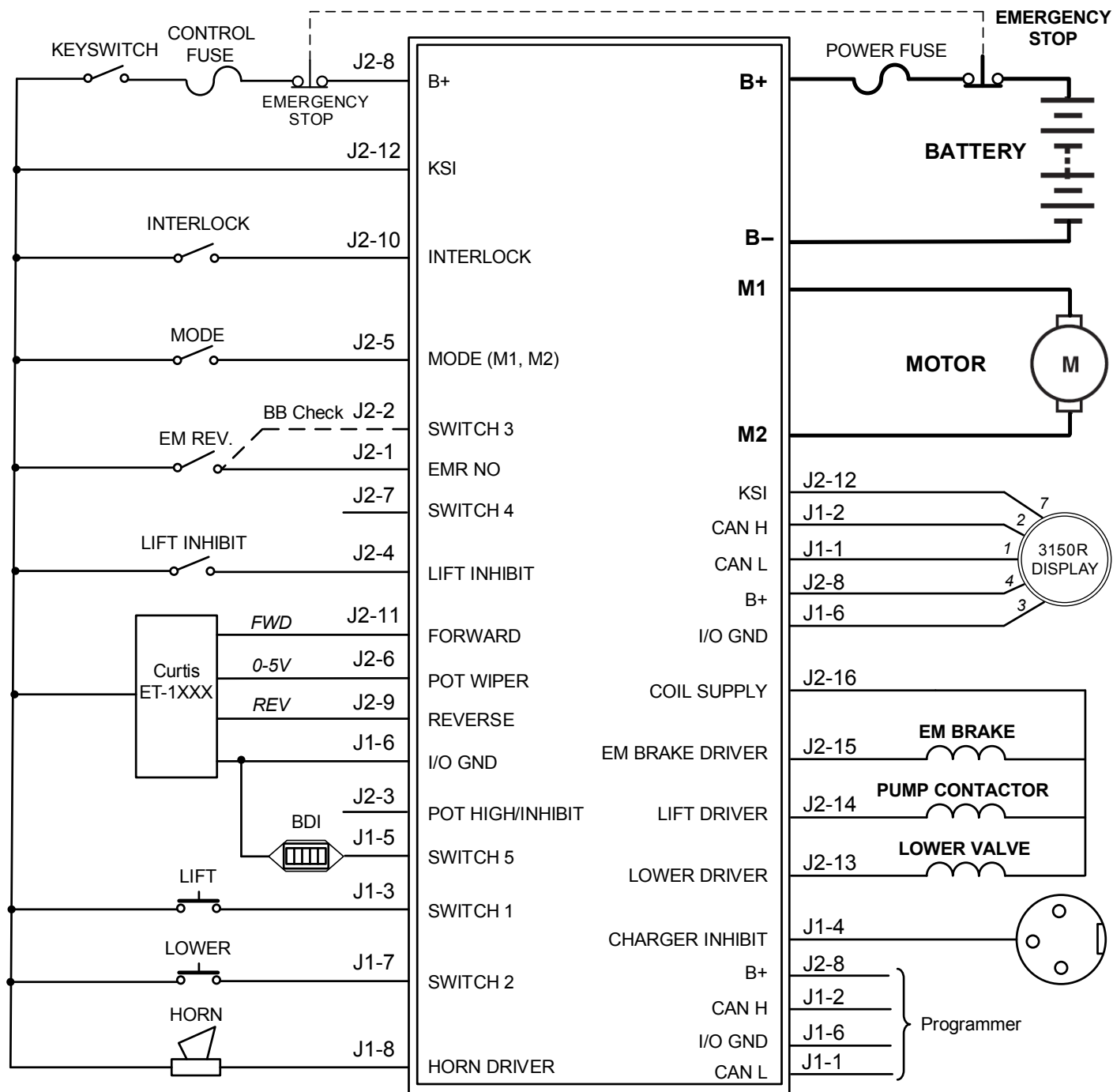
Model Number	Nominal Voltage	10 Second Rating	2 Minute Rating	1 Hour Rating
1212E-25xx	24V	90A	50A	20A

The current ratings are based on mounting the controller on an aluminum plate (180 mm x 200 mm x 8 mm). The initial heatsink temperature is 25°C. The motor current is held at the rating being tested for a minimum of 120% of the rated time before thermal limiting begins. The current ratings have a 5%/5A error tolerance.





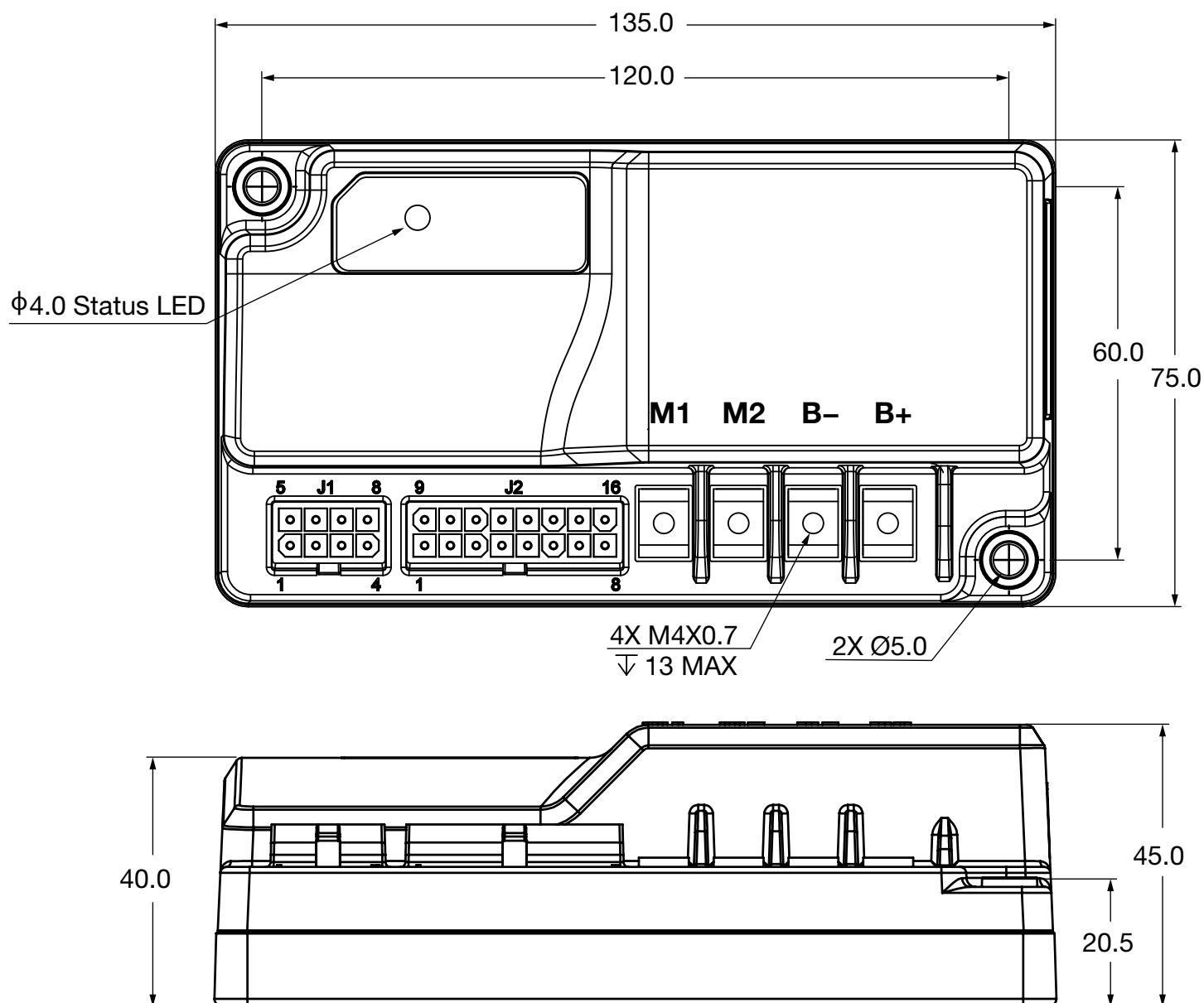
WIRING DIAGRAM



1212E

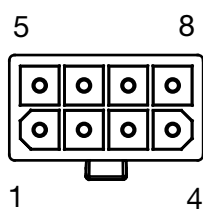


DIMENSIONS mm



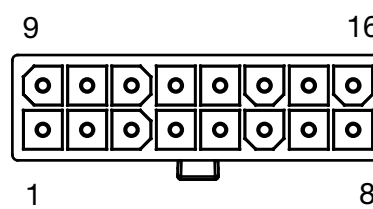


CONNECTOR PINOUT CHARTS



J1

Pin	Description
1	CAN L
2	CAN H
3	Switch 1
4	Charger Inhibit
5	Switch 5
6	I/O Ground
7	Switch 2
8	Horn Driver



J2

Pin	Description	Pin	Description
1	EMR NO	9	Reverse
2	Switch 3	10	Interlock
3	Pot-High / Inhibit	11	Forward
4	Lift Inhibit	12	KSI (keyswitch)
5	Mode Input	13	Lower Driver
6	Pot Wiper	14	Lift Driver
7	Switch 4	15	EM Brake Driver
8	B+	16	Coil Supply

MATING CONNECTOR

J1 8-PIN Connector

Part	IP54 (Sealed Connector)	IP40 (Unsealed Connector)
Connector	TYCO #794821-1, plug	TYCO #770579-1, plug
Contact	TYCO #770904-1	TYCO #770904-1
Interface Seals	TYCO #794772-8	
Wire Seals	TYCO #794758-1	
Cavity Plug	TYCO #794995-1 (Cavity plugs are required for unused pins.)	

J2 16-PIN Connector

Part	IP54 (Sealed Connector)	IP40 (Unsealed Connector)
Connector	TYCO #794824-1, plug	TYCO #770583-1, plug
Contact	TYCO #770904-1	TYCO #770904-1
Interface Seals	TYCO #1-1586362-6	
Wire Seals	TYCO #794758-1	
Cavity Plug	TYCO #794995-1 (Cavity plugs are required for unused pins.)	

1212E



SPECIFICATIONS

Nominal Input Voltage	24V
Electrical Isolation to Heatsink	500 VAC (minimum)
Storage Ambient Temperature	–40°C to 85°C
Operating Ambient Temperature	–40°C to 50°C
Thermal Cutback	The controller linearly reduces the maximum current limit when the internal heatsink temperature is between 80°C and 95°C; complete cutoff occurs above 95°C and below –40°C.
Design Life	8000 hours
Ingress Protection	Electronics sealed to IP65 per IEC 60529 (connectors can optionally be sealed to IP54).
Weight	0.5 kg
Dimensions (W x L x H)	75 mm x 135 mm x 45 mm
Mounting	2x ø5.0 mm
Power Connections	4X M4X0.7
EMC	Designed to the requirements of EN 12895:2015+A1:2019.
Safety	Designed to the requirements of EN ISO 13849-1:2015 and EN 1175:2020.
UL	UL recognized component per UL583.

WARRANTY Two year limited warranty from time of delivery.

