



CURTIS

Motor Controllers



# AC Induction and PMAC Motor Controllers

## **SE SERIES**



CE 





## Models 1232SE / 1234SE / 1236SE / 1238SE

A range of controllers (inverters) for the speed and torque control of 3-phase AC motors rated from 1kW to 25 kW. Intended for use as electric traction or hydraulic pump motor controllers for mobile, on-vehicle applications that use a 24-80Vdc nominal battery supply.

### The 'SE' Advantage

The Curtis 'SE' AC controllers utilize the latest technology to increase the peak current ratings for each size of controller. For a given rating, the SE models are smaller and lower cost than previous Curtis AC controllers, benefits that are highly advantageous for all types of applications.

### Only Curtis AC can offer:

**Curtis VCL™—Vehicle Control Language** is an easy to use programming language that allows vehicle developers to write powerful logic functions and create a 'virtual system controller.' Curtis offers customers VCL development tools and training. Curtis also provides a VCL service where Curtis engineers will work with the OEM to create any custom VCL code required.

**Field Oriented Control (FOC)** algorithms generate the maximum possible torque and efficiency across the entire speed range. Advanced Curtis control provides superb drive 'feel', improved speed regulation and increased gradeability.

**Curtis Auto-Tune** function enables quick and easy characterization of both AC induction motors (ACIM) and AC surface permanent magnet motors (SPM) without having to remove it from the vehicle. Internal Permanent Magnet motors (IPM) however might require further characterization on Curtis' dynamometer to ensure best possible efficiency.

**Dual-Drive Functionality** is standard, allowing correct control of applications featuring twin traction motors. This function ensures smooth and safe operation, minimal tire wear and correct load sharing between the traction motors at all times.

**Configurable CANbus** connection allows communication with other CANbus enabled devices. They are CANopen compatible and provide 24 VCL-configurable CAN 'mailboxes'—10 more than earlier Curtis AC controllers.

**Integrated System Controller**—More than just a motor controller, they are also powerful system controllers. They feature a comprehensive allocation of multi-function I/O pins for use as analog inputs, digital inputs, contactor coil drivers and proportional valve drivers. In addition to this local I/O, these controllers can use VCL to map and configure the remote I/O available on other CANbus devices, send messages to CAN displays and thus control and monitor the entire system.



Model 1232SE



Model 1234SE



Model 1236SE



Model 1238SE



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### FEATURES

#### Increased Performance, Improved Functionality

- ▶ Higher peak current rating allows use of a physically smaller controller for a given load, for easier installation in any vehicle.
- ▶ CE marked as a programmable safety device under EN ISO 13849-1.
- ▶ Models available for 250A–1000A output at 24–80V system voltages. These are true 2 minute RMS ratings, not short duration 'boost' ratings.
- ▶ Advanced control of AC induction and PMAC motors.
- ▶ Enhanced 64MHz micro and additional FLASH memory doubles the available VCL code space and provides more than twice the VCL execution speed.
- ▶ VCL-configurable CAN 'mailboxes' provide highly flexible CAN master capabilities.
- ▶ Advanced Pulse Width Modulation techniques produce low motor harmonics, low-torque ripple and minimized heating losses, resulting in high efficiency.

#### Unmatched Flexibility

- ▶ Programmable for either traction or pump applications.
- ▶ Field upgradeable software.
- ▶ Integrated battery state-of-charge algorithm and hour meters.
- ▶ Fully-featured generic software and VCL for typical Warehouse Truck applications is included on 24V 1232SE and 1234SE models.
- ▶ Comprehensive programming options and VCL allow other applications to be easily supported.
- ▶ Curtis hand-held or PC Windows programming tools provide easy programming and powerful system diagnostic tools.
- ▶ Integrated status LED provides instant diagnostic indication.

#### Robust Safety and Reliability

- ▶ Dual Microprocessor architecture cross-checks critical circuits, logic, and software functions to ensure the highest possible functional safety performance level is achieved.
- ▶ Insulated metal substrate power-base provides superior heat transfer for increased reliability.
- ▶ Fail-Safe power component design.
- ▶ Reverse polarity protection on battery connections.
- ▶ Short circuit protection on all output drivers.
- ▶ Thermal cutback, warning, and automatic shutdown provide protection to motor and controller.
- ▶ Rugged sealed housing and connectors meet IP65 environmental sealing standards for use in harsh environments.

#### Meets or complies with relevant US and International Regulations

- ▶ EMC: Designed to the requirements of EN 12895:2015.
- ▶ Safety: Designed to the requirements of:
  - EN1175-1:1998+A1:2010
  - EN (ISO) 13849-1 2015
- ▶ IP65 Rated per IEC 60529.
- ▶ UL recognized per UL583.
- ▶ 1238SE-592X UL583 Pending.
- ▶ Regulatory compliance of the complete vehicle system with the controller installed is the responsibility of the vehicle OEM.



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### FUNCTIONAL SAFETY DATA

Safety Function	Designated Architecture	MTTFd	DC	CCF	PL
Uncommanded Powered Movement	Category 2	>40 yrs	>90%	Pass	d
Motor Braking Torque	Category 2	>16 yrs	>90%	Pass	c

### MODEL CHART

Model	Motor Type	Nominal Battery Voltage (V)	Max Current [S2-2 Minute]	Max Current [S2-60 Minutes]
1232SE-242X	Induction	24	375Arms	185Arms
1232SE-247X	PMAC	24	375Arms	185Arms
1232SE-532X	Induction	36-48	350Arms	175Arms
1232SE-537X	PMAC	36-48	350Arms	175Arms
1232SE-632X	Induction	48-80	250Arms	145Arms
1232SE-637X	PMAC	48-80	250Arms	145Arms
1234SE-452X	Induction	24-36	500Arms	235Arms
1234SE-457X	PMAC	24-36	500Arms	235Arms
1234SE-542X	Induction	36-48	450Arms	215Arms
1234SE-547X	PMAC	36-48	450Arms	215Arms
1234SE-632X	Induction	48-80	350Arms	150Arms
1234SE-637X	PMAC	48-80	350Arms	150Arms
1236SE-462X	Induction	24-36	650Arms	285Arms
1236SE-562X	Induction	36-48	600Arms	260Arms
1236SE-652X	Induction	48-80	450Arms	185Arms
1238SE-492X	Induction	24-36	1000Arms	425Arms
1238SE-592X	Induction	36-48	900Arms	395Arms



Models 1232SE / 1234SE / 1236SE / 1238SE

## SYSTEM ACCESSORIES



**The Curtis Model 1222** is an AC induction motor controller for 'steer by wire' electric power steering systems and is the ideal partner for the 'SE' Controllers on vehicles such as reach trucks, order pickers, stackers and other similar industrial vehicles.



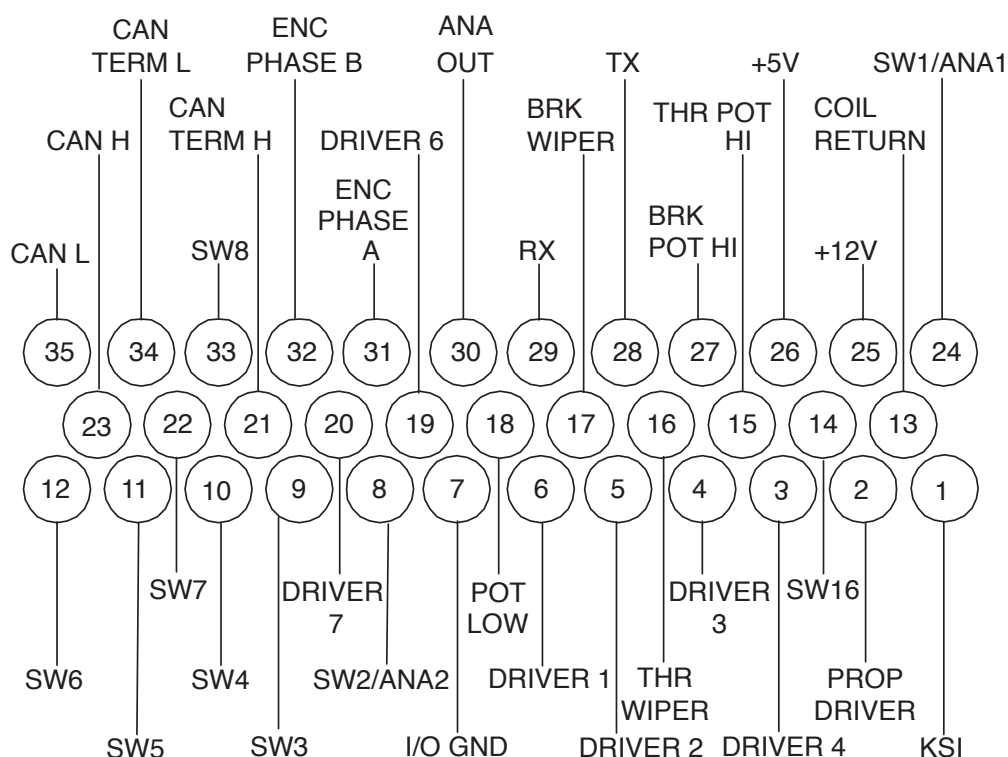
**The Curtis Model 1352** CANbus I/O expansion module features 9 I/O pins, including 6 proportional valve drivers. This module can be used to further expand the I/O capability of Curtis AC motor controllers using VCL.



**The Curtis Model 1313** Handheld Programmer is ideal for setting parameters and performing diagnostic functions.

Contact Curtis to obtain the VCL Vehicle Control Language compiler and development tools.

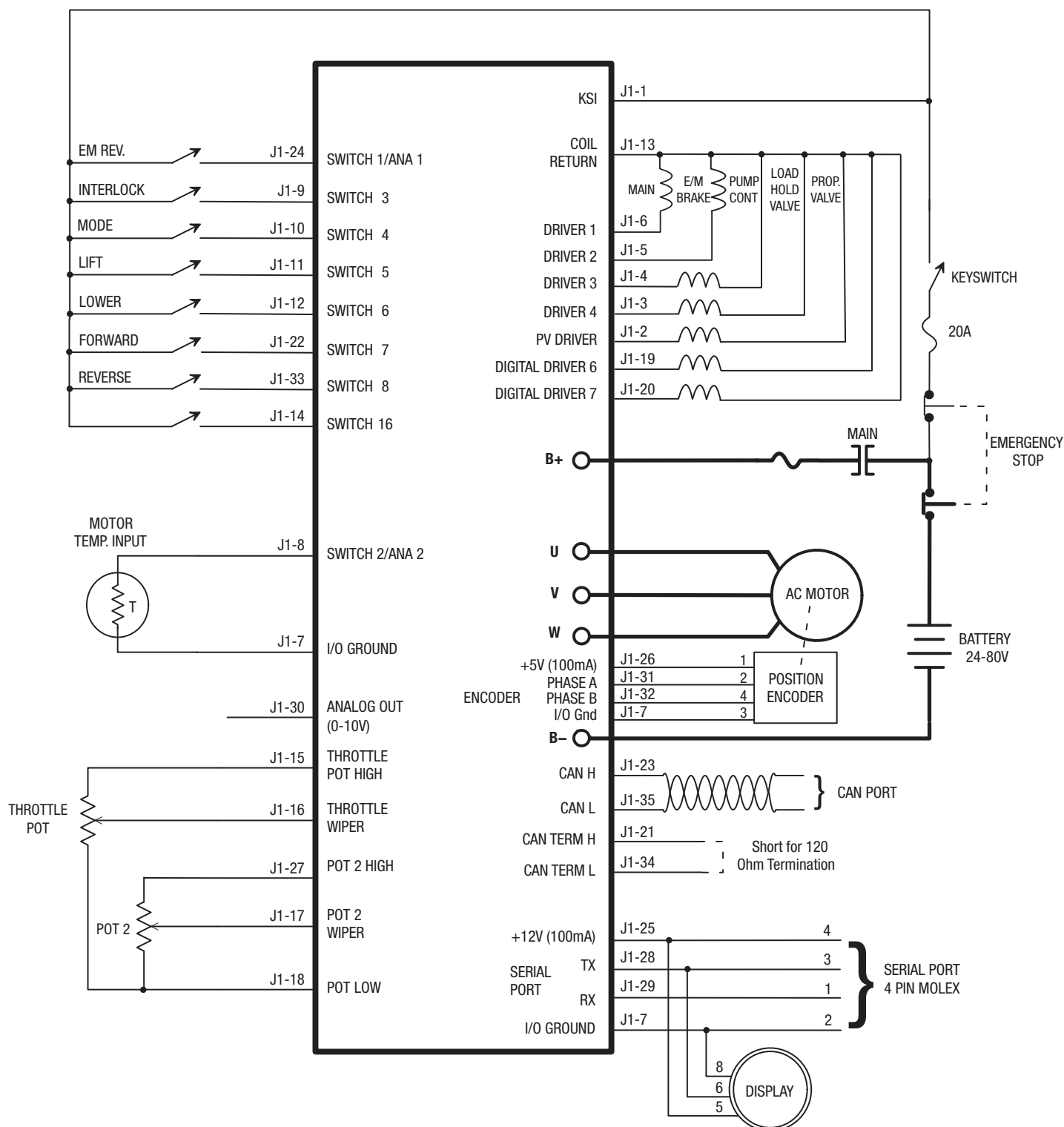
## CONNECTOR WIRING





Models 1232SE / 1234SE / 1236SE / 1238SE

## TYPICAL WIRING



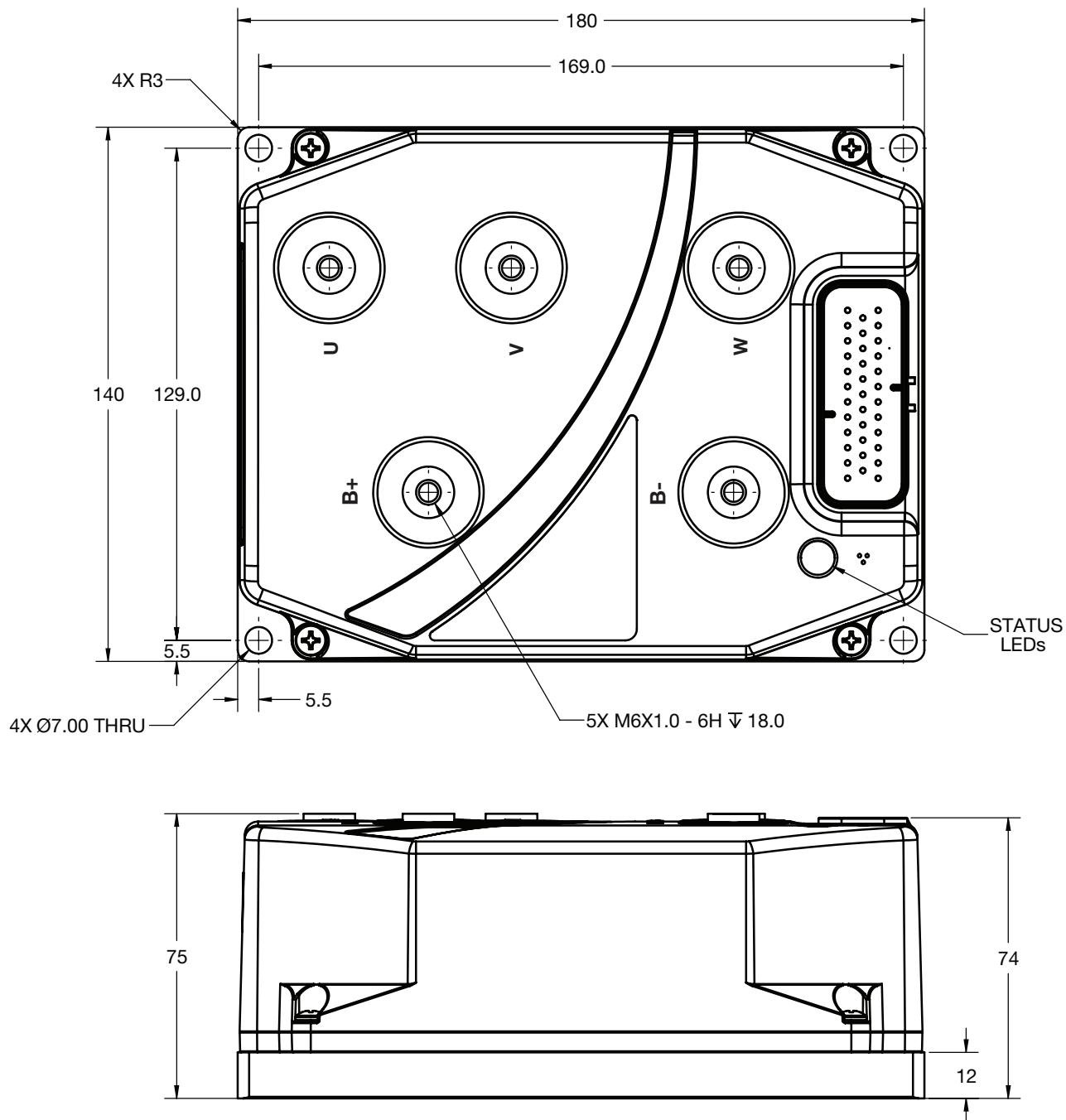




Models 1232SE / 1234SE / 1236SE / 1238SE

## DIMENSIONS mm (typical)

### 1232SE

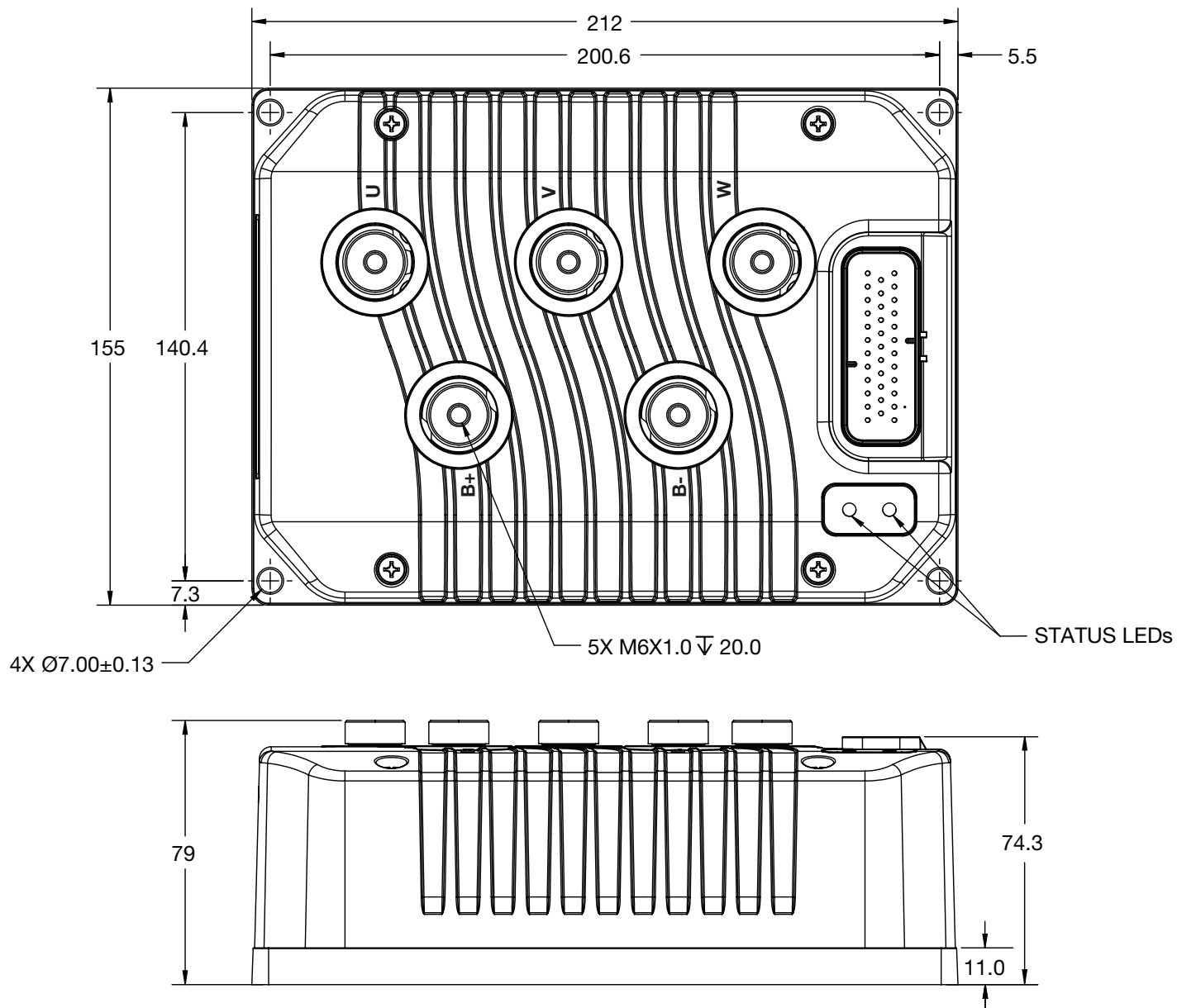




Models 1232SE / 1234SE / 1236SE / 1238SE

## DIMENSIONS mm (typical)

### 1234SE



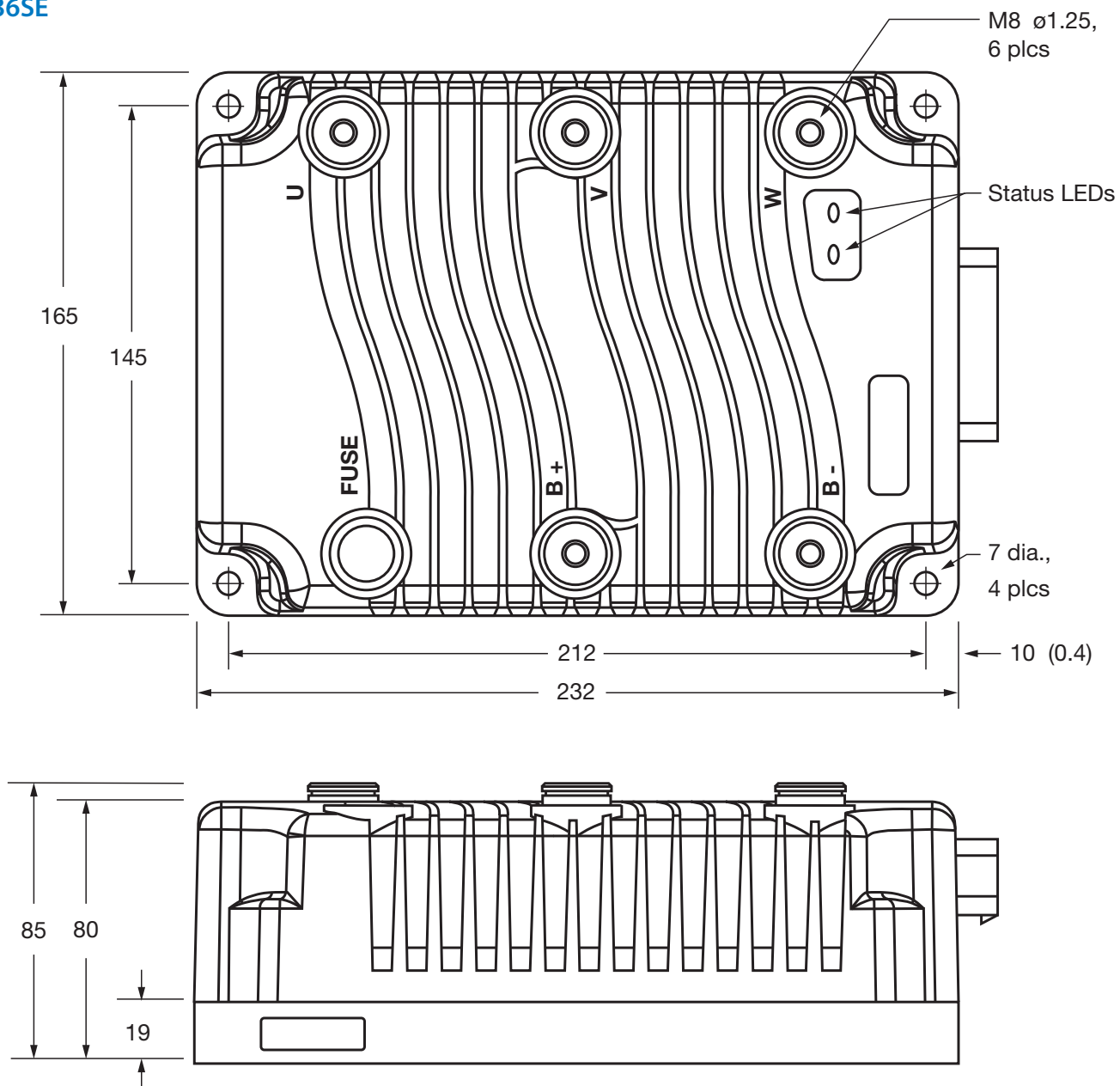




Models 1232SE / 1234SE / 1236SE / 1238SE

## DIMENSIONS mm (typical)

### 1236SE

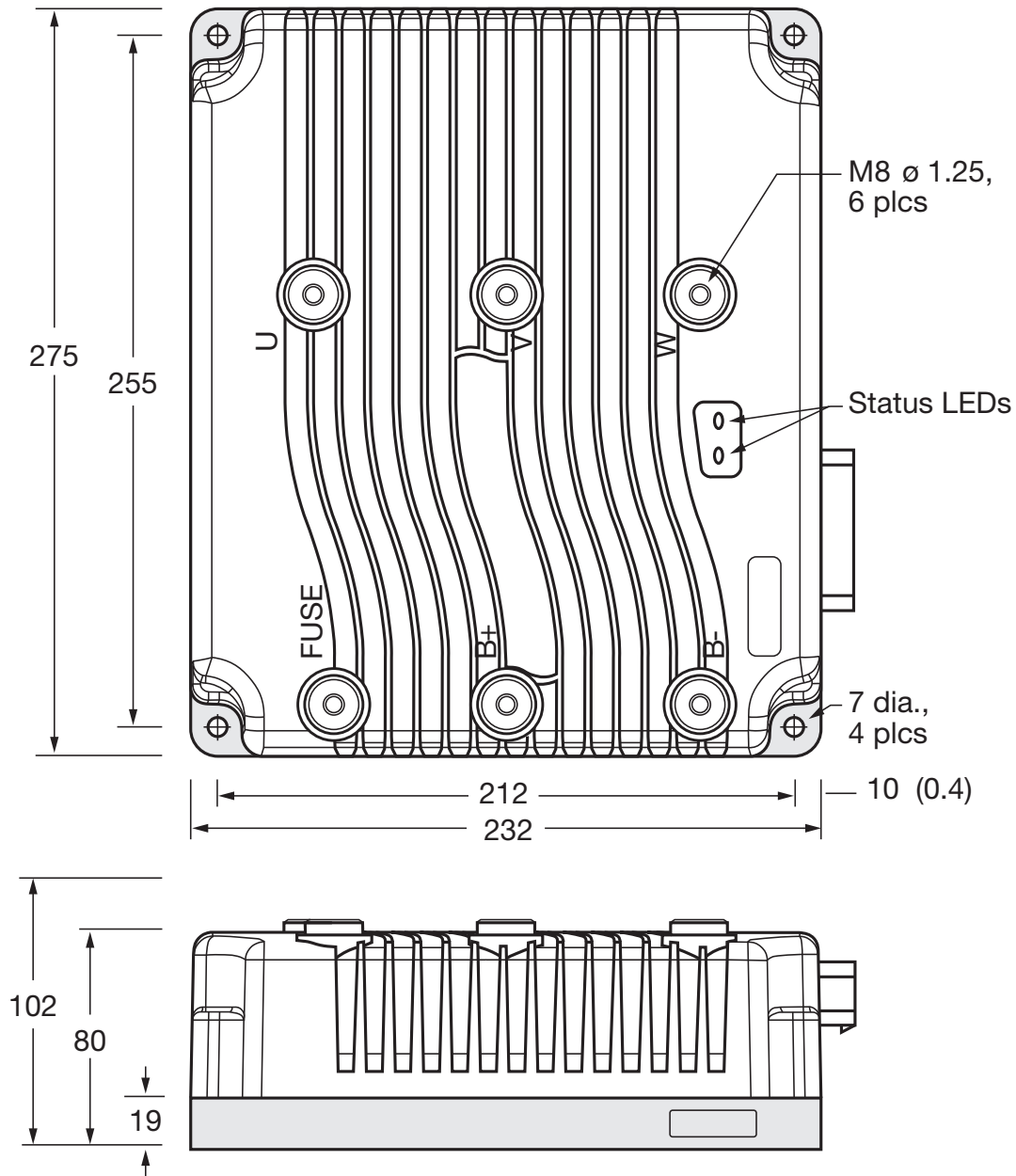




Models 1232SE / 1234SE / 1236SE / 1238SE

## DIMENSIONS mm (typical)

### 1238SE



**WARRANTY** Two year limited warranty from time of delivery.

The Curtis Difference  
You feel it when you drive it




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Specifications subject to change without notice

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