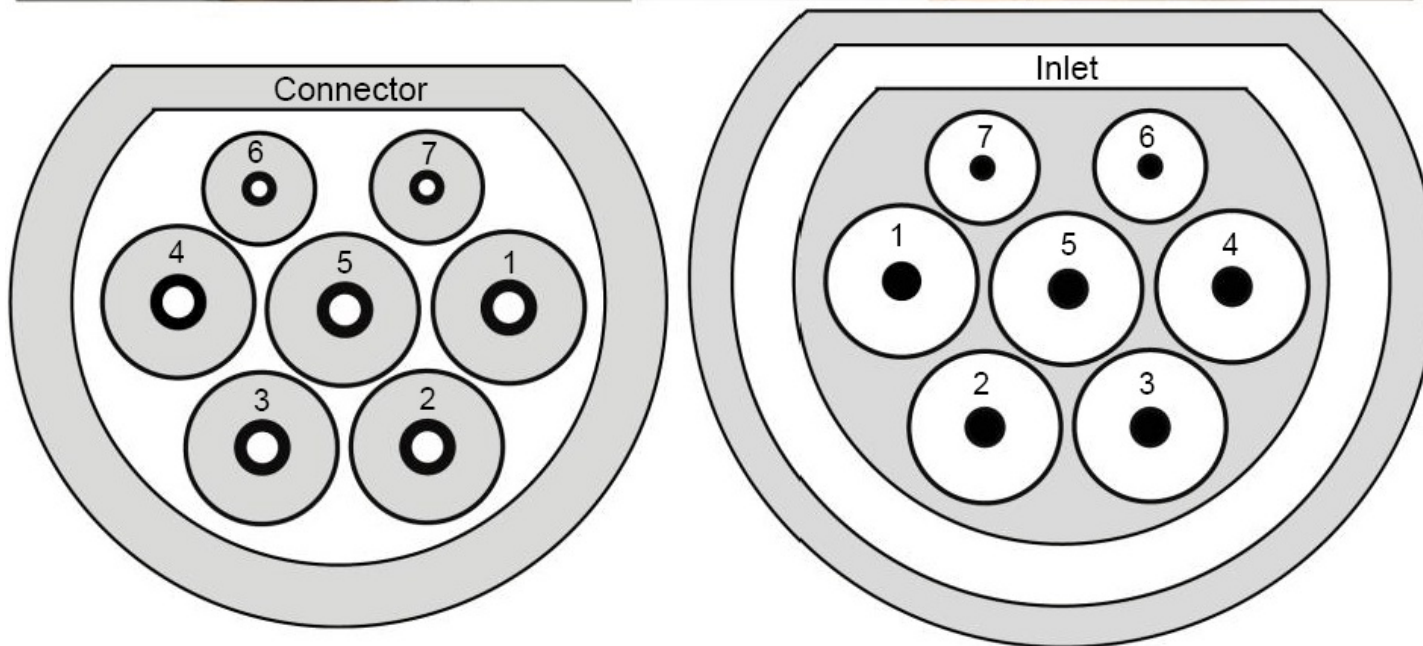


SAE J3068™ 3-phase AC charging update















































































Why was J3068 created? One coupler, many ratings, avoid different mechanical keys for every voltage/current:

2 POLE / 3 WIRE													
125V			250V			277VAC			480VAC		600VAC		
15A	20A	30A	15A	20A	30A	15A	20A	30A	20A	30A	20A	30A	
L5-15	L5-20	L5-30	L6-15	L6-20	L6-30	L7-15	L7-20	L7-30	L8-20	L8-30	L9-20	L9-30	

3 POLE / 4 WIRE							4 POLE / 5 WIRE						
125/250V		3p 250V		3p 480V		600V	3p 120/208V		3p 277/480V		3p 347/600V		
20A	30A	20A	30A	20A	30A	30A	20A	30A	20A	30A	20A	30A	
L14-20	L14-30	L15-20	L15-30	L16-20	L16-30	L17-30	L21-20	L21-30	L22-20	L22-30	L23-20	L23-30	

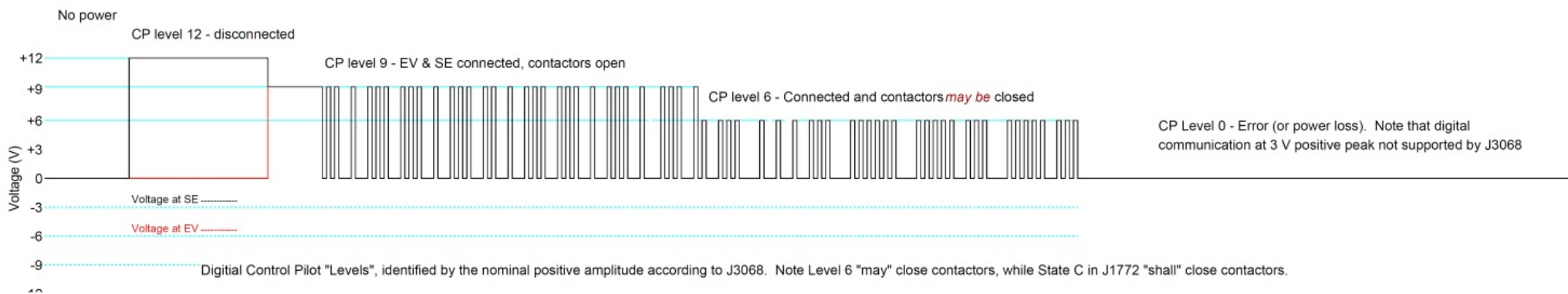
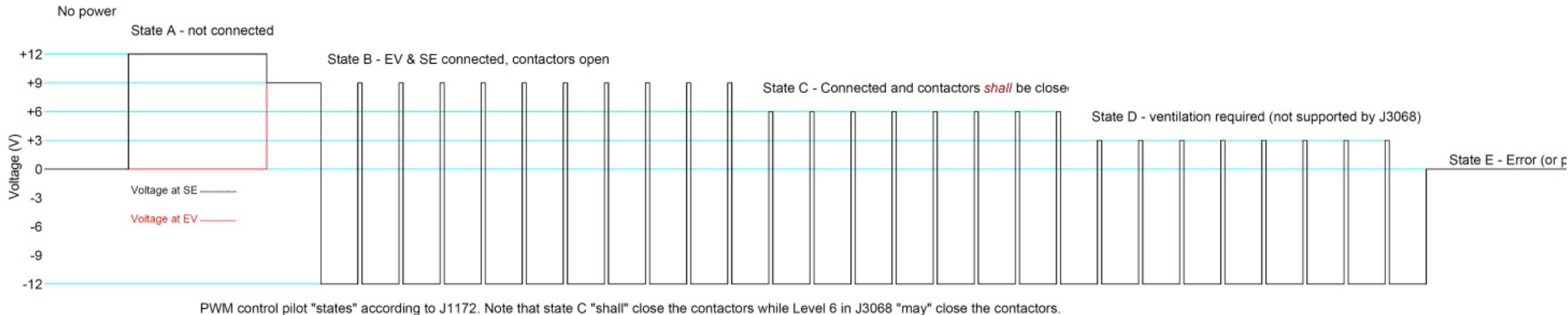
Use digital communication to signal voltage, current, phases, etc.

J1772 goal was similar, but only one phase and no voltage signal

		GENERAL - PURPOSE NONLOCKING PLUGS AND RECEPTACLES									
		15 AMPERE		20 AMPERE		30 AMPERE		50 AMPERE		60 AMPERE	
		RECEPTACLE	PLUG	RECEPTACLE	PLUG	RECEPTACLE	PLUG	RECEPTACLE	PLUG	RECEPTACLE	PLUG
125V	1	002 	001 								
250V	2		2-15P 	003 	003 	2-30R 	2-30P 				
125V	5	013 	013 	5-20R 	064 	5-30R 	5-30P 	5-50R 	5-50P 		
250V	6	014 	014 	6-20R 	068 	6-30R 	065 	6-50R 	6-50P 	134 	
277V, A.C	7	7-15R 	7-15P 	7-20R 	7-20P 	7-30R 	7-30P 	7-50R 	7-50P 		
125/250V	10			10-20R 	10-20P 	040 	040 	10-50R 	10-50P 		
3Ø 250V	11	11-15R 	11-15P 	11-20R 	11-20P 	11-30R 	11-30P 	11-50R 	11-50P 		
125/250V	14	14-15R 	14-15P 	14-20R 	119 	14-30R 	136 	016 	016 	14-60R 	14-60P 
3Ø 250V	15	15-15R 	15-15P 	15-20R 	15-20P 	15-30R 	15-30P 	15-50R 	15-50P 	15-60R 	15-60P 
3Ø Y 125/208V	18	18-15R 	18-15P 	18-20R 	18-20P 	18-30R 	18-30P 	18-50R 	18-50P 	18-60R 	18-60P 

So all J1772 EVs are assumed to handle 120 to 240 VAC.
Not enough for trucks and busses.

J3068 adopts the European Type 2 coupler, 5 wire with neutral and adds a simple, robust, inexpensive and established datalink:



LIN pulse width is the same as 5% PWM, so filters do not change.
Positive waveform amplitude is the same as State B and C.
Data rate is just below other established baseband signaling used for DC charging such as J2411.

A normal charging session conversation over LIN looks like:

- 1) Do the EV and SE speak a common version? (SAE = ver 2, IEC = 1)
- 2) Do they have compatible power? (Voltage, currents, frequency, etc.)



- 3) Let's charge! Four current limits are signaled. Fault codes are defined

EV & SE can support more than 100 communication/logic versions.
SE can provide more than one AC voltage (i.e. two or three contactors).
Single, 2, & 3 phase support (not high-leg nor corner-ground delta yet)



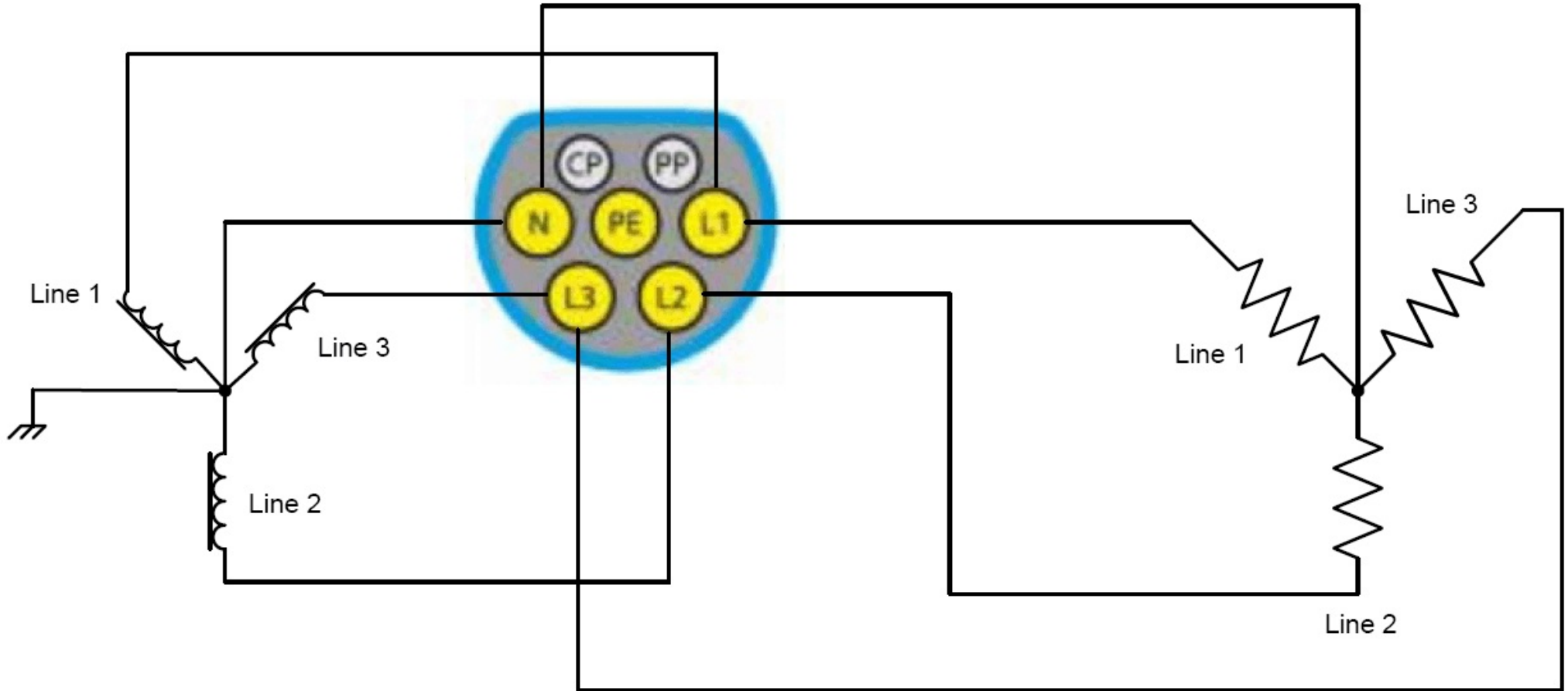
Fixed loads (refrigerated trailers) supported with required current signal
Appendix G summarizes links to all requirements to facilitate verification
LIN definition file supplied, facilitates auto generation of Comm layer

There are 2 ways to wire three separate chargers to a 3 phase supply:

Supply on left

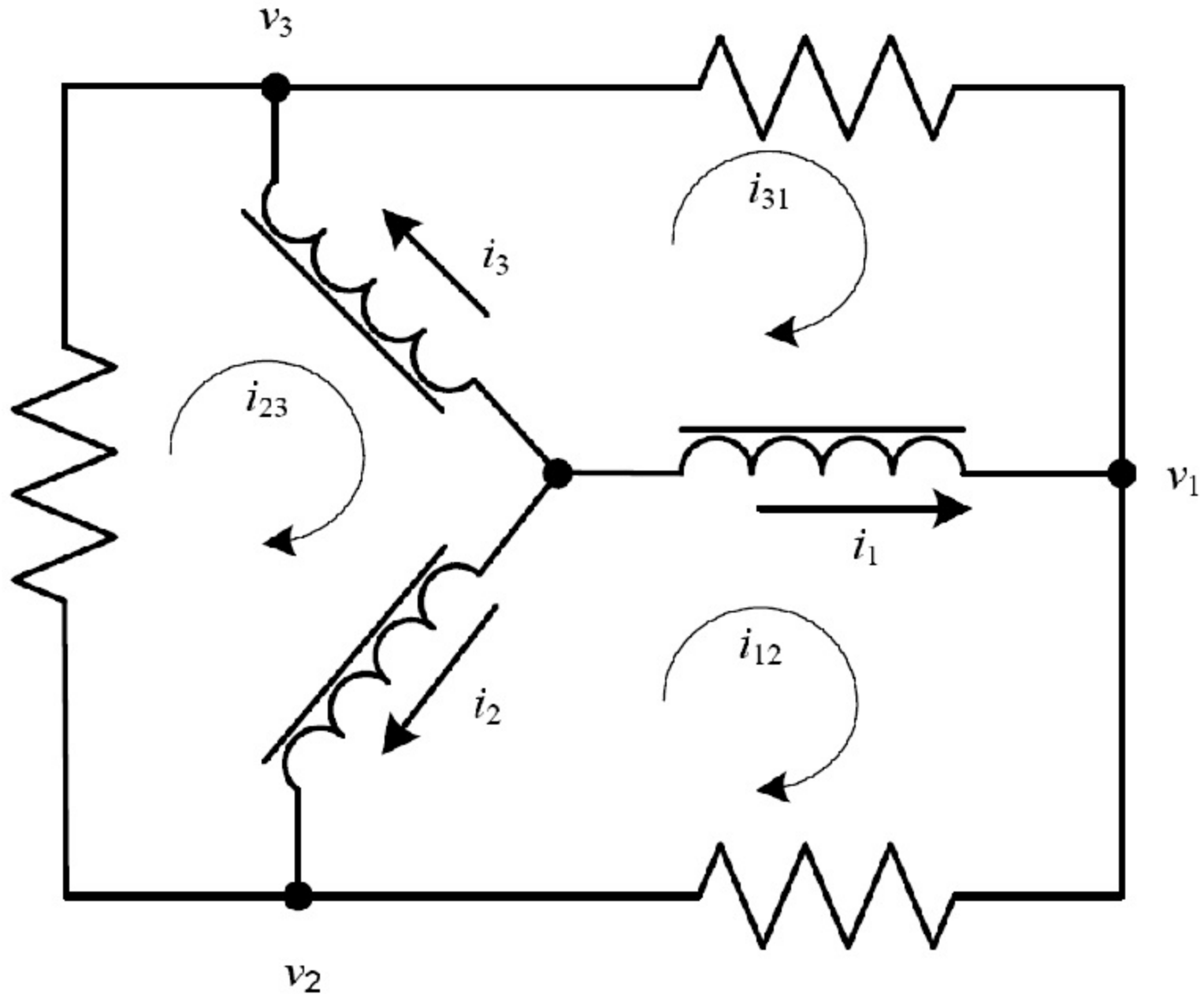
Coupler in the middle

EV on the right



Consider a hypothetical charger module, input 208 to 346 VAC nominal, shown as resistors. (Voltage ratio is smaller than 2:1 ratio for J1772.) Use "Wye" load topology above for 600/346 or 480/277 VAC supplies.

Use a "Delta" load as below for 208/120 VAC:



60% of the power at 35% of the voltage (coupler omitted in this view)

Example J3068 power ratings

VAC, Three-phase	IEC Standard Contacts 63A Coupler	J3068 Advanced Contacts		
		100A AC ₆ Coupler	120A AC ₆ Coupler	160A AC ₆ Coupler
120/208	22.7 kW	36.0 kW	43.2 kW	57.6 kW
277/480	52.4 kW	83.1 kW	99.7 kW	133 kW
347/600	65.6 kW	104.1 kW	124.9 kW	166 kW

Document status: Edition 1 finished, balloting in Hybrid committee

First ballot had no negative votes, but too many abstentions to pass.

Second ballot after minor corrections should finish mid Nov 2017.

Hardware / software being developed at University of Delaware. Many EVSE running earlier specifications are deployed in the field (earlier CAN version developed in IEC 61851-1 Annex D before publication).

Expect a conversion ECU to convert between LIN and PWM to support earlier EV & SE designs that used proprietary connectors or >250 VAC.