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eVe
electric vehicle energy

Delta Transformers Inc.

With over forty years of transformer experience and a long-standing commitment to quality and customer service, Delta transformers designs and manufactures dry type transformers for the unique requirements of Electric Vehicle (EV) charging applications.

At Delta Transformers, we offer a complete line of transformers that meet the requirements of level 1, 2, and fast charging electric vehicle installations. We can assist with new installations as well as replacement of existing transformers. Everything is completed considering the economical, environmental, reliability and long-term performance aspects of your projects.

High performance transformers for powering Electric Vehicle charging applications.

Proud of our products, made in Canada.

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Levels of EV Charging

North America currently employs three levels of charging for electric vehicles (EV). Although the term “level 3” is still used to qualify a fast charging station in DC, the term Fast Charging should be used instead.

The level of the charging station determines the time required to charge an EV. The higher the level, the faster the charging process will be because more power is delivered to the vehicle.

Three Levels of EV Charging

	LEVEL 1	LEVEL 2	FAST CHARGING
# of chargers per Transformer	1 to 2	3+	1 or more
Typical Feed Voltage	120 to 240	208, 240 to 480, 600	480, 600 or medium voltage
Typical Load Per Unit	1 to 2 kVA	3 to 8 kVA	200 to 500 kVA
Phase (Depending on number of charging stations)	Single phase	Single or Three phase	Three phase
Estimated driving distance (km) per hour of charging	3-15 km	25-110 km	80-450 km
Current type supplied to EV	AC	AC	DC

Technical Specifications to consider

Onboard EV chargers act as non-linear loads that cause current and voltage distortions. Therefore, they would have the potential to contaminate the distribution network by injecting large amounts of harmonics into it. Studies have indicated that a fast rate of charge will cause significant voltage harmonics and energy losses, as well as transformer overload. This is more important when the load is concentrated at peak times and depending on the type of charger (some having internal filters).

Certain considerations apply when selecting the appropriate transformer to integrate into EV charger applications:

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Technical Specifications to consider continued

Regulation requirement

Some national standards (Ex: CAN/CSA-C61000-2-2-04 R2014) may set limits on the amount of harmonics that can be returned to the power grid. This harmonic transmission can be reduced to compliant levels by various transformer designs, including features such as: phase shifting, use of electrostatic shields, zig-zag windings or other harmonic mitigation devices.

High harmonics

Based on the harmonic spectrum generated by the charging architecture of a DC fast charger, we recommend a K-factor of 9. On systems with level two chargers, a K-factor of 4 can be used.

Safety

Units should ideally be installed in areas where the general public does not have access. If this is not possible, options such as enclosed cabinets (Type 4, 4X) or bolted with tamper-proof hardware can be considered. For areas exposed to vehicular traffic, local regulatory codes may require the installation of bollards or other protective devices to prevent transformers from being struck and damaged by vehicles.

Environmental Conditions Location should also be considered

- Consider low temperature rise transformers if the ambient temperature regularly exceeds an average of 30°C over a 24 hour period.
- If heavy rain or blowing snow can be a problem, Type 3RE enhanced enclosures can be used. They include filters to prevent debris, snow, ice and rodents from getting inside the enclosure. Heating elements can sometimes be integrated.

Cosmetic Integration

Custom assorted (white, blue, red, green, other colors) or stainless steel enclosures are available for an easy cosmetic integration with other OEM electrical equipment.

Summary – Recommendation for transformers powering EV charging stations

	LEVEL 1	LEVEL 2	FAST CHARGING
Indoor Location	• If the average ambient temperature is >30°C: consider a transformer with a temperature rise of 130°C or 115°C. • Temperature rise of 150°C: if the average temperature is <30°C		
Outdoor Location	• 150°C temperature rise. • Type 3R or 3RE (enhanced enclosures with snow filters) • Type 4 enclosure, optional tamper-proof bolting		
Allowance for Harmonic Distortion	kVA increased to prevent heating from harmonics	• K=4 (minimum) • K=9 (better) • Harmonic Mitigating (best)	• K=9 • Consider Harmonic Mitigating if there is two stations or more

made in CANADA
fabriqué au CANADA

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Delta Electrical Vehicle Energy offering:

- Isolation, Autotransformers, epoxy potted, K rated and Harmonic Mitigating
- 80°C, 115°C, 130°C & 150°C temperature rise
- Aluminum or copper windings
- K1, K4, K9 and K13 factors
- Electrostatic shields
- Single and three phases
- Type 3R, 3RX, 4 & 4X enclosures
- Type 3RE & 3RXE enhanced for outdoor, with snow filters and temperature sensor
- Custom designs for MV applications, with primary voltage up to 27.6kV
- Dedicated nomenclature coding system, S7000 series

Advantages of "EV" rated transformers from Delta Transformers Inc.

- Rated for EV charging applications when loading varies from many hours of idling, to periods of heavy demand (helping to drive down building energy consumption)
- Low 'No-load losses' for efficiency during long idling period meeting or exceeding CSA C802.2-18 requirements
- Aluminum winding for a greener product, copper version also available
- Non brittle Epoxy Vacuum Impregnation coating (the EVI© process) remains flexible and can handle the thermal expansion/contraction movements of the coils during load and temperature fluctuation without cracking
- Long-term reliability and long-life expectancy
- CSA Efficiency Verified
- NOMEX-based insulation system resisting up to 220°C
- Custom units available to meet your project and technical requirements.

EVE RATED CODIFICATION SYSTEM

Example: CD6A0030_S7VR0BD, isolation transformer, 30kVA, EV duty, 600V Delta to 480V wye, 150 rise, no K factor, no static sheild, Type 3R enclosure

I	II	III	IV	V	IV	VII	VIII	IX	X
Common designation	Type of transformer	Number of phases	Winding material	kVA rating	Product line	Primary and Secondary voltages	Temperature rise, electrostatic shield and K factor	Winding configuration	Enclosure type
C	A = Auto	S = Single phase Non C802	A = Aluminum	0030 = 30kVA	S7 = EV duty	G = 120	0 = 150°C rise, no K factor, no sheild	Single phase:	
	E = Epoxy	T = Three phase Non C802	C = Copper			H = 208	1 = 150°C rise, K4, no sheild	3- 1 Ø, Primary (double),Secondary (double)	D- Type 3R
	D = Isolation, K rated, HMT	2 = Single phase C802				K = 240	2 = 150°C rise, K9, no sheild	Three phase:	E- Type 4, not-C802.2
		6 = Three phase C802				L = 277	4 = 150°C rise, no K factor, 1 x sheild	A- 3 Ø, Delta - Delta (0°C)	H- Type 4X (stainless), not-C802.2
						M = 347	5 = 150°C rise, K4, 1 x sheild	B- 3 Ø, Delta - Star (-30°C)	K- Type 3RX (stainless)
						O = 416	6 = 150°C rise, K9, 1 x sheild	C- 3 Ø, Star - Star (0°C)	P- Type 3R epoxy potted, not-C802.2
						R = 480	I = 115°C rise, no K factor, no sheild	F- 3 Ø, Star - Delta (+30°C)	Q- Type 3RX epoxy potted (stainless), not-C802.2
						V = 600	J = 115°C rise, K4, no sheild	HMT:	Y- Type 3RE Enhanced
						*	K = 115°C rise, K9, no sheild	G-3 Ø, Delta - Interconnected Star (Z) (0°C)	Z- Type 3RXE Enhanced (stainless)
							M = 115°C rise, no K factor, 1 x sheild	H-3 Ø, Delta - Interconnected Star (V) (-30°C)	****
							N = 115°C rise, K4, 1 x sheild	***	
							O = 115°C rise, K9, 1 x sheild		
							**		

* Other voltages available upon request
** K13 , 130°C & 80°C temperature rise available upon request
*** Other winding configurations available upon request
**** Type 3R Enhanced & 3RX Enhanced: Enclosures equipped with air filters and thermal sensor for outdoor use

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SYNONYMOUS WITH QUALITY

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