

# Selecting and Applying Buck-Boost Transformers

United CoolAir manufactures units that can be applied with a variety of voltages. Some applications utilize an input or supply voltage of 277-1-60. This power supply comes from a 460-3-60 (4-wire) system (The Neutral Leg and the Line side opposite the neutral leg).

While some components are available for direct application of 277-1-60 power, most manufacturers (including United CoolAir) find that the use of a buck-boost transformer to lower the voltage is more cost effective. The units are fabricated using components suitable for 208/230-1-60 power supply. The control voltage transformer is wired on the 230-volt tap to provide the 24-volt control voltage.

### Selecting a Buck-Boost Transformer

The following information should be confirmed for the application:

- **Line Voltage** – Confirm that the supply / input voltage is 277.
- **Frequency** – Input power supply frequency must match the equipment – either 50 or 60 Hertz (Hz). This TechTip is based on only applications of 60 Hz.

- **Phase** – The supply / input power phasing must be the same as the equipment requirements. The TechTip is based on single-phase applications.
- **Load KVA or Load Amps** – You only need to know one or the other. This information usually can be found on the unit nameplate(s). On United CoolAir equipment the Minimum Circuit Ampacity (MCA) should be used as the Load Amps.

The transformer is used to buck (decrease) the incoming power supply from 277 volts down to the 230 volts required for the unit. Table 1 lists the buck-boost transformers available from United CoolAir.

Read down the column until you see a KVA or Amp value that is just higher than the equipment to be operated.

**Table 1 - Available Buck-Boost Transformers**

UCA Part Number	Model		Single-Phase Line Voltage (Available)	277
			Load Voltage (Output)	230
4CA1901	T-1-81064	Load	KVA	1.44
			Amps	6.25
			Max. Size of Fuse or Breaker	10
4CA1902	T-1-81065	Load	KVA	2.88
			Amps	12.50
			Max. Size of Fuse or Breaker	15
4CA1903	T-1-81066	Load	KVA	4.31
			Amps	18.75
			Max. Size of Fuse or Breaker	20
4CA1904	T-1-37920	Load	KVA	5.75
			Amps	25.00
			Max. Size of Fuse or Breaker	30
4CA1905	T-1-37921	Load	KVA	8.63
			Amps	37.50
			Max. Size of Fuse or Breaker	40
4CA1906	T-1-37922	Load	KVA	11.5
			Amps	50.00
			Max. Size of Fuse or Breaker	60
4CA1907(1)	T-1-37923	Load	KVA	17.25
			Amps	75.00
			Max. Size of Fuse or Breaker	80

(1) Model contains lifting ears.

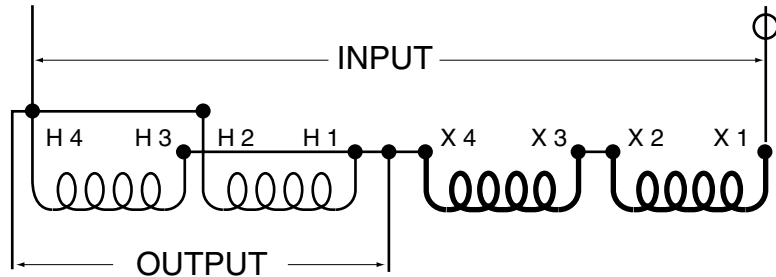
Connect the transformer according to the diagram to the right. Only one (1) transformer is required in the wiring diagram for each power supply to the equipment.

**CAUTION:** Do not make connections other than those shown. The transformer must be as large (KVA) as the load it must operate. Never exceed the nameplate rating as this could result in overheating, reduced life expectancy or worst cases, fire.

### Notes:

1. The symbol "O" used in this connection diagram illustrates where to field install an Overcurrent protective device (typically a fuse or circuit breaker) when one input conductor is grounded and the other input conductor is ungrounded.
2. When both input conductors are ungrounded an Overcurrent protection device is required to be installed in series with each input conductor.
3. For additional information refer to the National Electrical Code, Article 450-4.

**Figure 1 – Transformer Connection Diagram**



### General

The installation, operation and maintenance of dry-type transformers should be performed by an electrician or other qualified personnel who are familiar with international, national or local electrical codes. Familiarity with the potential shock hazards associated with electrical equipment is also necessary.

Encapsulated units are NEMA 3R enclosures suitable for either indoor use in harsh environments or for outdoor use. CE marked units have a protection index of IP23.

The transformer must be installed per the National Electrical Code (NEC) and local code requirements. CE marked transformers must be installed per EN 60742.

### Inspection and Handling

The transformer should be inspected carefully upon receipt to check for any visible or concealed damage that may have occurred during shipment. If damage is found, a claim should be filed immediately with the carrier.


Transformers fifty-five (55) pounds or larger are provided with lifting ears. Incorrect handling can bend the enclosure, cause other damage or result in personal injury. (P/N 4CA1907 contains lifting ears).

### Installation

When installing a buck-boost transformer, always follow all applicable national and local codes. Outside installation of the transformer should have the wiring in a conduit or as required by national and local codes.

Encapsulated transformers can be installed indoors or outdoors. When installed outdoors, these units should be installed with the wiring compartment down to prevent the entrance of moisture. Some encapsulated units have a top-entry wiring compartment and can be installed vertically (wiring compartment up).

For indoor floor mounting of an encapsulated unit that has a bottom-entry wiring compartment, the unit can be installed horizontally (on its back side) for ease of making wire connections.

	<b>! DANGER</b>
	Hazardous Voltage. Will Cause Severe Personal Injury or Death.  Turn Power Off Supplying Device Before Installing

**WARNING:** Danger of electric shock! Do not remove parts or make connections while transformer is energized.

### Electrical Connections

Refer to the transformer nameplate label or enclosed wiring diagram for primary and secondary voltage combinations, frequency and number of phases. Tap connections and voltage combinations are also listed on the diagram or nameplate.

Proper assembly of the field wiring to the transformer leads is extremely important. Make certain that the connector or terminal is sized for the cable. Space and insulate connections or terminals per the NEC.

### Grounding

All dry-type transformers have a ground stud in the enclosure. The transformer enclosure should be solidly grounded to protect personnel. The customer-supplied grounding conductor should have a current-carrying capacity to meet international, national and / or local requirements.

### Maintenance

Non-ventilated encapsulated styles only require periodic wiping of dust and dirt from the outside of the case under normal conditions and environments. Adverse conditions may require more frequent inspections.

**CAUTION:** Never perform internal maintenance while the unit is energized!

If a dry-type transformer accidentally gets wet, it must be cleaned and thoroughly dried before energizing. Otherwise, complete failure could result.

### Storage

Encapsulated transformers should be stored in a clean, dry area. Care should be taken to prevent moisture or condensation from entering the transformer. If stored outside, the transformer must be covered and protected from water, dust and other airborne contaminants.

**NOTICE:** These instructions are general in nature and may not cover all variations in transformer design or conditions of installation, operation and maintenance in enough detail to meet customer needs. Additional instructions may be included with the transformer. If you need further information or should a problem arise, please contact the manufacturer.

Notes



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