Buck-Boost Transformer Selection Information

How to select the proper transformer

To select the proper transformer for buck-boost applications, determine the following first:

Line Voltage

The voltage that you want to buck (decrease) or boost (increase). This can be found by measuring the supply line voltage with a voltmeter.

Load Voltage

The voltage at which your equipment is designed to operate. This is listed on the nameplate of the load equipment.

Load kVA or load Amps

You do not need to know both. One is sufficient for selection purposes. This information usually can be found on the nameplate of the equipment that you want to operate.

Supply Line and **Equipment** Frequencies

The supply line frequency must be the same as the frequency of the equipment to be operated. This will be 60 Hz for buck-boost transformers.

Number of Phases

Single-phase or three-phase line and load should match because a transformer is not capable of converting single-phase to three-phase.

The Type of Electrical Configuration

Delta or Wye.

How to use the selection charts on the following pages

1. Find the appropriate single-phase, three-phase delta or three-phase wye table.
2. Read across the appropriate input/output voltage rows and find the nearest ratio of required load voltage to line voltage for the application desired. (High voltage (HV) and low voltage (LV) may be either input or output voltage depending on the circumstances.)
3. Reading vertically down the column beginning with your application voltage ratio, locate in one of the kVA rows a kVA capacity equal to or larger than your load requirement.
4. Now move left across the kVA row to locate the appropriate transformer catalog number for your application.

Example:

(Assume the following information)

1. A reasonably constant line voltage of 200 volts.
2. A required equipment voltage of 236 volts.
3. 1.6 kVA load capacity needed.
4. Single-phase line and equipment.

In the voltage rows, 208 is closest to our line voltage of 200. The 236 high voltage meets our requirements.

Reading vertically down this column, find 1.8 kVA, the closest larger kVA to our required 1.6 load kVA.

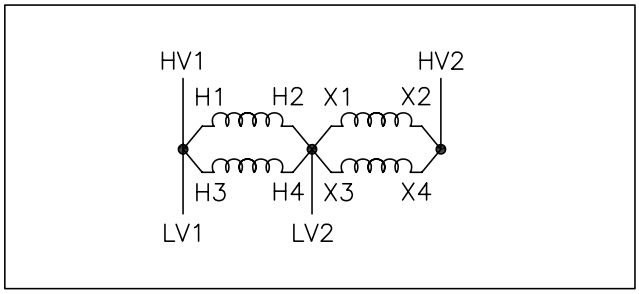
Moving left across this row, you will find the transformer catalog number to be 416-1221-000.

Buck-Boost 3-Phase Open Delta Selection Chart

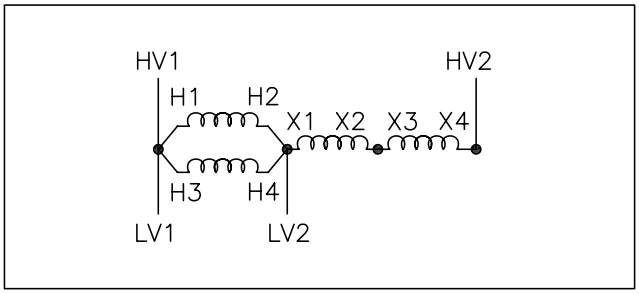
Please note: Three-phase open delta connections require two transformers.

Three-Phase Open Delta Connection													
Part Number	Input or Output	LV	208	218	229	240	240	Part Number	Input or Output	LV	208	212	225	240
		HV	230	240	240	252	264			HV	236	240	240	272
416-1100-000	LV Amps		2.3	2.3	4.4	4.4	2.3	416-1221-000	LV Amps		8.9	8.9	16.7	8.9
	kVA		0.8	0.9	1.7	1.8	1.0		kVA		3.2	3.3	6.5	3.7
	HV Amps		2.1	2.1	4.2	4.2	2.1		HV Amps		7.8	7.8	15.6	7.8
416-1101-000	LV Amps		4.6	4.6	8.8	8.8	4.6	416-1231-000	LV Amps		17.7	17.7	33.3	17.7
	kVA		1.7	1.7	3.5	3.6	1.9		kVA		6.4	6.5	13.0	7.4
	HV Amps		4.2	4.2	8.3	8.3	4.2		HV Amps		15.6	15.6	31.3	15.6
416-1121-000	LV Amps		11.5	11.5	21.9	21.9	11.5							
	kVA		4.1	4.3	8.7	9.1	4.8							
	HV Amps		10.4	10.4	20.8	20.8	10.4							
Wiring Diagram			10	10	9	9	10	Wiring Diagram			10	10	9	10

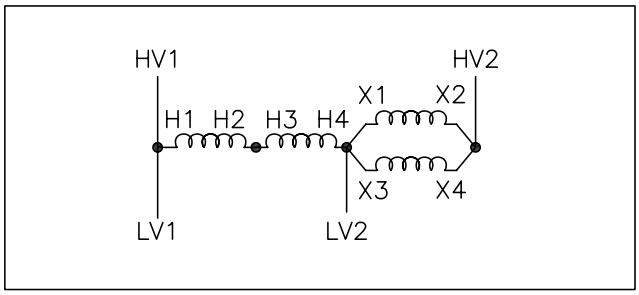
Buck-Boost Wiring Diagrams



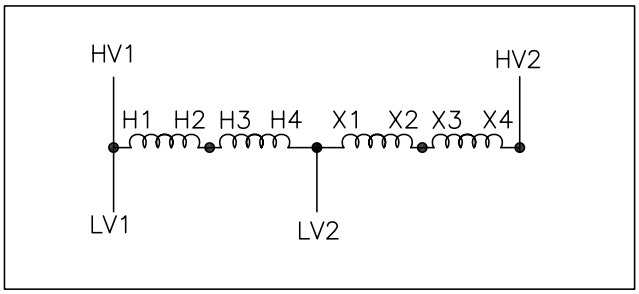
Wiring Diagram 1



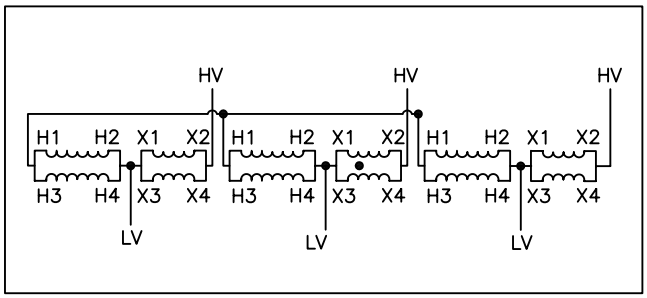
Wiring Diagram 2



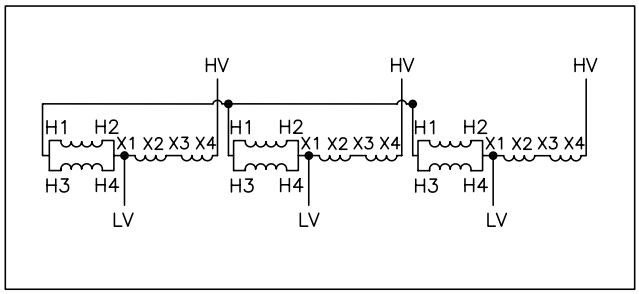
Wiring Diagram 3



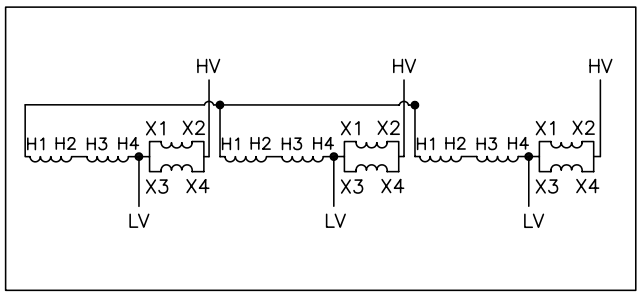
Wiring Diagram 4



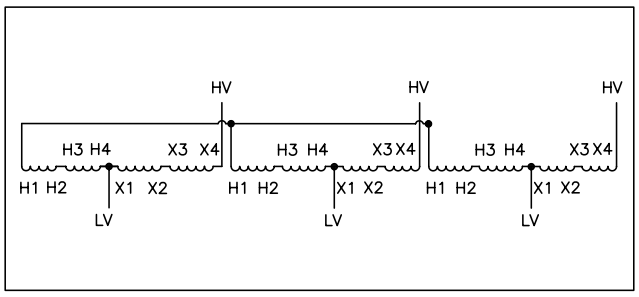
Wiring Diagram 5



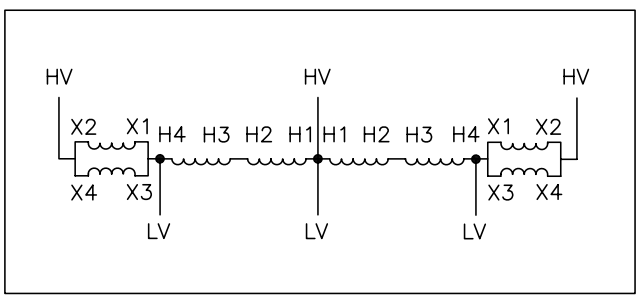
Wiring Diagram 6



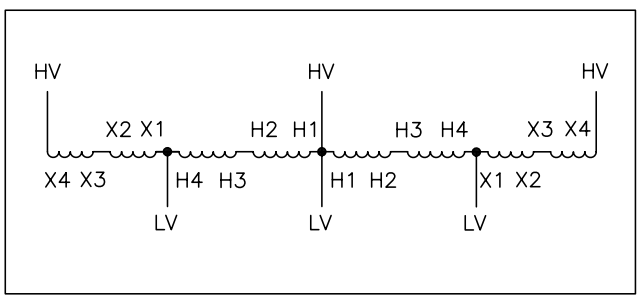
Wiring Diagram 7



Wiring Diagram 8



Wiring Diagram 9



Wiring Diagram 10

Note: Wiring diagrams 11 and 12 can be found in the product insert.

Buck-Boost Transformers
General Specifications and Terminations

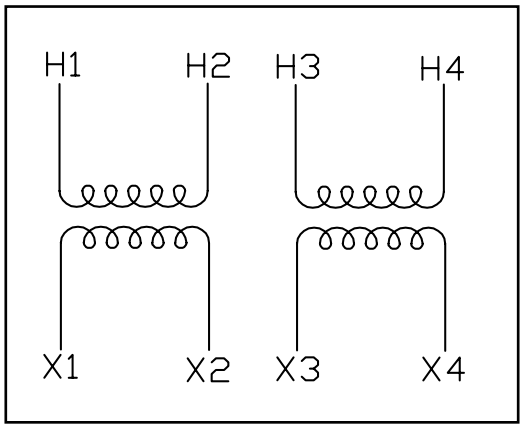
Single-Phase - 600V Class Transformers General Specifications										
	KVA	Part Number	Temp. Rise °C	Termination		Height (in.)	Width (in.)	Depth (in.)	Shipping Weight (lbs.)	Price
				HV	LV					
120 x 240 V 12/24 V 60 Hz	0.05	416-1100-000	95	#18 AWG Leads	#18 AWG Leads	8.03	3.31	3.08	4.4	Retired
	0.10	416-1101-000		#18 AWG Leads	#18 AWG Leads	8.03	3.31	3.08	4.8	Retired
	0.25	416-1121-000		#18 AWG Leads	#14 AWG Leads	8.03	3.31	3.08	6.7	Retired
	KVA	Part Number	Temp. Rise °C	Termination		Height (in.)	Width (in.)	Depth (in.)	Shipping Weight (lbs.)	Price
				HV	LV					
120 x 240 V 16/32 V 60 Hz	0.25	416-1221-000	95	#18 AWG Leads	#14 AWG Leads	8.03	3.31	3.08	6.7	Retired
	0.50	416-1231-000		#18 AWG Leads	#10 AWG Leads	10.19	5.06	4.59	15.0	Retired
	2	416-1271-000	135	#16 AWG Leads	#6 AWG Leads	12.50	6.69	5.34	41.2	Retired

Buck-Boost Transformer Connections

Used as an Isolation Transformer

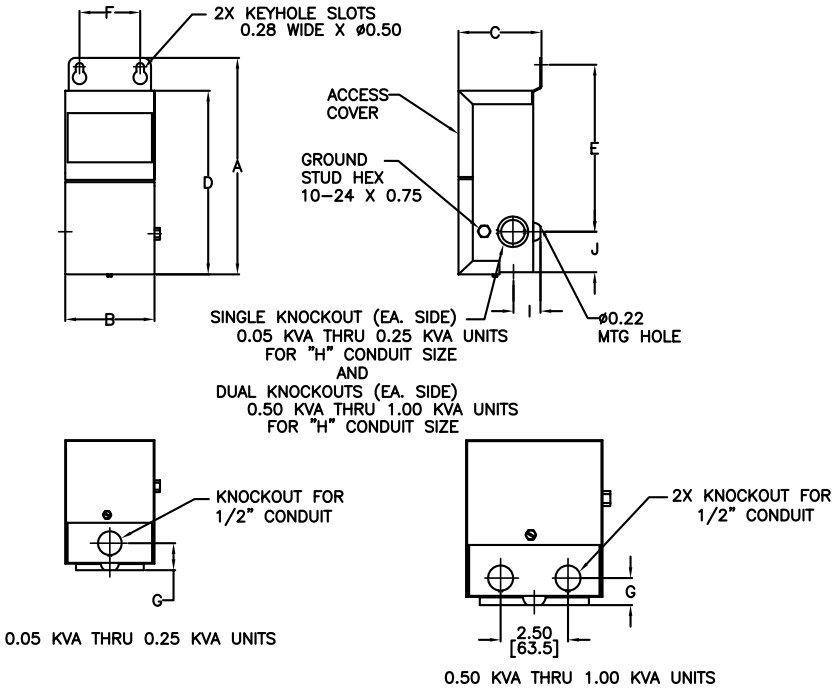
Maximum Secondary Current			
KVA	Part Number	Maximum Secondary Amperage	
		12V	24V
0.05	416-1100-000	4.16	2.08
0.10	416-1101-000	8.33	4.16
0.25	416-1121-000	20.8	10.4
KVA	Part Number	Maximum Secondary Amperage	
		16V	32V
0.25	416-1221-000	15.6	7.81
0.50	416-1231-000	31.2	15.6
2	416-1271-000	125	62.5

Isolation Transformer Connections

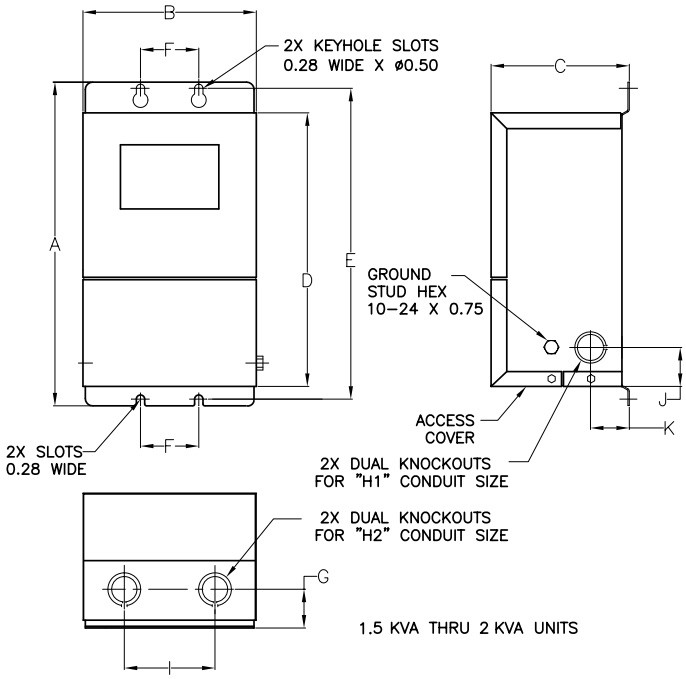


Connections			
Primary Volts		Interconnect	Primary Lines to Connect to
240		H2 to H3	H1-H4
120		H1 to H3	H1-H4
		H2 to H4	
Secondary Volts		Interconnect	Secondary Lines to Connect to
24	32	X2 to X3	X1-X4
12	16	X1 to X3	X1-X4
		X2 to X4	

Dimensional Diagrams



Housing Dimensions (in [mm])		
Part Numbers	***416-1100-000 416-1101-000 416-1121-000 416-1221-000***	***416-1231-000***
A	8.03 [203.96]	10.19 [258.83]
B	3.31 [80.07]	5.06 [128.52]
C	3.08 [78.23]	4.56 [115.82]
D	6.81 [172.97]	9.06 [230.12]
E	6.19 [157.23]	8.38 [212.85]
F	2.25 [57.15]	2.25 [57.15]
G	1.00 [25.4]	1.00 [25.4]
H	1/2" [12.7]	0.5 [12.7] & 0.75 [19.05]
I	1.00 [25.4]	1.25 [31.75]
J	1.50 [38.1]	1.50 [38.1]



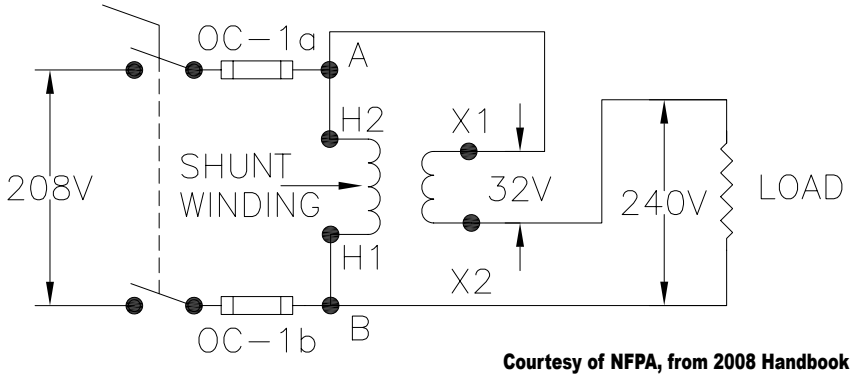
Housing Dimensions (in [mm])	
Part Numbers	***416-1271-000***
A	12.50 [317.5]
B	6.69 [169.93]
C	5.34 [135.64]
D	10.56 [268.22]
E	12.00 [304.8]
F	2.25 [57.15]
G	1.50 [38.1]
H1	0.5 [12.7] & 0.75 [19.05]
H2	0.5 [12.7] & 0.75 [19.05]
I	3.5 [88.9]
J	1.50 [38.1]
K	1.50 [38.1]

Fusing Buck-Boost Transformers

The method for determining the correct size overcurrent protection for an autotransformer is covered in the 2008 National Electric Code (NEC) 450.4 Autotransformers 600 Volts, Nominal, or Less.

(A) *Overcurrent Protection: Each autotransformer 600 volts, nominal, or less shall be protected by an individual overcurrent device installed in series with each ungrounded input conductor. Such overcurrent device shall be rated or set at not more than 125 percent of the rated full-load input current of the autotransformer. Where this calculation does not correspond to a standard rating of a fuse or nonadjustable circuit breaker and the rated input current is 9 amperes or more, the next higher standard rating described in 240.6 shall be permitted. An overcurrent device shall not be installed in series with the shunt winding (the winding common to both the input and the output circuits) of the autotransformer between Points A and B as shown in Exhibit 450.6 (below).*

Exhibit 450.6 provides an example of overcurrent protection for an autotransformer. It shows a two-winding, single-phase transformer connected to boost a 208-volt supply to 240 volts. The autotransformer is provided with a two-pole disconnect switch with both overcurrent devices (OC-1a and OC-1b) located on the supply side of the autotransformer.



Courtesy of NFPA, from 2008 Handbook

Buck-Boost Transformer Cross-Reference

Automation Direct	Hammond	Acme	Federal	Square D	Siemens	Micron	GE	Sola-Hevi Duty	Cuttler Hammer
416-1100-000	QC05ERCB	T1-81047	SB12N.050F	50SV43A	050BB1224	J050A1EA1A01	9T51B0102	HS19B50	S10N04A81N
416-1101-000	QC10ERCB	T1-81048	SB12N.100F	100SV43A	100BB1224	J100A1EA1A01	9T51B0104	HS19B100	S10N04A82N
416-1121-000	QC25ERCB	T1-81050	SB12N.250F	250SV43B	205BB1224	J250A1EA1A02	9T51B0107	HS19B250	S10N04A26N
416-1221-000	QC25ESCB	T1-81057	SB16N.250F	250SV46B	205BB1632	J250A1EB1A02	9T51B0127	HS20B250	S10N06A26N
416-1231-000	QC50ESCB	T1-81058	SB16N.500F	500SV46B	505BB1632	J500A1EB1A02	9T51B0128	HS20F500B	S10N06A51N
416-1271-000	Q002ESCF	T-1-13075	SB16N2F	2S46F	2BB1632	J002K1EB1A02	9T51B0132	HS20F2A	S10N06A02N

Note: All cross reference results are to the best of our knowledge. Please compare and verify all product specifications before selecting.