

Buck and Boost Dry-Type Transformers

Technical Data

UL Listed
Indoor/Outdoor

Instructions for the Selection, Safe Handling, Installation and Operation of Buck and Boost Dry-Type Transformers

How to Select the Proper Transformer

To select the proper transformer for Buck-Boost applications, determine:

1. **Input 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.
2. **Load voltage:** The voltage at which your equipment is designed to operate. This is listed on the nameplate of the load equipment.
3. **Load kVA or Load Amperes:** You do not need to know both — one or the other is sufficient for selection purposes. This information usually can be found on the nameplate of the equipment that you want to operate.
4. **Number of phases:** Single or three-phase line and load should match because a transformer is not capable of converting single to three-phase. It is, however, a common application to make a single-phase transformer connection from a three-phase supply by use of one leg of the three-phase supply circuit. Care must always be taken not to overload the leg of the three-phase supply. This is particularly true in a Buck-Boost application because the supply must provide for the load kVA, not just the nameplate rating of the Buck-Boost transformer.
5. **Frequency:** The supply line frequency must be the same as the frequency of the equipment to be operated — either 50 or 60 cycles.

How to Use Selection Charts

1. **Choose the selection table** with the correct number of phases. Tables I, III and V for single-phase and Tables II, IV and VI for three-phase transformers. Tables I and II are for 120 x 240 — 12/24 volts, tables III and IV are for 120 x 240 — 16/32 volts and tables V and VI are for 240 x 480 — 24/48 volts.
2. **Line/load voltage combinations** are listed across the top of the selection table. Select a line/load voltage combination which comes closest to matching your application.
3. **Follow the selected column** down until you find either the load kVA or load amperes of your application. If you do not find the exact value, go on to the next highest rating.
4. **Now follow across the table** to the far left-hand side to find the kVA of the transformer you need.
5. **Follow the column of your line/load voltage** to the bottom to find the connection diagram for this application.
Note: Connection diagrams show low voltage and high voltage connection terminals. Either can be input or output depending on buck or boost application.
6. **In the case of three-phase loads** either two or three single-phase transformers are required as indicated in the “quantity required” line at the bottom of Table II, IV or VI. The selection is dependent on whether a Wye connected bank of three transformers with a neutral is required or whether an open Delta connected bank of two transformers for a Delta connected load will be suitable. Wye connected banks should be used with 3-phase, 4-wire supplies only.

For line/load voltages not listed on table, use the pair listed on the table that is slightly above your application for reference, then apply the first formula at the bottom of Table II, IV or VI to determine “New” output voltage. The new kVA rating can be found using the second formula.

Operating and Installation Instructions for Encapsulated Dry-Type Transformers

General

The encapsulated dry-type transformer is a totally enclosed, non-ventilated, compound filled, insulating transformer which has been completely assembled at the factory and is ready for operation. These transformers are completely encased in a sturdy steel housing. A large wiring compartment with conduit knockouts permits fast wiring connections. This wiring compartment is accessible by a removable cover.

Inspection

The transformer should be unpacked as soon as it is received and examined for possible damage during shipment. Should damage be found, a claim should be filed immediately with the transportation company.

Handling

Care should be exercised in handling dry-type transformers. Lifting eyes or similar lifting means are provided on most sizes.

Installation

These encapsulated dry-type transformers are UL listed for indoor/outdoor applications. They may be installed on walls, beams, platforms, or other locations. They are ideal for applications in dusty industrial areas. Dry-type transformers must be protected by lightning arresters or other suitable equipment from outside lines which may cause lightning and switching surges to be transmitted to the transformer. The enclosure should be grounded to a water pipe or similar type of effective common ground. Transformers should not be loaded beyond their nameplate rating since overloads will result in a reduced life expectancy.

Connections

Refer to the nameplate for voltage combinations, frequency, number of phases, and tap connections. All leads not being used must be properly insulated.

Maintenance

Practically no maintenance is required on a dry-type transformer. Encapsulated types only require wiping off dust or dirt from the outside of the case.

Typical Three-Phase Buck-Boost Autotransformer Installation

Use quantity of Buck-Boost Transformer(s) indicated on chart for connection to be made. Quantity required may vary from quantity shown in this illustration.

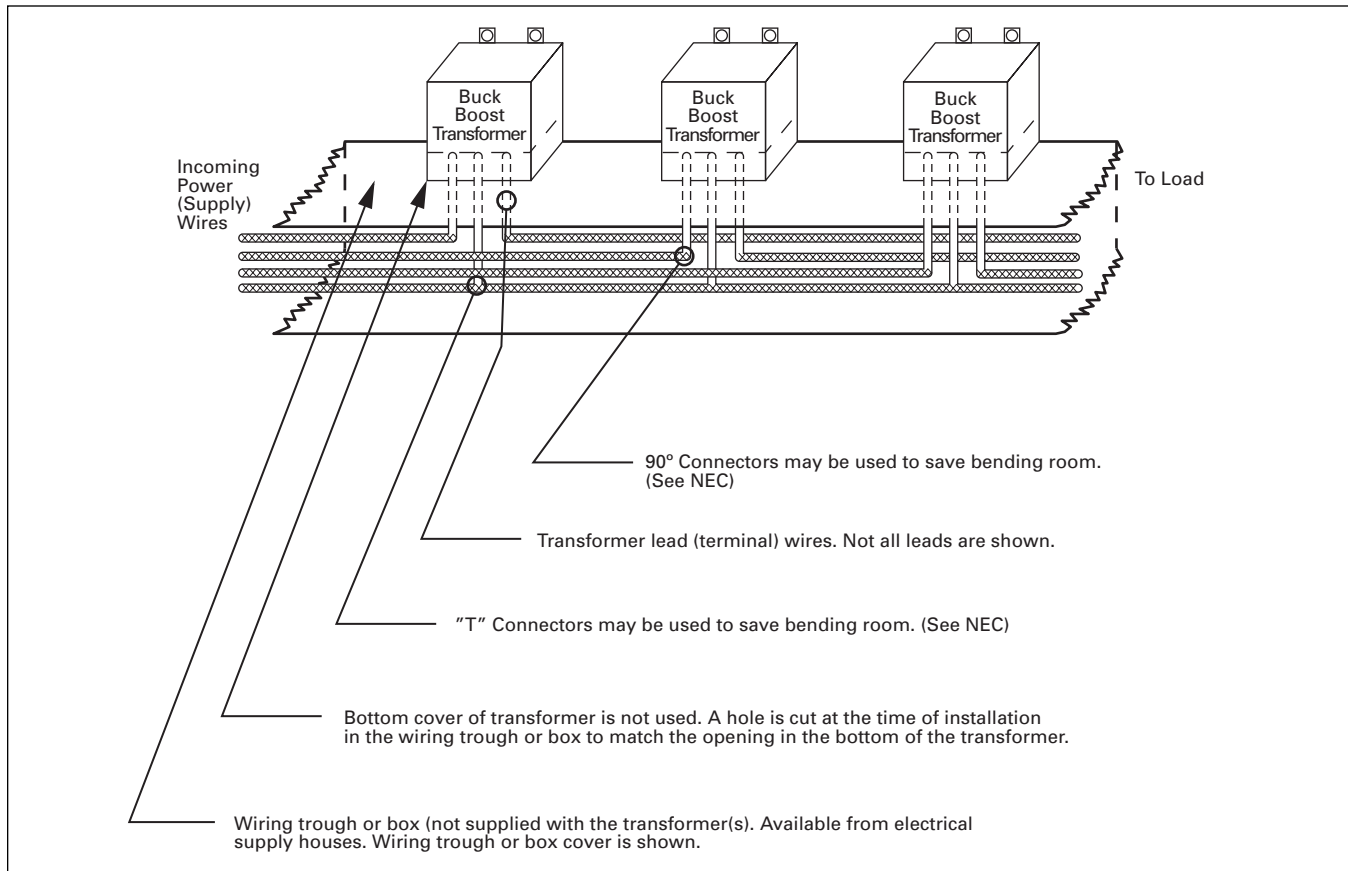


Figure 1. Typical Three-Phase Buck-Boost Autotransformer Installation

Buck-Boost Connection Diagram

Use the following information for single-phase autotransformer connections.

Note: Inputs and outputs may be reversed; kVA capacity remains constant. All applications are suitable for 60 Hz. only.

Important: Refer to the NEC (National Electrical Code) Article 450-4 for overcurrent protection of an autotransformer.

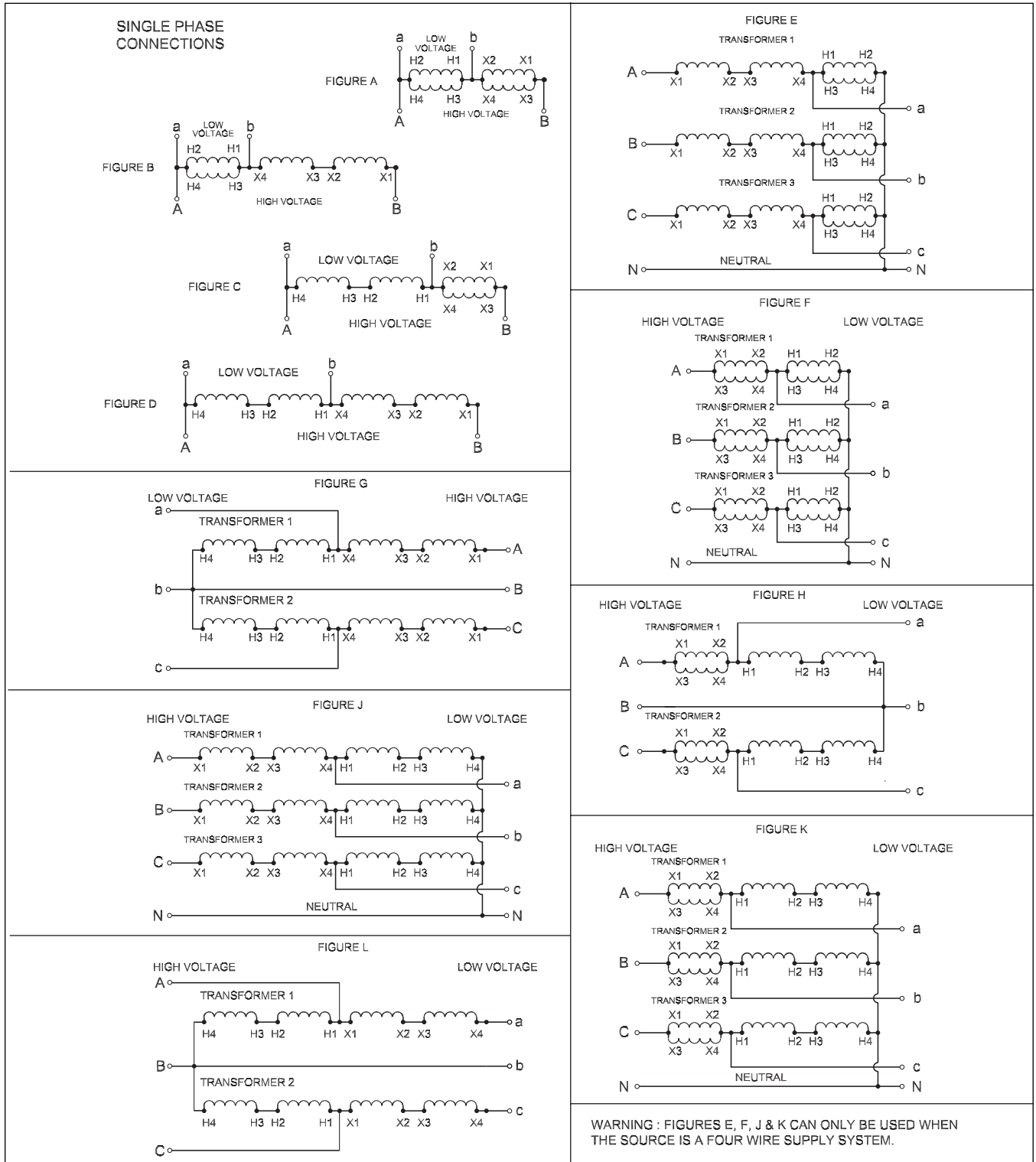


Figure 2. Buck-Boost Connection Diagram

Technical Data

120 x 140 Volts Primary — 12/24 Volts Secondary

Table 1. Single Phase

		Boosting								Bucking					
Line Voltage		96	100	105	109	189	208	218	220	125	132	229	245	250	252
Load Voltage		115	120	116	120	208	229	240	242	114	120	208	223	227	240
0.05 kVA	kVA	0.24	0.25	0.48	0.50	0.43	0.48	0.50	0.50	0.52	0.55	0.48	0.51	0.52	1.05
	Amperes Fuse ①	2.08 4 ②	2.08 4 ②	4.17 6	4.17 6	2.08 3	2.08 3	2.08 3	2.08 3	4.58 6	4.58 6	2.29 3	2.29 3	2.29 3	4.38 6
0.075 kVA	kVA	0.36	0.38	0.72	0.75	0.65	0.72	0.75	0.76	0.78	0.83	0.72	0.77	0.78	1.58
	Amperes Fuse ①	3.13 6	3.12 6	6.25 10	6.25 10	3.12 5 ②	3.13 5 ②	3.13 5 ②	3.13 5 ②	6.87 10	6.88 10	3.44 5 ②	3.44 5 ②	3.44 5 ②	6.56 10
0.1 kVA	kVA	0.48	0.50	0.96	1.00	0.87	0.95	1.00	1.01	1.04	1.10	0.95	1.02	1.04	2.10
	Amperes Fuse ①	4.17 8 ②	4.17 8 ②	8.33 15	8.33 15	4.17 6	4.17 6	4.17 6	4.17 6	9.17 12 ②	9.17 12 ②	4.58 6	4.58 6	4.58 6	8.75 12 ②
0.15 kVA	kVA	0.72	0.75	1.44	1.50	1.30	1.43	1.50	1.51	1.56	1.65	1.43	1.53	1.56	3.15
	Amperes Fuse ①	6.25 10	6.25 10	12.50 20	12.50 20	6.25 10	6.25 10	6.25 10	6.25 10	13.75 20	13.75 20	6.87 10	6.87 10	6.87 10	13.13 20
0.25 kVA	kVA	1.20	1.25	2.41	2.50	2.17	2.38	2.50	2.52	2.60	2.75	2.39	2.55	2.60	5.25
	Amperes Fuse ①	10.42 20	10.42 20	20.83 30	20.83 30	10.42 15	10.42 15	10.42 15	10.42 15	22.92 30	22.92 30	11.46 15	11.46 15	11.46 15	21.88 30
0.5 kVA	kVA	2.40	2.50	4.81	5.00	4.33	4.77	5.00	5.04	5.21	5.50	4.77	5.10	5.21	10.50
	Amperes Fuse ①	20.83 35	20.83 35	41.67 60	41.67 60	20.83 30	20.83 30	20.83 30	20.83 30	45.83 60	45.83 60	22.92 30	22.92 30	22.92 30	43.75 60
0.75 kVA	kVA	3.60	3.75	7.22	7.49	6.50	7.15	7.49	7.56	7.81	8.25	7.16	7.66	7.81	15.75
	Amperes Fuse ①	31.25 50	31.25 50	62.50 90	62.50 90	31.25 45	31.25 45	31.25 45	31.25 45	68.75 80	68.75 80	34.37 40	34.37 40	34.37 40	65.63 80
1 kVA	kVA	4.80	5.00	9.63	9.99	8.66	9.53	9.99	10.08	10.42	11.00	9.54	10.21	10.42	21.00
	Amperes Fuse ①	41.67 70	41.67 70	83.33 125	83.33 125	41.67 60	41.67 60	41.67 60	41.67 60	91.67 110	91.67 110	45.83 60	45.83 60	45.83 60	87.50 110
1.5 kVA	kVA	7.20	7.50	14.44	14.99	12.99	14.30	14.99	15.13	15.62	16.50	14.31	15.31	15.62	31.50
	Amperes Fuse ①	62.50 100	62.50 100	125.00 175	125.00 175	62.50 90	62.50 90	62.50 90	62.50 90	137.50 175	137.50 175	68.75 80	68.75 80	68.75 80	131.25 175
2 kVA	kVA	9.60	10.00	19.25	19.98	17.32	19.07	19.98	20.17	20.83	22.00	19.08	20.42	20.83	42.00
	Amperes Fuse ①	83.33 125	83.33 125	166.67 250	166.67 250	83.33 125	83.33 125	83.33 125	83.33 125	183.33 225	183.33 225	91.67 110	91.67 110	91.67 110	175.00 225
3 kVA	kVA	14.40	15.00	28.88	29.98	25.99	28.60	29.98	30.25	31.25	33.00	28.62	30.62	31.25	63.00
	Amperes Fuse ①	125.00 200	125.00 200	250.00 350	250.00 350	125.00 175	125.00 175	125.00 175	125.00 175	275.00 350	275.00 350	137.50 175	137.50 175	137.50 175	262.50 350
5 kVA	kVA	24.00	25.00	48.13	49.96	43.31	47.67	49.96	50.42	52.08	55.00	47.71	51.04	52.08	105.00
	Amperes Fuse ①	208.33 350	208.33 350	416.67 600	416.67 600	208.33 300	208.33 300	208.33 300	208.33 300	458.33 600	458.33 600	229.17 300	229.17 300	229.17 300	437.50 600
Diagram		B	B	A	A	D	D	D	D	A	A	D	D	D	C

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

120 x 140 Volts Primary — 12/24 Volts Secondary (Continued)

Table 2. Three Phase

Line Voltage		Boosting									Bucking				
		189Y/ 109	195Y/ 113	200Y/ 115	208Y/ 120	416Y/ 240	416Y/ 240	189	208	220	218	229	250	255	264
Load Voltage		208Y/ 120	234Y/ 135	240Y/ 139	229Y/ 132	458Y/ 264	437Y/ 252	208	229	242	208	208	227	232	240
0.05 kVA	kVA	1.50	0.84	0.87	1.65	1.65	3.15	0.75	0.83	0.87	1.57	0.83	0.90	0.92	0.95
	Amperes Fuse ①	4.17 6	2.08 4 ②	2.08 4 ②	4.17 6	2.08 3	4.17 6	2.08 3	2.08 3	2.08 6.00	4.38 6	2.29 3	2.29 3	2.29 3	2.29 3
0.075 kVA	kVA	2.25	1.27	1.30	2.48	2.48	4.73	1.13	1.24	1.31	2.36	1.24	1.35	1.38	1.43
	Amperes Fuse ①	6.25 10	3.12 6	3.12 6	6.25 10	3.13 5 ②	6.25 10	3.12 5 ②	3.13 5 ②	3.13 5 ②	6.56 10	3.44 5 ②	3.44 5 ②	3.44 5 ②	3.44 5 ②
0.1 kVA	kVA	3.00	1.69	1.73	3.30	3.30	6.30	1.50	1.65	1.75	3.15	1.65	1.80	1.84	1.91
	Amperes Fuse ①	8.33 15	4.17 8 ②	4.17 8 ②	8.33 15	4.17 6	8.33 12 ②	4.17 6	4.17 6	4.17 6	8.75 12 ②	4.58 6	4.58 6	4.58 6	4.58 6
0.15 kVA	kVA	4.50	2.53	2.60	4.95	4.95	9.46	2.25	2.48	2.62	4.72	2.48	2.71	2.76	2.86
	Amperes Fuse ①	12.50 20	6.25 10	6.25 10	12.50 20	6.25 10	12.50 20	6.25 10	6.25 10	6.25 10	13.13 20	6.87 10	6.87 10	6.88 10	6.88 10
0.25 kVA	kVA	7.50	4.22	4.33	8.26	8.26	15.76	3.75	4.13	4.37	7.87	4.13	4.51	4.60	4.76
	Amperes Fuse ①	20.83 30	10.42 20	10.42 20	20.83 30	10.42 15	20.83 30	10.42 15	10.42 15	10.42 15	21.88 30	11.46 15	11.46 15	11.46 15	11.46 15
0.5 kVA	kVA	15.00	8.44	8.66	16.51	16.51	31.52	7.50	8.26	8.73	15.73	8.26	9.02	9.20	9.53
	Amperes Fuse ①	41.67 60	20.83 35	20.83 35	41.67 60	20.83 30	41.67 60	20.83 30	20.83 30	20.83 30	43.75 60	22.92 30	22.92 30	22.92 30	22.92 30
0.75 kVA	kVA	22.51	12.67	12.99	24.77	24.77	47.28	11.25	12.38	13.10	23.60	12.39	13.53	13.80	14.29
	Amperes Fuse ①	62.50 90	31.25 50	31.25 50	62.50 90	31.25 45	62.50 90	31.25 45	31.25 45	31.25 45	65.63 80	34.37 40	34.37 40	34.37 40	34.38 40
1 kVA	kVA	30.01	16.89	17.32	33.02	33.02	63.05	15.00	16.51	17.46	31.47	16.53	18.04	18.40	19.05
	Amperes Fuse ①	83.33 125	41.67 70	41.67 70	83.33 125	41.67 60	83.33 110	41.67 60	41.67 60	41.67 60	87.50 110	45.83 60	45.83 60	45.83 60	45.83 60
1.5 kVA	kVA	45.01	25.33	25.98	49.54	49.54	94.57	22.51	24.77	26.20	47.20	24.79	27.06	27.60	28.58
	Amperes Fuse ①	125.00 175	62.50 100	62.50 100	125.00 175	62.50 90	125.00 175	62.50 90	62.50 90	62.50 90	131.25 175	68.75 80	68.75 80	68.75 80	68.75 80
2 kVA	kVA	60.02	33.77	34.64	66.05	66.05	126.09	30.01	33.02	34.93	62.93	33.05	36.08	36.81	38.11
	Amperes Fuse ①	166.67 250	83.33 125	83.33 125	166.67 250	83.33 125	166.67 225	83.33 125	83.33 125	83.33 125	175.00 225	91.67 110	91.67 110	91.67 110	91.67 110
3 kVA	kVA	90.02	50.66	51.96	99.07	99.07	189.14	45.01	49.54	52.39	94.40	49.58	54.13	54.21	57.16
	Amperes Fuse ①	250.00 350	125.00 200	125.00 200	250.00 350	125.00 175	250.00 350	125.00 175	125.00 175	125.00 175	262.50 350	137.50 175	137.50 175	137.50 175	137.50 175
5 kVA	kVA	150.04	84.44	86.60	165.12	165.12	315.23	75.02	82.56	87.32	157.33	82.63	90.21	92.02	95.26
	Amperes Fuse ①	416.67 600	208.33 350	208.33 350	416.67 600	208.33 300	416.67 600	208.33 300	208.33 300	208.33 300	437.50 600	229.17 300	229.17 300	229.17 300	229.17 300
Number of Transformers		3	3	3	3	3	3	2	2	2	2	2	2	2	2
Diagram		F	E	E	F	J	K	G	G	G	H	G	G	G	G

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

Technical Data

120 x 240 Volts Primary — 16/32 Volts Secondary

Table 3. Single Phase

		Boosting								Bucking					
Line Voltage		95	100	105	208	215	215	220	225	135	240	240	245	250	255
Load Voltage		120	113	119	236	244	229	235	240	120	112	225	230	234	239
0.05 kVA	kVA	0.19	0.35	0.37	0.37	0.38	0.72	0.73	0.75	0.42	0.38	0.75	0.77	0.78	0.80
	Amperes Fuse ①	1.56 3	3.13 5 ②	3.13 5 ②	1.56 2.5 ②	1.56 2.5 ②	3.12 5 ②	3.12 5 ②	3.12 5 ②	3.54 5 ②	1.77 2.5 ②	3.33 5 ②	3.33 5 ②	3.33 5 ②	3.33 5 ②
0.075 kVA	kVA	0.28	0.53	0.56	0.55	0.57	1.07	1.10	1.12	0.63	0.56	1.12	1.15	1.17	1.20
	Amperes Fuse ①	2.34 4 ②	4.69 8 ②	4.69 8 ②	2.34 4 ②	2.34 4 ②	4.69 8 ②	4.69 8 ②	4.69 8 ②	5.31 6	2.66 3	5.00 6	5.00 6	5.00 6	5.00 6
0.1 kVA	kVA	0.38	0.71	0.74	0.74	0.76	1.43	1.47	1.50	0.84	0.75	1.50	1.53	1.56	1.59
	Amperes Fuse ①	3.13 6	6.25 10	6.25 10	3.13 5 ②	3.13 5 ②	6.25 10	6.25 10	6.25 10	7.08 10	3.54 5 ②	6.67 10	6.67 10	6.67 10	6.67 10
0.15 kVA	kVA	0.56	1.06	1.12	1.11	1.14	2.15	2.20	2.25	1.27	1.13	2.25	2.30	2.34	2.39
	Amperes Fuse ①	4.69 8 ②	9.36 15	9.38 15	4.69 8 ②	4.69 8 ②	9.37 15	9.37 15	9.37 15	10.63 15	5.31 6	10.00 15	10.00 15	10.00 15	10.00 15
0.25 kVA	kVA	0.94	1.77	1.86	1.84	1.90	3.58	3.67	3.75	2.11	1.88	3.75	3.83	3.91	3.98
	Amperes Fuse ①	7.81 15	15.63 25	15.63 25	7.81 12 ②	7.81 12 ②	15.62 25	15.62 25	15.62 25	17.71 20	8.85 10	16.67 20	16.67 20	16.67 20	16.67 20
0.5 kVA	kVA	1.88	3.54	3.72	3.68	3.81	7.17	7.33	7.50	4.22	3.75	7.50	7.66	7.81	7.97
	Amperes Fuse	15.63 25	31.25 45	31.25 45	15.63 25	15.63 25	31.25 45	31.25 45	31.25 45	35.42 40	17.71 20	33.33 40	33.33 40	33.33 40	33.33 40
0.75 kVA	kVA	2.82	5.31	5.58	5.53	5.71	10.75	11.00	11.25	6.33	5.63	11.25	11.48	11.72	11.95
	Amperes Fuse ①	23.44 40	46.88 70	46.88 70	23.44 35	23.44 35	46.87 70	46.87 70	46.87 70	53.13 60	26.56 30	50.00 60	50.00 60	50.00 60	50.00 60
1 kVA	kVA	3.76	7.08	7.44	7.37	7.61	14.33	14.67	15.00	8.44	7.50	15.00	15.31	15.62	15.94
	Amperes Fuse ①	31.25 50	62.50 90	62.50 90	31.25 45	31.25 45	62.50 90	62.50 90	62.50 90	70.83 80	35.42 40	66.67 80	66.67 80	66.67 80	66.67 80
1.5 kVA	kVA	5.64	10.63	11.16	11.05	11.42	21.50	22.00	22.50	12.66	11.25	22.50	22.97	23.44	23.91
	Amperes Fuse ①	46.88 80	93.75 150	93.75 150	46.88 70	46.88 70	93.75 125	93.75 125	93.75 125	106.25 125	53.13 60	100.00 125	100.00 125	100.00 125	100.00 125
2 kVA	kVA	7.52	14.71	14.88	14.73	15.23	28.67	29.33	30.00	16.88	15.00	30.00	30.62	31.25	31.87
	Amperes Fuse ①	62.50 100	125.00 200	125.00 200	62.50 90	62.50 90	125.00 175	125.00 175	125.00 175	141.67 175	70.83 80	133.33 175	133.33 175	133.33 175	133.33 175
3 kVA	kVA	11.28	21.25	22.31	22.10	22.84	43.00	44.00	45.00	25.31	22.50	45.00	45.94	46.87	47.81
	Amperes Fuse ①	93.75 150	187.50 300	187.50 300	93.75 150	93.75 150	187.50 250	187.50 250	187.50 250	212.50 250	106.25 125	200.00 250	200.00 250	200.00 250	200.00 250
5 kVA	kVA	18.80	35.42	37.19	36.83	38.07	71.67	73.33	75.00	42.19	37.50	75.00	76.56	78.12	79.69
	Amperes Fuse ①	156.25 250	312.5 450	312.50 450	156.25 225	156.25 225	312.50 450	312.50 450	312.50 450	354.17 400	177.08 200	333.33 400	333.33 400	333.33 400	333.33 400
Diagram		B	A	A	D	D	C	C	C	A	D	C	C	C	C

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

120 x 240 Volts Primary — 16/32 Volts Secondary (Continued)

Table 4. Three Phase

		Boosting					Bucking					
Line Voltage		183Y/106	208Y/120	195	208	225	240	245	250	256	265	272
Load Voltage		208Y/120	236Y/136	208	236	240	208	230	234	240	234	240
0.05 kVA	kVA	1.12	1.28	1.13	0.64	1.30	0.65	1.33	1.35	1.39	0.72	0.74
	Amperes	3.13	3.13	3.12	1.56	3.12	1.80	3.33	3.33	3.33	1.77	1.77
	Fuse ①	5 ②	5 ②	5 ②	2.5 ②	5 ②	2.5 ②	5 ②	5 ②	5 ②	2.5 ②	2.5 ②
0.075 kVA	kVA	1.68	1.91	1.69	0.96	1.95	0.97	1.99	2.03	2.08	1.08	1.10
	Amperes	4.69	4.69	4.69	2.34	4.69	2.70	5.00	5.00	5.00	2.66	2.66
	Fuse ①	8 ②	8 ②	8 ②	4 ②	8 ②	3 ②	6 ②	6 ②	6 ②	3	3
0.1 kVA	kVA	2.25	2.55	2.25	1.28	2.60	1.30	2.65	2.71	2.77	1.43	1.47
	Amperes	6.25	6.25	6.25	3.13	6.25	3.61	6.67	6.67	6.67	3.54	3.54
	Fuse ①	10	10	10	5 ②	10	5 ②	10	10	10	5 ②	5 ②
0.15 kVA	kVA	3.37	3.83	3.38	1.91	3.90	1.95	3.98	4.06	4.16	2.15	2.21
	Amperes	9.38	9.38	9.37	4.69	9.37	5.41	10.00	10.00	10.00	5.31	5.31
	Fuse ①	15	15	15	8 ②	15	6	15	15	15	6	6
0.25 kVA	kVA	5.61	6.38	5.63	3.19	6.50	3.25	6.63	6.77	6.93	3.59	3.68
	Amperes	15.63	15.62	15.62	7.81	15.62	9.01	16.67	16.67	16.67	8.85	8.85
	Fuse ①	25	25	25	12 ②	25	10	20	20	20	10	10
0.5 kVA	kVA	11.23	12.76	11.26	6.38	12.99	6.50	13.26	13.53	13.86	7.17	7.36
	Amperes	31.25	31.25	31.25	15.63	31.25	18.03	33.33	33.33	33.33	17.71	17.71
	Fuse ①	45	45	45	25	45	20	40	40	40	20	20
0.75 kVA	kVA	16.84	19.14	16.89	9.58	19.49	9.74	19.89	20.30	20.78	10.76	11.04
	Amperes	46.88	46.88	46.87	23.44	46.87	27.04	50.00	50.00	50.00	26.56	26.56
	Fuse ①	70	70	70	35	70	30	60	60	60	30	30
1 kVA	kVA	22.45	25.52	22.52	12.76	25.98	12.99	26.52	27.06	27.71	14.34	14.72
	Amperes	62.50	62.50	62.50	31.25	62.50	36.06	66.67	66.67	66.67	35.42	35.42
	Fuse ①	90	90	90	45	90	40	80	80	80	40	40
1.5 kVA	kVA	33.68	38.28	33.77	19.14	38.97	19.49	39.78	40.59	41.57	21.52	22.08
	Amperes	93.75	93.75	93.75	46.88	93.75	54.09	100.00	100.00	100.00	53.13	53.13
	Fuse ①	150	150	125	70	125	60	125	125	125	60	60
2 kVA	kVA	44.90	51.04	45.03	25.52	51.96	25.98	53.04	54.13	55.43	28.69	29.44
	Amperes	125.00	125.00	125.00	62.50	125.00	72.12	133.33	133.33	133.33	70.83	70.83
	Fuse ①	200	200	175	90	175	80	175	175	175	80	80
3 kVA	kVA	67.36	76.56	67.55	38.28	77.94	38.97	79.57	81.19	83.14	43.03	44.17
	Amperes	187.50	187.50	187.50	93.75	187.50	108.17	200.00	200.00	200.00	106.25	106.25
	Fuse ①	300	300	250	150	250	125	250	250	250	125	125
5 kVA	kVA	112.26	127.59	112.58	63.80	129.90	64.95	132.61	135.32	138.56	71.72	73.61
	Amperes	312.50	312.50	312.50	156.25	312.50	180.29	333.33	333.33	333.33	177.08	177.08
	Fuse ①	450	450	450	225	450	200	400	400	400	200	200
Number of Transformers		3	3	2	2	2	2	2	2	2	2	
Diagram		F	F	H	G	H	L	H	H	H	G	G

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non-NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

Technical Data

240 x 480 Volts Primary — 24/48 Volts Secondary

Table 5. Single Phase

Line Voltage		Boosting									Bucking				
		230	380	416	425	430	435	440	450	460	132	277	480	480	504
Load Voltage		276	418	458	468	473	457	462	495	483	126	231	436	457	480
0.05 kVA	kVA Amperes Fuse ①	0.29 1.04 2 ②	0.44 1.04 1.5 ②	0.48 1.04 1.5 ②	0.49 1.04 1.5 ②	0.49 1.04 1.5 ②	0.95 2.08 3	0.96 2.08 3	0.52 1.04 1.5 ②	1.01 2.08 3	0.28 2.19 3	0.29 1.25 1.5 ②	0.50 1.15 1.5 ②	1.00 2.19 3	1.05 2.19 3
0.075 kVA	kVA Amperes Fuse ①	0.43 1.56 3	0.65 1.56 2.5 ②	0.72 1.56 2.5 ②	0.73 1.56 2.5 ②	0.74 1.56 2.5 ②	1.43 3.13 5 ②	1.44 3.13 5 ②	0.77 1.56 2.5 ②	1.51 3.13 5 ②	0.41 3.28 5 ②	0.43 1.88 2.5 ②	0.75 1.72 2.5 ②	1.50 3.28 5 ②	1.58 3.28 5 ②
0.1 kVA	kVA Amperes Fuse ①	0.58 2.08 4 ②	0.87 2.08 3	0.95 2.08 3	0.97 2.08 3	0.99 2.08 3	1.90 4.17 6	1.93 4.17 6	1.03 2.08 3	2.01 4.17 6	0.55 4.38 6	0.58 2.50 3	1.00 2.29 3	2.00 4.38 6	2.10 4.38 6
0.15 kVA	kVA Amperes Fuse ①	0.86 3.13 6	1.31 3.13 5 ②	1.43 3.13 5 ②	1.46 3.13 5 ②	1.48 3.13 5 ②	2.85 6.25 10	2.89 6.25 10	1.55 3.13 5 ②	3.02 6.25 10	0.83 6.56 10	0.87 3.75 5 ②	1.50 3.44 5 ②	3.00 6.56 10	3.15 6.56 10
0.25 kVA	kVA Amperes Fuse ①	1.44 5.21 10	2.18 5.21 8 ②	2.38 5.21 8 ②	2.43 5.21 8 ②	2.46 5.21 8 ②	4.76 10.42 15	4.81 10.42 15	2.58 5.21 8 ②	5.03 10.42 15	1.38 10.94 15	1.44 6.25 8 ②	2.50 5.73 8 ②	5.00 10.94 15	5.25 10.94 15
0.5 kVA	kVA Amperes Fuse ①	2.88 10.42 20	4.35 10.42 15	4.77 10.42 15	4.87 10.42 15	4.93 10.42 15	9.52 20.83 30	9.63 20.83 30	5.16 10.42 15	10.06 20.83 30	2.75 21.88 30	2.89 12.50 15	5.00 11.46 15	10.00 21.88 30	10.50 21.88 30
0.75 kVA	kVA Amperes Fuse ①	4.31 15.63 25	6.53 15.63 25	7.15 15.62 25	7.30 15.63 25	7.39 15.63 25	14.27 31.25 45	14.44 31.25 45	7.73 15.63 25	15.09 31.25 45	4.13 32.81 40	4.33 18.75 20	7.50 17.19 20	15.00 32.81 40	15.75 32.81 40
1 kVA	kVA Amperes Fuse ①	5.75 20.83 35	8.71 20.83 30	9.53 20.83 30	9.74 20.83 30	9.85 20.83 30	19.03 41.67 60	19.25 41.67 60	10.31 20.83 30	20.13 41.67 60	5.50 43.75 60	5.77 25.00 30	10.00 22.92 30	20.00 43.75 60	21.00 43.75 60
1.5 kVA	kVA Amperes Fuse ①	8.63 31.25 50	13.06 31.25 45	14.30 31.25 45	14.61 31.25 45	14.78 31.25 45	28.55 62.50 90	28.88 62.50 90	15.47 31.25 45	30.19 62.50 90	8.25 65.63 80	8.66 37.50 40	15.00 34.37 40	30.00 65.63 80	31.50 65.63 80
2 kVA	kVA Amperes Fuse ①	11.50 41.67 70	17.42 41.67 60	19.07 41.67 60	19.48 41.67 60	19.71 41.67 60	38.06 83.33 110	38.50 83.33 110	20.63 41.67 60	40.25 83.33 110	11.00 87.50 110	11.54 50.00 60	20.00 45.83 60	40.00 87.50 110	42.00 87.50 110
3 kVA	kVA Amperes Fuse ①	17.25 62.50 100	26.13 62.50 90	28.60 62.50 90	29.22 62.50 90	29.56 62.50 90	57.09 125.00 175	57.75 125.00 175	30.94 62.50 90	60.38 125.00 175	16.50 131.25 175	17.31 75.00 80	30.00 68.75 80	60.00 131.25 175	63.00 131.25 175
5 kVA	kVA Amperes Fuse ①	28.75 104.17 175	43.54 104.17 150	47.67 104.17 150	48.70 104.17 150	49.27 104.17 150	95.16 208.33 300	96.25 208.33 300	51.56 104.17 150	100.63 208.33 300	27.50 218.75 300	28.85 125.00 150	50.00 114.58 150	100.00 218.75 300	105.00 218.75 300
Diagram		B	D	D	D	D	C	C	D	C	C	B	D	C	C

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non-NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

240 x 480 Volts Primary — 24/48 Volts Secondary (Continued)

Table 6. Three Phase

Line Voltage		Boosting								Bucking							
		399Y/230	380	430	440	460	460	480	480	440	440	460	460	480	480	500	500
Load Voltage		480Y/277	418	473	462	506	483	528	504	400	419	438	418	457	436	455	476
0.05 kVA	kVA	0.86	0.75	0.85	1.67	0.91	1.74	0.95	1.82	0.79	1.59	1.66	0.83	1.73	0.87	0.90	1.80
	Amperes	1.04	1.04	1.04	2.08	1.04	2.08	1.04	2.08	1.15	2.19	2.19	1.15	2.19	1.15	1.15	2.19
	Fuse ①	2 ②	1.5 ②	1.5 ②	3	1.5 ②	3	1.5 ②	3	1.5 ②	3	3	1.5 ②	3	1.5 ②	1.5 ②	3
0.075 kVA	kVA	1.30	1.13	1.28	2.50	1.37	2.61	1.43	2.73	1.19	2.38	2.49	1.24	2.60	1.30	1.35	2.71
	Amperes	1.56	1.56	1.56	3.13	1.56	3.13	1.56	3.13	1.72	3.28	3.28	1.72	3.28	1.72	1.72	3.28
	Fuse ①	3	2.5 ②	2.5 ②	5 ②	2.5 ②	5 ②	2.5 ②	5 ②	2.5 ②	5 ②	5 ②	2.5 ②	5 ②	2.5 ②	2.5 ②	5 ②
0.1 kVA	kVA	1.73	1.51	1.71	3.33	1.83	3.49	1.91	3.64	1.59	3.18	3.32	1.66	3.46	1.73	1.80	3.61
	Amperes	2.08	2.08	2.08	4.17	2.08	4.17	2.08	4.17	2.29	4.38	4.38	2.29	4.38	2.29	2.29	4.38
	Fuse ①	4 ②	3	3	6	3	6	3	6	3	6	6	3	6	3	3	6
0.15 kVA	kVA	2.59	2.26	2.56	5.00	2.74	5.23	2.86	5.46	2.38	4.76	4.98	2.49	5.20	2.60	2.71	5.41
	Amperes	3.13	3.13	3.13	6.25	3.13	6.25	3.13	6.25	3.44	6.56	6.56	3.44	6.56	3.44	3.44	6.56
	Fuse ①	6	5 ②	5 ②	10	5 ②	10	5 ②	10	5 ②	10	10	5 ②	10	5 ②	5 ②	10
0.25 kVA	kVA	4.32	3.77	4.27	8.34	4.56	8.71	4.76	9.09	3.97	7.94	8.30	4.15	8.66	4.33	4.51	9.02
	Amperes	5.21	5.21	5.21	10.42	5.21	10.42	5.21	10.42	5.73	10.94	10.94	5.73	10.94	5.73	5.73	10.94
	Fuse ①	10	8 ②	8 ②	15	8 ②	15	8 ②	15	8 ②	15	15	8 ②	15	8 ②	8 ②	15
0.5 kVA	kVA	8.64	7.54	8.53	16.67	9.13	17.43	9.53	18.19	7.94	15.88	16.60	8.30	17.32	8.66	9.02	18.04
	Amperes	10.42	10.42	10.42	20.83	10.42	20.83	10.42	20.83	11.46	21.88	21.88	11.46	21.88	11.46	11.46	21.88
	Fuse ①	20	15	15	30	15	30	15	30	15	30	30	15	30	15	15	30
0.75 kVA	kVA	12.96	11.31	12.80	25.01	13.69	26.14	14.29	27.28	11.91	23.82	24.90	12.45	25.98	12.99	13.53	27.06
	Amperes	15.62	15.63	15.63	31.25	15.63	31.25	15.63	31.25	17.19	32.81	32.81	17.19	32.81	17.19	17.19	32.81
	Fuse ①	25	25	25	45	25	45	25	45	20	40	40	20	40	20	20	40
1 kVA	kVA	17.28	15.08	17.07	33.34	18.26	34.86	19.05	36.37	15.88	31.75	33.20	16.60	34.64	17.32	18.04	36.08
	Amperes	20.83	20.83	20.83	41.67	20.83	41.67	20.83	41.67	22.92	43.75	43.75	22.92	43.75	22.92	22.92	43.75
	Fuse ①	30	30	30	60	30	60	30	60	30	60	60	30	60	30	30	60
1.5 kVA	kVA	25.92	22.62	25.60	50.01	27.39	52.29	28.58	54.56	23.82	47.63	49.80	24.90	51.96	25.98	27.06	54.13
	Amperes	31.25	31.25	31.25	62.50	31.25	62.50	31.25	62.50	34.38	65.63	65.63	34.38	65.63	34.37	34.37	65.63
	Fuse ①	50	45	45	90	45	90	45	90	40	80	80	40	80	40	40	80
2 kVA	kVA	34.55	30.17	34.14	66.68	36.52	69.72	38.11	72.75	31.75	63.51	66.40	33.20	69.28	34.64	36.08	72.17
	Amperes	41.67	41.67	41.67	83.33	41.67	83.33	41.67	83.33	45.83	87.50	87.50	45.83	87.50	45.83	45.83	87.50
	Fuse ①	70	60	60	110	60	110	60	110	60	110	110	60	110	60	60	110
3 kVA	kVA	51.83	45.25	51.20	100.03	54.78	104.57	57.16	109.12	47.63	95.26	99.59	49.80	103.92	51.96	54.13	108.25
	Amperes	62.50	62.50	62.50	125.00	62.50	125.00	62.50	125.00	68.75	131.25	131.25	68.75	131.25	68.75	68.75	131.25
	Fuse ①	100	90	90	175	90	175	90	175	80	175	175	80	175	80	80	175
5 kVA	kVA	86.39	75.42	85.34	166.71	91.29	174.29	95.26	181.87	79.39	158.77	165.99	82.99	173.21	86.60	90.21	180.42
	Amperes	104.17	104.17	104.17	208.33	104.17	208.33	104.17	208.33	114.58	218.75	218.75	114.58	218.75	114.58	114.58	218.75
	Fuse ①	175	150	150	300	150	300	150	300	150	300	300	150	300	150	150	300
Number of Transformers		3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Diagram		E	G	G	H	G	H	G	H	G	H	H	G	H	G	G	H

① Maximum fuse or circuit breaker size per NEC 450-4.

② Non-NEC standard fuse size (NEC 240-6). Check with local authorities for use of next larger standard size.

Note: Output voltage for lower input voltage can be found by: $\frac{\text{Rated Output Voltage}}{\text{Rated Input Voltage}} \times \text{Input Actual Voltage} = \text{Output New Voltage}$.

Note: Output kVA available at reduced input voltage can be found by: $\frac{\text{Actual Input Voltage}}{\text{Rated Input Voltage}} \times \text{Output kVA} = \text{New kVA Rating}$.

Technical Data

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