

# Buck-Boost Transformer Terms & Definitions

Buck-Boost transformers are single phase, four winding transformers designed for two purposes. The first purpose is as a low voltage isolation transformer for use on 12, 16, 24, 32, or 48 volt circuits. When used as low voltage transformers, Buck-Boost transformers have capacities of .050 kVA to 5.0 kVA. Their second, and more important use, is as a Buck-Boost transformer. Buck-Boost means that these transformers are used to buck (lower) or boost (increase) line voltage to match required load voltage.

Buck-Boost transformers are used to correct consistently low or high voltage conditions, where the voltage difference ranges from approximately 5% to 27%. Variation of the input voltage is passed through to the output side of the transformer in the same percentage. This concept is important because the question is frequently asked if Buck-Boost transformers will stabilize variable voltages. They will not!

**When connected as a Buck Boost transformer, these transformers, with dual primaries of 120 x 240, or 240 x 480, and dual secondaries of 12 / 24, 16 / 32, or 24 / 48 volts, have literally hundreds of voltage matching applications.**

## Applications:

The most common applications for these transformers are boosting 208 volt lines to 230 or 240 volts, and vice-versa. These applications include both single and three phase lines and are particularly common in HVAC applications for air-conditioning appliances.

Additionally, Buck-Boost transformers are very well suited to motor loads, boosting 240 to 277 for lighting loads and many applications where nominal voltage is above or below 120 volts. Their use should be considered where supply line voltage is found to be consistently above or below desired nominal values of load voltage.

## Single Phase Applications:

Single phase applications require the purchase of one transformer. Charts are provided on Pages 35 - 37 for sizing and specifying single phase applications.

## Three Phase Applications:

Three phase applications require banking either 2 or 3 Buck-Boost transformers. Charts are provided on Pages 38 - 40 for sizing and specifying three phase applications.

## Connection/Configurations to Avoid:

Some line/load distribution system combinations are to be avoided. For instance, closed delta connections are not recommended because they may cause phase shifting to occur on the load side of the bank. In addition, they require larger transformers to accomplish similar results and are, therefore, less efficient and more expensive. Also, a three phase, 4 wire wye supply line should be connected to a wye configuration, 3 transformer bank. This configuration will assure sufficient current carrying capacity in the neutral of the wye circuit.

The chart below indicates distribution system restrictions.

Input (Supply System)	Desired Output Connection	
WYE 4 wire	WYE 3 or 4 wire	OK
WYE 3 or 4 wire	OPEN DELTA 3 wire	OK
CLOSED DELTA 3 Wire	OPEN DELTA 3 wire	OK
DELTA 3 Wire	WYE 3 or 4 wire	DO NOT USE
OPEN DELTA 3 wire	WYE 3 or 4 wire	DO NOT USE
WYE 3 or 4 wire	CLOSED DELTA 3 Wire	DO NOT USE



# Single Phase Buck-Boost Sizing Tables

## Single Phase Buck-Boost Table, Type M

Type M		Single Phase / Single Unit - Type M												
		Boost - Increase Voltage								Buck - Decrease Voltage				
Catalog Number	Line	96	100	108	109	216	218	228	208	132	144	230	252	264
	Load	120	120	120	120	240	240	240	230	120	120	208	240	240
35-M005	Load Amps	2.0	2.0	3.7	4.1	2.0	2.0	4.1	1.9	4.5	2.5	2.1	4.3	2.2
	kVA	0.25	0.25	0.45	0.49	0.50	0.49	1.00	0.45	0.55	0.30	0.45	1.05	0.55
	Line Fuse	5	5	8	8	5	5	7	5	7	5	5	7	5
35-M010	Load Amps	4.1	4.1	7.5	8.2	4.1	4.1	8.3	3.9	9.1	5.0	4.3	8.7	4.5
	kVA	0.50	0.50	0.90	0.99	1.00	0.99	2.00	0.90	1.10	0.60	0.91	2.10	1.10
	Line Fuse	10	10	15	15	8	8	15	8	15	7	7	15	7
35-M015	Load Amps	6.2	6.2	11.2	12.3	6.2	6.1	12.5	5.9	13.7	7.5	6.5	13.1	6.8
	kVA	0.75	0.75	1.35	1.48	1.50	1.48	3.00	1.36	1.65	0.90	1.36	3.15	1.65
	Line Fuse	15	15	20	20	12	12	20	12	20	12	10	20	12
85-M020	Load Amps	10.4	10.4	18.7	20.6	10.4	10.3	20.8	9.8	22.9	12.5	10.9	21.8	11.4
	kVA	1.25	1.25	2.25	2.47	2.50	2.47	5.00	2.26	2.75	1.50	2.27	5.25	2.75
	Line Fuse	20	20	30	30	15	15	30	15	30	15	15	30	15
85-M025	Load Amps	20.8	20.8	37.5	41.2	20.8	20.6	41.6	19.7	45.8	25.0	21.8	43.7	22.9
	kVA	2.50	2.50	4.50	4.95	5.00	4.95	10.00	4.53	5.50	3.00	4.55	10.50	5.50
	Line Fuse	35	35	60	60	30	30	60	30	60	30	30	60	30
85-M030	Load Amps	31.2	31.2	56.2	61.9	31.2	30.9	62.5	29.5	68.7	37.5	32.8	65.6	34.3
	kVA	3.75	3.75	6.75	7.43	7.50	7.43	15.00	6.79	8.25	4.50	6.83	15.75	8.25
	Line Fuse	50	50	80	90	45	45	80	45	80	40	40	80	40
85-M035	Load Amps	41.6	41.6	75.0	82.5	41.6	41.2	83.3	39.4	91.6	50.0	43.7	87.5	45.8
	kVA	5.00	5.00	9.00	9.90	10.00	9.90	20.00	9.06	11.00	6.00	9.10	21.00	11.00
	Line Fuse	70	70	125	125	60	60	110	60	110	60	60	110	60
85-M040	Load Amps	62.5	62.5	112.5	123.8	62.5	61.9	125.0	59.1	137.5	75.0	65.6	131.2	68.7
	kVA	7.5	7.5	13.5	14.8	15.0	14.8	30.0	13.5	16.5	9.0	13.6	31.5	16.5
	Line Fuse	100	100	175	175	80	80	175	90	175	80	80	175	80
85-M045	Load Amps	83.3	83.3	150.0	165.1	83.3	82.5	166.6	78.8	183.3	100.0	87.5	175.0	91.6
	kVA	10.0	10.0	18.0	19.8	20.0	19.8	40.0	18.1	22.0	12.0	18.2	42.0	22.0
	Line Fuse	150	150	250	250	125	125	225	125	225	110	110	225	110
85-M050	Load Amps	125.0	125.0	225.0	247.7	125.0	123.8	250.0	118.2	275.0	150.0	131.3	262.5	137.5
	kVA	15.0	15.0	27.0	29.7	30.0	29.7	60.0	27.1	33.0	18.0	27.3	63.0	33.0
	Line Fuse	200	200	350	350	175	175	350	175	350	175	150	350	175
85-M055	Load Amps	208.3	208.3	375.0	412.8	208.3	206.4	416.6	197.0	458.3	250.0	218.9	437.5	229.1
	kVA	25.0	25.0	45.0	49.5	50.0	49.5	100.0	45.3	55.0	30.0	45.5	105.0	55.0
	Line Fuse	350	350	600	600	300	300	600	300	600	300	250	600	300
Qty. Required		1	1	1	1	1	1	1	1	1	1	1	1	1
Connection Dia. Page		SP - 8 43	SP - 12 44	SP - 7 43	SP - 11 44	SP - 6 43	SP - 10 44	SP - 5 43	SP - 10 44	SP - 3 43	SP - 4 43	SP - 2 43	SP - 1 43	SP - 2 43

# Single Phase Buck-Boost Sizing Tables

## Single Phase Buck-Boost Table, Type Y

Type Y		Single Phase / Single Unit - Type Y												
		Boost - Increase Voltage								Buck - Decrease Voltage				
Catalog Number	Line	88	95	104	106	212	224	225	208	136	152	256	272	240
	Load	120	120	120	120	240	240	240	240	120	120	240	240	208
35-Y005	Load Amps	1.5	1.9	3.1	3.1	1.5	3.1	3.1	1.5	3.5	1.9	3.3	1.7	1.8
	kVA	0.18	0.23	0.37	0.37	0.37	0.75	0.75	0.37	0.42	0.23	0.80	0.42	0.37
	Line Fuse	5	5	5	5	5	5	5	5	5	5	5	5	5
35-Y010	Load Amps	3.1	3.9	6.2	6.3	3.1	6.2	6.2	3.1	7.0	3.9	6.6	3.5	3.6
	kVA	0.37	0.47	0.75	0.75	0.75	1.50	1.50	0.75	0.85	0.47	1.60	0.85	0.75
	Line Fuse	7	8	12	12	6	10	10	6	10	5	10	5	5
35-Y015	Load Amps	4.6	5.9	9.3	9.4	4.7	9.3	9.3	4.6	10.6	5.9	10.0	5.3	5.4
	kVA	0.56	0.71	1.12	1.13	1.13	2.25	2.25	1.12	1.27	0.71	2.40	1.27	1.12
	Line Fuse	10	15	15	15	9	15	15	9	15	8	15	8	8
85-Y020	Load Amps	7.8	9.8	15.6	15.7	7.8	15.6	15.6	7.8	17.7	9.8	16.6	8.8	9.0
	kVA	0.93	1.18	1.87	1.89	1.89	3.75	3.75	1.87	2.12	1.18	4.00	2.12	1.87
	Line Fuse	15	25	25	25	15	25	25	15	20	15	20	15	15
85-Y025	Load Amps	15.6	19.7	31.2	31.5	15.7	31.2	31.2	15.6	35.4	19.7	33.3	17.7	18.0
	kVA	1.87	2.37	3.75	3.78	3.78	7.50	7.50	3.75	4.25	2.37	8.00	4.25	3.75
	Line Fuse	3.0	35	45	45	25	45	45	25	4	25	40	25	25
85-Y030	Load Amps	23.4	29.6	46.8	47.3	23.6	46.8	46.8	23.4	53.1	29.6	50.0	26.5	27.0
	kVA	2.81	3.56	5.62	5.67	5.67	11.25	11.25	5.62	6.37	3.56	12.00	6.37	5.62
	Line Fuse	40	50	70	70	35	70	70	35	60	30	60	35	30
85-Y035	Load Amps	31.2	39.5	62.5	63.0	31.5	62.5	62.5	31.2	70.8	39.5	66.6	35.4	36.0
	kVA	3.75	4.75	7.50	7.57	7.57	15.00	15.00	7.50	8.50	4.75	16.00	8.50	7.50
	Line Fuse	60	70	90	90	45	90	90	50	80	40	80	45	40
85-Y040	Load Amps	46.8	59.3	93.7	94.6	47.3	93.7	93.7	46.8	106.2	59.3	100.0	53.1	54.0
	kVA	5.6	7.1	11.2	11.3	11.3	22.5	22.5	11.2	12.7	7.1	24.0	12.7	11.2
	Line Fuse	80	100	150	150	70	125	125	70	125	60	125	70	60
85-Y045	Load Amps	62.5	79.1	125.0	126.1	63.0	125.0	125.0	62.5	141.6	79.1	133.3	70.8	72.1
	kVA	7.5	9.5	15.0	15.1	15.1	30.0	30.0	15.0	17.0	9.5	32.0	17.0	15.0
	Line Fuse	110	125	200	200	90	175	175	100	175	80	150	90	80
85-Y050	Load Amps	93.7	118.7	187.5	189.2	94.6	187.5	187.5	93.7	212.5	118.7	200.0	106.2	108.1
	kVA	11.2	14.2	22.5	22.7	22.7	45.0	45.0	22.5	25.5	14.2	48.0	25.5	22.5
	Line Fuse	175	200	300	300	150	300	300	150	250	125	225	150	125
85-Y055	Load Amps	156.2	197.9	312.5	315.4	157.7	312.5	312.5	156.2	354.1	197.9	333.3	177.0	180.2
	kVA	18.7	23.7	37.5	37.8	37.8	75.0	75.0	37.5	42.5	23.7	80.0	42.5	37.5
	Line Fuse	300	350	500	450	250	450	450	250	400	200	400	250	200
Qty. Required		1	1	1	1	1	1	1	1	1	1	1	1	1
Connection Dia. Page		SP - 8 43	SP - 12 44	SP - 7 43	SP - 11 44	SP - 10 44	SP - 5 43	SP - 9 44	SP - 6 43	SP - 3 43	SP - 4 43	SP - 1 43	SP - 2 43	SP - 13 44

# Single Phase Buck-Boost Sizing Tables

## Single Phase Buck-Boost Table, Type LM

Type LM		Single Phase / Single Unit - Type LM													
		Boost - Increase Voltage								Buck - Decrease Voltage					
Catalog Number	Line	192	200	216	218	432	437	456	457	253	277	264	288	504	528
	Load	240	240	240	240	480	480	480	480	230	230	240	240	480	480
35-LM010	Load Amps	2.0	2.0	4.1	4.1	2.0	2.1	4.1	4.1	4.5	2.4	4.5	2.5	4.3	2.2
	kVA	0.50	0.50	1.00	1.00	1.00	1.01	2.00	1.98	1.05	0.56	1.10	0.60	2.10	1.10
	Line Fuse	5	5	8	7	5	5	7	7	7	5	7	7	5	7
35-LM015	Load Amps	3.1	3.1	6.2	6.2	3.1	3.1	6.2	6.2	6.8	3.6	6.8	3.7	6.5	3.4
	kVA	0.75	0.75	1.50	1.50	1.50	1.52	3.00	2.98	1.58	0.84	1.65	0.90	3.15	1.65
	Line Fuse	7	7	10	12	6	6	10	10	10	5	10	5	10	5
85-LM020	Load Amps	5.2	5.2	10.4	10.4	5.2	5.2	10.4	10.3	11.4	6.1	11.4	6.2	10.9	5.7
	kVA	1.25	1.25	2.50	2.50	2.50	2.54	5.00	4.96	2.63	1.41	2.75	1.50	5.25	2.75
	Line Fuse	10	10	15	15	10	10	15	15	15	9	15	9	15	9
85-LM025	Load Amps	10.4	10.4	20.8	20.8	10.4	10.5	20.8	20.6	22.9	12.2	22.9	12.5	21.8	11.4
	kVA	2.50	2.50	5.00	5.00	5.00	5.08	10.00	9.93	5.27	2.82	5.50	3.00	10.50	5.50
	Line Fuse	20	20	30	30	15	15	30	30	30	15	30	15	30	15
85-LM030	Load Amps	15.6	15.6	31.2	31.2	15.6	15.8	31.2	31.0	34.3	18.4	34.3	18.7	32.8	17.1
	kVA	3.75	3.75	7.50	7.50	7.50	7.62	15.00	14.90	7.90	4.23	8.25	4.50	15.75	8.25
	Line Fuse	25	25	45	45	25	25	45	45	40	20	20	20	40	20
85-LM035	Load Amps	20.8	20.8	41.6	41.6	20.8	21.1	41.6	41.3	45.8	24.5	45.8	25.0	43.7	22.9
	kVA	5.00	5.00	10.00	10.00	10.00	10.16	20.00	19.87	10.54	5.64	11.00	6.00	21.00	11.00
	Line Fuse	35	35	60	60	30	30	60	60	60	30	60	30	60	30
85-LM040	Load Amps	31.2	31.2	62.5	62.5	31.2	31.7	62.	62.0	68.7	36.8	68.7	37.5	65.6	34.3
	kVA	7.50	7.50	15.00	15.00	15.00	15.24	30.00	29.80	15.81	8.47	16.50	9.00	31.50	16.50
	Line Fuse	50	50	90	90	45	45	90	90	80	40	80	40	80	40
85-LM045	Load Amps	41.6	41.6	83.3	83.3	41.6	42.3	83.3	82.7	91.6	49.1	91.6	50.0	87.5	45.8
	kVA	10.0	10.0	20.0	20.0	20.0	20.3	40.0	39.7	21.0	11.2	22.0	12.0	42.0	22.0
	Line Fuse	70	70	125	125	60	60	110	110	110	60	110	60	110	60
85-LM050	Load Amps	62.5	62.5	125.0	124.9	62.5	63.5	125.0	124.1	137.5	73.6	137.5	75.0	131.2	68.7
	kVA	15.0	15.0	30.0	30.0	30.0	30.4	60.0	59.6	31.6	16.9	33.0	18.0	63.0	33.0
	Line Fuse	100	100	175	175	90	90	175	175	175	80	175	80	175	80
85-LM055	Load Amps	104.1	104.1	208.3	208.3	104.1	105.8	208.3	206.9	229.1	122.7	229.1	125.0	218.7	114.5
	kVA	25.0	25.0	50.0	50.0	50.0	50.8	100.0	99.3	52.7	28.2	55.0	30.0	105.0	55.0
	Line Fuse	175	175	300	300	150	150	300	300	300	150	300	150	300	150
Qty. Required		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Connection Dia. Page		SP - 8 43	SP -12 44	SP - 7 43	SP -11 44	SP - 6 43	SP -10 44	SP - 5 43	SP - 9 44	SP - 3 43	SP - 4 43	SP - 3 43	SP - 4 43	SP - 1 43	SP - 2 43

# Three Phase Buck-Boost Sizing Tables

## Three Phase Buck-Boost Table, Type M

Type M		Three Phase / Two or Three Units - Type M															
		Boost - Increase Voltage										Buck - Decrease Voltage					
Catalog Number	Line	166	173	187	<b>208</b>	216	228	374	377	395	397	<b>230</b>	249	252	264	437	457
	Load	208	208	208	<b>230</b>	240	240	416	416	416	416	<b>208</b>	208	240	240	416	416
35-M005	Load Amps	1.6	2.0	3.6	4.1	1.8	3.9	1.8	2.0	3.9	4.1	4.5	2.4	4.3	2.2	4.3	2.2
	kVA	0.60	0.75	1.30	1.64	0.77	1.64	1.34	1.50	2.85	3.95	1.64	0.90	1.82	0.95	3.12	1.65
	Line Fuse	5	5	7	8	5	7	5	5	7	7	7	5	7	5	7	5
35-M010	Load Amps	3.3	4.1	7.2	8.2	3.7	7.8	3.7	4.1	7.9	8.3	9.1	4.9	8.7	4.5	8.6	4.5
	kVA	1.20	1.49	2.60	3.29	1.55	3.28	2.69	3.00	5.70	5.99	3.29	1.80	3.64	1.90	6.24	3.30
	Line Fuse	7	8	15	12	7	15	7	7.5	15	15	15	7	15	7	15	7
35-M015	Load Amps	4.9	6.2	10.8	12.4	5.5	11.8	5.6	6.2	11.8	12.4	13.7	7.4	13.1	6.8	12.9	6.8
	kVA	1.80	2.24	3.90	4.94	2.32	4.92	4.04	4.50	8.55	8.99	4.94	2.70	5.46	2.86	9.36	4.95
	Line Fuse	10	12	20	20	10	20	12	10	20	20	20	10	20	10	20	10
85-M020	Load Amps	8.3	10.4	18.0	20.6	9.3	19.7	9.3	10.4	19.7	20.8	22.8	12.4	21.9	11.4	21.6	11.4
	kVA	3.00	3.74	6.50	8.23	3.87	8.20	6.74	7.50	14.26	14.99	8.23	4.50	9.10	4.76	15.60	8.25
	Line Fuse	15	20	30	30	15	30	15	15	30	30	30	15	30	15	30	15
85-M025	Load Amps	16.6	20.8	36.0	41.3	18.6	39.4	18.7	20.8	39.5	41.6	45.7	24.9	43.8	22.9	43.3	22.9
	kVA	6.00	7.49	13.00	16.46	7.75	16.40	13.49	15.00	28.52	29.98	16.46	9.00	18.20	9.53	31.21	16.50
	Line Fuse	30	35	60	60	30	60	30	30	60	60	60	30	60	30	60	30
85-M030	Load Amps	24.9	31.2	54.1	62.0	27.9	59.1	28.0	31.2	59.3	62.42	68.5	37.4	65.7	34.4	64.9	34.3
	kVA	9.00	11.24	19.50	24.69	11.62	24.60	20.23	22.50	42.78	44.97	24.69	13.50	27.31	14.30	46.82	24.75
	Line Fuse	45	50	80	90	45	80	45	45	80	90	80	45	80	45	80	45
85-M035	Load Amps	33.3	41.6	72.1	82.6	37.2	78.9	37.4	41.6	79.1	83.2	91.4	49.9	87.6	45.8	86.6	45.8
	kVA	12.00	14.99	26.00	32.93	15.50	32.80	26.98	30.00	57.05	59.97	32.93	18.00	36.41	19.07	62.49	33.00
	Line Fuse	60	70	110	125	60	110	60	60	110	110	110	60	110	60	110	60
85-M040	Load Amps	49.9	62.4	108.2	124.0	55.9	118.3	56.17	62.45	118.7	124.8	137.1	74.9	131.4	68.8	129.9	68.7
	kVA	18.00	22.49	39.00	49.39	23.25	49.20	40.47	45.00	85.57	89.95	49.39	27.00	54.62	28.61	93.64	49.50
	Line Fuse	80	100	175	175	80	175	80	90	175	175	175	80	175	80	175	80
85-M045	Load Amps	66.6	83.2	144.3	165.3	74.5	157.8	74.8	83.2	158.3	166.4	182.8	99.9	175.2	91.7	173.2	91.6
	kVA	24.0	29.9	52.0	65.8	31.1	65.6	53.9	60.0	114.1	119.9	65.8	36.0	72.8	38.1	124.8	66.0
	Line Fuse	110	150	225	250	110	250	110	125	250	250	225	110	225	110	225	110
85-M050	Load Amps	99.9	124.8	216.5	248.0	111.8	236.7	112.3	124.9	237.5	249.6	274.2	149.9	262.8	137.6	259.9	137.4
	kVA	36.0	44.9	78.8	98.7	46.5	98.4	80.9	90.00	171.1	179.9	98.7	54.0	109.2	57.2	187.2	99.0
	Line Fuse	175	200	350	400	175	250	175	175	350	350	350	175	350	175	350	175
85-M055	Load Amps	166.6	208.1	360.8	413.3	186.4	394.5	187.2	208.1	395.9	416.1	457.0	249.8	438.0	229.4	433.2	229.0
	kVA	60.0	74.9	130.0	164.6	77.5	164.0	134.9	150.0	285.2	299.8	164.6	90.0	182.0	95.3	312.1	165.0
	Line Fuse	300	350	600	600	300	600	200	300	600	600	600	300	600	300	600	300
Qty. Required		3	3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
Connection Dia. Page		TP-18 46	TP-22 47	TP-17 46	TP-21 47	TP-5 45	TP-6 45	TP-20 47	TP-24 47	TP-19 47	TP-23 47	TP-13 46	TP-14 46	TP-10 46	TP-9 45	TP-15 46	TP-16 46

# Three Phase Buck-Boost Sizing Tables

## Three Phase Buck-Boost Table, Type Y

Type Y		Three Phase / Two and Three Units - Type Y															
		Boost - Increase Voltage										Buck - Decrease Voltage					
Catalog Number	Line Load	152	164	180	208	208	212	224	360	388	416	263	235	240	256	272	390
		208	208	208	235	240	240	240	416	416	471	208	208	208	240	240	416
35-Y005	Load Amps	1.5	1.5	2.6	3.1	1.3	1.5	2.9	1.3	2.9	1.5	1.9	3.5	1.5	3.3	1.77	3.1
	kVA	0.55	0.55	0.96	1.27	0.56	0.64	1.21	0.96	2.09	1.25	0.69	1.27	0.56	1.38	.73	2.25
	Line Fuse	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5.6
35-Y010	Load Amps	3.0	3.1	5.3	6.2	2.7	3.0	5.8	2.6	5.8	3.0	3.8	7.0	3.1	6.6	3.5	6.2
	kVA	1.11	1.11	1.93	2.54	1.12	1.28	2.42	1.93	4.19	2.50	1.39	2.54	1.12	2.77	1.47	4.50
	Line Fuse	5	7	10	12	5	5	10	5	12	6	5	10	5	10	5	7
35-Y015	Load Amps	4.6	4.6	8.0	9.3	4.0	4.6	8.7	4.0	8.7	4.6	5.8	10.6	4.6	10.0	5.3	9.3
	kVA	1.67	1.67	2.89	3.81	1.68	1.92	3.63	2.89	6.28	3.75	2.09	3.81	1.68	4.16	2.21	6.75
	Line Fuse	8	10	12	15	8	9	15	7.5	15	9	8	15	7	15	9	15
85-Y020	Load Amps	7.7	7.7	13.4	15.6	6.7	7.7	14.5	6.7	14.5	7.6	9.7	17.6	7.8	16.6	8.8	15.6
	kVA	2.78	2.79	4.83	6.36	2.81	3.21	6.05	4.83	10.47	6.26	3.49	6.36	2.81	6.93	3.68	11.25
	Line Fuse	12	15	25	30	15	15	25	15	25	15	15	25	10	25	15	25
85-Y025	Load Amps	15.4	15.5	26.8	31.2	13.5	15.4	29.1	13.4	29.0	15.3	19.4	35.3	15.6	33.3	17.7	31.2
	kVA	5.57	5.58	9.66	12.72	5.62	6.42	12.10	9.66	20.94	12.52	6.99	12.72	5.62	13.87	7.37	22.51
	Line Fuse	25	25	45	45	25	25	45	25	45	25	25	45	25	45	25	45
85-Y030	Load Amps	23.1	23.2	40.2	46.9	20.2	23.1	43.6	20.1	43.6	23.0	29.1	53.0	23.4	50.0	26.5	46.8
	kVA	8.35	8.38	14.49	19.09	8.43	9.64	18.15	14.49	31.42	18.78	10.49	19.09	8.43	20.80	11.05	33.76
	Line Fuse	35	45	60	70	35	35	60	35	60	35	30	60	30	60	30	70
85-Y035	Load Amps	30.9	31.0	53.6	62.5	27.0	30.9	58.2	26.8	58.1	30.7	38.8	70.6	31.2	66.7	35.4	62.4
	kVA	11.14	11.17	19.32	25.45	11.25	12.85	24.21	19.32	41.89	25.04	13.98	25.45	11.25	27.74	14.73	45.02
	Line Fuse	45	50	80	90	45	45	80	45	80	45	45	80	40	80	40	90
85-Y040	Load Amps	46.3	46.5	80.4	93.8	40.5	46.3	87.3	40.2	87.2	46.0	58.2	106.0	46.8	100.1	53.1	93.7
	kVA	16.7	16.7	28.9	38.1	16.8	19.2	36.3	28.9	62.8	37.5	20.9	38.1	16.8	41.6	22.1	67.5
	Line Fuse	60	80	125	150	60	70	125	60	125	70	60	125	60	125	70	125
85-Y045	Load Amps	61.8	62.0	107.2	125.0	54.1	61.8	116.4	53.6	116.2	61.4	77.6	141.3	62.4	133.4	70.9	124.9
	kVA	22.2	22.3	38.6	50.9	22.5	25.7	48.4	38.6	83.7	50.0	27.9	50.9	22.5	55.4	29.4	90.0
	Line Fuse	80	100	175	200	80	90	175	80	175	125	80	175	70	175	80	175
85-Y050	Load Amps	92.7	93.0	160.9	187.6	81.1	92.7	174.7	80.4	174.4	92.1	116.4	212.0	93.6	200.2	106.3	187.4
	kVA	33.4	33.5	57.9	76.3	33.7	38.5	72.6	57.9	125.6	75.1	41.9	76.3	33.7	83.2	44.2	135.0
	Line Fuse	125	175	250	300	125	150	250	150	250	150	125	250	125	250	150	250
85-Y055	Load Amps	154.6	155.1	268.1	312.7	135.3	154.6	291.2	134.0	290.7	153.5	194.1	353.3	156.1	333.7	177.2	312.4
	kVA	55.7	55.8	96.6	127.2	56.2	64.2	121.0	96.6	209.4	125.2	69.9	127.2	56.2	138.7	73.6	225.1
	Line Fuse	200	250	400	450	200	225	400	200	400	250	250	400	175	400	200	450
Qty. Required		3	3	3	3	2	2	2	3	3	3	3	3	2	2	2	3
Connection Dia. Page		TP-18 46	TP-22 47	TP-17 46	TP-21 47	TP-5 45	TP-1 45	TP-6 45	TP-20 47	TP-19 47	TP-24 47	TP-14 46	TP-13 46	TP-2 45	TP-10 46	TP-9 45	TP-23 47

# Three Phase Buck-Boost Sizing Tables

## Three Phase Buck-Boost Table, Type LM

Type LM		Three Phase / Two or Three Units - Type LM																	
		Boost - Increase Voltage									Buck - Decrease Voltage								
Catalog Number	Line	192	200	216	332	346	400	400	432	456	240	240	253	276	264	288	500	504	528
	Load	240	240	240	416	416	440	480	480	480	200	216	230	230	240	240	416	480	480
35-LM010	Load Amps	1.6	2.0	3.7	1.6	2.0	4.1	2.1	1.8	3.9	2.4	4.1	4.5	2.4	4.5	2.5	2.5	4.3	2.2
	kVA	0.68	0.86	1.54	1.20	1.50	3.13	1.80	1.54	3.28	0.86	1.54	1.80	0.98	1.90	1.04	1.80	3.64	1.90
	Line Fuse	5	5	7	5	5	7	5	5	7	5	6	7	5	7	5	5	7	5
35-LM015	Load Amps	2.4	3.1	5.5	2.5	3.1	6.1	3.2	2.7	5.9	3.7	6.1	6.7	3.7	6.8	3.7	3.7	6.5	3.4
	kVA	1.02	1.29	2.31	1.80	2.26	4.70	2.70	2.31	4.92	1.29	2.31	2.70	1.47	2.86	1.56	2.70	5.46	2.86
	Line Fuse	5	6	10	5	6	10	6	5	10	5	9	10	5	10	5	5	10	5
85-LM020	Load Amps	4.0	5.1	9.2	4.1	5.2	10.2	5.4	4.6	9.8	6.2	10.2	11.3	6.1	11.4	6.2	6.2	10.9	5.7
	kVA	1.70	2.15	3.85	3.00	3.76	7.83	4.50	3.85	8.20	2.15	3.85	4.51	2.46	4.76	2.60	4.50	9.10	4.76
	Line Fuse	8	10	15	9	10	15	10	8	15	8	15	15	8	15	9	9	15	9
85-LM025	Load Amps	8.1	10.3	18.5	8.3	10.4	20.5	10.8	9.2	19.7	12.4	20.8	22.6	12.3	12.9	12.5	12.5	21.9	11.4
	kVA	3.40	4.30	7.70	6.01	7.53	15.67	9.00	7.70	16.40	4.30	7.70	9.02	4.92	9.53	5.20	9.01	18.20	9.53
	Line Fuse	15	20	30	15	20	30	20	15	30	15	25	30	15	30	15	15	30	15
85-LM030	Load Amps	12.2	15.5	27.7	12.5	15.6	30.8	16.2	13.8	29.5	18.6	30.8	33.9	18.5	34.4	18.7	18.7	32.8	17.2
	kVA	5.10	6.46	11.55	9.02	11.29	23.51	13.50	11.55	24.60	6.46	11.55	13.5	7.38	14.30	7.80	13.52	27.31	14.30
	Line Fuse	25	25	45	25	25	45	25	25	45	25	45	45	25	45	25	25	45	25
85-LM035	Load Amps	16.3	20.7	37.0	16.7	20.9	41.1	21.6	18.5	39.4	24.8	41.1	45.2	24.7	45.8	25.0	25.0	43.8	22.9
	kVA	6.80	8.61	15.40	12.03	15.06	31.35	18.00	15.40	32.80	8.61	15.40	18.04	9.84	19.07	10.40	18.03	36.41	19.07
	Line Fuse	30	35	60	30	35	60	35	30	60	30	50	60	30	60	30	30	60	30
85-LM040	Load Amps	24.5	31.0	55.5	25.0	31.3	61.7	32.4	27.7	59.1	37.3	61.7	67.9	37.0	68.8	37.5	37.5	65.7	34.4
	kVA	10.2	12.9	23.1	18.0	22.5	47.0	27.0	23.1	49.2	12.9	23.1	27.0	14.7	28.6	15.6	27.0	54.6	28.6
	Line Fuse	45	50	80	45	50	90	50	45	80	45	80	80	45	80	45	45	80	45
85-LM045	Load Amps	32.7	41.4	74.0	33.4	41.8	82.2	43.3	37.0	78.9	49.7	82.3	90.5	49.4	91.7	50.0	50.0	87.6	45.8
	kVA	13.6	17.2	30.8	24.0	30.1	62.7	36.0	30.8	65.6	17.2	30.8	36.0	19.6	38.1	20.8	36.0	72.8	38.1
	Line Fuse	60	60	110	60	70	125	70	60	110	60	100	110	60	110	60	60	110	60
85-LM050	Load Amps	49.0	62.1	111.1	50.1	62.7	123.4	64.9	55.5	118.3	74.6	123.4	135.8	74.1	137.6	75.0	75.0	131.4	68.8
	kVA	20.4	25.8	46.2	36.1	45.1	94.0	54.0	46.2	98.4	25.8	46.2	54.1	29.5	57.2	31.2	54.1	109.2	57.2
	Line Fuse	80	100	175	80	100	175	100	80	175	80	150	175	80	175	80	80	175	80
85-LM055	Load Amps	81.7	103.6	185.2	83.5	104.5	205.6	108.2	92.6	197.2	124.3	205.8	226.4	123.5	229.4	125.1	125.1	219.0	114.7
	kVA	34.0	43.0	77.0	60.1	75.3	156.7	90.0	77.6	164.0	43.0	77.0	90.2	49.2	95.3	52.0	90.1	182.0	95.3
	Line Fuse	150	175	300	150	175	300	175	150	300	150	250	300	150	300	150	150	300	150
Qty. Required		2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	3	2	2
Qty. Required Connection Dia. Page		TP-7 45	TP-3 45	TP-4 45	TP-18 46	TP-22 47	TP-21 47	TP-22 47	TP-5 45	TP-6 45	TP-11 46	TP-8 45	TP-12 46	TP-11 46	TP-12 46	TP-11 46	TP-14 46	TP-10 46	TP-9 45

# Buck-Boost Connection Diagrams

## Single Phase Connection Diagrams

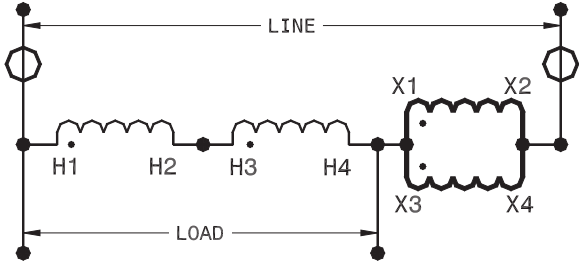


Diagram SP - 1

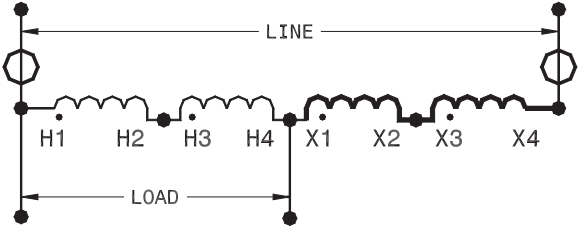


Diagram SP - 2

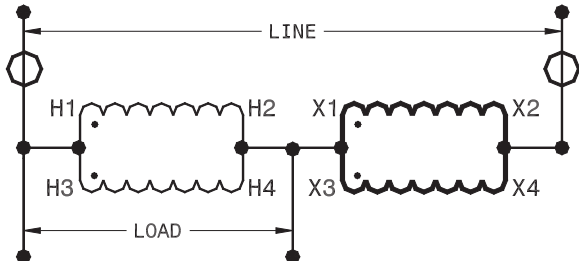


Diagram SP - 3

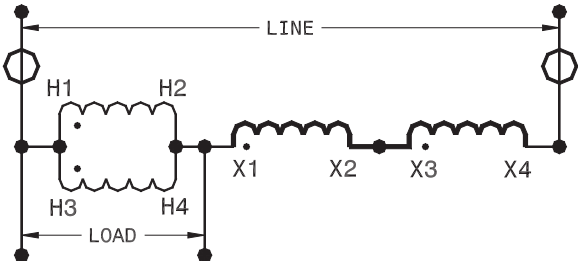


Diagram SP - 4

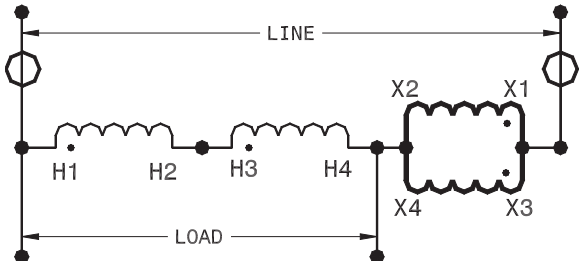


Diagram SP - 5

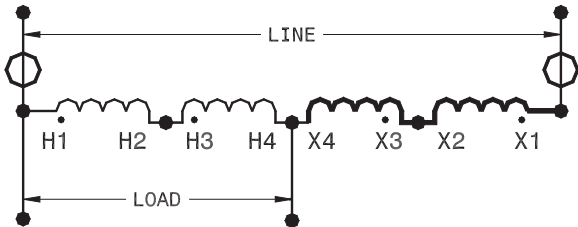


Diagram SP - 6

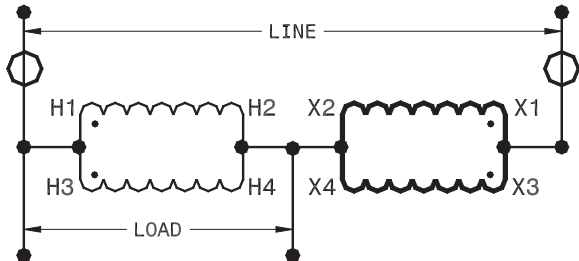


Diagram SP - 7

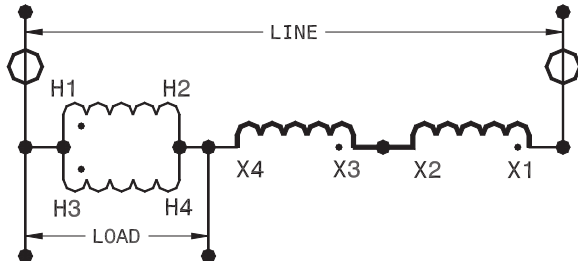


Diagram SP - 8



# Buck-Boost Connection Diagrams

## Single Phase Connection Diagrams

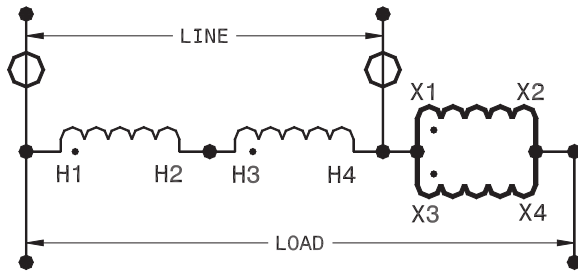


Diagram SP - 9

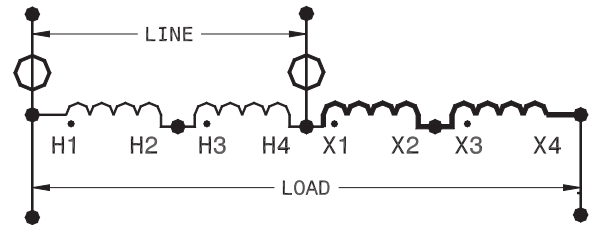


Diagram SP - 10

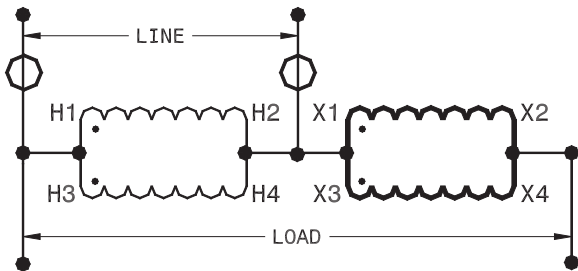


Diagram SP - 11

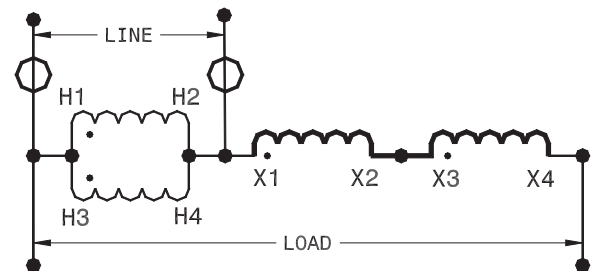


Diagram SP - 12

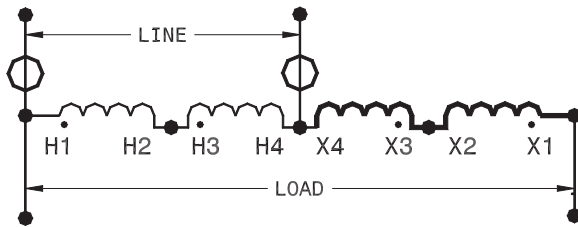


Diagram SP - 13

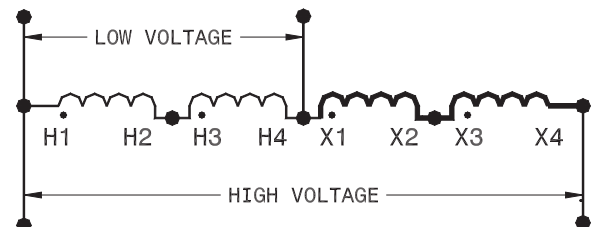


Diagram SP - 14

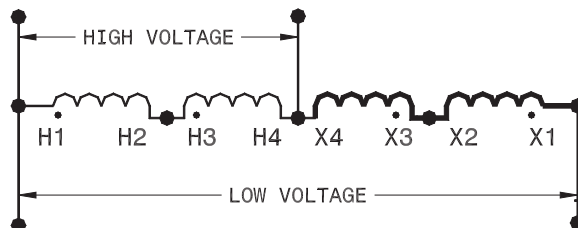


Diagram SP - 15

### Symbol Key

○ - Indicates Overcurrent Protection

Note: If present, do not fuse grounded conductor



# Buck-Boost Connection Diagrams

## Three Phase Connection Diagrams

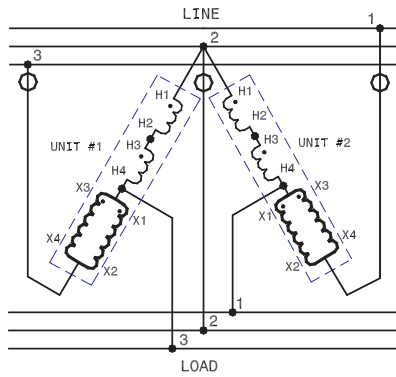


Diagram TP - 10

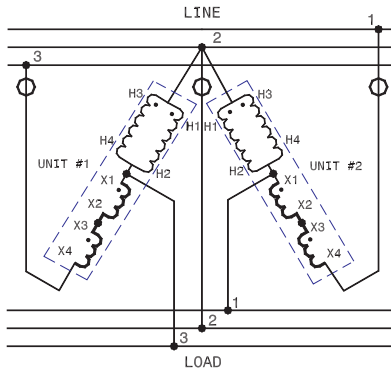


Diagram TP - 11

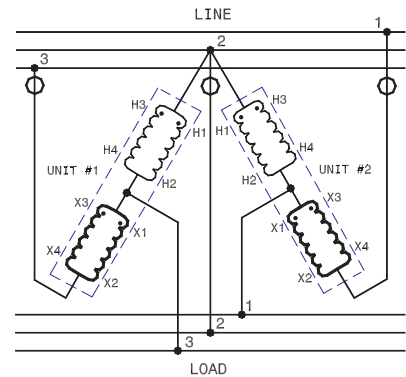


Diagram TP - 12

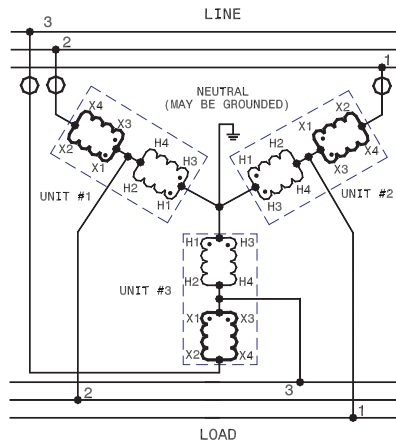


Diagram TP - 13

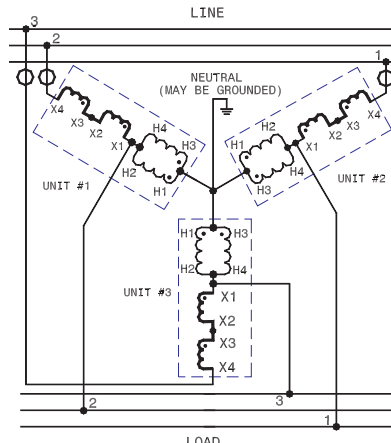


Diagram TP - 14

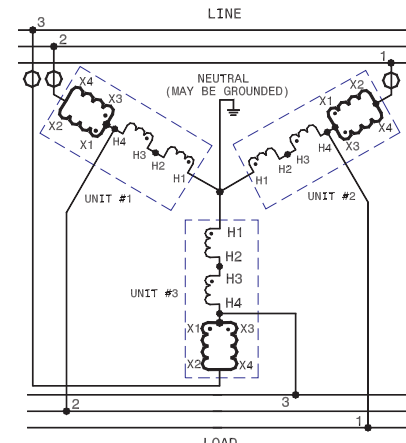


Diagram TP - 15

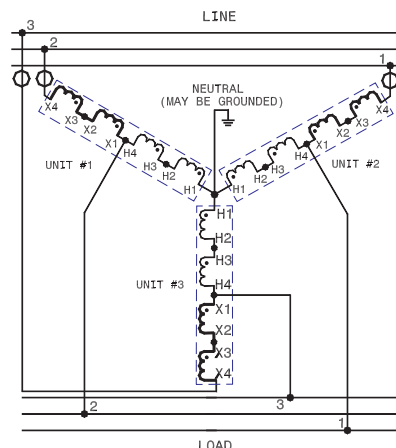


Diagram TP - 16

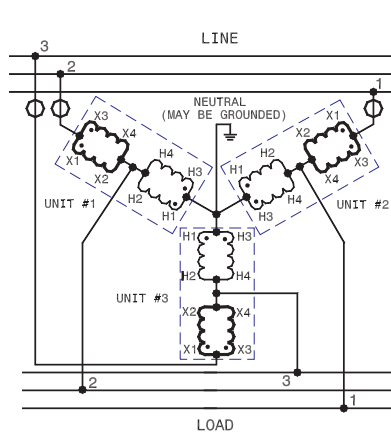


Diagram TP - 17

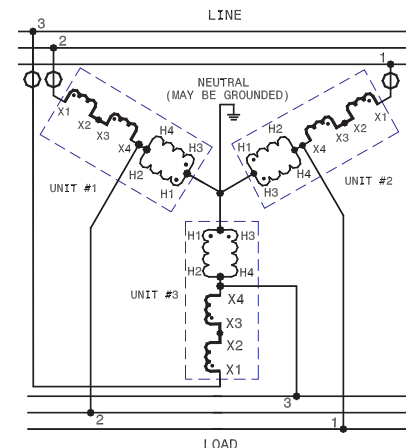


Diagram TP - 18

# Buck-Boost Connection Diagrams

## Three Phase Connection Diagrams

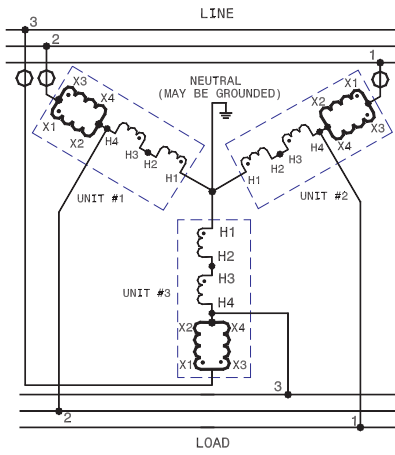


Diagram TP - 19

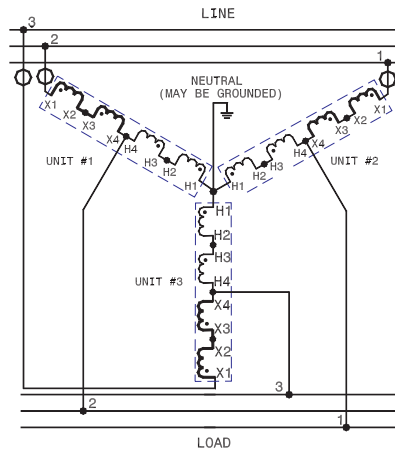


Diagram TP - 20

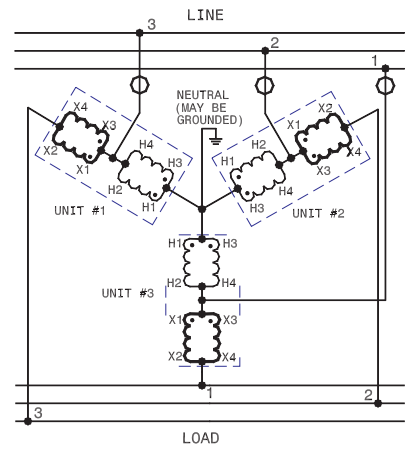


Diagram TP - 21

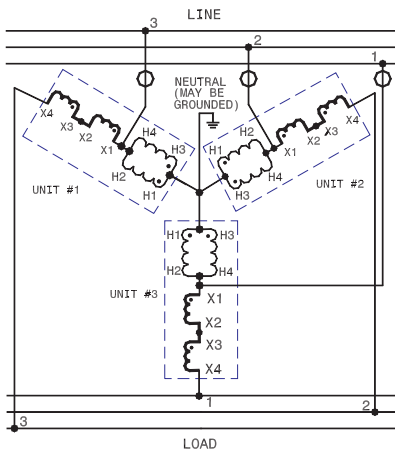


Diagram TP - 22

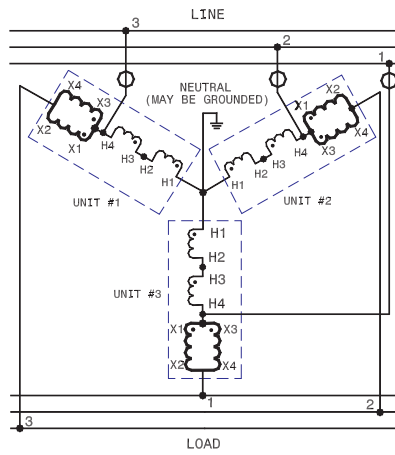


Diagram TP - 23

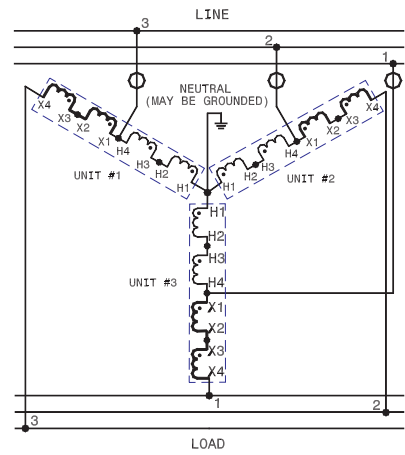


Diagram TP - 24

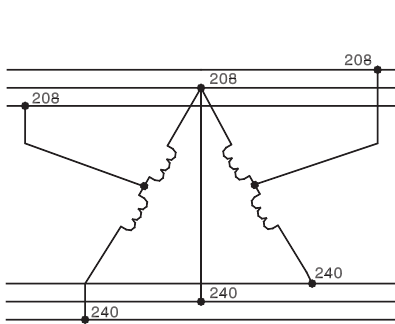


Diagram TP - 25

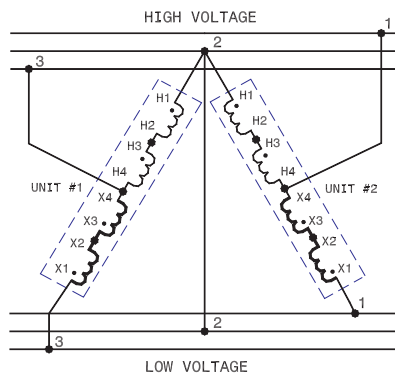


Diagram TP - 26

### Symbol Key

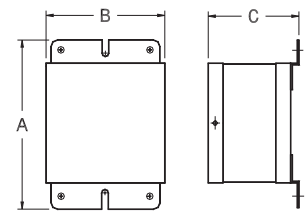
○ - Indicates Overcurrent Protection

Note: If present, do not fuse grounded conductor

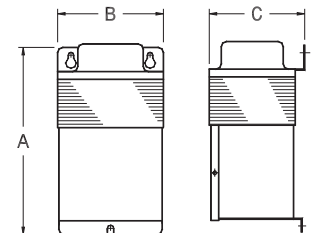
# Buck-Boost Transformers

## Primary Volts 120 X 240, Secondary Volts 12 / 24

General Information				Winding Specifications				Dimensions			
kVA Cap.	Catalog Number	Hz.	Wgt. Lbs	Taps	Maximum Amps		Conn Dia. Pg. 66	Height A	Width B	Depth C	Outline Dwg.
					Pri.	Sec.					
.050	35-M005*	50/60	4	0	.4 / .2	4.1 / 2.0	18	6.37	3.75	3.37	1
.100	35-M010*	50/60	5	0	.8 / .4	8.3 / 4.1	18	6.37	3.75	3.37	1
.150	35-M015*	50/60	7	0	1.2 / .6	12.5 / 6.2	18	7.00	4.00	3.63	2
.250	85-M020	50/60	15	0	2.0 / 1.0	20.8 / 10.4	18	12.00	4.87	5.25	3
.500	85-M025	50/60	19	0	4.1 / 2.0	41.6 / 20.8	18	12.00	4.87	5.25	3
.750	85-M030	50/60	23	0	6.2 / 3.1	62.5 / 31.2	18	12.00	4.87	5.25	3
1.0	85-M035	60	28	0	8 / 4	83 / 41	18	15.25	5.75	5.87	3
1.5	85-M040	60	39	0	12 / 6	125 / 62	18	15.25	5.75	5.87	3
2.0	85-M045	60	43	0	16 / 8	166 / 83	18	15.25	5.75	5.87	3
3.0	85-M050	60	69	0	25 / 12	250 / 125	18	15.25	8.25	7.87	3
5.0	85-M055	60	89	0	41 / 20	416 / 208	18	15.25	8.25	7.87	3
7.5	85-M060	60	150	0	62.5/31.3	625/312	18	19.375	13.75	11.5	3
10	85-M065	60	170	0	83.3/41.7	833/416.7	18	19.375	13.75	11.5	3



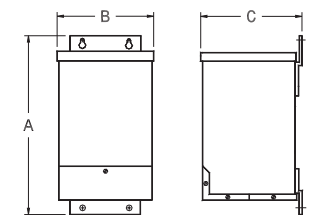
**Outline Drawing 1**  
Wall Mount - Ventilated - NEMA Type 1



**Outline Drawing 2**  
Wall Mount - Ventilated - NEMA Type 3R

## Primary Volts 120 X 240, Secondary Volts 16 / 32

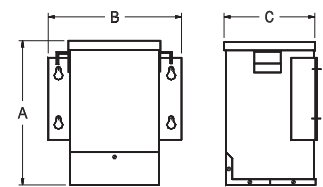
General Information				Winding Specifications				Dimensions			
kVA Cap.	Catalog Number	Hz.	Wgt. Lbs	Taps	Maximum Amps		Conn Dia. Pg. 66	Height A	Width B	Depth C	Outline Dwg.
					Pri.	Sec.					
.050	35-Y005*	50/60	4	0	.4 / .2	3.1 / 1.5	19	6.37	3.75	3.37	1
.100	35-Y010*	50/60	5	0	.8 / .4	6.2 / 3.1	19	6.37	3.75	3.37	1
.150	35-Y015*	50/60	7	0	1.2 / .6	9.3 / 4.6	19	7.00	4.00	3.63	2
.250	85-Y020	50/60	15	0	2.0 / 1.0	15.6 / 7.8	19	12.00	4.87	5.25	3
.500	85-Y025	50/60	19	0	4.1 / 2.0	31.2 / 15.6	19	12.00	4.87	5.25	3
.750	85-Y030	50/60	23	0	6.2 / 3.1	46.8 / 23.4	19	12.00	4.87	5.25	3
1.0	85-Y035	60	28	0	8 / 4	62 / 31	19	15.25	5.75	5.87	3
1.5	85-Y040	60	39	0	12 / 6	93 / 46	19	15.25	5.75	5.87	3
2.0	85-Y045	60	43	0	16 / 8	125 / 62	19	15.25	5.75	5.87	3
3.0	85-Y050	60	69	0	25 / 12	187 / 93	19	15.25	8.25	7.87	3
5.0	85-Y055	60	89	0	41 / 20	312 / 156	19	15.25	8.25	7.87	3
7.5	85-Y060	60	150	0	62.5/31.3	468.7/234.4	19	19.375	13.75	11.5	3
10	85-Y065	60	170	0	83.3/41.7	625/312.5	19	19.375	13.75	11.5	3



**Outline Drawing 3**  
Wall Mount - Encapsulated - NEMA Type 3R Note: 3 kVA & 5kVA 85 Series are also available in Outline Drawing 4 Configuration

## Primary Volts 240 X 480, Secondary Volts 24 / 48

General Information				Winding Specifications				Dimensions			
kVA Cap.	Catalog Number	Hz.	Wgt. Lbs	Taps	Maximum Amps		Conn Dia. Pg. 66	Height A	Width B	Depth C	Outline Dwg.
					Pri.	Sec.					
.100	35-LM010*	50/60	5	0	.4 / .2	4.1 / 2.0	20	6.37	3.75	3.37	1
.150	35-LM015*	50/60	7	0	.6 / .3	6.2 / 3.1	20	7.00	4.00	3.63	2
.250	85-LM020	50/60	15	0	1.0 / .52	10.4 / 5.2	20	12.00	4.87	5.25	3
.500	85-LM025	50/60	19	0	2.0 / 1.0	20.8 / 10.4	20	12.00	4.87	5.25	3
.750	85-LM030	50/60	23	0	3.1 / 1.6	31.2 / 15.6	20	12.00	4.87	5.25	3
1.0	85-LM035	60	28	0	4 / 2	41 / 20	20	15.25	5.75	5.87	3
1.5	85-LM040	60	39	0	6 / 3	62 / 31	20	15.25	5.75	5.87	3
2.0	85-LM045	60	43	0	8 / 4	83 / 41	20	15.25	5.75	5.87	3
3.0	85-LM050	60	69	0	12 / 6	125 / 62	20	15.25	8.25	7.87	3
5.0	85-LM055	60	89	0	20 / 10.	208 / 104	20	15.25	8.25	7.87	3
7.5	85-Y060	60	150	0	31.3/15.6	312.5/156.3	20	19.375	13.75	11.5	3
10	85-Y065	60	170	0	41.7/20.8	416.7/208.3	20	19.375	13.75	11.5	3



**Outline Drawing 4**  
Wall Mount - Encapsulated - NEMA Type 3R

\*Series 35 are ventilated units.

# Buck-Boost Transformers

## Low Voltage Connection Diagrams

Catalog Series 35-M0XX & 80-M0XX 85-M0XX			
Dia. 18	No Taps		
Tap Arrangement	High Voltage 120 X 240	Inter-Connect	Connect High Voltage Lines To
100	120	H1 To H3 H2 To H4	H1H3 & H2H4
100	240	H2 To H3	H1 & H4
Tap Arrangement	Low Voltage 12 / 24	Inter-Connect	Connect Low Voltage Lines To
100	12	X1 To X3 X2 To X4	X1X3 & X2X4
100	12 / 24	X2 To X3	X1 & X2X3 & X4
100	24	X2 To X3	X1 & X4

Catalog Series 35-Y0XX & 80-Y0XX 85-Y0XX			
Dia. 19	No Taps		
Tap Arrangement	High Voltage 120 X 240	Inter-Connect	Connect High Voltage Lines To
100	120	H1 To H3 H2 To H4	H1H3 & H2H4
100	240	H2 To H3	H1 & H4
Tap Arrangement	Low Voltage 16 / 32	Inter-Connect	Connect Low Voltage Lines To
100	16	X1 To X3 X2 To X4	X1X3 & X2X4
100	16 / 32	X2 To X3	X1 & X2X3 & X4
100	32	X2 To X3	X1 & X4

Catalog Series 35-LM0XX & 80-LM0XX 85-LM0XX			
DiDia. 20a. 20	No Taps		
Tap Arrangement	High Voltage 240 X 480	Inter-Connect	Connect High Voltage Lines To
100	240	H1 To H3 H2 To H4	H1H3 & H2H4
100	480	H2 To H3	H1 & H4
Tap Arrangement	Low Voltage 24 / 48	Inter-Connect	Connect Low Voltage Lines To
100	24	X1 To X3 X2 To X4	X1X3 & X2X4
100	24 / 48	X2 To X3	X1 & X2X3 & X4
100	48	X2 To X3	X1 & X4

