



Buck & Boost Transformer Installation Instructions

120 V x 240 V - 12/24 V Class 7414



Introduction

This manual provides installation, operation, and maintenance instructions for the 2847 Buck & Boost transformer, and is not intended as an instruction manual for untrained persons.

The Buck & Boost transformer is an isolating transformer that has a 120 V x 240 V primary and either a 12/24 V or 16/32 V secondary, or a 240 V x 480 V primary with a 24/48 V secondary. The equipment enclosure is designed and constructed for indoor or outdoor use and is NEMA 3R rated.

The primary and secondary of a Buck & Boost transformer can be interconnected for use as an autotransformer to slightly step up or down voltage. When used as an autotransformer to slightly adjust voltage, the Buck & Boost transformer can carry loads in excess of its nameplate rating. The transformer can also be used as an isolating transformer. In this case, the transformer can carry the full load stated on the nameplate. This Buck and Boost Transformer is UL and cUL listed (UL 506). It is designed, manufactured, and tested in accordance with ANSI standard Z535.3, Canadian standards CSA C22.2 no.66-1988 specialty transformers, and NEMA ST20 where applicable.

Safety Precautions

Carefully read and follow the safety precautions outlined below before attempting to install, service, or maintain electrical equipment.

DANGER



HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- Turn off all power supplying this equipment before working on it.
- Always use a properly rated voltage sensing device to confirm that power is off.
- This transformer must be installed and serviced only by qualified electrical personnel in accordance with The National Electric Code[®] (NEC[®]) and any other applicable codes and standards.
- Only qualified electrical personnel familiar with low voltage circuits are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near low voltage equipment.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Beware of potential hazards, wear personal protective equipment and take adequate safety precautions.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feeding.
- Handle this equipment carefully and install, operate and maintain it correctly in order for it to function properly. Neglecting fundamental installation and maintenance requirements may lead to personal injury, as well as damage to electrical equipment or other property.
- Carefully inspect your work area and remove any tools and objects left on the equipment.
- Replace all devices, doors, and covers before turning on the power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Receiving

Upon receipt, check the packing list against the equipment received to ensure the order and shipment are complete. Immediately inspect the equipment for any damage which may have occurred in transit. Report discrepancies to DCI as soon as identified.

Handling

Use care when uncrating and handling the transformer. Use only load-rated lifting equipment.

Storage

Place the transformer in its permanent location as soon as possible.

If the transformer must be stored before it is put into operation, keep it in a clean, dry, corrosion-free area where it is protected from damage. When transformers are stored for prolonged periods, inspect them regularly for corrosion and overall condition.

Pre-Installation

Correct Use of Transformers

Follow all guidelines for autotransformers as outlined in the National Electric Code®.

DANGER



HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- Turn off all power supplying this equipment before working on it.
- Do not attempt to create a 240/120 single-phase service from a 208Y/120 source.
- Do not attempt to adjust the voltage up or down on 3-phase, 3-Wire systems for 3-phase, 4-wire loads.
- Do not attempt to correct voltage drop on a long line where load fluctuates. Line drop will vary with the load.

Failure to follow these instructions will result in death or serious injury.

Using a 240/120 single-phase service from a 208Y/120 source creates unbalanced line-to-line neutral voltages. This application is proper only for 240 V 2-wire loads.

Adjusting 3-phase, 3-wire systems for 3-phase, 4-wire loads would improperly use three Buck & Boost transformers in a 3-phase wye connection. The neutral created by this connection is not stable and will not yield proper line-to-neutral voltages under load. This connection violates NEC® Article 210-9, Exception No. 1. The wye connection can be used for 3-wire to 3-wire, 4-wire to 3-wire, and 4-wire to 4-wire applications.

Line drop will vary with fluctuating loads. If Buck & Boost transformers are used to correct voltage drop during peak load cycle, dangerously high voltages may result under lightly loaded conditions.

Verifying Transformer Selection

Tables 1-20 (see pages 7 and 8) provide the guidelines necessary for selecting a transformer that supplies the required voltage for a specific kVA load.

1. Calculate the **Load kVA**:

$$\text{Single Phase kVa} = \frac{\text{Load Volts} \times \text{Load Amperes}}{1000}$$

$$\text{Three Phase kVa} = \frac{\text{Load Volts} \times \text{Load Amperes} \times 1.73}{1000}$$

2. Select the **Desired Load Voltage** table that is nearest the voltage required.
3. Find the nearest **Available Voltage** to the actual voltage measured.
4. Follow down the column of the available voltage (which is the actual voltage measured) and select a **Load kVA** *equal to or greater (never smaller) than* the load you calculated in Step 1. Then, move horizontally to the left and select the transformer catalog number.

NOTE: For three phase loads, two or three transformers may be required as shown in the table heading.

Refer to the correct wiring diagram number at the bottom of the **Load kVA** column for the load kVA you have chosen.

Installation

Install the transformer only in a well-ventilated area that is free from explosive or corrosive gases, vapor, or excessive dust, dirt, and moisture. Ensure a free flow of air around the transformer. Do not exceed surrounding air temperature of 40 °C (104 °F).

Mounting

Use sufficient mounting hardware (provided by customer) to support the weight of the transformer.

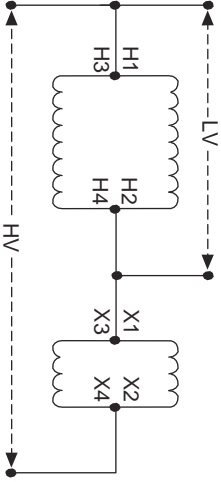
Connection

The tables that follow show the available voltages for the load kVA. They also show which wiring diagram applies for the corresponding transformer catalog number. Ensure you are using the correct wiring diagram for the transformer application. The selection information has been included in this document so that you can verify the transformer size for the application.

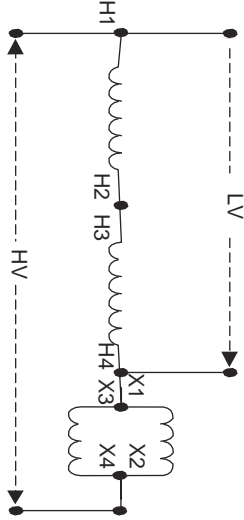
Maintenance

Visually inspect the transformer periodically to ensure that the air is flowing freely around it and that it is free from dust or debris.

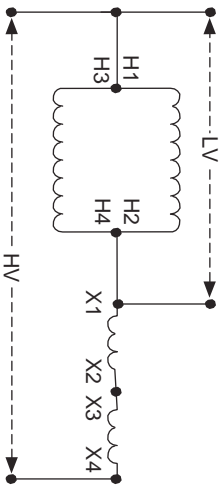
Wiring Diagrams



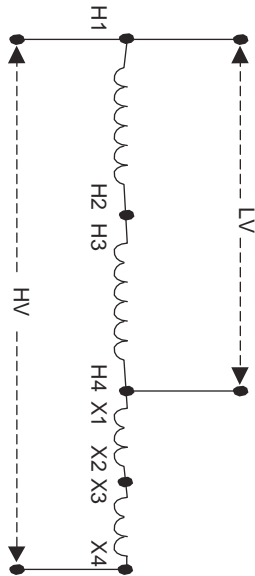
Wiring Diagram 1



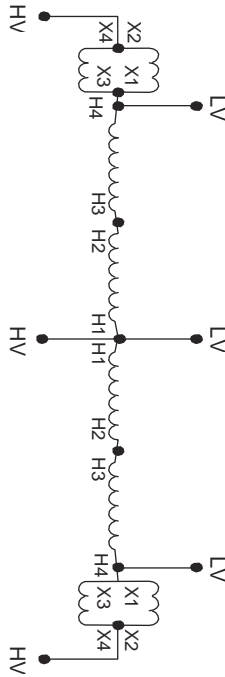
Wiring Diagram 3



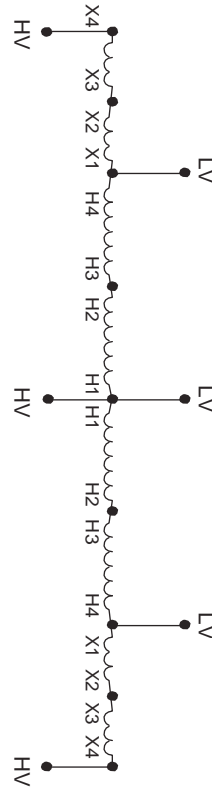
Wiring Diagram 2



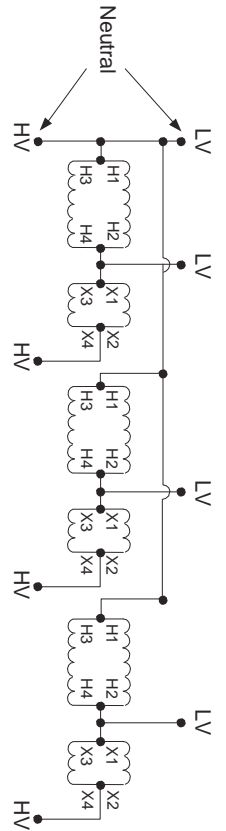
Wiring Diagram 4



Wiring Diagram 5

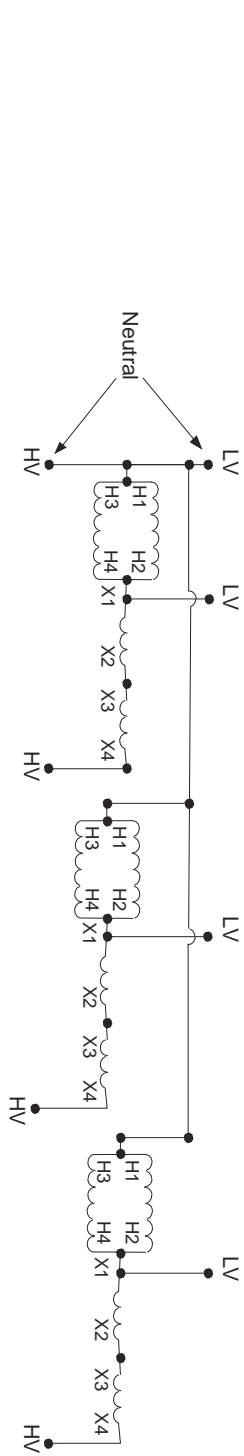


Wiring Diagram 6

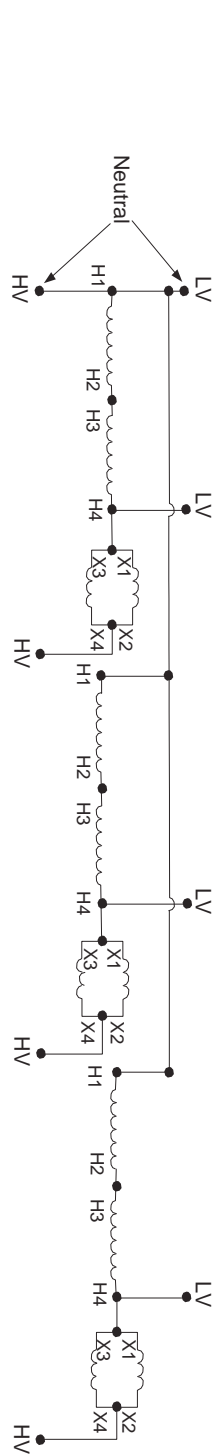


Wiring Diagram 7

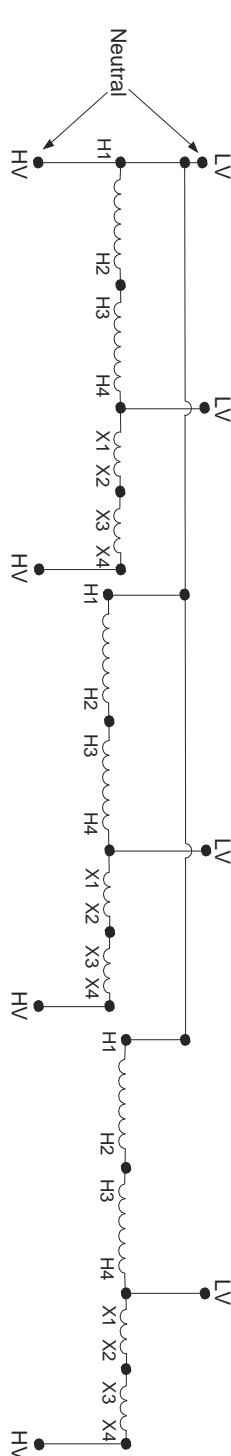
Wiring Diagrams



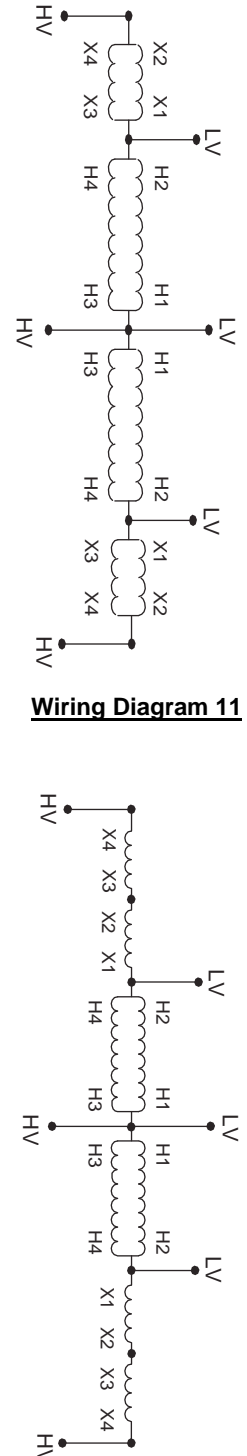
Wiring Diagram 8



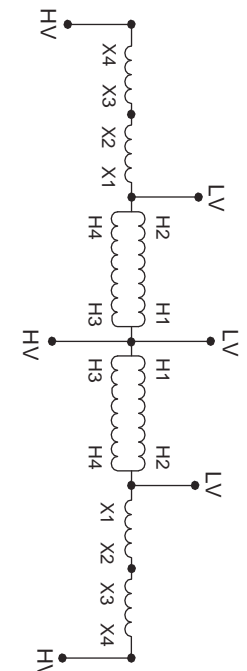
Wiring Diagram 9



Wiring Diagram 10



Wiring Diagram 11



Wiring Diagram 12

Available Voltages for Load kVA

TABLE 1	Desired Load/Source Voltage 100 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**83	**91	**110	**120
	Single Phase Load kVA			
1S43F	4.1	8.3	9.1	5.0
Wiring Diagram	2	1	1	2

**Good for 50/60 HZ Applications

TABLE 2	Desired Load/Source Voltage 115 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**96	**105	127	138
	Single Phase Load kVA			
1S43F	4.7	8.7	10.5	5.7
Wiring Diagram	2	1	1	2

**Good for 50/60 HZ Applications

TABLE 3	Desired Load/Source Voltage 120 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**100	**109	132	144
	Single Phase Load kVA			
1S43F	5.0	10.0	11.0	6.0
Wiring Diagram	2	1	1	2

**Good for 50/60 HZ Applications

TABLE 4	Desired Load/Source Voltage 200 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**182	**190	**210	**220
	Single Phase Load kVA			
1S43F	7.5	15.8	17.5	9.1
Wiring Diagram	4	3	3	4

**Good for 50/60 HZ Applications

TABLE 5	Desired Load/Source Voltage 208 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**189	**198	218	229
	Single Phase Load kVA			
1S43F	8.6	17.3	18.1	9.5
Wiring Diagram	4	3	3	4

**Good for 50/60 HZ Applications

TABLE 6	Desired Load/Source Voltage 230 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**209	219	242	253
	Single Phase Load kVA			
1S43F	9.5	18.2	20.1	10.5
Wiring Diagram	4	3	3	4

**Good for 50/60 HZ Applications

TABLE 7	Desired Load/Source Voltage 240 V Single Phase, 60 HZ, One Transformer Required			
Transformer Catalog Number	Voltage Options			
	**218	229	252	264
	Single Phase Load kVA			
1S43F	10.0	20.0	21.0	11.0
Wiring Diagram	4	3	3	4

**Good for 50/60 HZ Applications

TABLE 8	Desired Load/Source Voltage 200 V Three Phase, 60 HZ, Two Transformers Required			
Transformer Catalog Number	Voltage Options			
	**182	**190	**210	**220
	Three Phase Load kVA			
1S43F	14.4	28.8	30.3	15.8
Wiring Diagram	6	5	5	6

**Good for 50/60 HZ Applications

TABLE 9	Desired Load/Source Voltage 208 V Three Phase, 60 HZ, Two Transformers Required			
Transformer Catalog Number	Voltage Options			
	**189	**198	218	229
	Three Phase Load kVA			
1S43F	15.0	30.0	31.4	16.5
Wiring Diagram	6	5	5	6

**Good for 50/60 HZ Applications

TABLE 10	Desired Load/Source Voltage 230 V Three Phase, 60 HZ, Two Transformers Required			
Transformer Catalog Number	Voltage Options			
	**209	219	242	253
	Three Phase Load kVA			
1S43F	16.6	33.2	34.9	18.2
Wiring Diagram	6	5	5	6

**Good for 50/60 HZ Applications

Available Voltages for Load kVA

TABLE 11					
Desired Load/Source Voltage 240 V Three Phase, 60 HZ, Two Transformers Required					
Transformer Catalog Number	Voltage Options				
	**218	229	252	264	
Three Phase Load kVA					
1S43F	17.3	33.0	36.3	19.0	
Wiring Diagram	6	5	5	6	

**Good for 50/60 HZ Applications

TABLE 12						
Desired Load/Source Voltage 200Y/115 V Three Phase, 50/60 HZ, Three Transformers Required						
Transformer Catalog Number	Voltage Options					
	167Y /96	190Y /110	210Y /121	220Y /127	240Y /139	
Three Phase Load kVA						
1S43F	14.4	28.8	30.3	15.8	17.3	
Wiring Diagram	8	9	9	10	8	

TABLE 13						
Desired Load/Source Voltage 208Y/120 V Three Phase, 60 HZ, Three Transformers Required						
Transformer Catalog Number	Voltage Options					
	173Y /100	198Y /114	218Y /126	229Y /132	250Y /145	
Three Phase Load kVA						
1S43F	15.0	30.0	31.4	16.5	18.0	
Wiring Diagram	8	9	9	10	8	

TABLE 14					
Desired Load/Source Voltage 230Y/133 V Three Phase, 60 HZ, Three Transformers Required					
Transformer Catalog Number	Voltage Options				
	192Y /111	219Y /126	242Y /140	253Y /146	
Three Phase Load kVA					
1S43F	16.6	33.2	34.9	18.2	
Wiring Diagram	8	9	9	10	

TABLE 15					
Desired Load/Source Voltage 240Y/139 V Three Phase, 60 HZ, Three Transformers Required					
Transformer Catalog Number	Voltage Options				
	229Y /132	252Y /146	264Y /153	288Y /166	
Three Phase Load kVA					
1S43F	34.6	36.3	19.0	20.7	
Wiring Diagram	9	9	10	8	

TABLE 16					
Desired Load/Source Voltage 380Y/220 V Three Phase, 60 HZ, Three Transformers Required					
Transformer Catalog Number	Voltage Options				
	345Y /199	399Y /230	405Y /234	431Y /249	
Three Phase Load kVA					
1S43F	27.4	57.5	58.4	31.1	
Wiring Diagram	10	9	9	10	

TABLE 17					
Desired Load/Source Voltage 400Y/231 V Three Phase, 60 HZ, Three Transformers Required					
Transformer Catalog Number	Voltage Options				
	364Y /210	420Y /243	426Y /246	453Y /262	
Three Phase Load kVA					
1S43F	28.8	60.6	61.4	32.6	
Wiring Diagram	10	9	9	10	

TABLE 18					
Desired Load/Source Voltage 415Y/240 V Three Phase, 60 HZ, Three Transformers Required					
Transformer Catalog Number	Voltage Options				
	377Y /218	436Y /252	442Y /255	470Y /272	
Three Phase Load kVA					
1S43F	29.9	62.9	63.8	33.9	
Wiring Diagram	10	9	9	10	

TABLE 19	
Desired Load/Source Voltage 460Y/266 V Three Phase, 60 HZ, Three Transformers Required	
Transformer Catalog Number	Voltage Options
Three Phase Load kVA	
1S43F	33.2
Wiring Diagram	10

TABLE 20	
Desired Load/Source Voltage 480Y/277 V Three Phase, 60 HZ, Three Transformers Required	
Transformer Catalog Number	Voltage Options
Three Phase Load kVA	
1S43F	34.6
Wiring Diagram	10