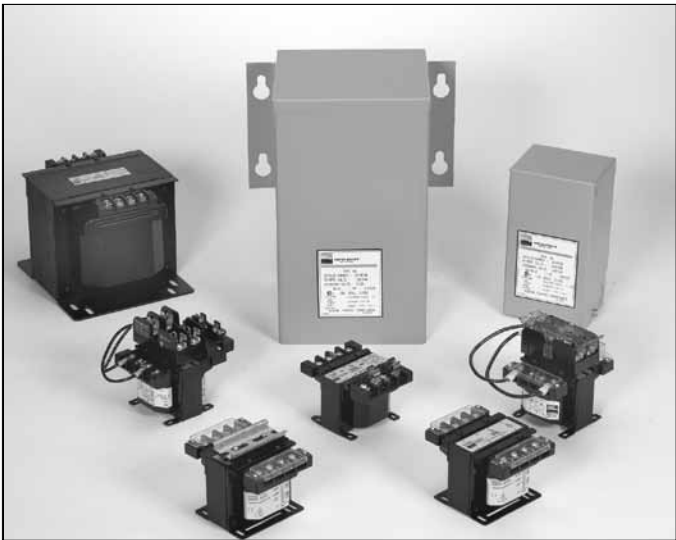




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Design Choices

SolaHD offers a broad range of industrial control solutions for the most demanding industrial applications. Our products exceed NEMA ratings for inrush and regulation to ensure control systems are powered correctly. Electromagnetic control components demand inrush currents up to 10 times the transformer's nominal rating. While this inrush is occurring, the output side of the transformer must not fall below 85% of nominal as specified by NEMA ST-1, Part 4. Using a transformer that does not meet these ratings may cause erroneous shutdowns of downstream processes.

To meet your complete control needs, SolaHD four series of control transformers, all of which exceed the NEMA standards. The Selection Chart can be used to identify the appropriate transformer for your application.

The **SBE series** is available from 50 - 5000 VA, 55°C rise and features copper windings and encapsulation (through 1000 VA) for longer life and protection from the environment. This low temperature performance can mean smaller cabinet size or longer life for any electronic components that may be nearby.

The **SMT series** are 115°C rise, aluminum wound and for applications where good voltage regulation and higher power capacities (1000-5000 VA) are required.

The **International series** meets IEC requirements and IP20 (touch proof covers ordered separately for E models) for European applications.

The **HSZ series** rounds out SolaHD's line with an enclosed series of control transformers from 1 - 10 KVA that feature either an UL-3R, NEMA 4X or NEMA 4/12 enclosure. This unique design, featuring copper windings and encapsulated construction, can help system designers meet harsher environmental standards or design for a safer installation outside of a control cabinet. The HSZ series is for applications where cost or heat issues make mounting the transformer outside the control panel necessary.

SolaHD is pleased to offer custom transformers 1 KVA and larger. If you can't find what you are looking for here, we are happy to provide a quote on a custom transformer if available. Contact Technical Services for more information.



Sizing an Industrial Control Transformer

For proper transformer selection, three characteristics of the load circuit must be determined in addition to the minimum voltage required to operate the circuit. These are total steady state (sealed) VA, total inrush VA, and inrush load power factor.

- A. Sealed VA** – Total steady state sealed VA is the volt-amperes that the transformer must deliver to the load circuit for an extended period of time.
- B. Inrush VA** – Total inrush VA is the volt-amperes that the transformer must deliver upon initial energization of the control circuit. Energization of electromagnetic devices takes 30-50 milliseconds. During this inrush period the electromagnetic control devices draw many times normal current – 3-10 times normal is typical.
- C. Inrush Load Power Factor** is difficult to determine without detailed vector analysis of all the load components. Generally such an analysis is not feasible, therefore, a safe assumption is 40% power factor. Until recently 20% PF was commonly used for transformer calculations, however, tests conducted on major brands of control devices indicate that 40% PF is a safer default assumption.

Selection Steps

1. Determine the supply and load voltages. The supply voltage is the available voltage to the control transformer. The load voltage is the operating voltage of the devices that will be connected to the transformer output.
2. Calculate the total sealed VA by adding the VA requirements of all components that will be energized together (timers, contactors, relays, solenoids, pilot lamps, etc.). Sealed VA data is available from the control device manufacturer.
3. Add the inrush VA of all components that will be energized together. Be sure to include the sealed VA of components that don't have an inrush, (lamps, timers, etc.) as they present a load to the transformer during maximum inrush.
4. Calculate selection inrush VA in one of the following two ways:

A. Selection inrush VA =

$$\sqrt{(VA \text{ sealed})^2 + (VA \text{ inrush})^2}$$

Alternative Method

B. VA sealed + VA inrush = Selection inrush

Method B will result in a slightly oversized transformer.

5. If your line voltage varies 10% or more, contact **Technical Services** for assistance.
6. Utilizing the Regulation Data chart on pg. 250, select the transformer VA needed for your application from the "Transformer VA Rating" column. Check to be sure that the nameplate VA rating exceeds the sealed VA of the control circuit calculated in Step 1. If it does not, select a larger transformer VA that exceeds the circuit sealed VA.

By following the above procedure, the secondary voltage delivered by the transformer will be 90% of the nameplate secondary voltage under maximum inrush conditions at rated input voltage.

Now refer to the Selection Tables on the following pages for the style you have chosen. Select your transformer according to your required voltage and VA capacity.

Chart A: Voltage Code Chart

Voltage Code	Primary Voltage	Secondary Voltage	Hertz
None	240 x 480	120	60
	230 x 460	115	50/60
	220 x 440	110	50/60
A	240/480/600 230/460/575	120/99 115/95	50/60
D	240 x 480	24	60
E	120 x 240	24	60
JL	208/240/277	120/24	60
JN	208/240/480/600 200/230/460/575	120/24 115/23	60
R	480	240	50/60
TC	208/240/415 200/230/400 - /220/380	120/- /24 115/24/23 110/23/-	50/60
TE	208/240/415 - /277/480 200/230/400 - /220/380	24 24 24 23	50/60 60 50/60 50/60
TF	208/240/415/480/600* 200/230/400/460/575* 220/277*/380	120 115 110	50/60 50/60 50/60
TH	240/415/480 230/400/460 220/380/440	120/240 115/230 110/220	50/60 50/60 50/60
MH	208/240/415/480/600 200/230/400/460/575 - /220/380/440/550	120/240 115/230 110/220	50/60 50/60 50/60
MC	208/240/415/480/600 200/230/400/460/575 - /220/380/440/550	120/- /24 115/24/23 110/23/-	50/60 50/60 50/60

* 60 Hz only at 277, 575 or 600 V.

Note: "-" indicated tap not used.

You can also use our online transformer product selector at www.solahd.com/select. Enter your voltage requirements, hit the submit button and the models that meet your requirements will be listed.

Choosing the Correct Series

The **SBE** series of industrial control transformers provide voltage regulation which exceeds NEMA standards. The SBE series are a 55°C rise and have copper windings and are 50/60 Hz rated. The SBE series can handle significant inrush with a minimal drop in output voltage.

The **SMT** series are 115°C rise, aluminum wound and are for applications where good voltage regulation and higher power capacities are required.

The **International** series have multiple voltage taps for easy application. These units also meet IEC 61558-1, 61558-2-2 and are CE marked for easy export to European countries.

The **HSZ** series is for applications where cost or heat issues make mounting the transformer outside the control panel necessary. This series has 80°C rise and have copper winding for industrial applications. These units are enclosed with NEMA 3R rating. Also available in NEMA 12, 4 and 4X.

Selection Chart

VA	SBE ENCAPSULATED					SBE OPEN	SMT OPEN	HSZ* NEMA 3R		
	--	D	E	JL	JN	--	--	--	A	R
Temp	55°C					115°C		80°C		
50	E050	E050D	E050E	E050JL	E050JN					
75	E075		E075E							
100	E100	E100D	E100E	E100JL	E100JN					
150	E150		E150E		E150JN					
200	E200		E200E							
250	E250	E250D	E250E	E250JL	E250JN					
300	E300		E300E							
350	E350		E350E							
500	E500	E500D	E500E	E500JL	E500JN					
750	E750		E750E							
1000	E1000						T1000	HZ1000	HZ1000A	HZ1000R
1500						Y1500	T1500	HZ1500	HZ1500A	HZ1500R
2000						Y2000	T2000	HZ2000	HZ2000A	HZ2000R
3000						Y3000	T3000	HZ3000	HZ3000A	HZ3000R
5000						Y5000	T5000	HZ5000	HZ5000A	HZ5000R
75000								HZ75000	HZ75000A	HZ75000R
100000								HZ100000	HZ100000A	HZ100000R

* Change HZxxxx to HZ12xxxx for NEMA 12 or 4 applications or HZ4Xxxxx for NEMA 4X applications.

Selection Chart - International Series

VA	INTERNATIONAL SERIES ENCAPSULATED						
	TC	TE	TF	TH	TH	MH	MC
Temp	55°C				80°C		
50	E050TC	E050TE	E050TF	E050TH			
100	E100TC	E100TE	E100TF	E100TH			
150	E150TC	E150TE	E150TF	E150TH			
250	E250TC	E250TE	E250TF	E250TH			
500	E500TC	E500TE	E500TF	E500TH			
750			E750TF	E750TH			CE750MC
1000					CE1000TH	CE1000MH	CE1000MC
1500					CE1500TH	CE1500MH	CE1500MC
2000					CE2000TH	CE2000MH	

Note: Contact Technical Services for higher VA sizes of the MH and TH units.

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

The SBE - Encapsulated Series

The SBE Encapsulated industrial control transformers are epoxy encapsulated to seal the transformer windings against moisture, dirt and industrial contaminants. Extra deep, molded terminal barriers reduce the chance of electrical failure as the result of arcing or frayed lead wires. The rugged construction and proven reliability of the SBE design is uniquely suited for all industrial environments.

Features

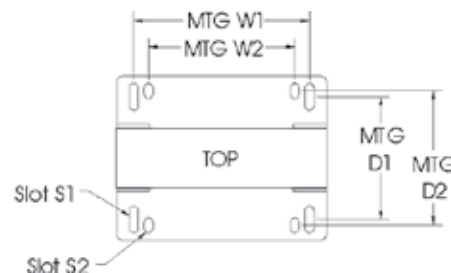
- 50 - 1000 VA, 50/60 Hz – suitable for worldwide applications.
- Interleaved copper windings reduce I²R losses and maximize efficiency.
- 55°C Rise, 105°C insulation system to minimize heat
- Epoxy encapsulated to protect cores and coils against moisture, dirt, and other contaminants.
- Meets or Exceeds NEMA Standard ST 1 and ANSI C89.1 for load inrush capability.
- Integrally molded, flame retardant (IEC 707/ISO Class 1210) Terminal Blocks provide greater terminal contact area and improved conductivity.
- Heavy gauge steel mounting plate
- Mounting dimensions are compatible with similar control transformers.
- **Secondary fuse holders (FB2X) included for 13/32 x 1½ cartridges (fuses not included).**
- **Factory-installed fuse holders are available (See W, WA & WB options).**
- 10 year warranty



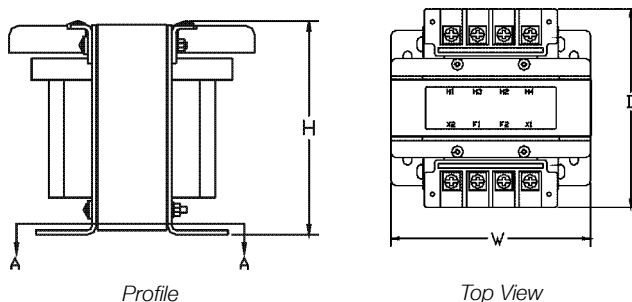
Related Products

- Linear Power Supplies
- DIN Rail DC Power Supplies
- Constant Voltage Transformers
- Line Reactors

SBE Mounting Profiles



Mounting Dimensions



Profile

Top View

Accessories

Catalog Number	Description
FBP	Primary "CC" Rejection Type Fuse Holder (Finger Safe covers not available)
FB2	Secondary Fuse Holder only (Glass or Ceramic, ¼" x 1¼" fuse)
FB2X	Secondary Fuse Holder only included where applicable. Not sold separately. (Midget Cartridge Type, 13/32" x 1½" fuse)
FBPC1	Primary "CC" Rejection Type Fuse Holder and Finger Safe Cover Kit
IP20	IEC Touchproof Cover Kit
SBEDIN	IEC Fuse Holder Adaptor Kit
W	Factory installed Primary Fuse Holder with Midget Type (no covers)
WA	Factory installed Fuse Holder with Glass/Ceramic Type and Covers
WB	Factory installed Fuse Holder with Midget Type and Covers

SBE Encapsulated Series Selection Tables

Group 1 – 120 x 240 Volt Primary, 24 Volt Secondary, 60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches) S1 / S2	Approx. Ship Weight lbs (kg)	
50	E050E	2.72	3.01	3.99	2.51 / NA	2.02 / NA	.20 x .33 / .20 x .33	3 (1.36)	
75	E075E	2.96	3.39	4.36	2.81 / 2.50	2.10 / NA	.20 x .50 / .20 x .50	4 (1.82)	
100	E100E	2.96	3.39	4.61	2.81 / 2.50	2.37 / NA	.20 x .50 / .20 x .50	5 (2.27)	
150	E150E	3.89	4.5	4.48	3.74 / 3.12	2.56 / 2.87	.20 x .65 / .20 x .33	8 (3.64)	
200	E200E	3.89	4.5	4.79	3.74 / 3.12	2.87 / 3.18	.20 x .65 / .20 x .33	10 (4.55)	
250	E250E	3.89	4.5	5.21	3.74 / 3.12	3.29 / 3.61	.20 x .65 / .20 x .33	11 (5.00)	
300	E300E	4.53	5.25	4.66	4.38 / 3.75	3.10 / NA	.31 x .71 / .31 x .71	12 (5.45)	
350	E350E	4.53	5.25	5.07	4.38 / 3.75	3.54 / NA	.31 x .71 / .31 x .71	15 (6.82)	
500	E500E	4.53	5.25	5.75	4.38 / 3.75	4.33 / NA	.31 x .85 / .31 x .85	19 (8.64)	
750	E750E	5.56	6.38	6.93	5.32 / 4.37	4.25 / 5.75	.31 x .85 / .31 x .85	31 (14.09)	

Note: Includes FB2X Secondary fuse holder.

Group 1A – Factory Installed Primary Fuse Holder Class "CC" and:

W – Secondary Fuse Holder (Midget Cartridge, 13/32" x 1½" fuse) supplied, no covers

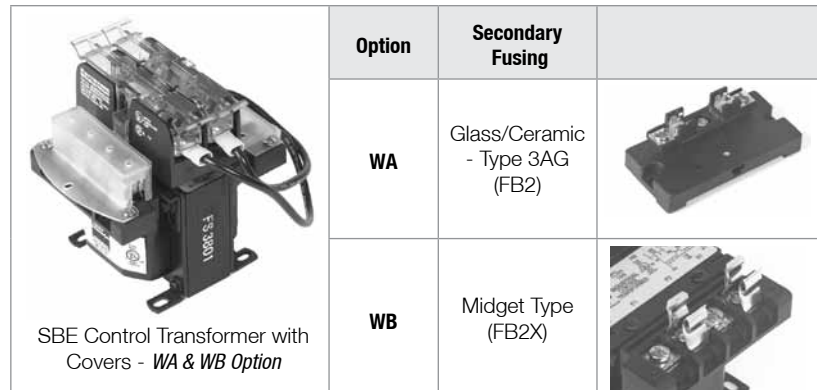
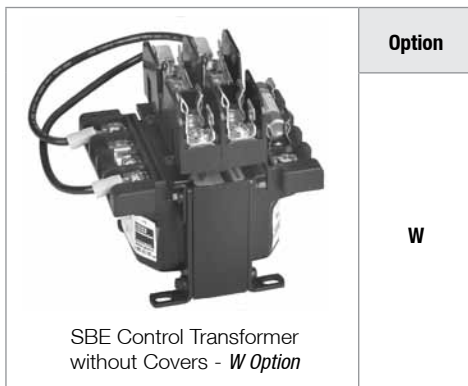
WA – Secondary Fuse Holder (Glass or Ceramic – Type 3AG, ¼" x 1¼" fuse type)

WB – Secondary Fuse Holder (Midget Cartridge, 13/32" x 1½" fuse)

VA	Primary Fuse Holder Class "CC"			Dimensions						
	W Option – Midget Type Catalog Number	WA Option – Type 3AG w/ Covers Catalog Number	WB Option – Midget Type w/ Covers Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches) S1 / S2	Approx. Ship Weight lbs (kg)
50	E050EW	E050EWA	E050EWB	4.18	3.01	3.99	2.51 / NA	2.02 / NA	.20 x .33 / .20 x .33	3 (1.36)
75	E075EW	E075EWA	E075EWB	4.41	3.39	4.36	2.81 / 2.50	2.10 / NA	.20 x .50 / .20 x .50	4 (1.82)
100	E100EW	E100EWA	E100EWB	4.41	3.39	4.61	2.81 / 2.50	2.37 / NA	.20 x .50 / .20 x .50	5 (2.27)
150	E150EW	E150EWA	E150EWB	5.36	4.5	4.48	3.74 / 3.12	2.56 / 2.87	.20 x .65 / .20 x .33	8 (3.64)
200	E200EW	E200EWA	E200EWB	5.36	4.5	4.79	3.74 / 3.12	2.87 / 3.18	.20 x .65 / .20 x .33	10 (4.55)
250	E250EW	E250EWA	E250EWB	5.36	4.5	5.21	3.74 / 3.12	3.29 / 3.61	.20 x .65 / .20 x .33	11 (5.00)
300	E300EW	E300EWA	E300EWB	5.99	5.25	4.66	4.38 / 3.75	3.10 / NA	.31 x .71 / .31 x .71	12 (5.45)
350	E350EW	E350EWA	E350EWB	5.99	5.25	5.07	4.38 / 3.75	3.54 / NA	.31 x .71 / .31 x .71	15 (6.82)
500	E500EW	NA	E500EWB	5.99	5.25	5.75	4.38 / 3.75	4.33 / NA	.31 x .85 / .31 x .85	19 (8.64)
750	E750EW	NA	E750EWB	7.01	6.38	6.93	5.32 / 4.37	4.25 / 5.75	.31 x .85 / .31 x .85	31 (14.09)

Notes: WA and WB suffix include Finger Safe covers. Fuses not included.

FB2 sold separately for W option. Secondary fusing assembly required.



SBE Encapsulated Series Selection Tables

Group 2 – 220 x 440 Volt Primary, 110 Volt Secondary, 50/60 Hz
230 x 460 Volt Primary, 115 Volt Secondary, 50/60 Hz
240 x 480 Volt Primary, 120 Volt Secondary, 60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches) S1 / S2	Approx. Ship Weight lbs (kg)	
50	E050	2.72	3.01	3.99	2.51 / NA	2.02 / NA	.20 x .33 / .20 x .33	3 (1.36)	
75	E075	2.96	3.39	4.36	2.81 / 2.50	2.10 / NA	.20 x .50 / .20 x .50	4 (1.82)	
100	E100	2.96	3.39	4.61	2.81 / 2.50	2.37 / NA	.20 x .50 / .20 x .50	5 (2.27)	
150	E150	3.89	4.5	4.48	3.74 / 3.12	2.56 / 2.87	.20 x .65 / .20 x .33	8 (3.64)	
200	E200	3.89	4.5	4.79	3.74 / 3.12	2.87 / 3.18	.20 x .65 / .20 x .33	10 (4.55)	
250	E250	3.89	4.5	5.21	3.74 / 3.12	3.29 / 3.61	.20 x .65 / .20 x .33	11 (5.00)	
300	E300	4.53	5.25	4.66	4.38 / 3.75	3.10 / NA	.31 x .71 / .31 x .71	12 (5.45)	
350	E350	4.53	5.25	5.07	4.38 / 3.75	3.54 / NA	.31 x .71 / .31 x .71	15 (6.82)	
500	E500	4.53	5.25	5.75	4.38 / 3.75	4.33 / NA	.31 x .85 / .31 x .85	19 (8.64)	
750	E750	5.56	6.38	6.93	5.32 / 4.37	4.25 / 5.75	.31 x .85 / .31 x .85	31 (14.09)	
1000	E1000	5.56	6.38	7.36	5.32 / 4.37	4.68 / 6.18	.31 x .85 / .31 x .85	36 (16.36)	

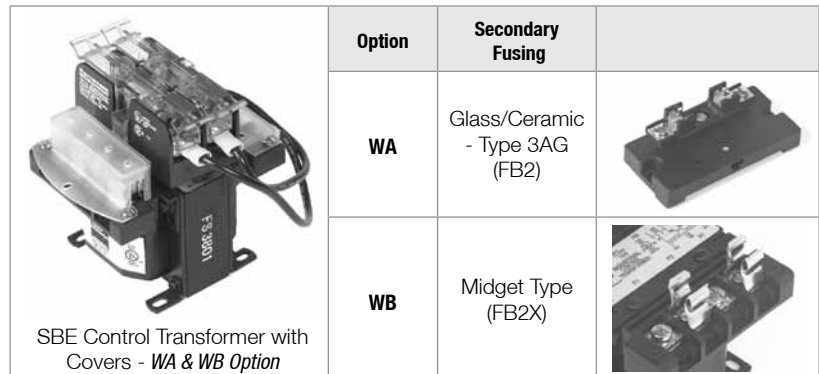
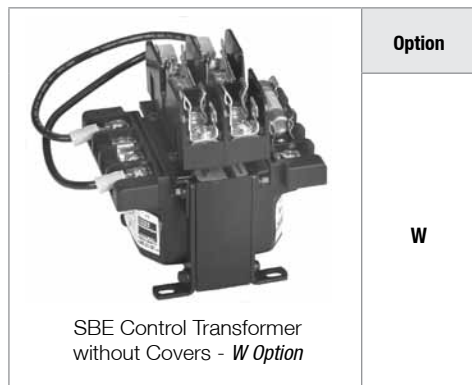
Note: Includes FB2X Secondary fuse holder.

Group 2A – Factory Installed Primary Fuse Holder Class "CC" and:
W – Secondary Fuse Holder (Midget Cartridge, 13/32" x 1½" fuse) supplied, no covers
WA – Secondary Fuse Holder (Glass or Ceramic – Type 3AG, ¼" x 1¼" fuse type)
WB – Secondary Fuse Holder (Midget Cartridge, 13/32" x 1½" fuse)



VA	Primary Fuse Holder Class "CC"			Dimensions						
	W Option – Midget Type Catalog Number	WA Option – Type 3AG w/ Covers Catalog Number	WB Option – Midget Type w/ Covers Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches) S1 / S2	Approx. Ship Weight lbs (kg)
50	E050W	E050WA	E050WB	4.18	3.01	3.99	2.51 / NA	2.02 / NA	.20 x .33 / .20 x .33	3 (1.36)
75	E075W	E075WA	E075WB	4.41	3.39	4.36	2.81 / 2.50	2.10 / NA	.20 x .50 / .20 x .50	4 (1.82)
100	E100W	E100WA	E100WB	4.41	3.39	4.61	2.81 / 2.50	2.37 / NA	.20 x .50 / .20 x .50	5 (2.27)
150	E150W	E150WA	E150WB	5.36	4.5	4.48	3.74 / 3.12	2.56 / 2.87	.20 x .65 / .20 x .33	8 (3.64)
200	E200W	E200WA	E200WB	5.36	4.5	4.79	3.74 / 3.12	2.87 / 3.18	.20 x .65 / .20 x .33	10 (4.55)
250	E250W	E250WA	E250WB	5.36	4.5	5.21	3.74 / 3.12	3.29 / 3.61	.20 x .65 / .20 x .33	11 (5.00)
300	E300W	E300WA	E300WB	5.99	5.25	4.66	4.38 / 3.75	3.10 / NA	.31 x .71 / .31 x .71	12 (5.45)
350	E350W	E350WA	E350WB	5.99	5.25	5.07	4.38 / 3.75	3.54 / NA	.31 x .71 / .31 x .71	15 (6.82)
500	E500W	E500WA	E500WB	5.99	5.25	5.75	4.38 / 3.75	4.33 / NA	.31 x .85 / .31 x .85	19 (8.64)
750	E750W	E750WA	E750WB	7.01	6.38	6.93	5.32 / 4.37	4.25 / 5.75	.31 x .85 / .31 x .85	31 (14.09)
1000	E1000W	E1000WA	E1000WB	7.01	6.38	7.36	5.32 / 4.37	4.68 / 6.18	.31 x .85 / .31 x .85	36 (16.36)

Notes: WA and WB suffix include Finger Safe covers. Fuses not included. W option for secondary fusing requires assembly (FB2 sold separately).



Visit our website at www.solahd.com or
contact **Technical Services** at **(800) 377-4384** with any questions.

SBE Series Selection Tables - continued

Group 3 – 240 x 480 Volt Primary, 24 Volt Secondary, 60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches)	Approx. Ship Weight lbs (kg)	
50	E050D	2.72	3.01	3.99	2.51/NA	2.02/NA	.20 x .33	3 (1.36)	
100	E100D	2.96	3.39	4.61	2.81/2.50	2.37/NA	.20 x .50	5 (2.27)	
250	E250D	3.89	4.5	5.21	3.74/3.12	3.29/3.61	.20 x .65	11 (5.00)	
500	E500D	4.53	5.25	5.75	4.38/3.75	4.33/NA	.31 x .71	19 (8.64)	

Note: Includes FB2X Secondary fuse holder.

Group 4 – 208/240/277 Volt Primary, 120/24 Volt Secondary, 60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches)	Approx. Ship Weight lbs (kg)	
50	E050JL	2.72	3.01	3.99	2.51/NA	2.02/NA	.20 x .33	3 (1.36)	
100	E100JL	2.96	3.39	4.61	2.81/2.50	2.37/NA	.20 x .50	5 (2.27)	
250	E250JL	3.89	4.5	5.21	3.74/3.12	3.29/3.61	.20 x .65	11 (5.00)	
500	E500JL	4.53	5.25	5.75	4.38/3.75	4.33/NA	.31 x .71	19 (8.64)	

Note: Will only accept one FB2 secondary fuse holder. Will not accept FB2X secondary fuse holder.

Group 5 – 208/240/480/600 Volt Primary, 120/24 Volt Secondary, 60 Hz
 200/230/460/575 Volt Primary, 115/23 Volt Secondary, 60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (inches)	Approx. Ship Weight lbs (kg)	
50	E050JN	2.96	3.39	4.36	2.81/2.50	2.10/NA	.20 x .50	4 (1.81)	
100	E100JN	3.89	4.5	4.48	3.74/3.12	2.56/2.87	.20 x .65	8 (3.67)	
150	E150JN	3.89	4.5	5.21	3.74/3.12	3.29/3.61	.20 x .65	11 (5.00)	
250	E250JN	4.53	5.25	5.07	4.38/3.75	3.54/NA	.31 x .71	15 (6.82)	
500	E500JN	5.56	6.38	6.93	5.32/4.37	4.25/5.75	.31 x .85	30 (13.64)	

Note: Will only accept one FB2 secondary fuse holder. Will not accept FB2X secondary fuse holder.

SBE Accessories (For Group 1 & 2 voltage configurations only)

FBP: Field installed primary fuse holder kit designed to accommodate two Class “CC” rejection type fuses. Finger safe covers not available.

FB2: Field installed secondary fuse holder kit designed to accommodate one Glass or Ceramic, 1/4” x 1 1/4” fuse.

SBEDIN: Field installed IEC Fuse Holder Adaptor Kit

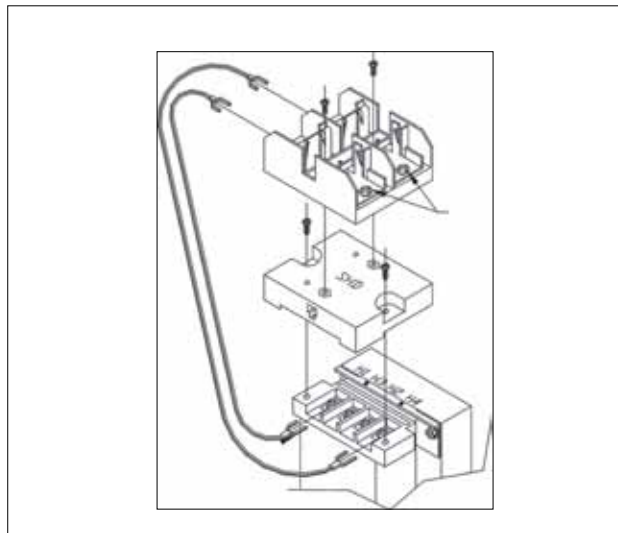
See the Technical Notes section for recommended fuse sizes.

FBPC1: Field installed primary fuse holder designed to accommodate two Class “CC” rejection type fuses with Primary and Secondary Finger Safe Covers Kit.

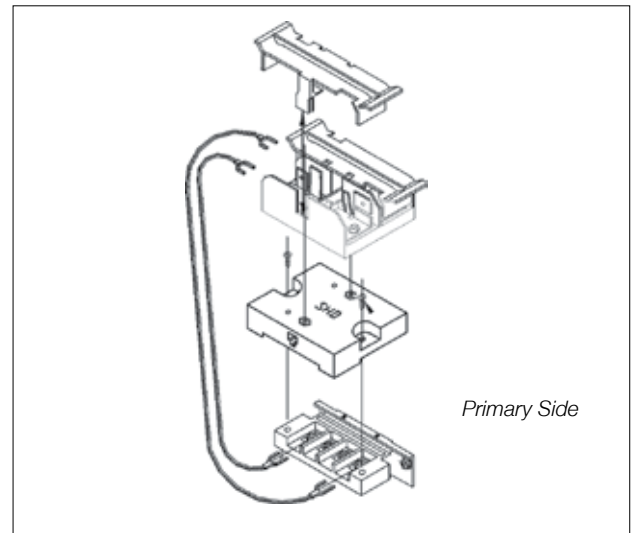
FB2X: Field installed secondary fuse holder designed to accommodate one 13/32” x 1 1/2” (Midget type) cartridge fuse (included with applicable transformer purchase only).

IP20: Field installed Primary and Secondary IEC Touch Proof Cover Kit.

FBP Fuse Block - Primary Side

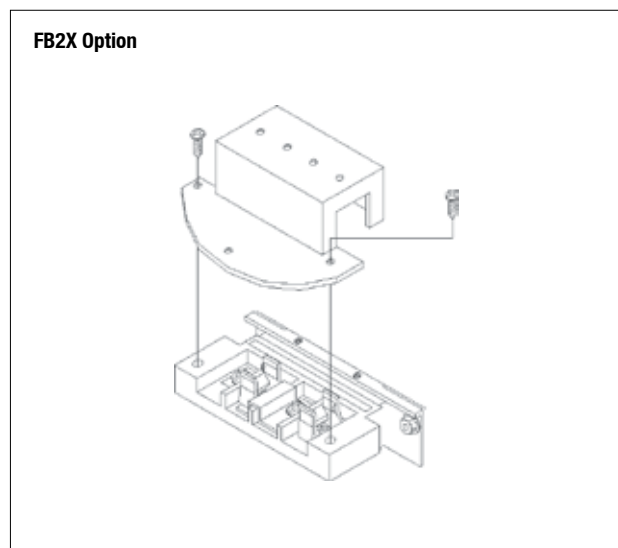


FBPC1 Fuse Block and Finger Safe Cover Kit

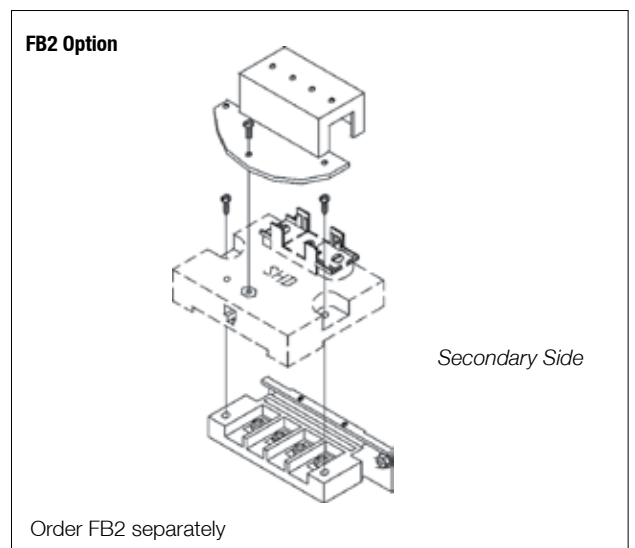


FBPC1 Secondary Cover - For use with either FB2X or FB2 options.

FB2X Option

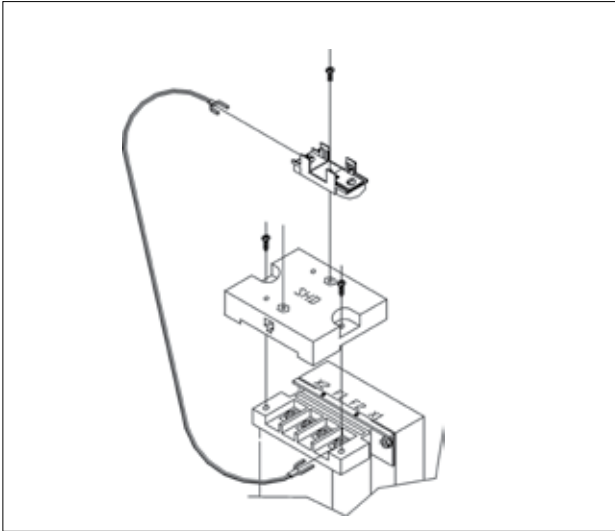


FB2 Option

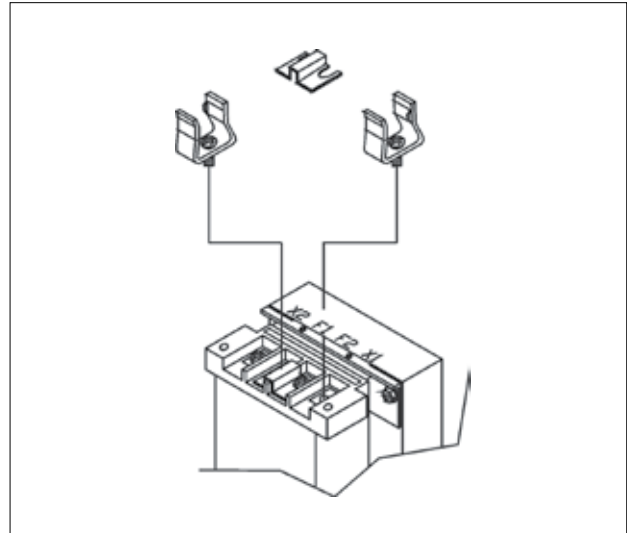


SBE Additional Accessories - continued

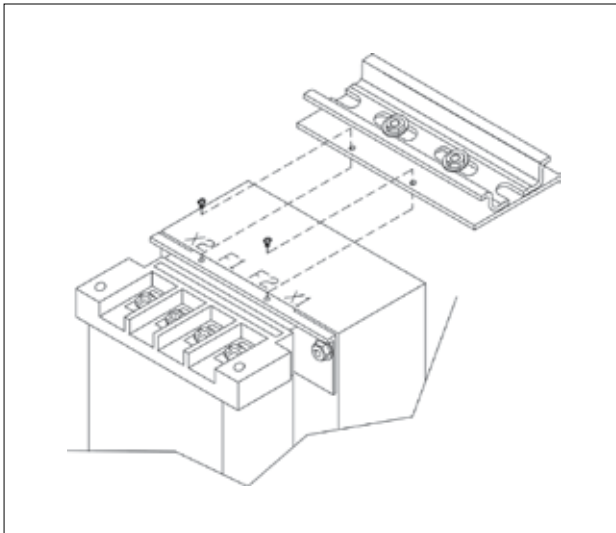
FB2 Fuse Block - Secondary Side



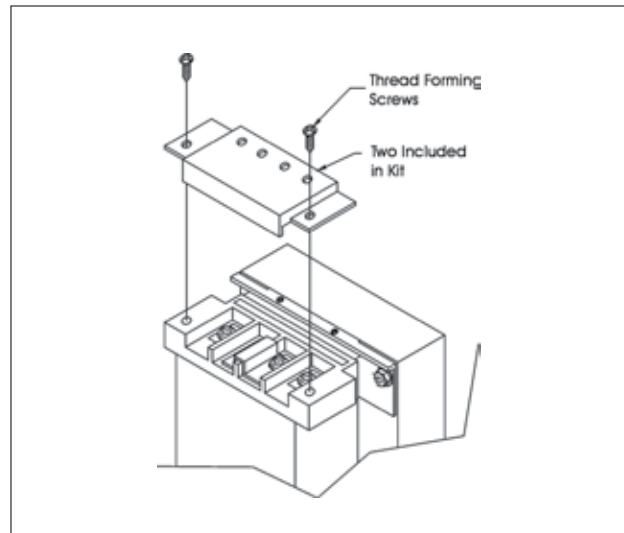
FB2X Fuse Block - Secondary Side



SBE DIN Circuit Breaker Mounting



IP20 Terminal Covers (Two Covers Per Kit)



SBE - Copper Wound, Open Style Design - SBE performance in larger VA (1500 - 5000) sizes

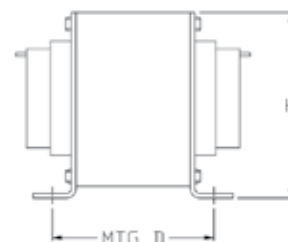
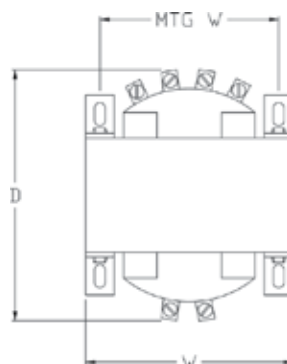
The open style SBE Series provides voltage regulation in excess of NEMA recommendations without exceeding **55°C rise**. These higher power capacity transformers are the best choice when 80% or more of the load components are electromagnetic devices.

Features

- Interleaved copper windings reduce I²R losses and maximize efficiency.
- Ratings 60 Hz unless noted 50/60 Hz
- Meets or exceeds electrical requirements of NEMA, ANSI, NMTBA and JIC
- 55°C rise, 105°C insulation system
- High quality silicon steel core

**Related Products**

- Linear Power Supplies
- DIN Rail DC Power Supplies
- Constant Voltage Transformers
- Line Reactors

SBE Design Style**Selection Table**

Group 1 – 240 X 480 Volt Primary, 120 Volt Secondary 60 Hz
230 X 460 Volt Primary, 115 Volt Secondary 50/60 Hz
220 X 440 Volt Primary, 110 Volt Secondary 50/60 Hz



VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width	Mtg Depth	Slot Size (inches)	Approx. Ship Weight lbs (kg)	
1500	Y1500	6.25	6.75	8.75	5.75	6.38	.44 x .69	43 (19.55)	
2000	Y2000	6.25	6.75	10	5.75	7.75	.44 x .69	55 (25.00)	
3000	Y3000	8	9	9.63	8	6	.44 x .69	74 (33.64)	
5000	Y5000	8	9	12	8	8.75	.44 x .69	120 (54.55)	

Note: Fuse holders are not available for this voltage configuration.

SMT Series - Aluminum Wound, Open Style Design

The SMT series is economical and compact with traditional open wound varnished coils. Ratings are from 1 KVA through 5 KVA with Class 180°C insulation system and **115°C rise** under full load. SMT transformers provide excellent cost benefits with NEMA regulation characteristics and electrical performance specifications.

Features

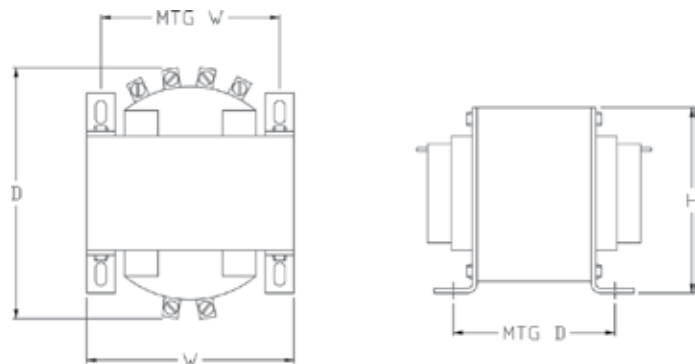
- Available from 1000–5000 VA, 60 Hz unless noted
- Meets or exceeds electrical requirements of NEMA, ANSI, NMTBA and JIC

Related Products

- Linear Power Supplies
- DIN Rail DC Power Supplies
- Constant Voltage Transformers
- Line Reactors



SMT Design Style



Selection Table

Group 1 – 240 X 480 Volt Primary, 120 Volt Secondary 60 Hz
230 X 460 Volt Primary, 115 Volt Secondary 50/60 Hz
220 X 440 Volt Primary, 110 Volt Secondary 50/60 Hz

VA	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width	Mtg Depth	Slot Size (inches)	Approx. Ship Weight lbs (kg)	
1000	T1000	5.63	6.38	6.38	5.31	4.25	.31 x .69	22 (10.00)	
1500	T1500	6.25	6.75	8.25	5.75	5.63	.44 x .69	28.3 (12.86)	
2000	T2000	6.25	6.75	9.13	5.75	6.63	.44 x .69	38.5 (17.5)	
3000	T3000	8	9	9.3	8	5.81	.44 x .69	55 (25.00)	
5000	T5000	8	9	11.3	8	7.5	.44 x .69	91 (41.36)	

Note: Fuse holders are not available for this voltage configuration.

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 contact **Technical Services** at (800) 377-4384 with any questions.

International Series Control Transformers

Electromagnetic control components demand inrush currents up to 10 times the transformers nominal rating without sacrificing secondary voltage stability beyond practical limits. The International series transformers fully comply with IEC and NEMA standards and are available with IEC touchproof covers (IP20).

Features

- Epoxy encapsulated for cooler operation
- Interleaved copper windings reduce I^2R losses and maximize efficiency.
- 50/60 Hz
- 55°C Rise, 105°C insulation system for harsh, heavy duty applications
- Exceeds IEC, NEMA, ANSI, NMTBA, JIC and automotive standards

Accessories

- IP20
 - Field installed Primary and Secondary IEC Touch Proof Cover Kit
- SBEDIN
 - Field installed IEC Fuse Holder Adaptor Kit

Related Products

- DIN Rail Power Supplies
- 63 Series Power Conditioners
- Surge Protective Devices

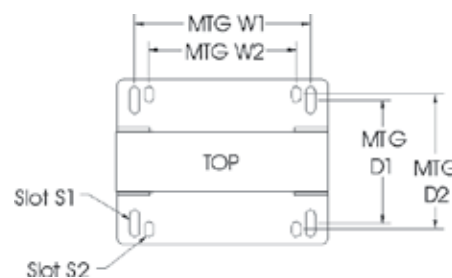
International Certifications

UL	CE
E77014 Vol. 1	IEC 61558-1 61558-2-2

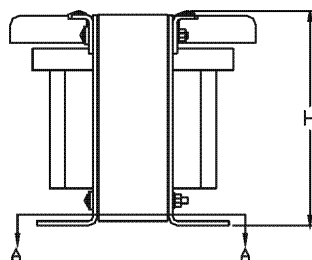


Note: IP20 covers sold separately.

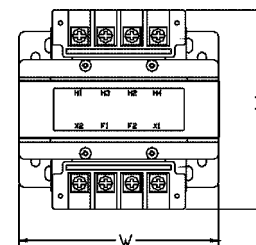
Design Style



Mounting Dimensions



Profile



Top View

Selection Tables: International Series

**Group 1 – 208/240/415 Volt Primary, 120/24 Secondary, 50/60 Hz
200/230/400 Volt Primary, 115/23 Secondary, 50/60 Hz**

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (mm) S1/S2	Approx. Ship Weight lbs (kg)	
50	105	E050TC	2.96	3.39	4.36	2.81/2.50	2.10/NA	5.08 x 12.7 / 5.08 x 12.7	4 (1.82)	
100	230	E100TC	3.89	4.5	4.48	2.56/2.87	2.87/3.18	5.08 x 16.5 / 5.08 x 8.4	8 (3.67)	
150	420	E150TC	3.89	4.5	5.21	3.74/3.12	3.29/3.61	5.08 x 16.5 / 5.08 x 8.4	11 (5.00)	
250	675	E250TC	4.53	5.25	5.07	4.38/3.75	3.54/NA	7.87 x 21.59 / 7.87 x 21.59	15 (6.82)	
500	1600	E500TC	5.56	6.38	6.93	5.32/4.37	4.25/5.75	7.87 x .85 / 7.87 x 21.59	30 (13.64)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

**Group 2 – 208/240/415 Volt Primary, 24 Volt Secondary, 50/60 Hz
277/480 Volt Primary, 24 Volt Secondary, 60 Hz
200/230/400 Volt Primary, 24 Volt Secondary, 50/60 Hz
220/380 Volt Primary, 23 Volt Secondary, 50/60 Hz**

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (mm) S1/S2	Approx. Ship Weight lbs (kg)	
50	105	E050TE	2.96	3.39	4.36	2.81 / 2.50	2.10 / NA	5.08 x 12.7 / 5.08 x 12.7	4 (1.82)	
100	230	E100TE	3.89	4.5	4.48	2.56 / 2.87	2.87 / 3.18	5.08 x .65 / 5.08 x .33	8 (3.67)	
150	420	E150TE	3.89	4.5	5.21	3.74 / 3.12	3.29 / 3.61	5.08 x .65 / 5.08 x .33	11 (5.00)	
250	675	E250TE	4.53	5.25	5.07	4.38 / 3.75	3.54 / NA	7.87 x 18.0 / 7.87 x 18.0	15 (6.82)	
500	1600	E500TE	5.56	6.38	6.93	5.32 / 4.37	4.25 / 5.75	7.87 x 21.6 / 7.87 x 21.6	30 (13.64)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Note: Fuse holders are not available for these voltage configurations.

Selection Tables: International Series - continued

Group 3 – 208/240/415/480/600* Volt Primary, 120 Volt Secondary, 50/60 Hz
200/230/400/460/575* Volt Primary, 115 Volt Secondary, 50/60 Hz
220/277*/380 Volt Primary, 110 Volt Secondary, 50/60 Hz

Continuous VA	Instantaneous VA**	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (mm) S1/S2	Approx. Ship Weight lbs (kg)	
50	93	E050TF	2.96	3.39	4.36	2.81 / 2.50	2.10 / NA	5.08 x 12.7 / 5.08 x 12.7	4 (1.82)	Diagram showing primary terminals H1, H3, H2, H4 and secondary terminals X1, X2, X3, X4. Taps are labeled with voltage ranges: 200-277, 380-600, 120 (415/208), 115 (400/200), 110 (380), 120 (480/240), 115 (460/230), 110 (220), 120 (600), 115 (575), 110 (277). 60 Hz Only.
100	205	E100TF	3.89	4.5	4.48	3.74 / 3.12	2.56 / 2.87	5.08 x 16.5 / 5.08 x 8.38	8 (3.67)	
150	390	E150TF	3.89	4.5	5.21	3.74 / 3.12	3.29 / 3.61	5.08 x 16.5 / 5.08 x 8.38	11 (5.00)	
250	630	E250TF	4.53	5.25	5.07	4.38 / 3.75	3.54 / NA	7.9 x 18.0 / 7.9 x 18.0	15 (6.82)	
500	1200	E500TF	5.56	6.38	6.93	5.32 / 4.37	4.25 / 5.75	7.9 x 21.6 / 7.9 x 21.6	30 (13.64)	
750	2290	E750TF	5.56	6.38	7.36	5.32 / 4.37	4.68 / 6.18	7.9 x 21.6 / 7.9 x 21.6	34 (15.45)	

* 60 Hz Only

** At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Group 4 – 240/415/480 Volt Primary, 120/240 Volt Secondary, 50/60 Hz
230/400/460 Volt Primary, 115/230 Volt Secondary, 50/60 Hz
220/380/440 Volt Primary, 110/220 Volt Secondary, 50/60 Hz

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width W1 / W2	Mtg Depth D1 / D2	Slot Size (mm) S1/S2	Approx. Ship Weight lbs (kg)	
50	110	E050TH	2.96	3.39	4.36	2.81 / 2.50	2.10 / NA	5.08 x 12.7 / 5.08 x 12.7	4 (1.82)	Diagram showing primary terminals H1, H3, H2, H4 and secondary terminals X1, X2, X3, X4. Taps are labeled with voltage ranges: 440/460/480, 380/400/415, 220/230/240, 120 (480/415/240), 115 (460/400/230), 110 (440/380/220), 240 (480/415/240), 230 (460/400/230), 220 (440/380/220).
100	235	E100TH	3.89	4.5	4.48	3.74 / 3.12	2.56 / 2.87	5.08 x 16.5 / 5.08 x 8.38	8 (3.67)	
150	470	E150TH	3.89	4.5	5.21	3.74 / 3.12	3.29 / 3.61	5.08 x 16.5 / 5.08 x 8.38	11 (5.00)	
250	730	E250TH	4.53	5.25	5.07	4.38 / 3.75	3.54 / NA	7.9 x 20.59 / 7.9 x 18.0	15 (6.82)	
500	1670	E500TH	5.56	6.38	6.93	5.32 / 4.37	4.25 / 5.75	7.9 x 21.59 / 7.9 x 21.59	30 (13.64)	
750	2250	E750TH	5.56	6.38	7.36	5.32 / 4.37	4.68 / 6.18	7.9 x 21.59 / 7.9 x 21.59	34 (15.45)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Note: Fuse holders are not available for these voltage configurations.

International Series - Fuse Recommendations

VA	Maximum Current Rating of Fuse		
	24 VAC	115 VAC	230 VAC
50	2	0.5	0.25
100	4	1	0.5
150	6	1.6	0.8
250	10	2	1
500	20	4	2
750	*	6	4
1000	*	8	4
1500	*	12	6
2000	-	16	8

Primary Fusing: Consult local Electrical Code

Secondary Fusing: per IEC EN61558-2-2

* See 500 VA fuse rating for MC design.

ICE International Series: 750 - 2000 VA

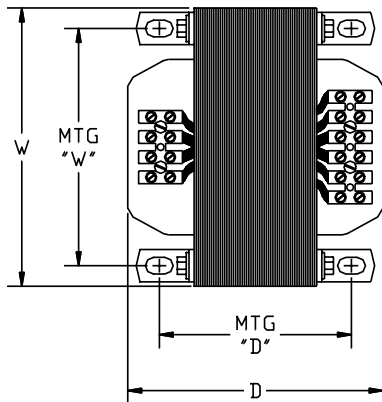
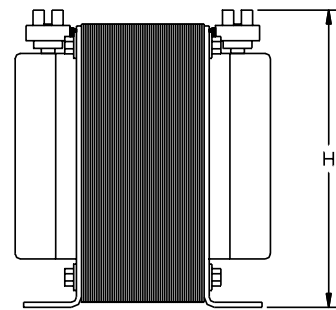
International CE marked transformers include IP20 touchproof terminations and copper windings in an encapsulated design. These units range from 750 to 2000 VA with 80°C temperature rise. The design is highly flexible due to the use of the standardized primary coil for multiple worldwide voltage combinations. CE marked and cULus approval make the ICE International Series the perfect choice for OEM export equipment.

Features

- IP20 Touch-Proof terminals
- Copper windings
- Epoxy encapsulated for cooler operation and increased reliability
- 80°C rise temp, 130°C insulation system for harsh, heavy-duty standards
- 50/60 Hz Frequency
- Meets or exceeds electrical requirements of NEMA, ANSI and IEC
- CE marked and cULus listed

**Related Products**

- DIN Rail Power Supplies
- 63 Series Power Conditioners
- Surge Protective Devices

Design Style*Top View**Profile*

Selection Tables: International Series

Group 5 – 240/415/480 Volt Primary, 120/240 Volt Secondary, 50/60 Hz 230/400/460 Volt Primary, 115/230 Volt Secondary, 50/60 Hz 220/380/440 Volt Primary, 110/220 Volt Secondary, 50/60 Hz

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width "W"	Mtg Depth "D"	Slot Size – inches (mm)	Approx. Ship Weight lbs (kg)	
1000	2500	CE1000TH	5.63	6.38	6	5.31	4.25	.31 x .69 (7.87 x 17.52)	25 (11.36)	
1500	4200	CE1500TH	5.63	6.38	6.75	5.31	5	.31 x .69 (7.87 x 17.52)	32 (14.55)	
2000	6000	CE2000TH	5.63	6.38	7.75	5.31	6	.31 x .69 (7.87 x 17.52)	37 (16.82)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Group 6 – 208/240/415/480/600 Volt Primary, 120/240 Volt Secondary, 50/60 Hz 200/230/400/460/575 Volt Primary, 115/230 Volt Secondary, 50/60 Hz – /220/380/440/550 Volt Primary, 110/220 Volt Secondary, 50/60 Hz

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width "W"	Mtg Depth "D"	Slot Size – inches (mm)	Approx. Ship Weight lbs (kg)	
1000	2500	CE1000MH	5.63	6.38	6	5.31	4.25	.31 x .69 (7.87 x 17.52)	25 (11.36)	
1500	4200	CE1500MH	5.63	6.38	6.75	5.31	5	.31 x .69 (7.87 x 17.52)	32 (14.55)	
2000	6000	CE2000MH	5.63	6.38	7.75	5.31	6	.31 x .69 (7.87 x 17.52)	37 (16.82)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Group 7 – 208/240/415/480/600 Volt Primary, 120/ – /24 Volt Secondary, 50/60 Hz 200/230/400/460/575 Volt Primary, 115/24/23 Volt Secondary, 50/60 Hz – /220/380/440/550 Volt Primary, 110/23/– Volt Secondary, 50/60 Hz

Continuous VA	Instantaneous VA*	Catalog Number	Height (inch)	Width (inch)	Depth (inch)	Mtg Width "W"	Mtg Depth "D"	Slot Size – inches (mm)	Approx. Ship Weight lbs (kg)	
750	1875	CE750MC	5.63	6.38	6	5.31	4.25	.31 x .69 (7.87 x 17.52)	25 (11.36)	
1000	3000	CE1000MC	5.63	6.38	6.75	5.31	5	.31 x .69 (7.87 x 17.52)	32 (14.55)	
1500	4500	CE1500MC	5.63	6.38	7.75	5.31	6	.31 x .69 (7.87 x 17.52)	37 (16.82)	

* At 50% PF (Power Factor), 95% Nominal Secondary Voltage.

Notes: 24V output 500 VA maximum load.

Fuse holders are not available for these voltage configurations.

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HSZ Series Industrial Control Transformers

The HSZ series of industrial control transformers are designed for applications requiring special mounting and are available in ratings from 1 through 10 KVA.

Features

- UL Class 180°C insulation system, 80°C temperature rise under full load
- Meets or exceeds NEMA regulation standards
- Copper magnet wire windings
- Encapsulated

Available Styles

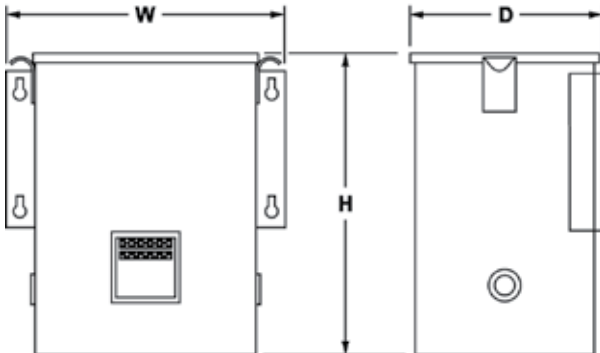
- NEMA 3R (rain proof)
- NEMA 4 (wash down & dust proof)
- NEMA 4X (corrosion proof)
- NEMA 12 (dust proof)



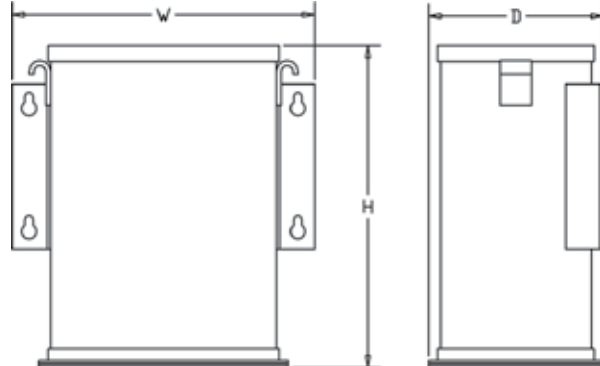
Related Products

- Linear Power Supplies
- DIN Rail DC Power Supplies
- Constant Voltage Transformers
- Line Reactors

HSZ Design Style 1 - NEMA 3R

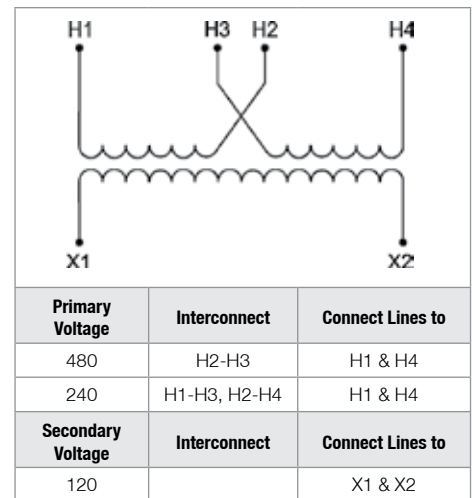


HSZ Design Style 2 - NEMA 12, NEMA 4, NEMA 4X

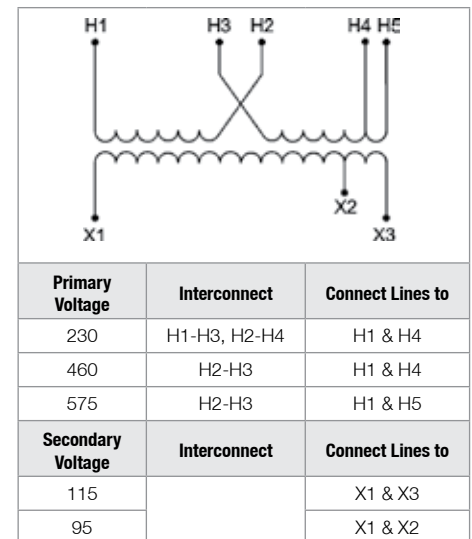


HSZ Series Selection Tables and Electrical Connections
Group 1 – 240/480, 230/460, 220/440 Volt Primary, 120/115/110 Volt Secondary, 50/60 Hz

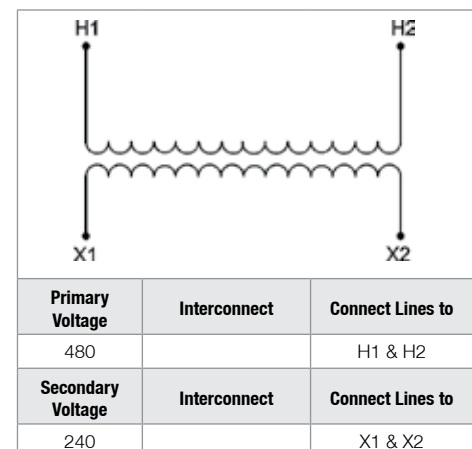
KVA	Catalog Number NEMA-3R	Catalog Number NEMA-4/12	Catalog Number NEMA-4X	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight lbs (kg)
1	HZ1000	HZ12-1000	HZ4X-1000	12	10	7	43 (19.55)
1.5	HZ1500	HZ12-1500	HZ4X-1500	12	10	7	55 (25.00)
2	HZ2000	HZ12-2000	HZ4X-2000	12	10	7	68 (30.91)
3	HZ3000	HZ12-3000	HZ4X-3000	17	14	9	108 (49.09)
5	HZ5000	HZ12-5000	HZ4X-5000	17	14	9	138 (62.73)
7.5	HZ7500	HZ12-7500	HZ4X-7500	17	14	9	173 (78.64)
10	HZ10000	HZ12-10000	HZ4X-10000	17	17	12	210 (95.45)


Group 2 – 230/460/575 Volt Primary, 115/95 Volt Secondary, 50/60 Hz

KVA	Catalog Number NEMA-3R	Catalog Number NEMA-4/12	Catalog Number NEMA-4X	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight lbs (kg)
1	HZ1000A	HZ12-1000A	HZ4X-1000A	12	10	7	43 (19.55)
1.5	HZ1500A	HZ12-1500A	HZ4X-1500A	12	10	7	55 (25.00)
2	HZ2000A	HZ12-2000A	HZ4X-2000A	12	10	7	68 (30.91)
3	HZ3000A	HZ12-3000A	HZ4X-3000A	17	14	9	108 (49.09)
5	HZ5000A	HZ12-5000A	HZ4X-5000A	17	14	9	138 (62.73)
7.5	HZ7500A	HZ12-7500A	HZ4X-7500A	17	14	9	173 (78.64)
10	HZ10000A	HZ12-10000A	HZ4X-10000A	17	17	12	210 (95.45)


Group 3 – 480 Volt Primary, 240 Volt Secondary, 50/60 Hz

KVA	Catalog Number NEMA-3R	Catalog Number NEMA-4/12	Catalog Number NEMA-4X	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight lbs (kg)
1	HZ1000R	HZ12-1000R	HZ4X-1000R	12	10	7	43 (19.55)
1.5	HZ1500R	HZ12-1500R	HZ4X-1500R	12	10	7	55 (25.00)
2	HZ2000R	HZ12-2000R	HZ4X-2000R	12	10	7	68 (30.91)
3	HZ3000R	HZ12-3000R	HZ4X-3000R	17	14	9	108 (49.09)
5	HZ5000R	HZ12-5000R	HZ4X-5000R	17	14	9	138 (62.73)
7.5	HZ7500R	HZ12-7500R	HZ4X-7500R	17	14	9	173 (78.64)
10	HZ10000R	HZ12-10000R	HZ4X-10000R	17	17	12	210 (95.45)



Note: Contact Technical Services for lead times on enclosures.

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contact **Technical Services** at **(800) 377-4384** with any questions.



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SolaHD Family of Transformers

SolaHD offers a broad range of transformers to meet many applications. These dry-type transformers are offered encapsulated, ventilated or non-ventilated, 600 Volt Class, isolation type, single and three phase, through 500 kVA. Indoor and outdoor models are available.

Applications

Transformers are useful where the available voltage must be changed to accommodate the voltage required by the load. For many electrical circuits, the National Electrical Code (NEC) requires a separately derived neutral secondary connection provided by Delta-Wye connected transformers. Typical applications include:

- Hospitals
- Industrial Plants
- Commercial Buildings
- Apartment Buildings
- Institutional Buildings
- Office Buildings
- Schools
- Shopping Centers
- High Rise Buildings

General purpose transformers can be located close to the load. No vaults are required for installation and no long, expensive feeder lines are needed. Common applications include inductive and resistive loads such as motors, lighting and heating.

SolaHD general purpose transformers are manufactured to meet applicable industry standards, are listed in accordance with UL 506 and UL 1561 specifications and are classified as isolation transformers. The family of transformers includes:

Distribution Transformers - Ventilated 15 kVA to 500 kVA

General Purpose

These industry workhorses feature dry type construction and are classified as isolation transformers.

Low Temperature Rise

Lower thermal stress on transformer insulation increases useful life.

K-Factor

Designed to reduce the heating effects of harmonic currents created by solid state loads.

Copper Wound

SolaHD general purpose transformers have standard aluminum coil windings. As an option, we offer a selection with copper windings.



Automation Transformers - Non-Ventilated 50 VA to 45 kVA, Drive Isolation 7.5 kVA to 440 kVA and Industrial Control 50 VA to 10 kVA

General Purpose

Dry-type transformers, 600 Volt Class, isolation type, single and three phase. Indoor and outdoor models available.

Hazardous Location (Encapsulated)

Comply with Article 500 of the NEC for Class I, Division 2, Group A-D locations.

Buck-Boost

Used for outdoor or designer low voltage lighting. When connected properly, these transformers can be used to raise or lower the supply voltage to match the needs of the load.

Drive Isolation

Designed to handle the mechanical stresses, voltage demands and harmonics associated with SCR applications. See Section 2.

Industrial Control

The units supply inrush current demands of electromagnetic loads and control applications. See Section 5.

Selection Steps

A. An online transformer product selector is available in the Transformer section of our website or you can use the following steps below to manually select a transformer.

B. Find the electrical load requirements. These are:

1. Load operating voltage.
2. Load frequency (expressed in Hz).
3. Determine load size - usually expressed in kVA, amperage or horsepower.
4. Is the load designed to operate on single phase or three phase power?

This information is available from the equipment manufacturer and is typically listed on the nameplate of the equipment.

C. Know the supply voltage conditions:

1. Available source voltage.
2. Available source frequency (a transformer will not change frequency. The frequency of the supply voltage and the needed load voltage must be equal).
3. Number of phases on power source.

D. Determine the transformer kVA rating:

1. If the load is expressed in kVA, select the appropriate transformer from the following selection charts (make sure the selected transformer's kVA rating is equal to or greater than the required load kVA).
2. If the load is expressed in amperage, use either the appropriate kVA formula listed below or the appropriate sizing chart on the next page.

$$\text{kVA (1}\phi\text{)} = \frac{\text{Volts} \times \text{Amps}}{1000}$$

$$\text{kVA (3}\phi\text{)} = \frac{\text{Volts} \times \text{Amps} \times 1.732}{1000}$$

3. If the load is expressed in wattage, either utilize the formula below to convert to kVA or refer to the equipment nameplate to obtain amperage requirement.

$$\text{kVA} = \frac{\text{Wattage}}{(1000 \times \text{Power Factor of the load})}$$

4. If the load is a motor and expressed in horsepower, refer to the motor horsepower charts on the next page.

Some sizes may require an optional weather shield (order separately) for outdoor use.

Always size the transformer to the load requirements.



Single Phase: Full Load Current Chart

kVA Rating	120 V	208 V	240 V	277 V	480 V	600 V
Amperes						
0.05	0.42	0.24	0.21	0.18	0.1	0.08
0.075	0.63	0.36	0.31	0.27	0.16	0.13
0.1	0.83	0.48	0.42	0.36	0.21	0.17
0.15	1.3	0.72	0.63	0.54	0.31	0.25
0.25	2.1	1.2	1	0.9	0.52	0.42
0.5	4.2	2.4	2.1	1.8	1.4	0.83
0.75	6.3	3.6	3.1	2.7	1.6	1.3
1	8.3	4.8	4.2	3.6	2.1	1.7
1.5	12.5	7.2	6.3	5.4	3.1	2.5
2	16.7	9.6	8.3	7.2	4.2	3.3
3	25	14.4	12.5	10.8	6.3	5
5	41.7	24	20.8	18.1	10.4	8.3
7.5	62.5	36.1	31.3	27.1	15.6	12.5
10	83.3	48.1	41.7	36.1	20.8	16.7
15	125	72.1	62.5	54.2	31.3	25.0
25	208.3	120.2	104.2	90.3	52.1	41.7
37.5	312.5	180.3	156.3	135.4	78.1	62.5
50	416.7	240.4	208.3	180.5	104.2	83.3
75	625	361	313	271	156	125.0
100	833	481	417	361	208	167.0
167	1392	803	696	603	348	278.0
200	1667	962	833	722	417	333.0
250	2083	1202	1042	903	521	417.0

Three Phase: Full Load Current Chart

kVA Rating	208 V	240 V	480 V	600 V
Amperes				
3	8.3	7.2	3.6	2.9
6	16.7	14.4	7.2	5.8
9	25	21.7	10.8	8.7
15	41.6	36.1	18	14.4
30	83.3	72.2	36.1	28.9
45	125	108.3	54.1	43.3
75	208.2	180.4	90.2	72.2
112.5	312	271	135	108.0
150	416	361	180	144.0
225	625	541	271	217.0
300	833	722	361	289.0
500	1388	1203	601	481.0

Single Phase Motor Chart: AC, Motor Horsepower Amperage

Horse Power	115 V	208 V	230 V	460 V	575 V	Mini Tfrmr. kVA	Std. NEMA kVA Size
1/6	4.4	2.4	2.2	1.1	0.9	0.53	0.75
¼	5.8	3.2	2.9	1.4	1.2	0.7	0.75
1/3	7.2	4	3.6	1.8	1.4	0.87	1
½	9.8	5.4	4.9	2.5	2	1.2	1.5
¾	13.8	7.6	6.9	3.5	2.8	1.7	2
1	16	8.8	8	4	3.2	1.9	2
1½	20	11	10	5	4	2.4	3
2	24	13.2	12	6	4.8	2.9	3
3	34	18.7	17	8.5	6.8	4.1	5
5	56	30.8	28	14	11.2	6.7	7.5
7.5	80	44	40	21	16	9.6	10
10	100	55	50	26	20	12	15

Three Phase Motor Chart: AC, Motor Horsepower Amperage

Horse Power	208 V	230 V	460 V	575 V	Mini Tfrmr. kVA	Std. NEMA kVA Size
½	2.2	2	1	0.8	0.9	3.0
¾	3.1	2.8	1.4	1.1	1.2	3.0
1	4	3.6	1.8	1.4	1.5	3.0
1½	5.7	5.2	2.6	2.1	2.1	3.0
2	7.5	6.8	3.4	2.7	2.7	3.0
3	10.7	9.6	4.8	3.9	3.8	6.0
5	16.7	15.2	7.6	6.1	6.3	9.0
7½	24	22	11	9	9.2	15.0
10	31	28	14	11	11.2	15.0
15	46	42	21	17	16.6	30.0
20	59	54	27	22	21.6	30.0
25	75	68	34	27	26.6	30.0
30	88	80	40	32	32.4	45.0
40	114	104	52	41	43.2	45.0
50	143	130	65	52	52	75.0
60	170	154	77	62	64	75.0
75	211	192	96	77	80	112.5
100	273	248	124	99	103	112.5
125	342	312	156	125	130	150.0
150	396	360	180	144	150	150.0
200	528	480	240	192	200	225.0

Three things to keep in mind:

- Motor horsepower charts are based on 1800 RPM squirrel cage induction motors. If using another type of motor, check running amperage against the chart and adjust as necessary.
- Increase required transformer kVA by 20% if motors are started more than once per hour.
- If your motor service factor is greater than 1, proportionally increase full load amperage. (i.e. – if service factor is 1.10, increase full load amperage by 10%).

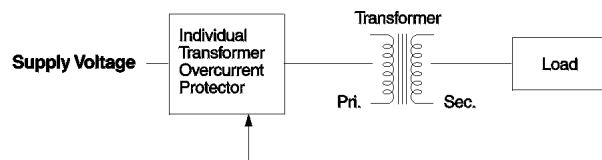
Are there any special application considerations?

- For ambient conditions over 40°C,** derate the transformer nameplate kVA by 8% for each 10°C above 40°C.
- For high altitude applications,** derate the transformer nameplate kVA by 0.3% for every 330 feet over 3300 feet above sea level. This assures proper transformer convection cooling.
- Some applications may require a transformer design that limits the BTU output of the unit at full load or a design to withstand and mitigate specific electrical anomalies.

Overcurrent Protection

Fusing and circuit breaker protection. How to overcurrent protect 600 Volt class transformers and associated wiring per NEC 450-3(b) and NEC 240-3.

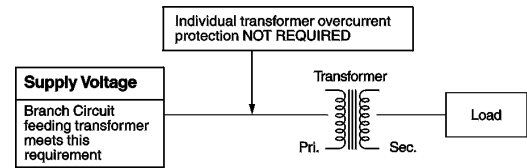
1. Primary protection only is required if the transformer is single-phase and the secondary has only two wires. Overcurrent protection rating and location are shown in Diagram A.



Primary Current	Overcurrent Protection Rating
Less than 2 amps	300% maximum
2 to 9 amps	167% maximum
9 amps or more	125% of rated primary current (or next highest standard rating)

Diagram A

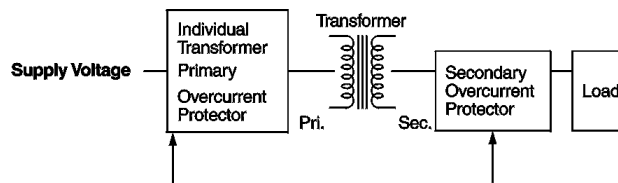
2. If the branch circuit feeding the transformer has overcurrent protection to meet the individual protection requirements in Example 1, then individual transformer protection is **not** required.



Primary Current	Overcurrent Protection Rating
Less than 2 amps	300% maximum
2 to 9 amps	167% maximum
9 amps or more	125% of rated primary current (or next highest standard rating)

Diagram B

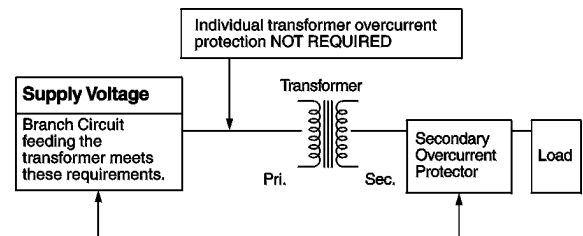
3. Primary and secondary protection is required if the transformer has more than two wires on the secondary circuit.



Primary Current	Secondary Current	Overcurrent Protection Rating
250% primary current	Less than 9 amps	167% maximum
Not more than 250%	9 amps or more	125% (or next higher standard rating)

Diagram C

4. If the branch circuit feeding the transformer has overcurrent protection to meet the individual primary overcurrent protection requirements in Example 3, then individual primary protection is **not** required. Secondary OCP is required as shown below.



Primary Current	Secondary Current	Overcurrent Protection Rating
250% primary current	Less than 9 amps	167% maximum
Not more than 250%	9 amps or more	125% (or next higher standard rating)

Diagram D

Section 240.6 (a) of the 2008 National Electrical Code*

The standard ampere ratings for fuses and inverse time circuit breakers shall be considered 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000 and 6000 amperes. Additional standard ratings for fuses shall be considered 1, 3, 6, 10 and 601. The use of fuses and inverse time circuit breakers with nonstandard ampere ratings shall be permitted.

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Primary Fuse Recommendations

Primary Voltage													
V _{in}	120	200	208	220	230	240	277	440	460	480	550	575	600
VA													
50	1.25 (2)	.75 (1.25)	.6 (1.13)	.6 (1.13)	.6 (1)	.6 (1)	.5 (.8)	.3 (.5)	.3 (.5)	.3 (.5)	.25 (.4)	.25 (.4)	.25 (.4)
75	1.8 (3)	1.13 (1.8)	1 (1.8)	1 (1.6)	.8 (1.6)	.8 (1.5)	.8 (1.25)	.5 (.8)	.4 (.8)	.4 (.75)	.4 (.6)	.3 (.6)	.3 (.6)
100	2.5 (4)	1.5 (2.5)	1.4 (2.25)	1.25 (2.25)	1.25 (2)	1.25 (2)	1 (1.8)	.6 (1.13)	.6 (1)	.6 (1)	.5 (.8)	.5 (.8)	.5 (.8)
150	3.5 (6.25)	2.25 (3.5)	2 (3.5)	2 (3.2)	1.8 (3.2)	1.8 (3)	1.6 (2.5)	1 (1.6)	.8 (1.6)	.8 (1.5)	.8 (1.25)	.75 (1.25)	.75 (1.25)
200	5 (8)	3 (5)	2.8 (4.5)	2.5 (4.5)	2.5 (4)	2.5 (4)	2 (3.5)	1.25 (2.25)	1.25 (2)	1.25 (2)	1 (1.8)	1 (1.5)	1 (1.6)
250	3 (5)	3.5 (6.25)	3.5 (6)	3.2 (5.6)	3.2 (5)	3 (5)	2.5 (4.5)	1.6 (2.8)	1.6 (2.5)	1.5 (2.5)	1.25 (2.25)	1.25 (2)	1.25 (2)
300	4 (6.25)	4.5 (7.5)	4 (7)	4 (6.25)	3.5 (6.25)	3.5 (6.25)	3.2 (5)	2 (3.2)	1.8 (3.2)	1.8 (3)	1.6 (2.5)	1.5 (2.5)	1.5 (2.5)
350	4.5 (7)	5 (8)	5 (8)	4.5 (7.5)	4.5 (7.5)	4 (7)	3.5 (6.25)	2.25 (3.5)	2.25 (3.5)	2 (3.5)	1.8 (3)	1.8 (3)	1.75 (2.5)
500	6.25 (10)	4 (6.25)	4 (6)	3.5 (5.6)	3.5 (5)	3 (5)	5 (9)	3.2 (5.6)	3.2 (5)	3 (5)	2.5 (4.5)	2.5 (4)	2.5 (4)
750	10 (15)	6.25 (9)	6 (9)	5.6 (8)	5 (8)	5 (7.5)	8 (12)	5 (8)	4.5 (8)	4.5 (7.5)	4 (6.25)	3.5 (6.25)	3.5 (6.25)
1000	12 (20)	8 (12)	8 (12)	7.5 (10)	7 (10)	6.25 (10)	10 (17.5)	3.5 (5.6)	3.6 (5)	3 (5)	5 (9)	5 (8)	5 (8)
1500	17.5 (30)	12 (15)	12 (15)	10 (15)	10 (15)	10 (15)	15 (25)	5.6 (8)	5 (8)	5 (7.5)	4.5 (6.25)	4.5 (6.25)	4.5 (6.25)
2000	25 (40)	15 (25)	15 (20)	15 (20)	12 (20)	12 (20)	20 (35)	7.5 (10)	7 (10)	6.25 (10)	6 (9)	5.6 (8)	5 (8)
3000	35 (60)	20 (35)	20 (35)	17.5 (30)	17.5 (30)	20 (30)	35 (50)	10 (15)	10 (15)	10 (15)	9 (12)	8 (12)	8 (12)
5000	60 (100)	35 (60)	30 (60)	30 (50)	30 (50)	30 (50)	60 (90)	15 (25)	15 (25)	15 (25)	12 (20)	12 (20)	12 (20)
7500	80 (150)	50 (90)	45 (90)	45 (80)	45 (80)	40 (70)	90 (125)	25 (40)	25 (40)	20 (35)	20 (30)		
10K	110 (200)	70 (125)	60 (110)	60 (110)	60 (110)	60 (100)	110 (175)	30 (50)	30 (50)	30 (50)	25 (45)		
15K	175 (300)	100 (175)	90 (175)	90 (150)	90 (150)	80 (150)	175 (250)	45 (80)	45 (80)	40 (70)	35 (60)		
25K	300 (500)	175 (300)	150 (300)	150 (250)	150 (250)	150 (250)	90 (250)	60 (70)	70 (125)	70 (125)	60 (110)		
37K						200 (350)				100 (175)			80 (150)
50K						300 (500)				150 (250)			110 (200)
75K						400 (750)				200 (350)			175 (300)
100K						600 (1000)				300 (500)			225 (400)
167K						900 (1600)				450 (850)			350 (650)

 Fuse = I*300% next size smaller if primary current is less than 2 amp. No secondary fusing required.

(Fuse) = (I*500%) next size smaller if used for a motor control circuit per NEC 430-72[C] exception No. 4

 Fuse = I*167% next size smaller if primary current is less than 9 amp. No secondary fusing required.

(Fuse) = (I*250%) next size smaller if primary current is less than 9 Amps. Secondary fusing is required see chart for size.

 Fuse = I*125% next size higher if primary current is 9 amp. or higher. No secondary fusing required.

(Fuse) = (I*250%) next size smaller if primary current is 9 Amps. or higher. Secondary fusing is required see chart for size.

Recommended fuse sizes per UL 508 and NEC450-3 (B) (1), NED 430-72 and commercially available type fuses.

Primary Overcurrent Protection

A transformer has all the same component parts as a motor, and like a motor, exhibits an inrush when energized. This inrush current is dependent upon where in the sine wave the transformer was last turned off in relation to the point of the sinewave you are when you energize the transformer. Although transformer inrush could run up to 30 to 35 times full load current under no load, it typically is the same as a motor...about 6 to 8 times normal running current. For this reason it is important to use a dual element slow blow type fuse - the same type of fuse you would use with a motor. If using a circuit breaker, select a breaker with a time delay – again the same type you would use with a motor. If the time delay is not sufficient, you may experience “nuisance tripping” – a condition where the breaker trips when energizing the transformer but when you try it again, it works fine.

Secondary Overcurrent Protection

Overcurrent devices are used between the output terminals of the transformer and the load for three reasons:

1. Protect the transformer from load electrical anomalies.
2. Since short circuit current is minimized, a smaller gauge wire may be used between the transformer and the load.
3. Per NEC, a larger primary fuse may be used to reduce nuisance tripping.

Secondary Fuse Recommendations

Secondary Voltage							
V _{OUT}	24	110	115	120	220	230	240
VA	Secondary Time Delay Dual Element Slow-Blow Fuse						
50	3.2	0.75	0.6	0.6	0.3	0.3	0.3
75	5	1.125	1	1	0.5	0.5	0.5
100	6.25	1.5	1.4	1.25	0.75	0.6	0.6
150	10	2.25	2	2	1.13	1	1
200	12	3	2.8	2.5	1.5	1.4	1.25
250	15	3.5	3.5	3.2	1.8	1.8	1.6
300	20	4.5	4	4	2.25	2	2
350	20	5	5	4.5	2.5	2.5	2.25
500	30	7.5	7	6.25	3.5	3.5	3.2
750	40	10	10	10	5.6	5	5
1000		12	12	12	7	7	6.25
1500		17.5	17.5	17.5	10	10	10
2000		25	25	25	12	12	12
3000		35	35	35	17.5	17.5	17.5
5000		60	60	60	30	30	30
7500		90	90	80	45	45	40
10K		125	110	110	60	60	60
15K		175	175	175	90	90	80
25K		300	300	300	150	150	150
37.5K				400			200
50K				600			300
75K				800			400
100K				1200			600
167K				1800			900

☐ Fuse = I*167% next size smaller if secondary current is less than 9 amp.

☒ Fuse = I*125% next size smaller if secondary current is 9 amp. or higher.

The Energy Policy Act of 2005 (H.R. 6) requires Distribution Transformers manufactured after January 1, 2007 to meet specific energy efficiency requirements. EPC Act 2005 defines the term “distribution transformers” as any transformer which:

- Has an input voltage of 34.5 kVA or less
- Has an output voltage of 600 V or less
- Is rated for operation at a frequency of 60 Hz
- Has a capacity of 10 kVA to 2500 kVA for liquid-immersed units and 15 kVA to 2500 kVA for dry-type units

The following special purpose transformers are excluded from the definition of “distribution transformers” and are, therefore, not required to meet the energy efficiency standards at this time:

- Autotransformers
- Drive (isolation) transformers
- Grounding transformers
- Machine-tool (control) transformers
- Non-ventilated transformers
- Rectifier and Regulating transformers
- Sealed transformers
- Special-impedance transformers
- Testing transformers
- Transformer with tap range of 20% or more
- Uninterruptible power supply transformers
- Welding transformers

Benefiting from Higher Energy Efficiencies

Increasing the energy efficiency of a transformer allows the unit to operate at the same level of power with less energy being wasted in the process. Decreasing usage through reduced waste by just .03% over the next 20 years cuts the need for new power generation in the United States by 60 to 66 million kw.

SolaHD has been engineering and producing energy efficient transformers for the past six years. The SolaHD E version transformers are optimized to meet NEMA's TP-1 limits for load losses calculated to 35% of the name plate rating, yet are the same compact size and footprint as its' conventional 150°C rise units.

The example pictured in Figure 1 shows the differences in efficiency for the old standard model compared to the compliant model. At 35% load, the absolute difference in efficiency is only 1.7%. However, that represents a 52% reduction in wasted energy. Taking that 52% reduction in wasted energy and multiplying it across all the energy consumed results in substantial savings.

75 kVA Transformer Efficiency

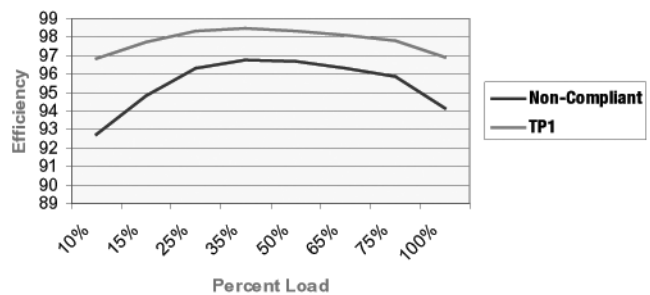


Figure 1

SolaHD offers the following family of transformers that meet the strict efficiency standards. The efficiencies of these transformers are optimized for the load losses calculated at 35% of the name plate rating. This 35% represents an industry average load of most LVGP transformers.

Applications

Any situation where the available voltage must be changed to accommodate the voltage required by the specific electrical circuit or connected equipment. For many electrical circuits, the National Electrical Code (NEC) requires a separately derived neutral secondary connection provided by Delta-Wye connected transformers.

Distribution transformers can be located close to the load. No vaults are required for installation and no long, expensive feeder lines are needed. Common applications include inductive and resistive loads such as motors, lighting and heating.

General Purpose Transformers

Transformers designed to meet the high energy efficiencies required by NEMA Standard TP-1.

Low Temperature Rise Transformers

Transformers designed to limit the temperature rise of the core and coil assembly to either 80°C or 115°C above a 40°C ambient. Reduction in temperature rise increases reliability.

K-Factor Transformers

Transformers designed to withstand the electrical anomalies associated with solid state equipment and DC power supplies (excluding SCR variable speed motor drives) without derating the nameplate kVA.

Copper Wound Transformers

SolaHD general purpose transformers have standard aluminum coil windings. As an option, we offer a selection with copper windings.

Visit our website at www.solahd.com or

contact **Technical Services** at (800) 377-4384 with any questions.

General Purpose

Energy efficient dry-type transformers 600 Volt Class, isolation type, single and three phase, 15 kVA through 500 kVA. Indoor and outdoor models available.

Accessories and Optional Design Styles

- Electrostatic shield for quality power
- Wall mounting brackets (500 lbs maximum) (Item WB1C)
- Weather Shields (UL-3R)*
- Stainless Steel Enclosures
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Open core and coil designs (UL Recognized)
- Copper Wound designs
- Low temperature designs

Features

- UL-3R ventilated outdoor enclosures when used with optional weather shields (order separately)
- UL Class 220°C insulation system, 150°C temperature rise under full load
- Terminal board connections and spacious wiring compartment



UL Listed
E25872

- Panel enclosure design reduces labor time. Wiring diagram on inside front cover.
- High efficiency for low cost operation
- Compliant to NEMA TP-1 Standards
- Single and three phase availability
- Fast delivery
- 10 year warranty

Selection Tables: Single Phase

Group 1: 240 x 480 Volt Primary, 120/240 Secondary, 60 Hz

UL Listed
E25872

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES5H15S	WS-15	28	16	16	210	1	1	62.5/31.3	125/62.5
25	ES5H25S	WS-15	28	16	16	245	1	1	104/52.1	208/104
37.5	ES5H37S	WS-17	31	18	18	340	1	1	156/78	313/156
50	ES5H50S	WS-17	31	18	18	415	1	1	208/104	416/208
75	ES5H75S	WS-09	44	23	21	610	1	1	313/156	625/313
100	ES5H100S	WS-09	44	23	21	705	1	1	417/208	833/417
167	ES5H167S	WS-16	46	26	24	980	1	1	695/348	1392/695

Group 2 – 120/208/240/277 Volt Primary, 120/240 Secondary, 60 Hz

UL Listed
E25872

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn	Primary Amps @ 277 V	Secondary Amps
15	ES12H15S	WS-15	28	16	16	215	1	2	54.2	125/62.5
25	ES12H25S	WS-15	28	16	16	250	1	2	90.3	208/104

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

Selection Tables: Single Phase

Group 3 – 600 Volt Primary, 120/240 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES10H15S	WS-15	28	16	16	175	1	4	25	125/62.5
25	ES10H25S	WS-15	28	16	16	265	1	4	41.7	208/104
37.5	ES10H37S	WS-17	31	18	18	340	1	4	62.5	313/156
50	ES10H50S	WS-17	31	18	18	410	1	4	83.3	416/208
75	ES10H75S	WS-09	44	23	21	655	1	4	125	625/313
100	ES10H100S	WS-09	44	23	21	750	1	4	167	833/417
167	ES10H167S	WS-16	46	26	24	980	1	4	278	1392/695

Group 4 – Export 190/200/208/220/380/400/415/440 Volt Primary, 110/220 Secondary, 50/60 Hz

Export 200/208/-/230/400/415/-/460 Volt Primary, 115/230 Secondary, 50/60 Hz

Export 208/-/240/415/-/480 Volt Primary, 120/240 Secondary, 60 Hz only



kVA	Catalog Number	NEMA 3R Weather Shield*	Height inch (mm)	Width inch (mm)	Depth inch (mm)	Approx. Ship Weight – lbs (kg)	Design Style**	Elec Conn	Primary Amps @ 220/440 V	Secondary Amps
15	ES14H15S	WS-15	28 (711.2)	16 (406.4)	16 (406.4)	210 (95.25)	1	3	68.2/34.1	136.4/68.2
25	ES14H25S	WS-15	28 (711.2)	16 (406.4)	16 (406.4)	265 (120.20)	1	3	113.6/56.8	227.3/113.6

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 199-200.

Selection Tables: Three Phase

Group A: 480 Volt Δ Primary, 208/120 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2H15***	WS-02	23	18	14	187	1	5	18.1	41.7
	ET2H15S									
30	ET2H30***	WS-14	28	23	16	292	1	5	36.1	83.4
	ET2H30S									
45	ET2H45***	WS-14	28	23	16	376	1	5	54.2	125.0
	ET2H45S									
75	ET2H75***	WS-30	34	28	22	569	1	5	90.3	208.0
	ET2H75S									
112.5	ET2H112S	WS-30	34	28	22	768	1	5	135.0	313.0
150	ET2H150S	WS-10	44	33	21	933	1	5	181.0	417.0
225	ET2H225S	WS-11	46	36	24	1342	1	5	271.0	625.0
300	ET2H300S	WS-11	46	36	24	1525	1	5	361.0	834.0
500	ET2H500S	WS-12	65	45	35	2460	1	5	602.0	1390.0

Notes:

* Weather shields (set of two) must be ordered separately.

** Design Style and Electrical Connections can be found on pages 199-200.

*** Unshielded model.

Selection Tables: Three Phase

Group B: 480 Volt Δ Primary, 240 Volt Δ , Secondary with reduced capacity center tap***, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET5H15****	WS-02	23	19	14	189	1	6	18.1	36.1
	ET5H15S									
30	ET5H30****	WS-14	28	23	16	292	1	6	36.1	72.3
	ET5H30S									
45	ET5H45****	WS-14	28	23	16	381	1	6	54.2	108.0
	ET5H45S									
75	ET5H75****	WS-30	34	28	22	560	1	6	90.3	181.0
	ET5H75S									
112.5	ET5H112S	WS-30	34	28	22	760	1	6	135.0	271.0
150	ET5H150S	WS-10	44	33	21	940	1	6	181.0	361.0
225	ET5H225S	WS-11	46	36	24	1342	1	6	271.0	542.0
300	ET5H300S	WS-11	46	36	24	1525	1	6	361.0	723.0
500	ET5H500S	WS-12	65	45	35	2460	1	6	602.0	1204.0

Group C: 480 Volt Δ Primary, 480Y/277 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET81H15S	WS-02	23	18	14	189	1	8	18.1	18.1
30	ET81H30S	WS-14	28	23	16	295	1	8	36.1	36.1
45	ET81H45S	WS-14	28	23	16	380	1	8	54.2	54.2
75	ET81H75S	WS-30	34	28	22	560	1	8	90.3	90.3
112.5	ET81H112S	WS-30	34	28	22	780	1	8	135.0	135.0
150	ET81H150S	WS-10	44	33	21	933	1	8	181.0	181.0
225	ET81H225S	WS-11	46	36	24	1342	1	8	271.0	271.0
300	ET81H300S	WS-11	46	36	24	1525	1	8	361.0	361.0
500	ET81H500S	WS-12	65	45	35	2460	1	8	602.0	602.0

Group D: 208 Volt Δ Primary, 480Y/277 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET84H15S	WS-02	23	18	14	195	1	10	41.7	18.1
30	ET84H30S	WS-14	28	23	16	295	1	10	83.4	36.1
45	ET84H45S	WS-14	28	23	16	375	1	10	125.0	54.2
75	ET84H75S	WS-30	34	28	22	570	1	10	208.0	90.3
112.5	ET84H112S	WS-30	34	28	22	780	1	10	313.0	135.0
150	ET84H150S	WS-10	44	33	21	972	1	10	417.0	181.0

Notes:

* Weather shields (set of two) must be ordered separately.

** Electrical Connections and Design Style can be found on pages 197 and 204 respectively.

*** See the Technical Notes section with respect to capacity of center tap.

**** Unshielded model.

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

Selection Tables: Three Phase

Group E: 208 Volt Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET3H15S	WS-02	23	18	14	190	1	9	41.7	41.7
30	ET3H30S	WS-14	28	23	16	295	1	9	83.4	83.4
45	ET3H45S	WS-14	28	23	16	380	1	9	125.0	125.0
75	ET3H75S	WS-30	34	28	22	570	1	9	208.0	208.0
112.5	ET3H112S	WS-30	34	28	22	805	1	9	313.0	313.0
150	ET3H150S	WS-10	44	33	21	972	1	9	416.0	416.0

Group F: 240 Volt Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET6H15S	WS-02	23	18	14	190	1	11	36.1	41.7
30	ET6H30S	WS-14	28	23	16	295	1	11	72.3	83.4
45	ET6H45S	WS-14	28	23	16	380	1	11	108.0	125.0
75	ET6H75S	WS-30	34	28	22	570	1	11	181.0	208.0
112.5	ET6H112S	WS-30	34	28	22	805	1	11	271.0	313.0
150	ET6H150S	WS-10	44	33	21	972	1	11	361.0	417.0

Group G: 240 Volt Δ Primary, 480Y/277 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET85H15S	WS-02	23	18	14	190	1	12	36.1	18.1
30	ET85H30S	WS-14	28	23	16	295	1	12	72.3	36.1
45	ET85H45S	WS-14	28	23	16	380	1	12	108.0	54.2
75	ET85H75S	WS-30	34	28	22	560	1	12	181.0	90.3
112.5	ET85H112S	WS-30	34	28	22	805	1	12	271.0	135.0
150	ET85H150S	WS-10	44	33	21	972	1	12	361.0	181.0

Group H: 600 Volt Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET7H15S	WS-02	23	18	14	190	1	13	14.5	41.7
30	ET7H30S	WS-14	28	23	16	292	1	13	28.9	83.4
45	ET7H45S	WS-14	28	23	16	376	1	13	43.4	125.0
75	ET7H75S	WS-30	34	28	22	570	1	13	72.3	208.0
112.5	ET7H112S	WS-30	34	28	22	770	1	13	108.0	313.0
150	ET7H150S	WS-10	44	33	21	933	1	13	145.0	417.0
225	ET7H225S	WS-11	46	36	24	1325	1	13	217.0	625.0
300	ET7H300S	WS-11	46	36	24	1525	1	13	289.0	834.0
500	ET7H500S	WS-12	65	45	35	2460	1	13	482.0	1390.0

Notes:

* Weather shields (set of two) must be ordered separately.

** Design Style and Electrical Connections can be found on pages 204-205.

Selection Tables: Three Phase

Group I: 600 Volt Δ Primary, 480Y/277 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET71H15S	WS-02	23	18	14	190	1	14	14.5	18.1
30	ET71H30S	WS-14	28	23	16	292	1	14	28.9	36.1
45	ET71H45S	WS-14	28	23	16	380	1	14	43.4	54.2
75	ET71H75S	WS-30	34	28	22	560	1	14	72.3	90.3
112.5	ET71H112S	WS-30	34	28	22	770	1	14	108.2	135.3
150	ET71H150S	WS-10	44	33	21	933	1	14	144.3	180.4

Group J: 480 Volt Δ Primary, 380Y/220 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET79H15S	WS-02	23	18	14	190	1	7	18.1	22.8
30	ET79H30S	WS-14	28	23	16	292	1	7	36.1	45.6
45	ET79H45S	WS-14	28	23	16	380	1	7	54.2	68.4
75	ET79H75S	WS-30	34	28	22	360	1	7	90.3	114.0
112.5	ET79H112S	WS-30	34	28	22	770	1	7	135.3	170.9
150	ET79H150S	WS-10	44	33	21	933	1	7	180.4	227.9

Group K: 480 Volt Δ Primary, 208Y/120 Secondary, 60 Hz, Copper-Wound



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2H15SCU	WS-02	23	18	14	205	1	5	18.1	41.7
30	ET2H30SCU	WS-14	28	23	16	305	1	5	36.1	83.4
45	ET2H45SCU	WS-14	28	23	16	405	1	5	54.2	125.0
75	ET2H75SCU	WS-30	34	28	22	535	1	5	90.3	208.0
112.5	ET2H112SCU	WS-30	34	28	22	805	1	5	135.0	313.0
150	ET2H150SCU	WS-10	44	33	21	972	1	5	181.0	417.0
225	ET2H225SCU	WS-11	46	36	24	1325	1	5	271.0	625.0
300	ET2H300SCU	WS-11	46	36	24	1515	1	5	361.0	834.0
500	ET2H500SCU	WS-12	65	45	35	2460	1	5	602.0	1390.0

Notes:

* Weather shields (set of two) must be ordered separately.

** Design Style and Electrical Connections can be found on pages 204-205.

Low Temperature Rise

SolaHD low temperature rise transformers feature a 220°C insulation system and temperature rise of only 80°C or 115°C under full nameplate load. The result is 13-21% lower operating losses than conventional 150°C rise units. Reduction in temperature rise increases reliability.

The 35°C thermal reserve on 115°C rise units and 70°C reserve on 80°C rise units definitely mean higher reliability. The extra benefit is being able to operate either of these transformers as a 150°C rise unit and have a short term overload capacity of 15-30% *without* compromising normal life expectancy (See Figure 2).

Low temperature rise transformers are designed for any critical application requiring extra overload capability, lower than average total losses and/or cooler operating temperatures. All are available with either a 115°C or 80°C thermal rise and a Class 220°C insulation system.



Accessories and Optional Design Styles

- Wall mounting brackets (500 lbs maximum) (Item WB1C)
- Weather Shields (UL-3R)*
- Stainless Steel Enclosures
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Open core and coil designs (UL Recognized)
- Copper Wound designs
- Compliant to NEMA TP-1 standards

* Not all optional designs are UL listed. Contact Technical Services.

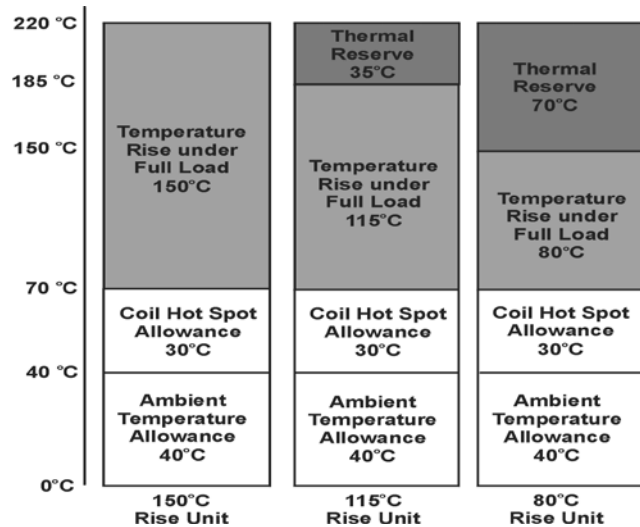


Figure 2

Selection Tables: Low Temperature Rise, Single Phase, **80°C Rise**

Group 1: 240 x 480 Volt Primary, 120/240 Secondary, 60 Hz, 80°C Rise



kVA	Catalog Number 80°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES5HB15S	WS-15	28	16	16	265	1	1	62.5/31.3	125/62.5
25	ES5HB25S	WS-17	31	18	18	340	1	1	104/52.1	208/104
37.5	ES5HB37S	WS-17	31	18	18	425	1	1	156/78	313/156
50	ES5HB50S	WS-09	44	23	21	655	1	1	208/104	416/208
75	ES5HB75S	WS-09	44	23	21	750	1	1	313/156	625/313
100	ES5HB100S	WS-16	46	26	24	980	1	1	417/208	833/417

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

Selection Tables: Low Temperature Rise, Single Phase, **80°C Rise**

Group 2: 600 Volt Primary, 120/240 Secondary, 60 Hz, 80°C Rise



kVA	Catalog Number 80°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES10HB15S	WS-15	28	16	16	265	1	4	25.0	125/62.5
25	ES10HB25S	WS-17	31	18	18	340	1	4	41.7	208/104
37.5	ES10HB37S	WS-17	31	18	18	425	1	4	62.5	313/156
50	ES10HB50S	WS-09	44	23	21	655	1	4	83.3	416/208
75	ES10HB75S	WS-09	44	23	21	750	1	4	125.0	625/313
100	ES10HB100S	WS-16	46	26	24	980	1	4	167.0	833/417

Selection Tables: Low Temperature Rise, Three Phase, **80°C Rise**

Group A: 480 Δ Primary, 208Y/120 Secondary, 60 Hz, 80°C Rise



kVA	Catalog Number 80°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2HB15S	WS-14	28	23	16	292	1	5	18.1	41.7
30	ET2HB30S	WS-14	28	23	16	376	1	5	36.1	83.4
45	ET2HB45S	WS-30	34	28	22	569	1	5	54.2	125.0
75	ET2HB75S	WS-30	34	28	22	768	1	5	90.3	208.0
112.5	ET2HB112S	WS-10	44	33	21	933	1	5	135.0	313.0
150	ET2HB150S	WS-11	46	36	24	1342	1	5	181.0	417.0
225	ET2HB225S	WS-11	46	36	24	1525	1	5	271.0	625.0
300	ET2HB300S	WS-12	65	45	35	2460	1	5	361.0	834.0

Group B: 480 Δ Primary, 240 Δ Secondary with 120V Reduced Capacity Center Tap***, 80°C Rise



kVA	Catalog Number 80°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET5HB15S	WS-14	28	23	16	292	1	6	18.1	36.1
30	ET5HB30S	WS-14	28	23	16	381	1	6	36.1	72.3
45	ET5HB45S	WS-30	34	28	22	580	1	6	54.2	108.0
75	ET5HB75S	WS-30	34	28	22	760	1	6	90.3	181.0
112.5	ET5HB112S	WS-10	44	33	21	940	1	6	135.0	271.0
150	ET5HB150S	WS-11	46	36	24	1342	1	6	181.0	361.0
225	ET5HB225S	WS-11	46	36	24	1525	1	6	271.0	542.0
300	ET5HB300S	WS-12	65	45	35	2460	1	6	361.0	723.0

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

***See the Technical Notes section with respect to capacity of center tap.

Selection Tables: Low Temperature Rise, Single Phase, **115°C Rise**Group 1: 240 x 480 Volt Primary, 120/240 Secondary, 60 Hz, **115°C Rise**

kVA	Catalog Number 115°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES5HF15S	WS-15	28	16	16	210	1	1	62.5/31.3	125/62.5
25	ES5HF25S	WS-15	28	16	16	245	1	1	104/52.1	208/104
37.5	ES5HF37S	WS-17	31	18	18	340	1	1	156/78	313/156
50	ES5HF50S	WS-17	31	18	18	425	1	1	208/104	416/208
75	ES5HF75S	WS-09	44	23	21	610	1	1	313/156	625/313
100	ES5HF100S	WS-09	44	23	21	750	1	1	417/208	833/417

Group 2: 600 Volt Primary, 120/240 Secondary, 60 Hz, **115°C Rise**

kVA	Catalog Number 115°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES10HF15S	WS-15	28	16	16	175	1	4	25	125/62.5
25	ES10HF25S	WS-15	28	16	16	265	1	4	41.7	208/104
37.5	ES10HF37S	WS-17	31	18	18	340	1	4	62.5	313/156
50	ES10HF50S	WS-17	31	18	18	425	1	4	83.3	416/208
75	ES10HF75S	WS-09	44	23	21	655	1	4	125	625/313
100	ES10HF100S	WS-09	44	23	21	750	1	4	167	833/417

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

Selection Tables: Low Temperature Rise, Three Phase, 115°C Rise
Group A: 480 Δ Primary, 208Y/120 Secondary, 60 Hz, 115°C Rise


kVA	Catalog Number 115°C Rise	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2HF15S	WS-02	23	18	14	187	1	5	18.1	41.7
30	ET2HF30S	WS-14	28	23	16	292	1	5	36.1	83.4
45	ET2HF45S	WS-14	28	23	16	378	1	5	54.2	125.0
75	ET2HF75S	WS-30	34	28	22	569	1	5	90.3	208.0
112.5	ET2HF112S	WS-30	34	28	22	768	1	5	135.0	313.0
150	ET2HF150S	WS-10	44	33	21	933	1	5	181.0	417.0
225	ET2HF225S	WS-11	46	36	24	1342	1	5	271.0	625.0
300	ET2HF300S	WS-11	46	36	24	1525	1	5	361.0	834.0

Group B: 480 Volt Δ Primary, 240 Volt Δ, Secondary with reduced capacity center tap, 60 Hz, 115°C Rise


kVA	Catalog Number	NEMA 3R Weather Shield**	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET5HF15S	WS-02	23	19	14	189	1	6	18.1	36.1
30	ET5HF30S	WS-14	28	23	16	292	1	6	36.1	72.3
45	ET5HF45S	WS-14	28	23	16	381	1	6	54.2	108.0
75	ET5HF75S	WS-30	34	28	22	560	1	6	90.3	181.0
112.5	ET5HF112S	WS-30	34	28	22	760	1	6	135.0	271.0
150	ET5HF150S	WS-10	44	33	21	940	1	6	181.0	361.0
225	ET5HF225S	WS-11	46	36	24	1342	1	6	271.0	542.0
300	ET5HF300S	WS-11	46	36	24	1525	1	6	361.0	723.0

Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

***See the Technical Notes section with respect to capacity of center tap.

K-Factor Transformers

K-Factor transformers are designed to reduce the heating effects of harmonic currents created by loads like those shown in Chart A. The K-Factor rating is an index of the transformer's ability to withstand harmonic content while operating within the temperature limits of its insulating system. SolaHD K-Factor transformers have UL ratings of K-4, K-13, and K-20.

The SolaHD K-Factor design is a specialized transformer that offers these benefits:

- Conductors capable of carrying the harmonic currents of non-linear loads without exceeding the temperature rating of the insulation system.
- A transformer design that takes into account the increase in naturally occurring “stray” losses caused by non-linear loads. These losses cause standard transformers to dramatically overheat and substantially shorten design life.
- A core and coil design that manages the DC flux caused by triplen harmonics. As these harmonics increase, they cause additional current to circulate in the delta winding. This produces a DC flux in the core which leads to core saturation, voltage instability and overheating.

Features

- Conductors to carry harmonics of a K-rated load without exceeding insulation temperature ratings
- UL 1561 listed up to K-20 rated protection
- Rated temperature rise of 150°C, 220°C insulation
- Shielded for quality power
- Basic design takes “stray losses” into account and functions within safe operating temperatures
- Core and coil design engineered to manage the zero sequence flux caused by triplen harmonics
- Provides 100% rated current without overheating the windings or saturating the core



UL Listed
E25872

Accessories and Optional Design Styles*

- Wall mounting brackets (500 lbs maximum) (Item WB1C)
- Weather Shields (UL-3R)
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Low temperature rise units available
- Open core and coil designs (UL Recognized)
- Copper Wound designs
- Alternate voltages
- Compliant to NEMA TP-1 Standards

* Not all optional designs are UL listed. Contact Technical Services.

Chart A: Typical Load K-Factors

Load	K-Factor
Electric discharge lighting	K-4
UPS with optional input filter	K-4
Welders	K-4
Induction heating equipment	K-4
PLCs and solid state controls	K-4
Telecommunications equipment (e.g., PBX)	K-13
UPS without input filtering	K-13
Multiwire receptacle circuits in general care areas of health care facilities and classrooms of schools, etc.	K-13
Multi-wire receptacle circuits supplying inspection or testing equipment on an assembly or production line.....	K-13
Mainframe computer loads	K-20
Solid state motor drives (variable speed drives).....	K-20

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Selection Tables: Three Phase

Group A: K-4 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H4T2H15S	WS-02	23	18	14	187	1	5	18.1	41.7
30	3H4T2H30S	WS-14	28	23	16	292	1	5	36.1	83.4
45	3H4T2H45S	WS-14	28	23	16	376	1	5	54.2	125.0
75	3H4T2H75S	WS-30	34	28	22	569	1	5	90.3	208.0
112.5	3H4T2H112S	WS-30	34	28	22	768	1	5	135.0	313.0
150	3H4T2H150S	WS-10	44	33	21	933	1	5	181.0	417.0
225	3H4T2H225S	WS-11	46	36	24	1342	1	5	271.0	625.0
300	3H4T2H300S	WS-11	46	36	24	1525	1	5	361.0	834.0
500	3H4T2H500S	WS-12	65	45	35	2460	1	5	602.0	1390.0

Group B: K-13 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H13T2H15S	WS-14	28	23	16	305	1	5	18.1	41.7
30	3H13T2H30S	WS-14	28	23	16	405	1	5	36.1	83.4
45	3H13T2H45S	WS-30	34	28	22	590	1	5	54.2	125.0
75	3H13T2H75S	WS-30	34	28	22	805	1	5	90.3	208.0
112.5	3H13T2H112S	WS-10	44	33	21	972	1	5	135.0	313.0
150	3H13T2H150S	WS-11	46	36	24	1325	1	5	181.0	417.0
225	3H13T2H225S	WS-11	46	36	24	1515	1	5	271.0	625.0
300	3H13T2H300S	WS-12	65	45	35	2460	1	5	361.0	834.0

Group C: K-20 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz



kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H20T2H15S	WS-14	28	23	16	305	1	5	18.1	41.7
30	3H20T2H30S	WS-14	28	23	16	405	1	5	36.1	83.4
45	3H20T2H45S	WS-30	34	28	22	590	1	5	54.2	125.0
75	3H20T2H75S	WS-30	34	28	22	805	1	5	90.3	208.0
112.5	3H20T2H112S	WS-10	44	33	21	972	1	5	135.0	313.0
150	3H20T2H150S	WS-11	46	36	24	1325	1	5	181.0	417.0
225	3H20T2H225S	WS-11	46	36	24	1515	1	5	271.0	625.0
300	3H20T2H300S	WS-12	65	45	35	2460	1	5	361.0	834.0

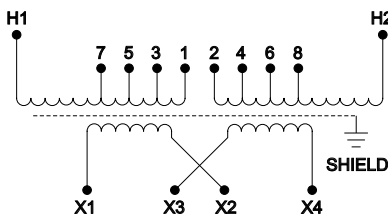
Notes:

* Weather shields (set of two) must be ordered separately.

**Design Style and Electrical Connections can be found on pages 204-205.

Electrical Connections (Single Phase)

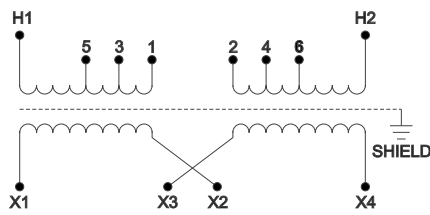
240 x 480 Volt Primary,
120/240 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN



Primary Voltage	Interconnect	Connect Lines To
504	1 to 2	H1 & H2
492	2 to 3	H1 & H2
480	3 to 4	H1 & H2
468	4 to 5	H1 & H2
456	5 to 6	H1 & H2
444	6 to 7	H1 & H2
432	7 to 8	H1 & H2
252	H1 to 2 H2 to 1	H1 & H2
240	H1 to 4 H2 to 3	H1 & H2
228	H1 to 6 H2 to 5	H1 & H2
216	H1 to 8 H2 to 7	H1 & H2
Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\frac{1}{2}$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

ES5 Series

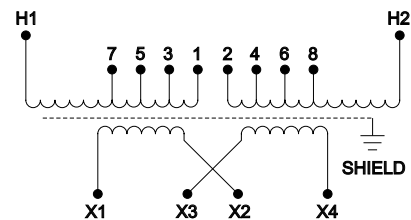
120/208/240/277 Volt Primary,
120/240 Volt Secondary
Taps: None



Primary Voltage	Interconnect	Connect Lines To
277	1 to 2	H1 & H2
240	3 to 4	H1 & H2
208	5 to 6	H1 & H2
120	H1 to 4 H2 to 3	H1 & H2
Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\frac{1}{2}$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

ES12 Series

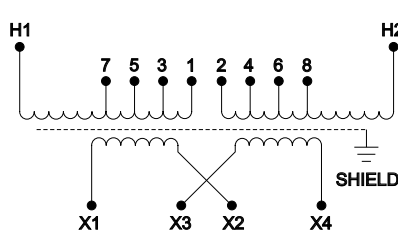
190/200/208/220/380/400/415/440 Volt Pri.,
110/220 Volt Secondary
Taps: None



Primary Voltage	Interconnect	Connect Lines To
440	1 to 2	H1 & H2
415	3 to 4	H1 & H2
400	5 to 6	H1 & H2
380	7 to 8	H1 & H2
220	H1 to 2 1 to H2	H1 & H2
208	H1 to 4 3 to H2	H1 & H2
200	H1 to 6 5 to H2	H1 & H2
190	H1 to 8 7 to H2	H1 & H2
Secondary Voltage	Interconnect	Connect Lines To
220	X2 to X3	X1 & X4
110-0-110	X2 to X3 X2 to $\frac{1}{2}$	X1-X2-X4
110	X1 to X3 X2 to X4	X1 & X4

ES14 Series

600 Volt Primary,
120/240 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN



Primary H1-H2-H3	Interconnect	Connect Lines To
630	1 to 2	H1 & H2
615	2 to 3	H1 & H2
600	3 to 4	H1 & H2
585	4 to 5	H1 & H2
570	5 to 6	H1 & H2
555	6 to 7	H1 & H2
540	7 to 8	H1 & H2
Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\frac{1}{2}$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

ES10 Series

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

Electrical Connections (Three Phase)

480 Δ Volt Primary,
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

5

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	208	120
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET2 and 3H Series

**Shield available in electrostatically shielded units only.*

480 Δ Volt Primary,
240 Δ W/120 CT Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

6

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X6-X1, X6-X3
1	504	240	120
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET5 Series

**Shield available in electrostatically shielded units only.*

480 Δ Volt Primary
380/220 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

7

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	380	220
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET79 Series

480 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

8

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	480	277
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET81 Series

208 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

9

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	218	208	120
2	213		
3	208		
4	203		
5	198		
6	192		
7	187		

ET3 Series

208 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

10

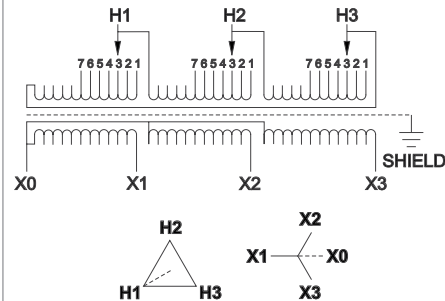
Primary X1-X2-X3		Secondary Voltage	
@ Tap	Voltage	H1-H2-H3	H0-H1, H2, H3
1	218	480	277
2	213		
3	208		
4	203		
5	198		
6	192		
7	187		

ET84 Series

Electrical Connections (Three Phase)

240 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

11

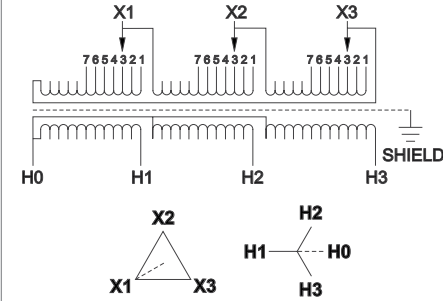


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	252	208	120
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

ET6 Series

240 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

12

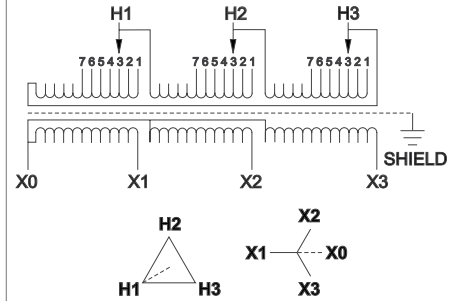


Primary X1-X2-X3		Secondary Voltage	
@ Tap	Voltage	H1, H2, H3	H0- H1, H2, H3
1	252	480	277
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

ET85 Series

600 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

13

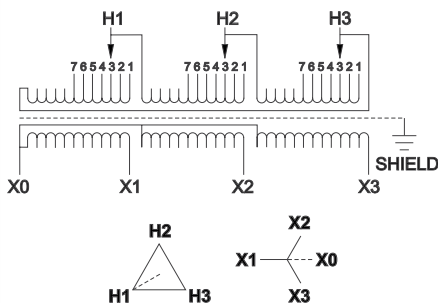


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	630	208	120
2	615		
3	600		
4	585		
5	570		
6	555		
7	540		

ET7 Series

600 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

14



Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	630	480	277
2	615		
3	600		
4	585		
5	570		
6	555		
7	540		

ET71 Series

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

Automation Transformers - Non-Ventilated 50 VA to 45 kVA

SolaHD encapsulated transformers are rated for Hazardous Locations (Class 1, Division 2, Group A-D) as well as harsh industrial environments. Encapsulation and rugged NEMA 3R enclosures protect the transformer from dust, moisture, and provide extra shock and vibration resistance. SolaHD UL listed transformers fully comply with the latest addition of the National Electrical Code for Class 1, Division 2, Group A-D locations when installed in compliance with NEC 501.100(B).

Features

Single Phase: .05 – .250 kVA

- UL-3R non encapsulated enclosure for indoor and outdoor service
- Low temperature rise, UL Class 130°C or 180°C insulation system, 80°C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment
- Copper lead wire terminations
- Class 1, Division 2

Single Phase: 0.500 – 25 kVA

Three Phase: 3 – 45 kVA

- UL-3R encapsulated enclosure for indoor and outdoor service
- Electrostatically shielded for quality power on sizes 1 kVA and larger
- UL Class 180°C or 200°C insulation system, 115°C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment
- Copper lead wire terminations
- .500 - 45 kVA units are encapsulated with electrical grade silica and epoxy for industrial applications



Related Products

- Some SolaHD DC power supplies are available with Class 1, Division 2 ratings or encapsulation.
- Surge Protective Devices

Accessories and Optional Design Styles*

- Wall mounting brackets (500 lbs maximum) (Item WB1C)
- Weather Shields
- Stainless Steel Enclosures
- Totally enclosed non-ventilated designs (TENV)
- Open core and coil designs
- Copper Wound designs
- NEMA 4/12 or 4X Encapsulated Enclosures
- Low temperature designs available.

*Not all optional designs are UL listed. Contact Technical Services.

Note: Weights and dimensions may change and should not be used for construction purposes.

Selection Table: Single Phase

Group 1: 240 x 480 Primary, 120/240 Secondary, 60 Hz



kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn*	Primary Amps	Secondary Amps
Non-Encapsulated										
.050	HS1B50	N/A	6	4	3	3	2	15	.208/.104	0.416/0.208
.075	HS1B75		6	4	3	3	2	15	.312/.156	0.625/0.312
.100	HS1B100		6	4	3	4	2	15	.417/.208	0.833/0.417
.150	HS1B150		8	4	4	5	2	15	.625/.313	1.25/.625
.250	HS1B250		8	4	4	8	2	15	1.04/.512	2.08/1.04
Encapsulated										
0.5	HS1F500B	HSS1F500B	10	6	5	22	3	15	2.08/1.04	4.16/2.08
0.75	HS1F750B	HSS1F750B	10	6	5	27	3	15	3.13/1.56	6.25/3.13
1	HS1F1BS	HSS1F1BS	10	6	5	28	3	16	4.17/2.08	8.33/4.17
1.5	HS1F1.5AS	HSS1F1.5AS	12	10	7	38	4	16	6.25/3.13	12.5/6.25
2	HS1F2AS	HSS1F2AS	12	10	7	45	4	16	8.33/4.17	16.7/8.33
3	HS5F3AS	HSS5F3AS	12	10	7	55	4	17	12.5/6.25	25.0/12.5
5	HS5F5AS	HSS5F5AS	17	14	9	131	4	17	20.8/10.4	41.6/20.8
7.5	HS5F7.5AS	HSS5F7.5AS	17	14	9	156	4	18	31.3/15.6	62.5/31.3
10	HS5F10AS	HSS5F10AS	17	14	9	156	4	18	41.7/20.8	83.3/41.7
15	HS5F15AS	HSS5F15AS	30	29	12	549	4	18	62.5/31.2	125.0/62.5
25	HS5F25AS	HSS5F25AS	30	29	12	637	4	18	104.0/52.0	208.0/104.0

Group 2: 600 Volt Primary, 120/240 Secondary, 60 Hz



kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style*	Elec Conn*	Primary Amps	Secondary Amps
Non-Encapsulated										
.100	HS10B100	N/A	6	4	3	4	2	21	0.167	.833/.417
.150	HS10B150		8	4	4	5	2	21	0.25	1.25/.625
.250	HS10B250		8	4	4	8	2	21	0.417	2.08/1.04
Encapsulated										
.500	HS10F500B	HSS10F500B	10	6	5	22	3	21	0.833	4.16/2.08
.750	HS10F750B	HSS10F750B	10	6	5	23	3	21	1.25	6.25/3.13
1	HS10F1BS	HSS10F1BS	10	6	5	28	3	21	1.67	8.33/4.17
1.5	HS10F1.5AS	HSS10F1.5AS	12	10	7	38	4	21	2.5	12.5/6.25
2	HS10F2AS	HSS10F2AS	12	10	7	60	4	21	3.33	16.7/8.33
3	HS10F3AS	HSS10F3AS	12	10	7	66	4	22	5.0	25.0/12.5
5	HS10F5AS	HSS10F5AS	17	14	9	100	4	22	8.3	41.6/20.8
7.5	HS10F7.5AS	HSS10F7.5AS	17	14	9	135	4	22	12.5	62.5/31.3
10	HS10F10AS	HSS10F10AS	17	14	9	150	4	22	16.7	83.3/41.7

Note:

* Design Style and Electrical Connections can be found on pages 204-205.

Selection Table: Single Phase

Group 3: 120/208/240/277 Volt Primary, 120/240 Secondary, 60 Hz



kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style*	Elec Conn*	Primary Amps @ 277 V	Secondary Amps
Encapsulated										
1	HS12F1BS	HSS12F1BS	10	6	5	29	3	19	3.6	8.33/4.17
1.5	HS12F1.5AS	HSS12F1.5AS	12	10	7	40	4	20	5.4	12.5/6.25
2	HS12F2AS	HSS12F2AS	12	10	7	60	4	20	7.2	16.7/8.33
3	HS12F3AS	HSS12F3AS	12	10	7	66	4	20	10.8	25.0/12.5
5	HS12F5AS	HSS12F5AS	17	14	9	104	4	20	18.0	41.6/20.8
7.5	HS12F7.5AS	HSS12F7.5AS	17	14	9	135	4	20	27.1	62.5/31.3
10	HS12F10AS	HSS12F10AS	17	14	9	156	4	20	36.1	83.3/41.7

Note:

* Design Style and Electrical Connections can be found on pages 204-205.

Group 4: Export 190/200/208/220/380/400/415/440 Volt Primary, 110/220 Secondary, 50/60 Hz Copper wound
 Export 200/208/230/400/415/460 Volt Primary, 115/230 Secondary, 50/60 Hz Copper wound
 Export 208/240/415/480 Volt Primary, 120/240 Secondary, 60 Hz only Copper wound



kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height inch (mm)	Width inch (mm)	Depth inch (mm)	Ship Weight Approx. – lbs (kg)	Design Style*	Elec Conn*	Primary Amps**	Secondary Amps
Encapsulated, Copper Wound										
1	HS14F1BS	HSS14F1BS	10 (254.0)	6 (152.4)	5 (127.0)	34 (15.42)	3	23	4.5/2.3	9.1/4.5
1.5	HS14F1.5BS	HSS14F1.5BS	12 (304.8)	10 (254.0)	7 (177.8)	40 (18.13)	4	24	6.8/3.4	13.6/6.8
2	HS14F2BS	HSS14F2BS	12 (304.8)	10 (254.0)	7 (177.8)	60 (27.21)	4	24	9.1/4.5	18.2/9.1
3	HS14F3BS	HSS14F3BS	12 (304.8)	10 (254.0)	7 (177.8)	73 (33.11)	4	24	13.6/6.8	27.3/13.6
5	HS14F5BS	HSS14F5BS	17 (431.8)	14 (355.6)	9 (228.6)	100 (45.36)	4	24	22.7/11.4	45.5/22.7
7.5	HS14F7.5BS	HSS14F7.5BS	17 (431.8)	14 (355.6)	9 (228.6)	140 (63.50)	4	24	34.1/17.0	68.2/34.1
10	HS14F10BS	HSS14F10BS	17 (431.8)	14 (355.6)	9 (228.6)	175 (79.38)	4	24	45.5/22.7	90.9/45.5

Notes:

* Design Style and Electrical Connections can be found on pages 204-205.

** Amperage calculated at 220/440 Volts on primary. UL Listed, CSA Certified and CE Marked. 240 & 480 V not available at 50 Hz.

Selection Tables: Three Phase

Group A: 480 Volt Δ Primary, 208Y/120 Secondary, 60 Hz
 E77014
E25872

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style	Elec Conn**	Primary Amps**	Secondary Amps
3	HT1F3AS	HTS1F3AS	13	16	9	105	4	27	3.6	8.3
6	HT1F6AS	HTS1F6AS	13	16	9	110	4	27	7.2	16.6
9	HT1F9AS	HTS1F9AS	17	20	11	250	4	27	10.8	25.0
15	HT1F15AS	HTS1F15AS	17	20	11	261	4	27	18.1	41.7
30*	HT1F30AS	HTS1F30AS	30	29	12	696	4	27	36.1	83.4
45*	HT1F45AS	HTS1F45AS	30	29	12	844	4	27	54.2	125.0

Group B: 208 Volt Δ Primary, 208Y/120 Secondary, 60 Hz
 E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT3F3AS	HTS3F3AS	13	16	9	97	4	26	7.2	8.3
6	HT3F6AS	HTS3F6AS	13	16	9	141	4	26	14.4	16.6
9	HT3F9AS	HTS3F9AS	17	20	11	256	4	26	21.7	25.0

Group C: 480 Volt Δ Primary, 240 Volt Δ 120 Secondary with reduced capacity center tap, 60 Hz***
 E77014
E25872

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT5F3AS	HTS5F3AS	13	16	9	105	4	28	3.6	7.2
6	HT5F6AS	HTS5F6AS	13	16	9	110	4	28	7.2	14.4
9	HT5F9AS	HTS5F9AS	17	20	11	250	4	28	10.8	21.7
15	HT5F15AS	HTS5F15AS	17	20	11	305	4	28	18.1	36.1
30*	HT5F30AS	HTS5F30AS	29	25	12	698	4	28	36.1	72.2
45*	HT5F45AS	HTS5F45AS	29	25	12	876	4	28	54.2	108.3

Group D: 240 Volt Δ Primary, 208Y/120 Secondary, 60 Hz
 E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT6F3AS	HTS6F3AS	13	16	9	97	4	25	7.2	8.3
6	HT6F6AS	HTS6F6AS	13	16	9	141	4	25	14.4	16.6
9	HT6F9AS	HTS6F9AS	17	20	11	256	4	25	21.7	25.0

* cUL Underwriters tested to CSA standards.

** Design Style and Electrical Connections can be found on pages 204-205.

*** See the Technical Notes section with respect to capacity of center tap.

Selection Tables: Three Phase

Group E: 480 Volt Δ Primary, 380Y/220 Secondary, 60 HzcUL[®] US E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT79F3AS	HTS79F3AS	13	16	9	121	4	29	3.6	4.6
6	HT79F6AS	HTS79F6AS	13	16	9	141	4	29	7.2	9.1
9	HT79F9AS	HTS79F9AS	17	20	11	255	4	29	10.8	13.6

Group F: 600 Volt Δ Primary, 208Y/120 Secondary, 60 HzcUL[®] US E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT7F3AS	HTS7F3AS	13	16	9	116	4	30	2.9	8.3
6	HT7F6AS	HTS7F6AS	13	16	9	145	4	30	5.8	16.6
9	HT7F9AS	HTS7F9AS	17	20	11	225	4	30	8.7	25.0

Group G: 208 Volt Δ Primary, 480Y/277 Secondary, 60 HzcUL[®] US E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style	Elec Conn**	Primary Amps**	Secondary Amps
3	HT84F3AS	HTS84F3AS	13	16	9	97	4	31	8.3	3.6
6	HT84F6AS	HTS84F6AS	13	16	9	141	4	31	16.6	7.2
9	HT84F9AS	HTS84F9AS	17	20	11	256	4	31	25.0	10.8

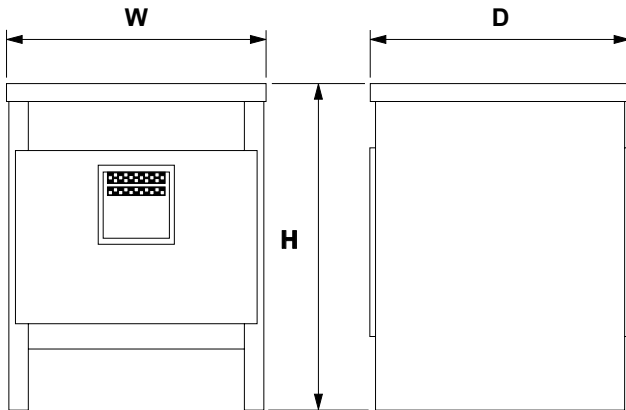
Group H: 240 Volt Δ Primary, 480Y/277 Secondary, 60 HzcUL[®] US E77014

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
3	HT85F3AS	HTS85F3AS	13	16	9	97	4	32	7.2	3.6
6	HT85F6AS	HTS85F6AS	13	16	9	141	4	32	14.4	7.2
9	HT85F9AS	HTS85F9AS	17	20	11	256	4	32	21.6	10.8

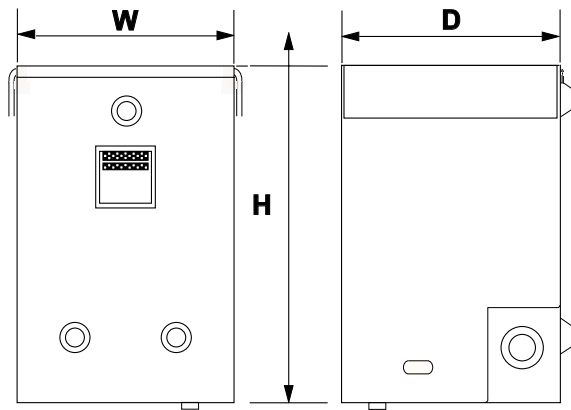
* cUL Underwriters tested to CSA standards.

** Design Styles and Electrical Connections can be found on pages 204-205.

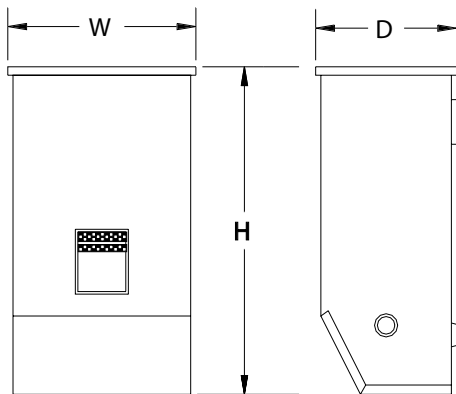
Design Styles



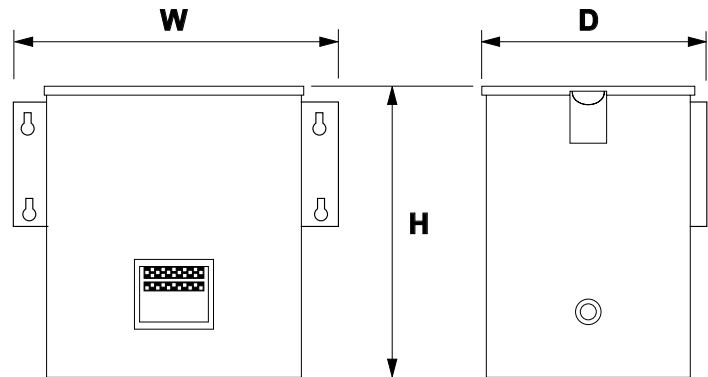
Style 1 - Ventilated



Style 2 - Non-Encapsulated

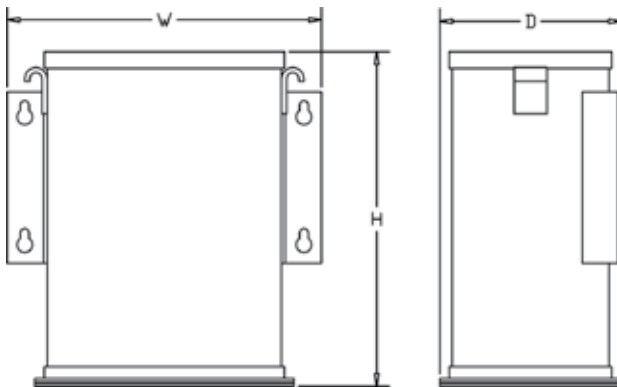


Style 3 - Encapsulated



Style 4 - Encapsulated

Customized Enclosures - Contact Technical Services



Style 5 - Encapsulated

Available for all encapsulated kVA sizes (For NEMA 4, 12 and 4X)

Electrical Connections (Single Phase)

240 X 480 Volt Primary
120/240 Volt Secondary
Taps: None

15

Primary Voltage	Interconnect	Connect Lines to
480	H2 to H3	H1 & H4
240	H1 to H3 H2 to H4	H1 & H4
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS1 Series

240 X 480 Volt Primary
120/240 Volt Secondary
Taps: None

16

Primary Voltage	Interconnect	Connect Lines to
480	H2 to H3	H1 & H4
240	H1 to H3 H2 to H4	H1 & H4
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS1 Series

240 X 480 Volt Primary
120/240 Volt Secondary
Taps: 2, 2½% FCAN & FCBN

17

Primary Voltage	Interconnect	Connect Lines to
504	H4 to H5	H1 & H8
492	H3 to H5	H1 & H8
480	H3 to H6	H1 & H8
468	H2 to H6	H1 & H8
456	H2 to H7	H1 & H8
252	H1 to H5 H4 to H8	H1 & H8
240	H1 to H6 H3 to H8	H1 & H8
228	H1 to H7 H2 to H8	H1 & H8
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS5 Series

240 X 480 Volt Primary,
120/240 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

18

Primary Voltage	Interconnect	Connect Lines to
504	H5 to H6	H1 & H10
492	H4 to H6	H1 & H10
480	H4 to H7	H1 & H10
468	H3 to H7	H1 & H10
456	H3 to H8	H1 & H10
444	H2 to H8	H1 & H10
432	H2 to H9	H1 & H10
252	H1 to H6 H5 to H10	H1 & H10
240	H1 to H7 H4 to H10	H1 & H10
228	H1 to H8 H3 to H10	H1 & H10
216	H1 to H9 H2 to H10	H1 & H10
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS5 Series

120/208/240/277 Volt Primary
120/240 Volt Secondary
Taps: None

19

Primary Voltage	Interconnect	Connect Lines to
277	H2 to H3	H1 & H6
240	H2 to H3	H1 & H5
208	H2 to H3	H1 & H4
120	H1 to H3 H2 to H5	H1 & H5
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS12 Series (1 kVA only)

$\perp$ = Earth Ground

Note:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

120/208/240/277 Volt Primary
120/240 Volt Secondary
Taps: None

20

Primary Voltage	Interconnect	Connect Lines to
277	H4 to H5	H1 & H8
240	H3 to H6	H1 & H8
208	H2 to H7	H1 & H8
120	H1 to H6 H3 to H8	H1 & H8
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS12 Series

Visit our website at www.solahd.com or
contact **Technical Services** at (800) 377-4384 with any questions.

Electrical Connections (Single Phase)

600 Volt Primary,
120/240 Volt Secondary
Taps: None

21

Primary Voltage	Interconnect	Connect Lines to
600		H1 & H2
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1, X2 & X4
120	X1 to X3 X2 to X4	X1 & X4

HS10 Series

Note: 1 through 2 kVA units have electrostatic shielding.

190/200/208/220/380/400/415/440 Volt Pri.
110/220 Volt Secondary
Taps: None

24

Primary Voltage	Interconnect	Connect Lines to
440	H5 to H6	H1 & H10
415	H4 to H7	H1 & H10
400	H3 to H8	H1 & H10
380	H2 to H9	H1 & H10
220	H1 to H6, H5 to H10	H1 & H10
208	H1 to H7, H4 to H10	H1 & H10
200	H1 to H8, H3 to H10	H1 & H10
190	H1 to H9 H2 to H10	H1 & H10
Secondary Voltage	Interconnect	Connect Lines to
220	X2 to X3	X1 & X4
110-0-110	X2 to X3 X2 to $\perp$	X1, X2 & X4
110	X1 to X3 X2 to X4	X1 & X4

HS14 Series

$\perp$ = Earth Ground

Notes:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

600 Volt Primary
120/240 Volt Secondary
Taps: 2, 5% FCBN

22

Primary Voltage	Interconnect	Connect Lines to
600	H3 to H4	H1 & H6
570	H2 to H4	H1 & H6
540	H2 to H5	H1 & H6
Secondary Voltage	Interconnect	Connect Lines to
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to $\perp$	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

HS10 Series

190/200/208/220/380/400/415/440 Volt Pri.
110/220 Volt Secondary
Taps: None

23

Primary Voltage	Interconnect	Connect Lines to
440	H5 to H6	H1 & H10
415	H4 to H6	H1 & H9
400	H3 to H6	H1 & H8
380	H2 to H6	H1 & H7
220	H1 to H6 H5 to H10	H1 & H10
208	H1 to H6 H4 to H9	H1 & H9
200	H1 to H6 H3 to H8	H1 & H8
190	H1 to H6 H2 to H7	H1 & H7
Secondary Voltage	Interconnect	Connect Lines to
220	X2 to X3	X1 & X4
110-0-110	X2 to X3 X2 to $\perp$	X1, X2 & X4
110	X1 to X3 X2 to X4	X1 & X4

HS14 Series (1 kVA only)

Electrical Connections (Three Phase)

240 Δ Volt Primary 208Y/120 Volt Secondary
Taps: 2, 5% FCBN

25

Primary Voltage	Connect Taps	Connect Lines To
240	1-H1 & 2-H2 & 3-H3	H1, H2, H3
228	4-H1 & 5-H2 & 6-H3	H1, H2, H3
216	7-H1 & 8-H2 & 9-H3	H1, H2, H3
Secondary Voltage		Connect Lines To
208		X1, X2, & X3
120		X0, X1, X2, X3

HT6 Series

208 Δ Volt Primary 208Y/120 Volt Secondary
Taps: 2, 5% FCBN

26

Primary Voltage	Connect Taps	Connect Lines To
208	1-H1 & 2-H2 & 3-H3	H1, H2, H3
198	4-H1 & 5-H2 & 6-H3	H1, H2, H3
187	7-H1 & 8-H2 & 9-H3	H1, H2, H3
Secondary Voltage		Connect Lines To
208		X1, X2, & X3
120		X0, X1, X2, X3

HT3 Series

480 Δ Volt Primary 208Y/120 Volt Secondary
Taps: 2, 5% FCBN

27

Primary Voltage	Interconnect	Connect Lines to
480	1-H1 & 2-H2 & 3- H3	H1, H2, H3
456	4-H1 & 5-H2 & 6- H3	H1, H2, H3
432	7-H1 & 8-H2 & 9- H3	H1, H2, H3
Secondary Voltage		Connect Lines to
208		X1, X2, & X3
120		X0, X1, X2, X3

HT1 Series

480 Δ Volt Primary 240 Δ w/120 CT Volt Secondary
Taps: 2, 5% FCBN

28

Primary Voltage	Connect Taps	Connect Lines To
480	1-H1 & 2-H2 & 3-H3	H1, H2, H3
456	4-H1 & 5-H2 & 6-H3	H1, H2, H3
432	7-H1 & 8-H2 & 9-H3	H1, H2, H3
Secondary Voltage	Interconnect	Connect Lines To
240		X1, X2, X3
120-0-120	X6 to $\perp$	X1-X6-X3

HT5 Series

480 Δ Volt Primary 380Y/220 Volt Secondary
Taps: 2, 5% FCBN

29

Primary Voltage	Interconnect	Connect Lines to
480	1-H1 & 2-H2 & 3-H3	H1, H2 & H3
456	4-H1 & 5-H2 & 6-H3	H1, H2 & H3
432	7-H1 & 8-H2 & 9-H3	H1, H2 & H3
Secondary Voltage	Interconnect	Connect Lines to
380		X1, X2, X3
220		X0, X1, X2, X3

HT9 Series

$\perp$ = Earth Ground

Notes:

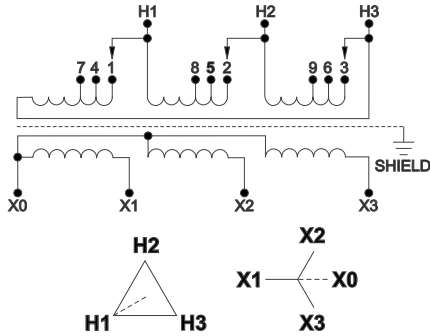
Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

Visit our website at www.solahd.com or contact **Technical Services** at (800) 377-4384 with any questions.

Electrical Connections (Three Phase)

600 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 5% FCBN

30

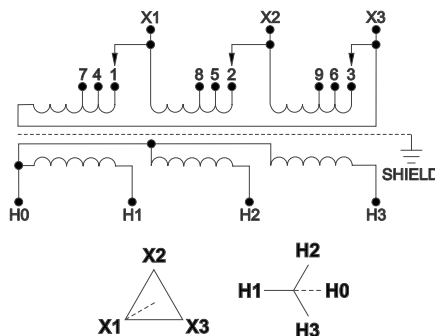


Primary Voltage	Connect Taps	Line Leads
600	1-H1 & 2-H2 & 3-H3	H1, H2, H3
570	4-H1 & 5-H2 & 6-H3	H1, H2, H3
540	7-H1 & 8-H2 & 9-H3	H1, H2, H3
Secondary Voltage		Line Leads
208		X1, X2, X3
120		X0, X1, X2, X3

HT7 Series

208 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 5% FCBN

31

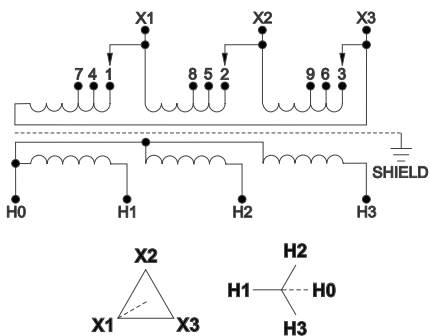


Primary Voltage	Connect Taps	Line Leads
208	1-X1 & 2-X2 & 3-X3	X1, X2, X3
198	4-X1 & 5-X2 & 6-X3	X1, X2, X3
187	7-X1 & 8-X2 & 9-X3	X1, X2, X3
Secondary Voltage		Line Leads
480		H1, H2, H3
277		H0, H1, H2, H3

HT84 Series

240 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 5% FCBN

32



Primary Voltage	Connect Taps	Line Leads
240	1-X1 & 2-X2 & 3-X3	X1, X2, X3
228	4-X1 & 5-X2 & 6-X3	X1, X2, X3
216	7-X1 & 8-X2 & 9-X3	X1, X2, X3
Secondary Voltage		Line Leads
480		H1, H2, H3
277		H0, H1, H2, H3

HT85 Series

Notes:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

Custom Transformers

If you can't find what you are looking for here, please fill out the information below and submit to our Technical Services Group. We are happy to provide a quote on a custom transformer if available. SolaHD is pleased to offer the broadest range of transformers on the market including many custom designs.

Date:				
Customer Information				
Contact:			Phone/Fax:	
Address:			Email:	
City/State:				
Specifications*				
*Size (Required)		*Quantity		Temperature Rise (Check One)
☐ KVA	☐ One Time Buy	☐ 80°C ☐ 115°C ☐ 150°C		
☐ VA	☐ Annual Usage			
Check all that apply:		Enclosure Type (Check One)		
Three Phase	Single Phase	VENTILATED	ENCAPSULATED	ENCLOSED (NON-UL)
☐ 50 Hz	☐ 60 Hz (Standard)	☐ Open Coil **	☐ NEMA 3R	☐ TENV
☐ Copper Windings	☐ Aluminum Windings (Standard)	☐ NEMA 1	☐ NEMA 3R (SS)	☐ TENV (SS)
No Electrostatic Shield		☐ NEMA 1 (SS)	☐ NEMA 4/12 (SS)	
☐ LVGP	☐ SCR Drive Isolation	☐ NEMA 3R (WSXX)	☐ NEMA 4X (SS)	
☐ Energy Star	☐ K-Factor 13	☐ NEMA 3R (SS)		
☐ K-Factor 4	☐ K-Factor 20	(SS) STAINLESS STEEL GRADE: ☐ Standard (304) ☐ Optional (316)		
☐ Other:				
Industrial Control Transformers				
☐ ICE ☐ HSZ Series ☐ Other:				
*Primary Voltage			Secondary Voltage	
☐ 120	Taps:	☐ Standard	☐ 120	
☐ 208		☐ Other	☐ 208	
☐ 240			☐ 240	
☐ 480	If 3 Phase:	☐ Delta (Standard)	☐ 480	If 3 Phase: ☐ Delta (Standard)
☐ 600		☐ Wye	☐ 600	
☐ Other Voltage: _____			☐ Other Voltage: _____	
Agency Certifications				
Check all that apply: ☐ UL ☐ CSA or cUL ☐ CE ☐ Other: _____				
Additional Information				
Please quote a Catalog or Design Number		☐ Similar to :		
(if "similar to" note changes above)		☐ Exactly Like:		
*Does this request pertain to a bid specification? ☐ Yes ☐ No				

Specification Guide for Low Voltage, General Purpose, Dry Type Transformers (600 Volt Class) - .05 kVA to 500 kVA

General

Single and three phase distribution transformers (600 Volt and below)

- Provide and install, as referenced on the electrical plans, enclosed dry type transformers as manufactured by SolaHD or approved equal.

Standards

- Transformers must be listed by Underwriters Laboratory, evaluated to CSA standards and designed, constructed and rated in accordance with NEMA ST 20 and applicable IEEE & OSHA specifications. Certain units are compliant with the TP-1 standards enacted by the Energy Policy Act of 2005.

Construction

Cores

- All transformer cores shall be constructed of low loss, high quality, electrical grade laminate steel. By design, the flux density is to be kept well below the saturation level to reduce audible sound level and minimize core losses. The core volume shall allow operation at 10% above rated primary voltage at no load without exceeding the temperature rise of the unit.

Coils

- Coil conductors shall be either aluminum or copper and must be continuous. The entire core and coil assembly shall be impregnated with a thermal setting varnish and cured to reduce hot spots in the coils and seal out moisture. Coils with exposed magnet wire will not be acceptable. Transformers shall have common core construction.
- All transformers 1 kVA or larger shall incorporate a faraday (electrostatic) shield between primary and secondary windings for the attenuation of voltage spikes, line noise and voltage transients.
- General purpose transformers are classified as isolation transformers.

Electrostatic Shield

- For power conditioning purposes, it is recommended that isolation transformers be equipped with electrostatic shielding between the primary and secondary windings. An electrostatic shield provides a conducting path to ground that reduces the effect of coupling between primary and secondary windings and improves the isolation transformer's ability to isolate its' load from the common-mode noise present on the input power source. Electrostatic shields significantly reduce or eliminate electrical disturbances on the line from being transmitted to the sensitive load.

Enclosures

- Transformer enclosures shall be constructed of heavy gauge sheet steel and coated with a grey powder paint finish (ANSI 61). Enclosures shall be UL/NEMA Type 1/3R rated for outdoor use. This information must be listed on the transformer nameplate.
- Maximum transformer enclosure temperature will not exceed 65°C rise above a 40°C ambient under full load.
- The transformer enclosure must be grounded by the installer in accordance with the latest edition of the National Electric Code and any local codes or ordinances.

Performance

- Audible sound levels will not exceed limits established in NEMA ST20:

Less than 10 kVA	40 db
10 to 50 kVA	45 db
51 to 150 kVA	50 db
151 to 300 kVA	55 db
301 to 500 kVA	60 db

- Transformers shall incorporate a UL recognized insulation system.

Warranty

- Transformers are warranted against material, performance and workmanship defects for a period of ten (10) years from date of manufacture with the provision for an additional two (2) years. Custom transformers come with a 1-year warranty.

Approval

- Typical performance and dimensional data on similar units must be submitted on all transformers for approval. Factory testing must have been conducted in accordance with NEMA ST20. Submitted performance and dimensional data must include, but is not limited to the following:
 - A. Height, width, depth, mounting dimensions, conduit entry locations and lifting provisions
 - B. Weight
 - C. Transformer losses
 - D. Potential tests both applied and induced
 - E. Temperature - ambient and rise under full load
 - F. Insulation class
 - G. % excitation current
 - H. Electrical schematic including taps
 - I. Polarity and phase rotation
 - J. kVA, frequency and voltage rating
 - K. IR, IX, and IZ percentages at reference temperature
 - L. Audible sound level



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Buck-Boost transformers are small, single phase, dry type distribution transformers designed and shipped as insulating/isolating transformers. They have a dual voltage primary and a dual voltage secondary. These transformers can be connected for a wide range of voltage combinations. The most common use is to buck (lower) or boost (raise) the supply voltage a small amount, usually 5 to 27%. Buck-boost transformers are in compliance with NEC Article 210-9, Exception 1 when field connected as an autotransformer.

The major advantages of Buck-boost transformers are their low cost, compact size and light weight. They are also more efficient and cost less than equivalent isolation transformers. When connected as an autotransformer, they can handle loads up to 20 times the nameplate rating. A buck-boost transformer is the ideal solution for changing line voltage by small amounts.

When a buck-boost has the primary and secondary windings connected, per recommended instructions, it becomes an autotransformer. Now only the secondary windings are transforming voltage and current. The majority of the kVA load passes directly from the supply to the load. This is the reason buck-boost transformers can supply a load with a much larger kVA rating than the nameplate indicates.

Low voltage lighting control applications

SolaHD buck-boost transformers are designed to supply power to low voltage lighting circuits, control panels or other systems requiring 12, 16, 24, 32, or 48 Volts. When connected as an insulating transformer (by following the wiring diagram located after the specification tables on the inside of the transformer case), the transformer's capacity matches the nameplate kVA rating.

SolaHD buck-boost transformers are also suited for low voltage landscape lighting. They are UL listed for outdoor service and their compact size makes them the perfect solution for providing power to accent lighting applications. Electrical Connection diagrams are shown at the end of this chapter.

When using dimmers for low voltage lighting applications, use dimmers on the output of the transformer that are designed and rated for use with magnetic loads. We strongly recommend contacting the dimmer manufacturer for advice on your specific lighting application



Accessories

- Surge Protective Devices
- Active Tracking® Filters

Selection Steps

1. Input Line Voltage

Measure the supply voltage with a voltmeter.

2. Voltage Required for the Load

Check the load equipment to determine the voltage requirement.

3. kVA or Ampere Rating of the Load

Find either the load kVA or the load amperage requirements. This information is listed on the nameplate of the load equipment.

4. Frequency

Either 50 or 60 Hz. The frequency of the transformer must match the frequency of the load.

5. Number of Phases

Single or three phase line and load must match. (A transformer cannot convert single to three phase.) A common application is to make a single phase connection from a three phase supply by using one phase of the three phase supply circuit. Be careful not to overload that phase of the three phase supply. For buck-boost applications the supply must provide load kVA – not just the nameplate rating of the buck-boost. Refer to the Selection Tables on the following pages.

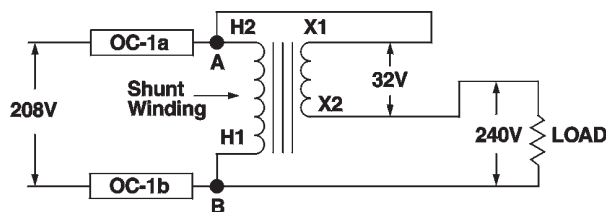
Three phase, buck-boost applications require two or three transformers. Check the "Quantity Required" column of the Three Phase Selection Tables for the exact quantity.

Fusing Buck-Boost Transformers

For determining the correct size of breaker or fuse for a given range of input or output ampere ratings, refer to Section 450-4, of the 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. An overcurrent device shall not be installed in series with the shunt winding ...".

" ...Exception. Where the rated input current of an autotransformer 9 amperes or more and 125 percent of this current does not correspond to a standard rating of a fuse or non-adjustable circuit breaker, the next higher standard rating described in Section 240-6 shall be permitted. Where the rated input current is less than 9 amperes, an overcurrent device rated or set at no more than 167 percent of the input current shall be permitted..."



Overcurrent devices OC-1a and OC-1b are shown correctly installed in accordance with 450-4. Locating an overcurrent device in series with the shunt winding anywhere between A and B is not permitted. The shunt winding is the winding common to both the input and the output circuits.

Using the Selection Tables

1. Determine if you are trying to Boost (raise) or Buck (lower) your voltage. Select an input/output voltage combination that comes closest to matching your application from the appropriate single or three phase charts on the following pages.
2. Move across your selected input/output voltage row to the amperage or kVA rating closest to, but greater than the rating required by your load.
3. Reading the top of the column will give you the catalog number of the exact buck-boost transformer you need. See the Specification Tables on the next page.
4. Connect the transformers according to the diagram indicated. See the Electrical Connections section at the end of this chapter. Connection diagrams are packed with each transformer.

Specification Tables

Group 1 – 120 x 240 Volt Primary, 12/24 Volt Secondary



KVA	Catalog Number	Maximum Secondary Amperage		Height (inch)	Width (inch)	Depth (inch)	Ship Weight lbs (kg)	Design Style	Elec Conn
		12 V	24 V						
Non-Encapsulated - 50/60 Hz, Single Phase									
0.05	HS19B50	4.16	2.08	6	4	3	2 (0.91)	2	1
0.1	HS19B100	8.33	4.16	6	4	3	4 (1.82)	2	1
0.15	HS19B150	12.5	6.25	7.5	4	4	5 (2.27)	2	1
0.25	HS19B250	20.8	10.4	7.5	4	4	8 (3.64)	2	1
Encapsulated - 60 Hz, Single Phase									
0.5	HS19F500B	41.6	20.8	10	6	5	22 (10.0)	3	1
0.75	HS19F750B	62.5	31.2	10	6	5	27 (12.27)	3	1
1	HS19F1B	83.3	41.6	10	6	5	28 (12.73)	3	1
1.5	HS19F1.5A	125	62.5	12	10	7	38 (17.27)	4	1
2	HS19F2A	166.6	83.3	12	10	7	45 (20.45)	4	1
3	HS19F3A	250	125	12	10	7	55 (25.0)	4	1
5	HS19F5A	416.5	208.3	17	14	9	100 (45.45)	4	1
7.5	HS19F7.5A	625	312.5	17	14	9	135 (61.36)	4	1

Group 2 – 120 x 240 Volt Primary, 16/32 Volt Secondary



KVA	Catalog Number	MaximumSecondaryAmperage		Height (inch)	Width (inch)	Depth (inch)	Ship Weight lbs (kg)	Design Style	Elec Conn
		16 V	32 V						
Non-Encapsulated - 50/60 Hz, Single Phase									
0.15	HS20B150	9.38	4.69	8	4	4	6 (2.73)	2	2
0.25	HS20B250	15.6	7.81	8	4	4	8 (3.64)	2	2
Encapsulated - 60 Hz, Single Phase									
0.5	HS20F500B	31.2	15.6	10	6	5	22 (10.0)	3	2
0.75	HS20F750B	46.8	23.4	10	6	5	27 (12.27)	3	2
1	HS20F1B	62.5	31.2	10	6	5	28 (12.73)	3	2
1.5	HS20F1.5A	93.7	46.8	12	10	7	38 (17.27)	4	2
2	HS20F2A	125	62.5	12	10	7	45 (20.45)	4	2
3	HS20F3A	187.5	93.7	12	10	7	55 (25.0)	4	2
5	HS20F5A	312	156	17	14	9	100 (45.45)	4	2
7.5	HS20F7.5A	468	234	17	14	9	135 (61.36)	4	2

Note: Weights and dimensions may change and should not be used for construction purposes.

Specification Tables – continued

Group 3 – 240 x 480 Volt Primary, 24/48 Volt Secondary



KVA	Catalog Number	Maximum Secondary Amperage		Height (inch)	Width (inch)	Depth (inch)	Ship Weight (lbs)	Design Style	Elec Conn
		24 V	48 V						
Non-Encapsulated - 50/60 Hz, Single Phase									
0.15	HS22B150	6.25	3.13	8	4	3	5	2	3
0.25	HS22B250	10.4	5.2	8	4	3	8	2	3
Encapsulated - 60 Hz, Single Phase									
0.5	HS22F500B	20.8	10.4	8	6	5	22	3	3
0.75	HS22F750B	31.2	15.6	10	6	5	27	3	3
1	HS22F1B	41.6	20.8	10	6	5	28	3	3
1.5	HS22F1.5A	62.5	31.2	12	10	7	38	4	3
2	HS22F2A	83.3	41.6	12	10	7	45	4	3
3	HS22F3A	125	62.5	12	10	7	55	4	3
5	HS22F5A	208	104	17	14	9	100	4	3
7.5	HS22F7.5A	312	156	17	14	9	135	4	3

Electrical Connections for Low Voltage Applications

= Earth Ground

120 X 240 Volt Primary,
12/24 Volt Secondary
Taps: None

1

Primary Voltage	Interconnect	Connect Lines To
240	H2 to H3	H1 & H4
120	H1 to H3 H2 to H4	H1 & H4
Secondary Voltage	Interconnect	Connect Lines To
24	X2 to X3	X1 & X4
12-0-12	X2 to X3 X2 to	X1-X2-X4
12	X1 to X3 X2 to X4	X1 & X4

HS19 and S19 Series

120 X 240 Volt Primary,
16/32 Volt Secondary
Taps: None

2

Primary Voltage	Interconnect	Connect Lines To
240	H2 to H3	H1 & H4
120	H1 to H3 H2 to H4	H1 & H4
Secondary Voltage	Interconnect	Connect Lines To
32	X2 to X3	X1 & X4
16-0-16	X2 to X3 X2 to	X1-X2-X4
16	X1 to X3 X2 to X4	X1 & X4

HS20 and S20 Series

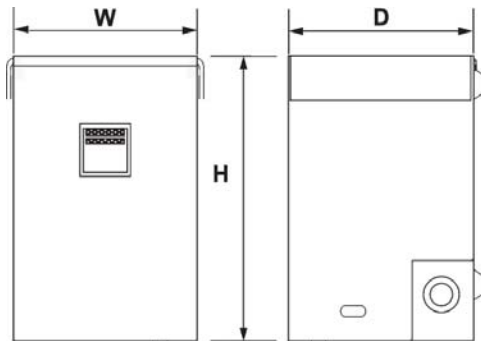
240 X 480 Volt Primary,
24/48 Volt Secondary
Taps: None

3

Primary Voltage	Interconnect	Connect Lines To
480	H2 to H3	H1 & H4
240	H1 to H3 H2 to H4	H1 & H4
Secondary Voltage	Interconnect	Connect Lines To
48	X2 to X3	X1 & X4
24-0-24	X2 to X3 X2 to	X1-X2-X4
24	X1 to X3 X2 to X4	X1 & X4

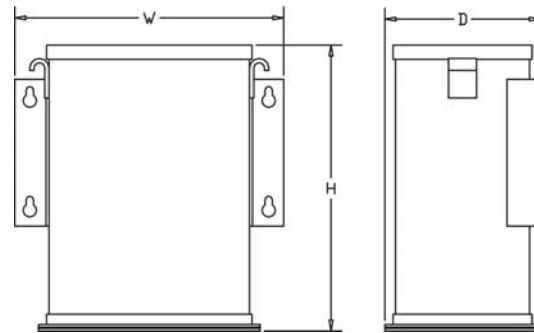
HS22 and S22 Series

Design Styles



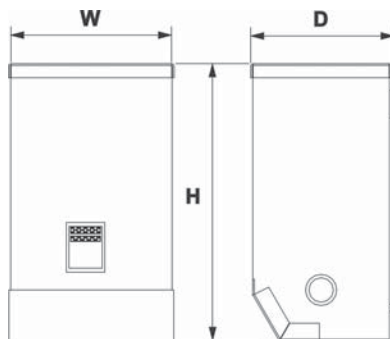
Style 2 - Non-Encapsulated

Custom Design Styles

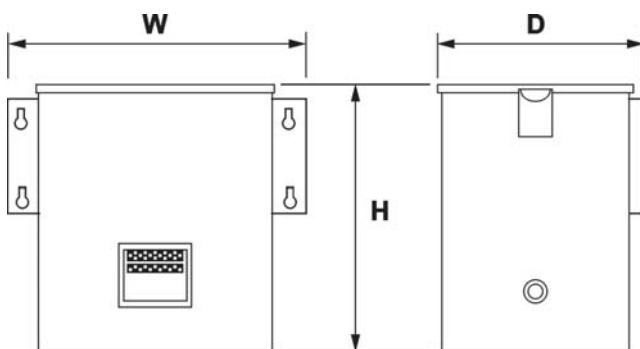


Style 5 - Encapsulated

Available for all encapsulated KVA sizes (For NEMA 4, 12 and 4X)



Style 3 - Encapsulated



Style 4 - Encapsulated

Selection Tables: Single Phase

Table 1: Using Group 1 (120 x 240 V Primary, 12/24 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Con- nection Diagram*	Application Data	Catalog Number						
					HS19B50	HS19B100	HS19B150	HS19B250	HS19F500B	HS19F750B	HS19F1B
BOOSTING											
100	120	1	B1	KVA	0.25	0.5	0.75	1.25	2.5	3.75	5.0
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.2	41.6
				Fuse Size	6.0	10.0	15.0	25.0	35.0	50.0	70.0
109	120	1	A1	KVA	0.5	1.0	1.5	2.5	5.0	7.5	10.0
				Load Amps	4.16	8.33	12.5	20.8	41.6	62.5	83.3
				Fuse Size	10.0	15.0	20.0	30.0	60.0	90.0	125.0
189	208	1	D1	KVA	0.43	0.87	1.3	2.16	4.33	6.49	8.65
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.2	41.6
				Fuse Size	6.0	10.0	15.0	15.0	30.0	45.0	60.0
197	208	1	C1	KVA	0.87	1.73	2.6	4.33	8.65	13.0	17.3
				Load Amps	4.16	8.33	12.5	20.8	41.6	62.5	83.3
				Fuse Size	6.0	15.0	20.0	30.0	60.0	90.0	110.0
208	229	1	D1	KVA	0.48	0.95	1.43	2.38	4.77	7.15	9.54
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.2	41.6
				Fuse Size	6.0	10.0	15.0	15.0	30.0	45.0	60.0
218**	240	1	D1	KVA	0.5	1.0	1.5	2.5	5.0	7.5	10.0
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.2	41.6
				Fuse Size	6.0	10.0	15.0	15.0	30.0	45.0	60.0
229	240	1	C1	KVA	1.0	2.0	3.0	5.0	10.0	15.0	20.0
				Load Amps	4.16	8.33	12.5	20.8	41.6	62.5	83.3
				Fuse Size	6.0	15.0	20.0	30.0	60.0	90.0	110.0
BUCKING											
132**	120	1	A2	KVA	0.55	1.1	1.65	2.75	5.5	8.25	11.0
				Load Amps	4.58	9.16	13.75	22.9	45.8	68.7	91.6
				Fuse Size	10.0	15.0	20.0	30.0	60.0	80	110
144**	120	1	B2	KVA	0.3	0.6	0.9	1.5	3.0	4.5	6.0
				Load Amps	2.5	5.0	7.5	12.5	25	37.5	50.0
				Fuse Size	6.0	10.0	15.0	15.0	30.0	40.0	60.0
229	208	1	D2	KVA	0.48	0.95	1.43	2.38	4.77	7.15	9.54
				Load Amps	2.29	4.58	6.88	11.4	22.9	34.4	45.8
				Fuse Size	6.0	10.0	15.0	15.0	30.0	40.0	60.0
252**	240	1	C2	KVA	1.04	2.1	3.15	5.25	10.5	15.7	21
				Load Amps	4.34	8.75	13.13	21.8	43.7	65.6	87.5
				Fuse Size	10.0	15.0	15.0	30.0	60.0	80.0	110.0
264**	240	1	D2	KVA	0.55	1.1	1.65	2.75	5.5	8.25	11.0
				Load Amps	2.29	4.58	6.88	11.4	22.9	34.3	45.8
				Fuse Size	6.0	10.0	15.0	15.0	30.0	40.0	60.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Visit our website at www.solaheviduty.com or
contact **Technical Services** at **(800) 377-4384** with any questions.

Selection Tables: Single Phase

Table 1: Using Group 1 (120 x 240 V Primary, 12/24 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS19F1.5A	HS19F2A	HS19F3A	HS19F5A	HS19F7.5A
BOOSTING									
100	120	1	B1	KVA	7.5	10.0	15.0	25.0	37.5
				Load Amps	62.5	83.3	125.0	208.0	312.0
				Fuse Size	100.0	125.0	200.0	350.0	500.0
109	120	1	A1	KVA	15.0	20.0	30.0	49.9	75.0
				Load Amps	125.0	167.0	250.0	416.0	625.0
				Fuse Size	175.0	250.0	350.0	600.0	1000.0
189	208	1	D1	KVA	13.0	17.3	26.0	43.3	64.9
				Load Amps	62.5	83.3	125.0	208.0	312.0
				Fuse Size	90.0	125.0	175.0	300.0	450.0
197	208	1	C1	KVA	26.0	34.7	52.0	86.5	130.0
				Load Amps	125.0	167.0	250.0	416.0	625.0
				Fuse Size	175.0	225.0	350.0	600.0	1000.0
208	229	1	D1	KVA	14.3	19.1	28.6	47.6	71.4
				Load Amps	62.5	83.3	125.0	208.0	312.0
				Fuse Size	90.0	125.0	175.0	300.0	450.0
218**	240	1	D1	KVA	15.0	20.0	30.0	49.9	74.9
				Load Amps	62.5	83.3	125.0	208.0	312.0
				Fuse Size	90.0	125.0	175.0	300.0	450.0
229	240	1	C1	KVA	30.0	40.1	60.0	99.8	150.0
				Load Amps	125.0	167.0	250.0	416.0	625.0
				Fuse Size	175.0	225.0	350.0	600.0	1000.0
BUCKING									
132**	120	1	A2	KVA	16.5	22.0	33.0	54.9	82.5
				Load Amps	137.5	183.3	275.0	457.6	687.5
				Fuse Size	175.0	225.0	350.0	600.0	800.0
144**	120	1	B2	KVA	9.0	12.0	18.0	30.0	44.9
				Load Amps	75.0	100.0	150.0	249.6	374.4
				Fuse Size	80.0	110.0	175.0	300.0	400.0
229	208	1	D2	KVA	14.3	19.1	28.6	47.6	71.4
				Load Amps	68.8	91.6	137.5	228.8	343.2
				Fuse Size	80.0	110.0	175.0	300.0	400.0
252**	240	1	C2	KVA	31.5	42.0	63.0	104.8	157.5
				Load Amps	131.3	174.9	262.5	436.8	656.3
				Fuse Size	175.0	225.0	350.0	600.0	800.0
264**	240	1	D2	KVA	16.5	22.0	33.0	54.9	78.6
				Load Amps	68.8	91.6	137.5	228.8	343.2
				Fuse Size	80.0	110.0	175.0	300.0	400.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Single Phase

Table 2: Using Group 2 (120 x 240 V Primary, 16/32 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS20B150	HS20B250	HS20F500B	HS20F750B	HS20F1B
BOOSTING									
95	120	1	B1	KVA	0.6	0.9	1.9	2.8	3.8
				Load Amps	4.7	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	40.0	50.0
106	120	1	A1	KVA	1.1	1.9	3.7	5.6	7.5
				Load Amps	9.4	15.6	31.2	46.8	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
183	208	1	D1	KVA	1.0	1.6	3.2	4.9	6.5
				Load Amps	4.7	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	35.0	45.0
195	208	1	C1	KVA	2.0	3.2	6.5	9.7	13.0
				Load Amps	9.4	15.6	31.2	46.8	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
208	236	1	D1	KVA	1.1	1.8	3.7	5.5	7.4
				Load Amps	4.7	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	40.0	50.0
225	240	1	C1	KVA	2.3	3.7	7.5	11.2	15.0
				Load Amps	9.4	15.6	31.2	46.8	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
240**	272	1	D1	KVA	1.3	2.1	4.2	6.4	8.5
				Load Amps	4.7	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	35.0	45.0
BUCKING									
136**	120	1	A2	KVA	1.3	2.1	4.2	6.4	8.5
				Load Amps	10.6	17.7	35.4	53.2	70.8
				Fuse Size	15.0	20.0	40.0	60.0	80.0
152**	120	1	B2	KVA	0.7	1.2	2.4	3.6	4.7
				Load Amps	6.0	9.9	19.8	29.6	39.5
				Fuse Size	10.0	15.0	20.0	30.0	40.0
236	208	1	D2	KVA	1.1	1.8	3.7	5.5	7.4
				Load Amps	5.3	8.9	17.7	26.5	35.4
				Fuse Size	6.0	15.0	20.0	30.0	40.0
256**	240	1	C2	KVA	2.4	4.0	8.0	12.0	16.0
				Load Amps	10.0	16.6	33.3	50.0	66.7
				Fuse Size	15.0	20.0	40.0	60.0	80.0
272**	240	1	D2	KVA	1.3	2.1	4.2	6.4	8.5
				Load Amps	5.3	8.8	17.7	26.5	35.4
				Fuse Size	10.0	15.0	20.0	30.0	40.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Single Phase

Table 2: Using Group 2 (120 x 240 V Primary, 16/32 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS20F1.5A	HS20F2A	HS20F3A	HS20F5A	HS20F7.5A
BOOSTING									
95	120	1	B1	KVA	5.6	7.5	11.2	18.7	28.0
				Load Amps	46.8	62.5	93.7	156.0	234.0
				Fuse Size	80.0	100.0	150.0	250.0	400.0
106	120	1	A1	KVA	11.2	15.0	22.5	37.4	56.2
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	150.0	200.0	300.0	450.0	700.0
183	208	1	D1	KVA	9.7	13.0	19.5	32.4	48.6
				Load Amps	46.8	62.5	93.7	156.0	234.0
				Fuse Size	70.0	90.0	150.0	225.0	350.0
195	208	1	C1	KVA	19.5	26.0	39.0	64.9	97.3
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	125.0	175.0	250.0	450.0	700.0
208	236	1	D1	KVA	11.0	14.7	22.0	36.8	55.2
				Load Amps	46.8	62.5	93.7	156.0	234.0
				Fuse Size	70.0	90.0	150.0	225.0	350.0
225	240	1	C1	KVA	22.5	30.0	45.0	74.8	112.3
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	125.0	175.0	250.0	450.0	700.0
240**	272	1	D1	KVA	12.7	17.0	25.5	42.4	63.6
				Load Amps	46.8	62.5	93.7	156.0	234.0
				Fuse Size	70.0	90.0	150.0	225.0	350.0
BUCKING									
136**	120	1	A2	KVA	12.7	17.0	25.5	42.4	63.6
				Load Amps	106.2	141.7	212.5	353.6	530.4
				Fuse Size	125.0	175.0	250.0	400.0	600.0
152**	120	1	B2	KVA	7.1	9.5	14.3	23.7	35.6
				Load Amps	59.4	79.2	118.8	197.6	296.4
				Fuse Size	60.0	80.0	125.0	200.0	300.0
236	208	1	D2	KVA	11.1	14.8	22.1	36.8	55.2
				Load Amps	53.2	70.9	106.4	177.0	265.5
				Fuse Size	60.0	80.0	125.0	200.0	300.0
256**	240	1	C2	KVA	24.0	32.0	48.0	79.9	119.8
				Load Amps	99.9	133.3	200.0	332.8	499.2
				Fuse Size	125.0	175.0	250.0	400.0	600.0
272**	240	1	D2	KVA	12.8	17.0	25.5	42.4	63.6
				Load Amps	53.2	70.8	106.3	176.8	265.2
				Fuse Size	60.0	80.0	125.0	200.0	300.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Visit our website at www.solaheviduty.com or
 contact **Technical Services** at **(800) 377-4384** with any questions.

Selection Tables: Single Phase

Table 3: Using Group 3 (240 x 480 V Primary, 24/48 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS22B150	HS22B250	HS22F500B	HS22F750B	HS22F1B
BOOSTING									
200	240	1	B1	KVA	0.75	1.25	2.50	3.74	4.99
				Load Amps	3.10	5.20	10.40	15.60	20.80
				Fuse Size	6.00	10.00	15.00	20.00	30.00
230**	277	1	B1	KVA	0.87	1.44	2.88	4.22	5.76
				Load Amps	3.10	5.20	10.40	15.60	20.80
				Fuse Size	10.00	15.00	20.00	25.00	35.00
346	380	1	D1	KVA	1.20	1.98	3.95	5.93	7.90
				Load Amps	3.10	5.20	10.40	15.60	20.80
				Fuse Size	6.00	10.00	15.00	20.00	30.00
362	380	1	C1	KVA	2.40	3.95	7.90	11.86	15.81
				Load Amps	6.30	10.40	20.80	31.20	41.60
				Fuse Size	10.00	15.00	30.00	40.00	60.00
378	416	1	D1	KVA	1.30	2.16	4.33	6.49	8.65
				Load Amps	3.10	5.20	10.40	15.60	20.80
				Fuse Size	6.00	10.00	15.00	25.00	30.00
436	480	1	D1	KVA	1.50	2.50	4.99	7.49	9.98
				Load Amps	3.10	5.20	10.40	15.60	20.80
				Fuse Size	6.00	10.00	15.00	25.00	30.00
458**	480	1	C1	KVA	3.00	4.99	9.98	14.98	19.97
				Load Amps	6.30	10.40	20.80	31.20	41.60
				Fuse Size	15.00	15.00	30.00	45.00	60.00
BUCKING									
277**	230	1	B2	KVA	0.86	1.44	2.88	4.33	5.76
				Load Amps	3.80	6.26	12.53	18.79	25.05
				Fuse Size	6.00	10.00	15.00	20.00	30.00
398	380	1	C2	KVA	2.50	4.14	8.28	12.40	16.60
				Load Amps	6.50	10.89	21.79	32.70	43.60
				Fuse Size	10.00	15.00	30.00	40.00	60.00
418**	380	1	D2	KVA	1.30	2.18	4.35	6.52	8.69
				Load Amps	3.40	5.72	11.40	17.20	22.90
				Fuse Size	6.00	10.00	15.00	20.00	30.00
504**	480	1	C2	KVA	3.10	5.24	10.50	15.70	21.00
				Load Amps	6.60	10.40	21.80	32.80	43.70
				Fuse Size	15.00	15.00	30.00	45.00	60.00
528**	480	1	D2	KVA	1.65	2.75	5.49	8.24	11.00
				Load Amps	3.40	5.72	11.44	17.16	22.88
				Fuse Size	6.00	10.00	15.00	20.00	30.00

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Single Phase

Table 3: Using Group 3 (240 x 480 V Primary, 24/48 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS22F1.5A	HS22F2A	HS22F3A	HS22F5A	HS22F7.5A
BOOSTING									
200	240	1	B1	KVA	7.49	9.98	15.0	24.96	37.44
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	90.0	150.0	225.0
230**	277	1	B1	KVA	8.64	11.52	17.31	28.81	43.21
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	100.0	175.0	250.0
346	380	1	D1	KVA	11.86	15.81	23.75	39.52	59.28
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	45.0	60.0	90.0	150.0	225.0
362	380	1	C1	KVA	23.75	31.65	47.5	79.04	118.56
				Load Amps	62.5	83.3	125	208	312.0
				Fuse Size	90.0	110.0	175.0	300.0	450.0
378	416	1	D1	KVA	12.98	17.31	26.0	43.26	64.9
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	60.0	90.0	150.0	225.0
436	480	1	D1	KVA	14.98	19.97	30.0	49.92	74.88
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	45.0	60.0	90.0	150.0	225.0
458**	480	1	C1	KVA	30.0	39.98	60.0	99.84	149.76
				Load Amps	62.5	83.3	125.0	208.0	312.0
				Fuse Size	90.0	110.0	175.0	300.0	450.0
BUCKING									
277**	230	1	B2	KVA	8.64	11.5	17.3	28.8	43.2
				Load Amps	37.6	50.1	75.3	125.3	187.9
				Fuse Size	40.0	60.0	80.0	150.0	200.0
398	380	1	C2	KVA	24.8	33.1	49.8	82.8	124.2
				Load Amps	65.4	87.1	130.9	217.9	326.8
				Fuse Size	80.0	110.0	175.0	300.0	400.0
418*	380	1	D2	KVA	13.0	17.4	26.1	43.5	65.2
				Load Amps	34.3	45.8	68.8	114.4	171.6
				Fuse Size	40.0	60.0	80.0	150.0	200.0
504**	480	1	C2	KVA	31.4	41.9	63.0	104.8	157.2
				Load Amps	65.5	87.4	131.3	218.4	327.6
				Fuse Size	90.0	110.0	175.0	300.0	450.0
528**	480	1	D2	KVA	16.5	22.0	33.0	54.9	82.4
				Load Amps	34.3	45.8	68.8	114.4	171.6
				Fuse Size	40.0	60.0	80.0	150.0	200.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 4: Using Group 1 (120 x 240 V Primary, 12/24 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number						
					HS19B50	HS19B100	HS19B150	HS19B250	HS19F500B	HS19F750B	HS19F1B
BOOSTING											
188	208	2	F1	KVA	0.749	1.5	2.25	3.75	7.51	11.3	15.0
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.25	41.6
				Fuse Size	6.0	10.0	15.0	15.0	30.0	45.0	60.0
198	208	2	E1	KVA	1.5	3.0	4.5	7.51	15.0	22.5	30.0
				Load Amps	4.16	8.32	12.5	20.8	41.6	62.5	83.3
				Fuse Size	6.0	15.0	25.0	30.0	60.0	90.0	110.0
208	229	2	F1	KVA	0.825	1.65	2.48	4.13	8.26	12.4	16.5
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.25	41.6
				Fuse Size	6.0	10.0	15.0	15.0	30.0	45.0	60.0
208	229	3	J1	KVA	1.65	3.3	4.96	8.26	16.5	24.8	33.1
				Load Amps	4.16	8.32	12.5	20.8	41.6	62.5	83.3
				Fuse Size	10.0	15.0	20.0	30.0	60.0	90.0	125.0
228**	240	2	E1	KVA	1.73	3.46	5.2	8.68	17.3	26	34.6
				Load Amps	4.16	8.32	12.5	20.8	41.6	62.5	83.3
				Fuse Size	6.0	15.0	20.0	30.0	60.0	90.0	110.0
416	436	3	L1	KVA	3.15	6.29	9.44	15.8	31.5	47.2	62.9
				Load Amps	4.16	8.32	12.5	20.8	41.6	62.5	83.3
				Fuse Size	6.0	15.0	20.0	30.0	60.0	90.0	110.0
416	458	3	M1	KVA	1.65	3.31	4.96	8.27	16.5	24.8	33
				Load Amps	2.08	4.16	6.25	10.4	20.8	31.25	41.6
				Fuse Size	3.0	6.0	10.0	15.0	30.0	45.0	60.0
BUCKING											
218	208	2	E2	KVA	1.57	3.14	4.73	7.85	15.7	23.6	31.4
				Load Amps	4.36	8.72	13.1	21.8	43.6	65.5	87.2
				Fuse Size	10.0	15.0	20.0	30.0	60.0	80.0	110.0
229	208	2	F2	KVA	0.824	1.65	2.48	4.12	8.25	12.4	16.5
				Load Amps	2.29	4.58	6.88	11.4	22.9	34.4	45.8
				Fuse Size	6.0	10.0	15.0	15.0	30.0	40.0	60.0
252**	240	2	E2	KVA	1.82	3.63	5.46	9.08	18.2	27.3	36.3
				Load Amps	4.37	8.74	13.1	21.8	43.7	65.6	87.4
				Fuse Size	6.00	10.00	15.00	30.00	60.00	80.00	110.00
264**	240	2	F2	KVA	0.951	1.9	2.86	4.76	9.51	14.3	19.00
				Load Amps	2.29	4.58	6.88	11.44	22.9	34.4	45.8
				Fuse Size	6.0	6.0	10.0	15.0	30.0	40.0	60.0
418	378	3	M2	KVA	1.5	3.0	4.5	7.49	15.0	22.5	30.0
				Load Amps	2.29	4.58	6.88	11.44	22.9	34.4	45.8
				Fuse Size	6.0	6.0	10.0	15.0	30.0	40.0	60.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 4: Using Group 1 (120 x 240 V Primary, 12/24 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS19F1.5A	HS19F2A	HS19F3A	HS19F5A	HS19F7.5A
BOOSTING									
188	208	2	F1	KVA	22.5	30.0	45.0	75.1	112.5
				Load Amps	62.5	83.3	125.0	208.3	312.5
				Fuse Size	90.0	125.0	175.0	300.0	450.0
198	208	2	E1	KVA	45.0	60.0	90.1	150.1	225.2
				Load Amps	125.0	166.6	250.0	416.6	625.0
				Fuse Size	175.0	225.0	350.0	600.0	1000.0
208	229	2	F1	KVA	24.8	33.1	49.6	82.6	123.9
				Load Amps	62.5	83.3	125.0	208.3	312.5
				Fuse Size	90.0	125.0	175.0	300.0	450.0
208	229	3	J1	KVA	49.6	66.1	99.2	165.3	247.9
				Load Amps	125.0	166.6	250.0	416.6	625.0
				Fuse Size	175.0	250.0	350.0	600.0	1000.0
228**	240	2	E1	KVA	52.0	69.3	103.9	173.2	259.8
				Load Amps	125.0	166.6	250.0	416.6	625.0
				Fuse Size	175.0	250.0	350.0	600.0	1000.0
416	436	3	L1	KVA	94.4	125.8	188.79	314.6	472.0
				Load Amps	125.0	166.6	250.0	416.6	625.0
				Fuse Size	175.0	250.0	350.0	600.0	1000.0
416	458	3	M1	KVA	49.6	66.1	99.2	165.3	247.9
				Load Amps	62.5	83.3	125.0	208.3	312.5
				Fuse Size	90.0	125.0	175.0	300.0	450.0
BUCKING									
218	208	2	E2	KVA	47.2	62.7	94.4	157.3	236.0
				Load Amps	131.0	174.0	262.0	436.6	655.0
				Fuse Size	175.0	225.0	350.0	600.0	800.0
229	208	2	F2	KVA	24.8	33.0	49.6	82.5	123.9
				Load Amps	68.8	91.6	137.6	229.0	344.1
				Fuse Size	80.0	110.0	175.0	300.0	400.0
252**	240	2	E2	KVA	54.6	72.5	109.1	181.8	272.8
				Load Amps	131.3	174.3	262.5	437.4	656.3
				Fuse Size	175.0	225.0	350.0	600.0	800.0
264**	240	2	F2	KVA	28.6	38.0	57.2	95.1	142.9
				Load Amps	68.8	91.5	137.5	228.8	343.8
				Fuse Size	80.0	110.0	175.0	300.0	400.0
418	378	3	M2	KVA	45.0	59.9	90.1	149.9	225.2
				Load Amps	68.8	91.6	137.6	228.9	343.9
				Fuse Size	80.0	110.0	175.0	300.0	400.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 5: Using Group 2 (120 x 240 V Primary, 16/32 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS20B150	HS20B250	HS20F500B	HS20F750B	HS20F1B
BOOSTING									
184	208	2	F1	KVA	1.69	2.81	5.63	8.44	11.3
				Load Amps	4.69	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	35.0	45.0
195	208	2	E1	KVA	3.38	5.63	11.3	16.9	22.5
				Load Amps	9.38	15.6	31.2	46.9	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
208	236	2	F1	KVA	1.92	3.19	6.39	9.58	12.8
				Load Amps	4.69	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	35.0	45.0
208	236	3	J1	KVA	3.83	6.38	12.8	19.2	25.6
				Load Amps	9.38	15.6	31.2	46.9	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
225	240	2	E1	KVA	3.9	6.5	13.0	19.5	26.0
				Load Amps	9.38	15.6	31.2	46.9	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
416	443	3	L1	KVA	7.2	12.0	24.0	36.0	48.0
				Load Amps	9.38	15.6	31.2	46.9	62.5
				Fuse Size	15.0	25.0	45.0	70.0	90.0
416	471	3	M1	KVA	3.83	6.37	12.8	19.1	25.5
				Load Amps	4.69	7.8	15.6	23.4	31.2
				Fuse Size	10.0	15.0	25.0	35.0	45.0
BUCKING									
222	208	2	E2	KVA	3.61	6.0	12.0	18.0	24.0
				Load Amps	10.0	16.6	33.3	50.1	66.7
				Fuse Size	15.0	20.0	40.0	60.0	80.0
236	208	2	F2	KVA	1.92	3.19	6.38	9.56	12.8
				Load Amps	5.32	8.85	17.7	26.5	35.4
				Fuse Size	10.0	10.0	20.0	30.0	40.0
256**	240	2	E2	KVA	4.16	6.92	13.8	20.8	27.7
				Load Amps	10.1	16.6	33.3	50.0	66.7
				Fuse Size	15.0	20.0	40.0	60.0	80.0
272**	240	2	F2	KVA	2.21	3.67	7.35	11.0	14.7
				Load Amps	5.32	8.84	17.7	26.5	35.4
				Fuse Size	10.0	15.0	20.0	30.0	40.0
432	380	3	M2	KVA	3.51	5.84	11.7	17.5	23.3
				Load Amps	5.33	8.87	17.7	26.6	35.5
				Fuse Size	10.0	10.0	20.0	30.0	40.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 5: Using Group 2 (120 x 240 V Primary, 16/32 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS20F1.5A	HS20F2A	HS20F3A	HS20F5A	HS20F7.5A
BOOSTING									
184	208	2	F1	KVA	16.9	22.5	33.8	56.3	84.4
				Load Amps	46.9	62.5	93.8	156.0	234.0
				Fuse Size	60.0	90.0	150.0	225.0	350.0
195	208	2	E1	KVA	33.8	45.0	67.6	112.6	168.9
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	125.0	175.0	250.0	450.0	700.0
208	236	2	F1	KVA	19.2	25.6	38.2	63.9	95.8
				Load Amps	46.9	62.5	93.7	156.0	234.0
				Fuse Size	70.0	90.0	150.0	225.0	350.0
208	236	3	J1	KVA	38.2	51.1	76.6	127.7	191.6
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	150.0	200.0	300.0	450.0	700.0
225	240	2	E1	KVA	71.9	52.0	77.9	129.9	194.0
				Load Amps	93.7	125.0	187.5	312.0	468.0
				Fuse Size	125.0	175.0	250.0	450.0	700.0
416	443	3	L1	KVA	71.9	95.9	143.9	239.8	359.7
				Load Amps	93.7	125	187.5	312.0	468.0
				Fuse Size	125.0	175.0	250.0	450.0	700.0
416	471	3	M1	KVA	38.2	51.0	76.5	127.5	191.2
				Load Amps	46.9	62.5	93.8	156.0	234.0
				Fuse Size	70.0	90.0	150.0	225.0	350.0
BUCKING									
222	208	2	E2	KVA	36.0	48.1	72.1	120.0	179.9
				Load Amps	100.0	133.4	200.1	333.0	499.5
				Fuse Size	125.0	175.0	250.0	400.0	600.0
236	208	2	F2	KVA	19.2	25.5	38.8	63.8	95.6
				Load Amps	53.2	70.9	106.4	177.0	265.5
				Fuse Size	60.0	80.0	125.0	200.0	300.0
256**	240	2	E2	KVA	41.5	55.4	83.1	138.3	207.5
				Load Amps	99.9	133.3	200.0	332.8	499.2
				Fuse Size	125.0	175.0	250.0	400.0	600.0
272**	240	2	F2	KVA	22.1	29.4	44.2	73.5	110.2
				Load Amps	53.2	70.8	106.3	176.8	265.2
				Fuse Size	60.0	80.0	125.0	200.0	300.0
432	380	3	M2	KVA	35.1	46.8	70.2	116.7	175.1
				Load Amps	53.3	71.1	106.6	177.3	266.0
				Fuse Size	60.0	80.0	125.0	200.0	300.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 6: Using Group 3 (240 x 480 V Primary, 24/48 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS22B150	HS22B250	HS22F500B	HS22F750B	HS22F1B
BOOSTING									
173	208	2	G1	KVA	1.12	1.88	3.75	5.63	7.5
				Load Amps	3.12	5.2	10.4	15.6	20.8
				Fuse Size	6.0	10.0	20.0	25.0	35.0
200	240	2	G1	KVA	1.3	2.16	4.33	6.5	8.66
				Load Amps	3.12	5.2	10.4	15.6	20.8
				Fuse Size	6.0	10.0	20.0	25.0	35.0
362	380	2	E1	KVA	3.91	6.52	13	19.6	26.1
				Load Amps	6.24	10.4	20.8	31.2	41.6
				Fuse Size	10.0	15.0	30.0	45.0	60.0
346	416	3	K1	KVA	2.25	3.75	7.5	11.3	15.0
				Load Amps	3.12	5.2	10.4	15.6	20.8
				Fuse Size	6.0	10.0	20.0	25.0	35.0
400	480	3	K1	KVA	2.59	4.33	8.65	13.0	17.3
				Load Amps	3.12	5.2	10.4	15.6	20.8
				Fuse Size	10.0	15.0	20.0	25.0	35.0
436	480	2	F1	KVA	2.59	4.33	8.65	13	17.3
				Load Amps	3.12	5.2	10.4	15.6	20.8
				Fuse Size	6.0	10.0	15.0	25.0	30.0
468	492	2	E1	KVA	5.2	8.66	17.3	26.0	34.6
				Load Amps	6.24	10.4	20.8	31.2	41.6
				Fuse Size	15.0	15.0	30.0	45.0	60.0
BUCKING									
250	208	2	G2	KVA	1.35	2.25	4.5	6.75	9.01
				Load Amps	3.75	6.25	12.5	18.7	25.0
				Fuse Size	6.0	10.0	15.0	20.0	30.0
457	380	3	K2	KVA	2.47	4.12	8.23	12.3	16.5
				Load Amps	3.75	6.25	12.5	18.8	25.0
				Fuse Size	6.0	10.0	15.0	20.0	30.0
499	416	3	K2	KVA	2.7	4.49	8.99	13.5	18.0
				Load Amps	3.74	6.24	12.5	18.7	24.9
				Fuse Size	6.0	10.0	15.0	20.0	30.0
504**	480	2	E2	KVA	5.45	9.08	18.2	27.2	36.3
				Load Amps	6.56	10.9	21.8	32.8	43.7
				Fuse Size	15.0	15.0	30.0	40.0	60.0
528**	480	2	F2	KVA	2.85	4.76	9.51	14.3	19.0
				Load Amps	3.43	5.72	11.4	17.2	22.9
				Fuse Size	6.0	10.0	15.0	20.0	30.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

Selection Tables: Three Phase

Table 6: Using Group 3 (240 x 480 V Primary, 24/48 V Secondary) Transformers



Input Voltage	Output Voltage	Quantity Req'd	Connection Diagram*	Application Data	Catalog Number				
					HS22F1.5A	HS22F2A	HS22F3A	HS22F5A	HS22F7.5A
BOOSTING									
173	208	2	G1	KVA	11.3	15	22.5	37.5	56.3
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	100.0	175.0	250.0
200	240	2	G1	KVA	13.0	17.3	26.0	43.3	65.0
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	100.0	175.0	250.0
362	380	2	E1	KVA	39.1	52.2	78.4	130.4	195.6
				Load Amps	62.4	83.2	125	208.0	312.0
				Fuse Size	90.0	125.0	175.0	300.0	450.0
346	416	3	K1	KVA	22.5	30.0	45.0	75.1	112.6
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	100.0	175.0	250.0
400	480	3	K1	KVA	26.0	34.6	52.0	86.6	129.9
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	50.0	70.0	100.0	175.0	250.0
436	480	2	F1	KVA	26.0	34.6	52.0	86.6	129.9
				Load Amps	31.2	41.6	62.5	104.0	156.0
				Fuse Size	45.0	60.0	90.0	150.0	225.0
468	492	2	E1	KVA	52.0	69.3	103.9	173.2	259.8
				Load Amps	62.4	83.2	125.0	208.0	312.0
				Fuse Size	90.0	110.0	175.0	300.0	450.0
BUCKING									
250	208	2	G2	KVA	13.5	18.0	27.1	45.0	67.5
				Load Amps	37.5	50.0	75.1	125.0	187.5
				Fuse Size	40.0	60.0	80.0	150.0	200.0
457	380	3	K2	KVA	24.7	32.9	49.5	82.3	123.5
				Load Amps	37.5	50.0	75.2	125.1	187.6
				Fuse Size	40.0	60.0	80.0	150.0	200.0
499	416	3	K2	KVA	27.0	36.0	54.0	89.9	134.8
				Load Amps	37.4	49.9	75.0	124.7	187.1
				Fuse Size	40.0	60.0	80.0	150.0	200.0
504**	480	2	E2	KVA	54.5	72.6	109.1	181.6	272.4
				Load Amps	65.5	87.4	131.3	218.4	327.6
				Fuse Size	80.0	110.0	175.0	300.0	400.0
528**	480	2	F2	KVA	28.5	38.0	57.2	95.1	142.7
				Load Amps	34.3	45.8	68.8	114.4	171.6
				Fuse Size	40.0	60.0	80.0	150.0	200.0

* For connection diagrams, refer to pages 231-234.

** Shaded items are 60 Hz only (All other ratings shown are 50/60 Hz).

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 contact **Technical Services** at **(800) 377-4384** with any questions.

Alternate Electrical Connections for Buck-Boost Applications

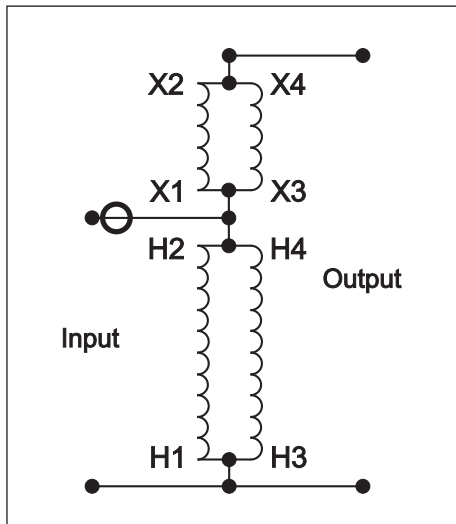


Diagram A1 – Boosting

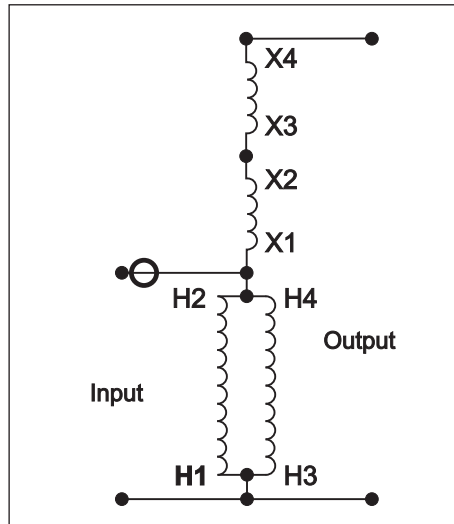


Diagram B1 – Boosting

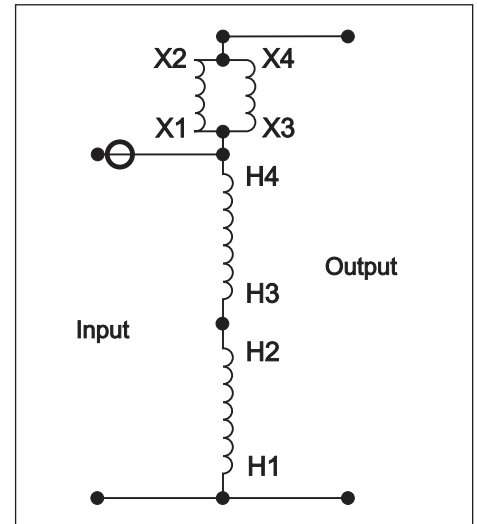


Diagram C1 – Boosting

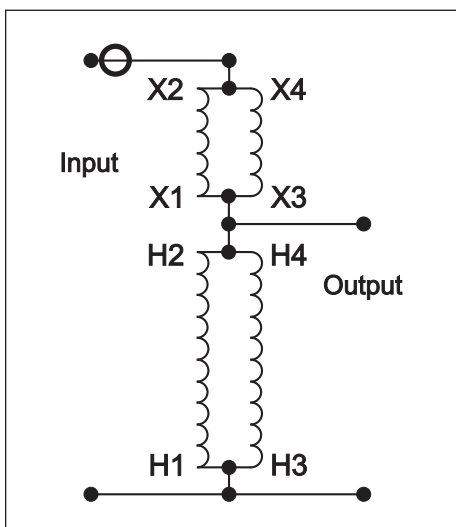


Diagram A2 – Bucking

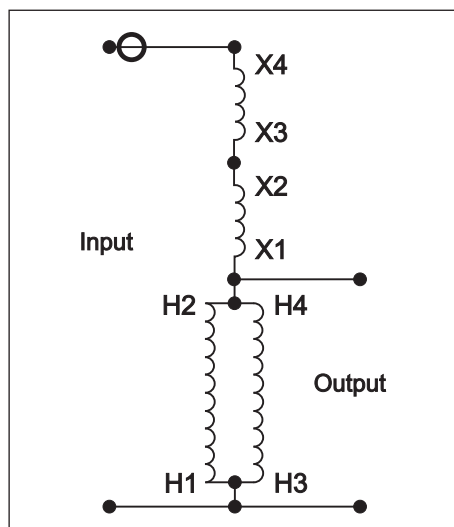


Diagram B2 – Bucking

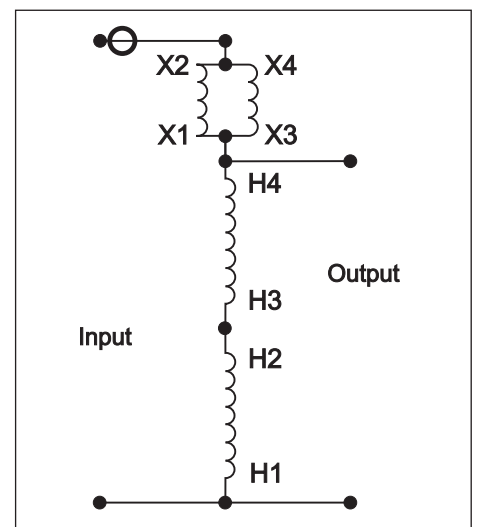


Diagram C2 – Bucking

The O symbol shown on these connection diagrams indicates where fuses or breakers should be field installed for line to neutral applications. For line to line applications, fuses or breakers should be installed on both lines.

Application Note: On all auto-wye connections, the source neutral must be present and connected to the transformer bank. If source neutral is not present, do not use an auto-wye connection.

Alternate Electrical Connections for Buck-Boost Applications

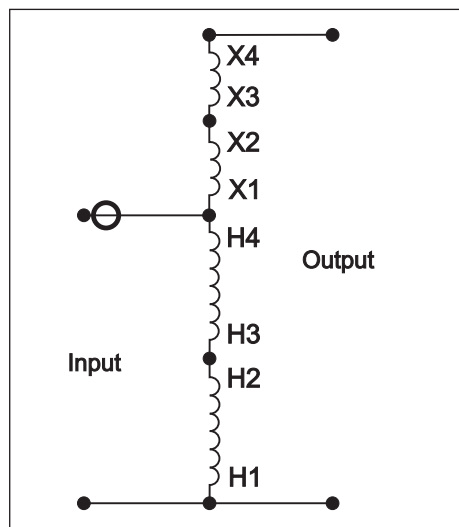


Diagram D1 – Boosting

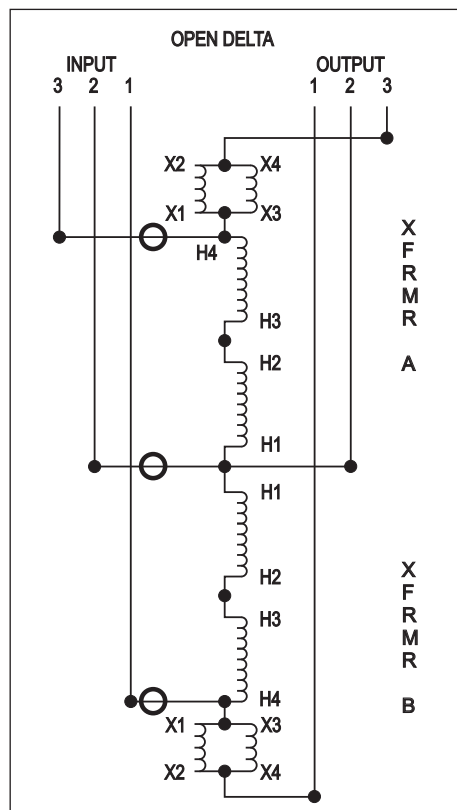


Diagram E1 – Boosting

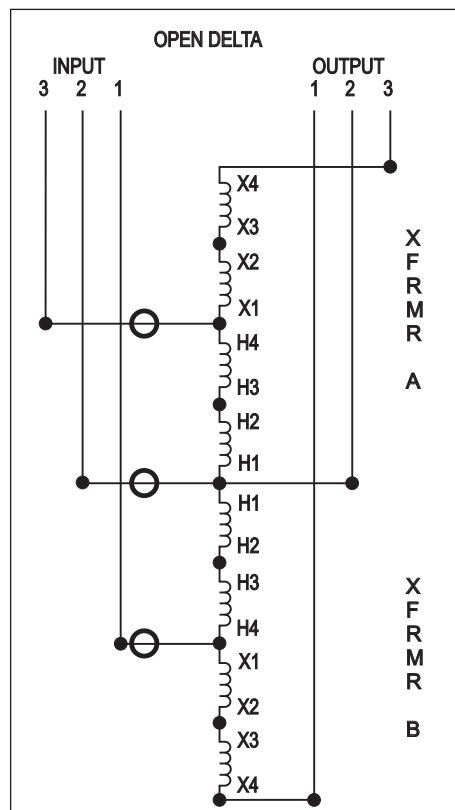


Diagram F1 – Boosting

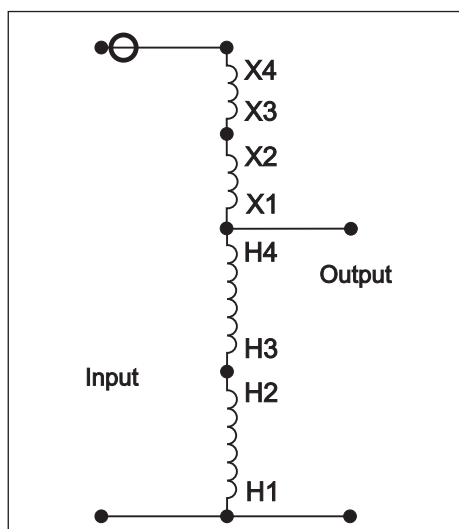


Diagram D2 – Bucking

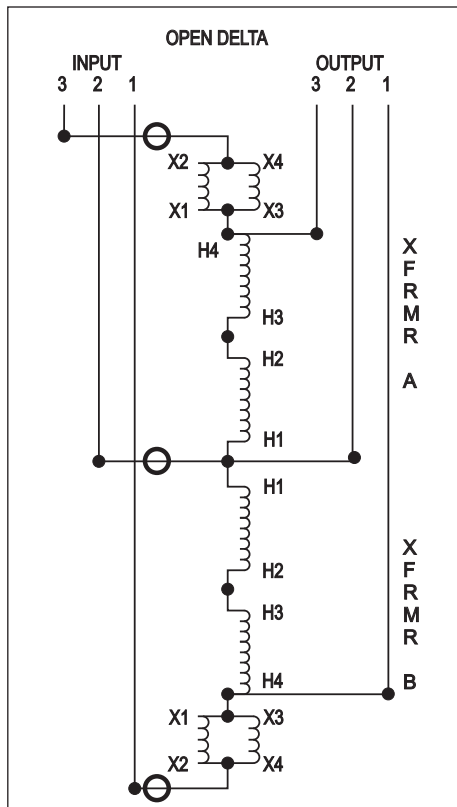


Diagram E2 – Bucking

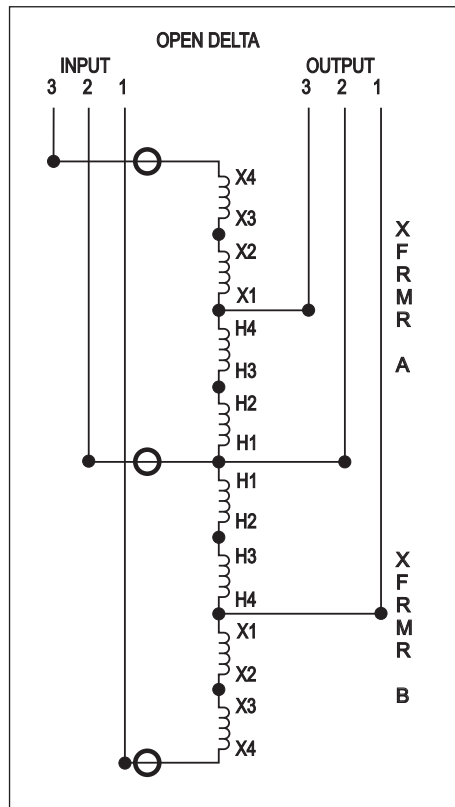


Diagram F2 – Bucking

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Alternate Electrical Connections for Buck-Boost Applications

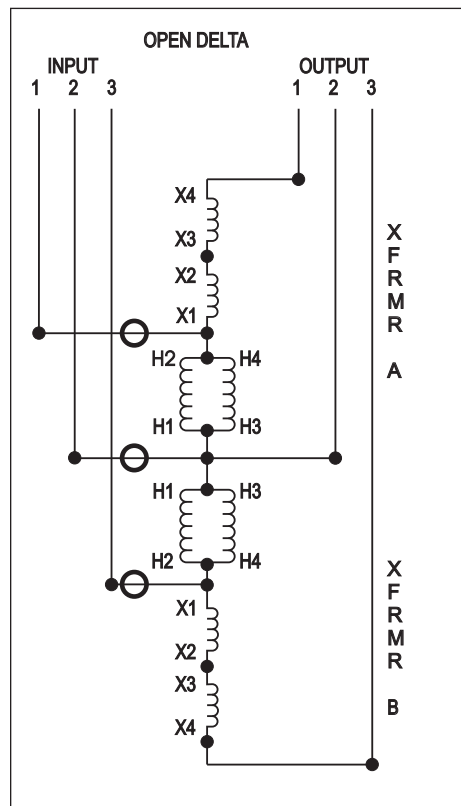


Diagram G1 – Boosting

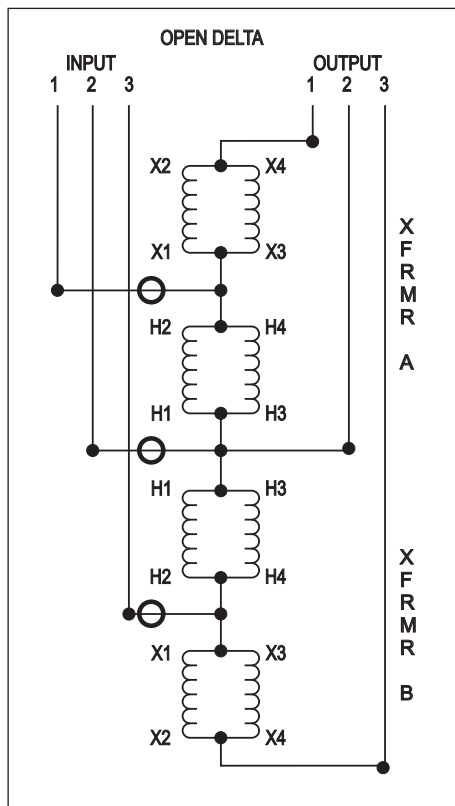


Diagram H1 – Boosting

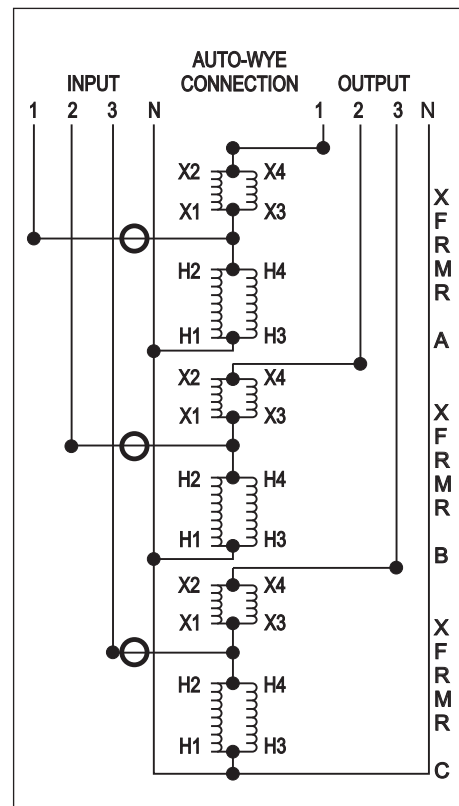


Diagram J1 – Boosting

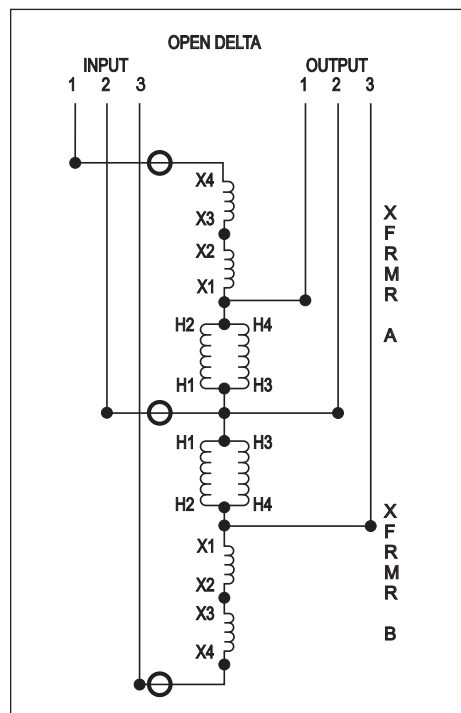


Diagram G2 – Bucking

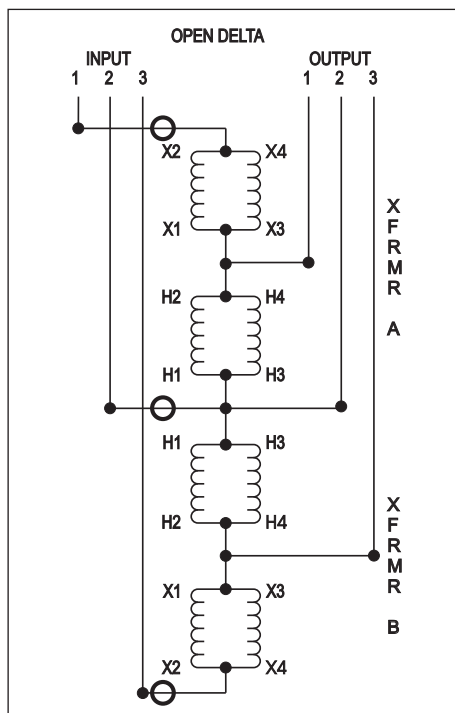


Diagram H2 – Bucking

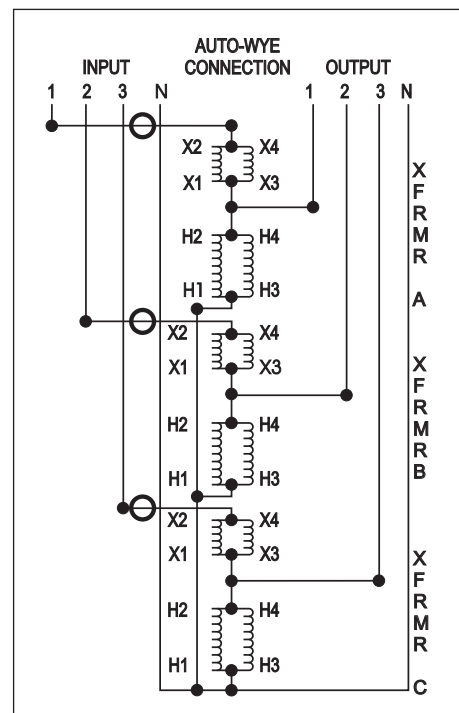


Diagram J2 – Bucking

Alternate Electrical Connections for Buck-Boost Applications

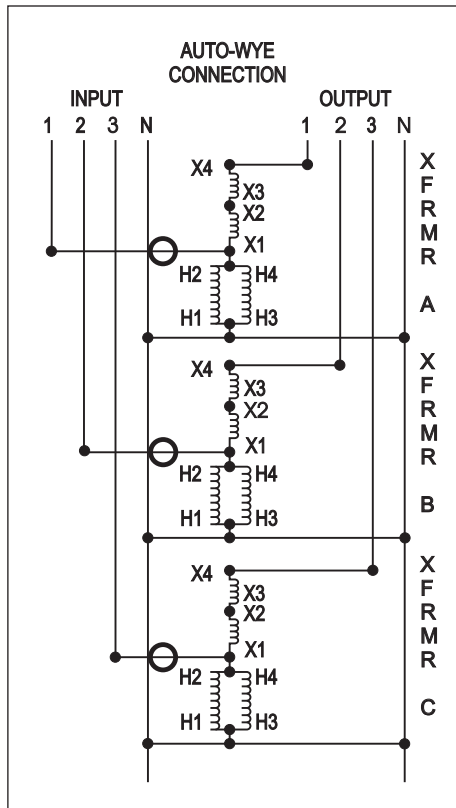


Diagram K1 – Boosting

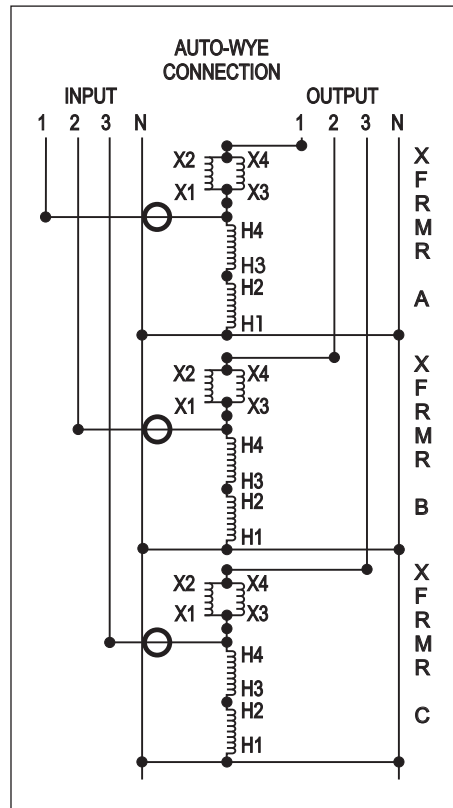


Diagram L1 – Boosting

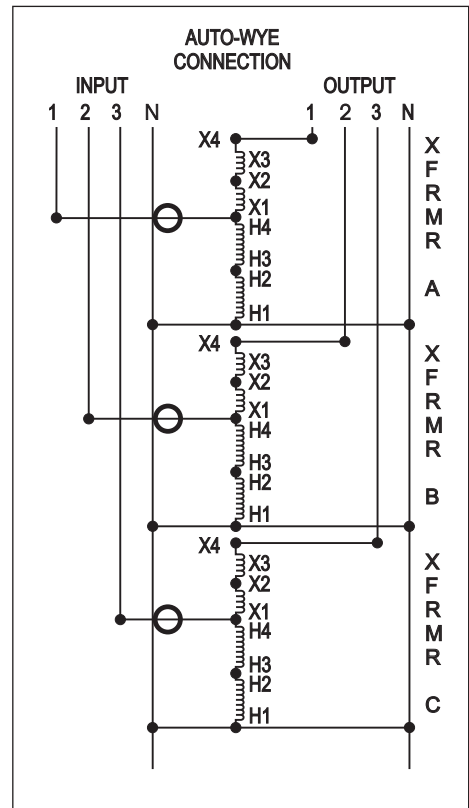


Diagram M1 – Boosting

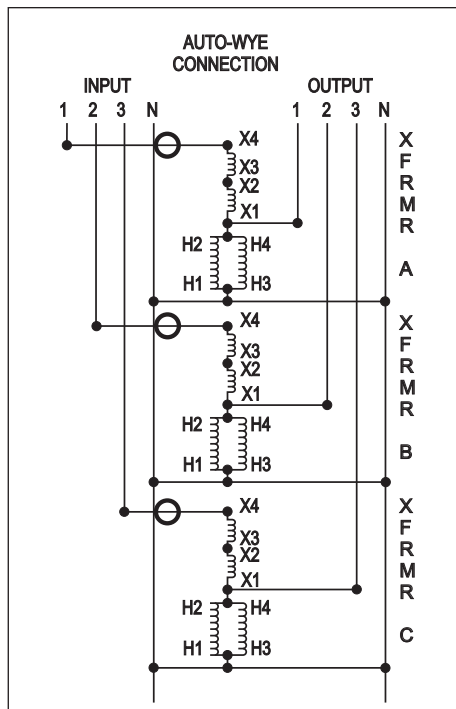


Diagram K2 – Bucking

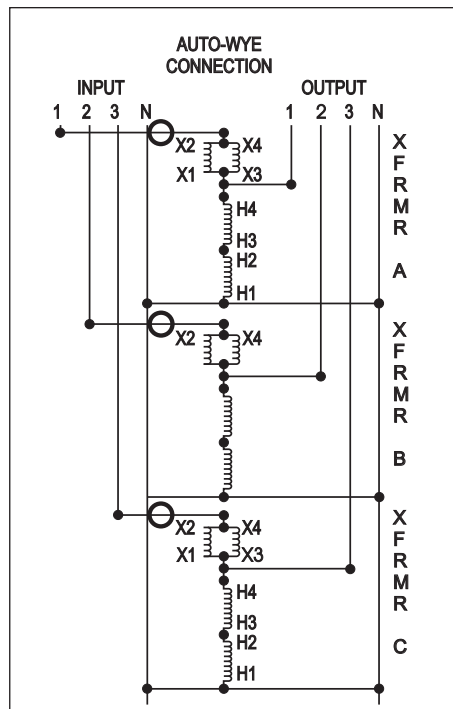


Diagram L2 – Bucking

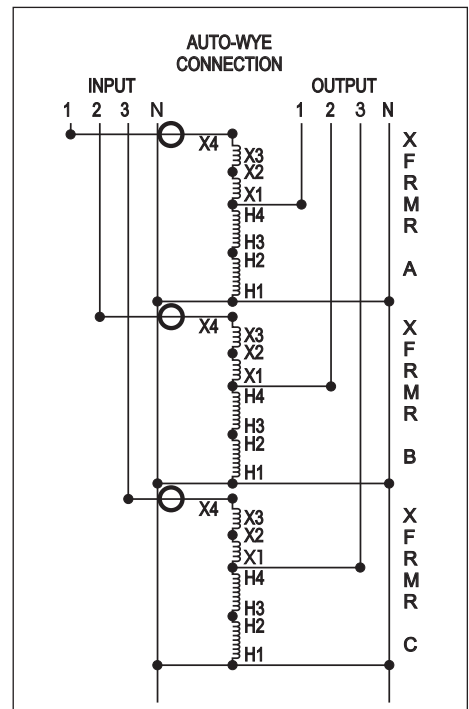


Diagram M2 – Bucking

Application Note

Application Limitations with Buck-Boost Transformers

1. A Buck-Boost transformer cannot be used to develop a three phase, four wire wye circuit from a three phase, three wire delta circuit.

A delta to wye connection does not supply enough current carrying capability to provide for unbalanced currents flowing in the neutral wire of the four wire circuit. The neutral created is not stable and under load will not deliver desired line to neutral voltages. This connection would also be in violation of the National Electric Code, Article 210-9.

2. Buck-Boost transformers cannot be used in a closed delta connection.

A closed delta requires more KVA capacity than a wye or an open delta connection, plus phase shifting comes into play on the output side.

3. Buck-Boost transformers should not be used to correct for voltage drop on a long circuit run where the load fluctuates.

Voltage drop varies with the load and buck-boost transformers are connected for a specific voltage change. If a buck-boost transformer was used to correct voltage drop during peak loading conditions, high voltages may result under light load conditions. This could be equally detrimental to the load and possibly pose safety hazards.

4. Buck-Boost transformers cannot be used to create a 240/120 Volt, single phase service from a 208Y/120 Volt three phase supply.

Two problems are created if you were to try this:

- A. Two neutrals would exist on the same circuit. Since neutrals must be grounded according to the National Electric Code, a short circuit would be created.
- B. Unbalanced line to output neutral voltages would be created; one line would read 120 Volts, the other 130+ Volts.

What is a Buck-Boost transformer and why is it used?

Isolation transformers have separate primary and secondary windings, electrically insulated and isolated from one another. With a relatively high voltage primary (typically 120, 240 or 480 Volts) and a relatively low voltage secondary (typically 12, 16, 24, 32 or 48 Volts), buck-boost transformers are designed to be field connected as autotransformers. These are transformers with one continuous winding, a portion of which is jointly shared between the input and the output. No electrical isolation is present in an autotransformer.

Buck-Boost transformers have two major uses:

1. When field connected as an autotransformer, they can be used to Buck (lower) or Boost (raise) available line voltage in the range of 5 to 27% and at a KVA rating many times that listed on the transformer nameplate.
2. When left as an isolation transformer, they can be used to supply power to low voltage circuits at the nameplate rating listed.

The importance of altering available line voltage.

Electrical equipment is designed to operate at maximum efficiency at a specific standard supply voltage. Your voltage may not be at the standard supply voltage level. Causes can be proximity to a large utility transformer, losses in the line voltage due to loads on that circuit, or a difference between the standard supply voltage available and the standard supply voltage needed to run the equipment.

Normally the problem is having low voltage available. Low voltage on a circuit, even as little as 5% lower can cause a decrease in incandescent light output, and a decrease in resistive heat output. With motors low voltage can cause a decrease in motor torque, an increase in motor amperage requirements, an increase in motor temperature and decrease in motor life expectancy.

