DONGAN

ENERGY EFFICIENT TRANSFORMERS

Engineered solutions for
power and the environment

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Introduction to NEMA Class 1, TP-1 Energy Efficiency Ratings

The Energy Policy and Conservation Act (EPACT 2005) authorizes the United States Department of Energy (DOE) to establish energy conservation standards for various consumer, commercial and industrial products including certain types of General Purpose dry-type distribution transformers. The Act promotes transformer designs featuring reduced conductor and core losses that will produce considerable energy savings from the installation date and continuing over the life of the product.

Following the direction of the National Electrical Manufacturers Association (NEMA), DOE and transformer manufacturers, minimum efficiency standards of 97% were established for single and three phase transformers, depending on size, targeting a 3 year energy payback. This standard has become known as the NEMA TP-1 standard. A companion standard, NEMA TP-2, defines efficiency testing requirements, and TP-3 defines labeling requirements, insuring conformance to EPACT.

The impact of the legislation places design compliance on distribution transformer manufacturers. EPACT requires all transformers defined in the Act, manufactured subsequent to January 1, 2007, to be compliant with the mimimum TP-1 efficiency standards.

Distribution transformers included by definition in EPACT are those meeting the following criteria:
- Operational frequency of 60 Hz.
- Input voltage of 34.5 kV (34,500 Volts) or less
- Output voltage of 600 volts or less
- Liquid emersed capacity of 10 to 2,500 kVA
- Dry-type capacity of 15 to 2500 kVA

EPACT also provides exclusions for the following types of transformers:
- Uninterruptible power supplies
- Transformers with multiple voltage taps, the highest of which equals at least 20% more than the lowest tap.

- Special-impedance transformers
- Sealed transformers
- Non-ventilated transformers
- Testing transformers
- Grounding transformers
- Drive isolation transformers (Currently not excluded in Canada)
- Autotransformers
- Rectifer transformers
- Regulating transformers
- Welding transformers

In addition, EPACT authorizes DOE to exclude any transformer if it is designed for a special application, if the transformer is unlikely to be used in a general purpose application and where significant energy savings would not result.

Dongan Electric is pleased to introduce our Energy Efficient transformers - engineered to provide reduced cost of ownership over the life of the installation.

Features

- Meet NEMA TP-1 1996 energy efficiency standards
- Aluminum or copper windings
- High quality, electrical grade core steel
- 41 & 43 Series have a 220°C Insulation system with a 150°C temperature rise
- 42 & 44 Series have a 200°C Insulation system with a 115°C temperature rise
- 45 Series have a 200°C Insulation system with a 115°C temperature rise
- 60 Hz
- Wound with electrostatic shields as standard
- Standard enclosures meet NEMA 3R indoor outdoor requirements without the purchase of additional rainshields
- Available wall mount brackets
- Non-standard designs available
- Furnished with vibration dampening pads

Options

- Virtually any voltage combination up to 600 volts may be ordered as TP-1 Compliant.
- Core and Coil Designs
- Lower temperature rises of 80°C and 115°C are available
- 10 Year Warranty

Minimum efficiency ratings are shown in the chart to the right.

Most conventional installations will be covered by units displayed in this catalog.

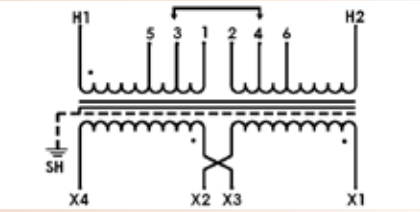
Please consult your Dongan Representative or the factory Customer Service Department at 800.428.2626 for price and availability on hundreds of custom designs in our library.

TP-1 Minimum Ratings

NEMA Class 1 Efficiency Levels Low Voltage - Dry Type Distribution Transformers			
Single Phase kVA	Minimum Efficiency	Three Phase kVA	Minimum Efficiency
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8

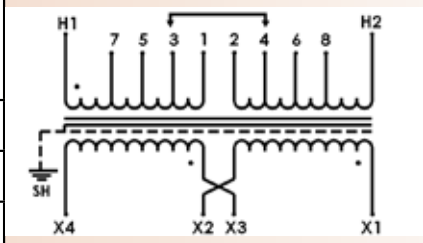
Single Phase TP-1 Compliant Transformers

240 x 480 Volt Primary, 120 / 240 Volt Secondary, 60Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	41-1470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	1	23.5	18.8	18.5	224	BR-890
25	41-1475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	1	30.2	21.7	19.5	318	BR-890
37.5	41-1680SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	2	32.0	27.3	26.3	433	BR-892
50	41-1685SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	2	32.0	27.3	26.3	483	BR-892
75	41-1690SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	2	41.0	34.3	26.8	700	N.A.
100	41-1695SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	2	41.0	34.3	26.8	758	N.A.



41-14XXSH Series
41-34XXSH Series
41-44XXSH Series

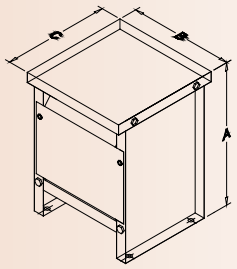
208 Volt Primary, 120 / 240 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	41-3470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	3	23.5	18.8	18.5	224	BR-890
25	41-3475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	3	30.2	21.7	19.5	318	BR-890
37.5	41-3680SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	4	32.0	27.3	26.3	433	BR-892
50	41-3685SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	4	32.0	27.3	26.3	483	BR-892
75	41-3690SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	4	41.0	34.3	26.8	700	N.A.
100	41-3695SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	4	41.0	34.3	26.8	758	N.A.



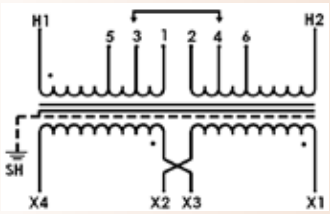
41-16XXSH Series
41-36XXSH Series
41-46XXSH Series

277 Volt Primary, 120 / 240 Volt Secondary, 60Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	41-4470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	5	23.5	18.8	18.5	224	BR-890
25	41-4475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	5	30.2	21.7	19.5	318	BR-890
37.5	41-4680SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	6	32.0	27.3	26.3	433	BR-892
50	41-4685SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	6	32.0	27.3	26.3	483	BR-892
75	41-4690SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	6	41.0	34.3	26.8	700	N.A.
100	41-4695SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	6	41.0	34.3	26.8	758	N.A.

Wall mounting requires purchasing an optional Wall Mounting Bracket Set.
Complete electrical connections may be found on Page 16.

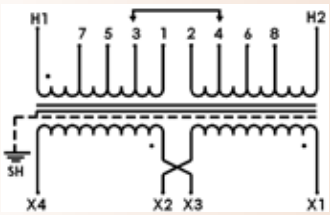


Enclosure Drawing



41-54XXSH Series
41-64XXSH Series

600 Volt Primary, 120 / 240 Volt Secondary, 60Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	41-5470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	7	23.5	18.8	18.5	224	BR-890
25	41-5475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	7	30.2	21.7	19.5	318	BR-890
37.5	41-5680SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	8	32.0	27.3	26.3	433	BR-892
50	41-5685SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	8	32.0	27.3	26.3	483	BR-892
75	41-5690SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	8	41.0	34.3	26.8	700	N.A.
100	41-5695SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	8	41.0	34.3	26.8	758	N.A.

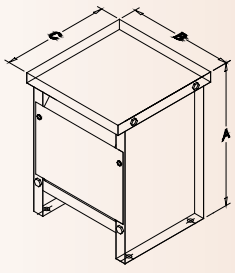


41-56XXSH Series
41-66XXSH Series

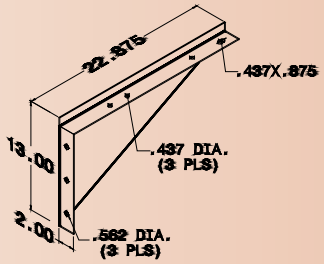
120 x 240 Volt Primary, 120 / 240 Volt Secondary, 60Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	41-6470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	9	23.5	18.8	18.5	224	BR-890
25	41-6475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W or F	9	30.2	21.7	19.5	318	BR-890
37.5	41-6680SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	27	32.0	37.3	26.3	433	BR-892
50	41-6685SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	27	32.0	27.3	26.3	483	BR-892
75	41-6690SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	27	41.0	34.3	26.8	700	N.A.
100	41-6695SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	27	41.0	34.3	26.8	758	N.A.

Wall mounting requires purchasing an optional Wall Mounting Bracket set.
Complete electrical connections may be found on Page 16.

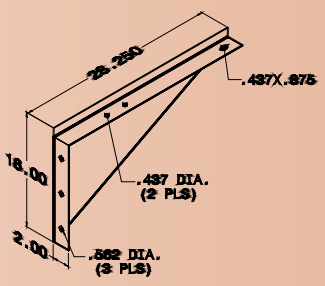
Single Phase Wall Mounting Brackets
(Sold in Pairs)



Enclosure Drawing



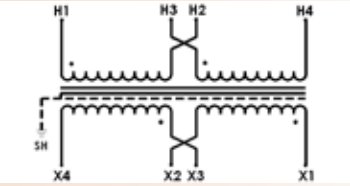
BR-890
15 to 25 kVA



BR-892
37.5 to 50 kVA

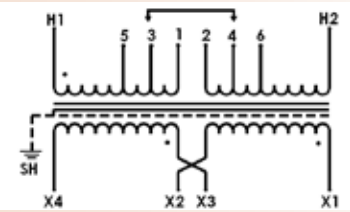
Copper Wound - 45 Series

240 x 480 Volt Primary, 120 / 240 Volt Secondary, 60Hz								
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)
15	45-1070SH	None	W	10	19.4	17.6	11.5	270
15	45-1470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W	11	19.4	17.6	11.5	270
25	45-1075SH	None	W	10	19.4	17.6	11.5	300
25	45-1475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W	11	19.4	17.6	11.5	300

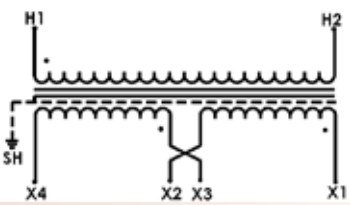


45-10XXSH Series

208 Volt Primary, 120 / 240 Volt Secondary, 60Hz								
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)
15	45-3070SH	None	W	12	19.4	17.6	11.5	270
25	45-3075SH	None	W	12	19.4	17.6	11.5	300

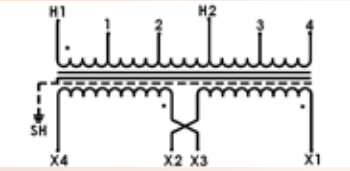


45-14XXSH Series



45-30XXSH Series
45-40XXSH Series

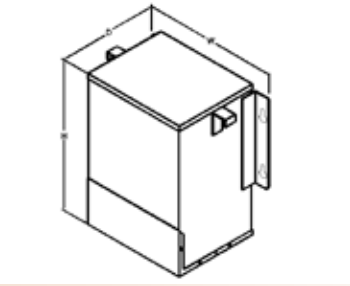
277 Volt Primary, 120 / 240 Volt Secondary, 60Hz								
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)
15	45-4070SH	None	W	13	19.4	17.6	11.5	270
25	45-4075SH	None	W	13	19.4	17.6	11.5	300



45-54XXSH Series

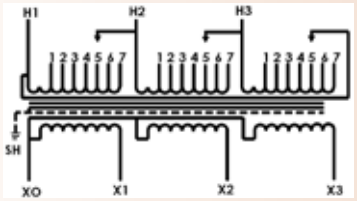
600 Volt Primary, 120 / 240 Volt Secondary, 60Hz								
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)
15	45-5470SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W	14	19.4	17.6	11.5	270
25	45-5475SH	2 - 2 ½% FCAN 2 - 2 ½% FCBN	W	14	19.4	17.6	11.5	300

All units are wall mount only.
Complete electrical connections may be found on Page 17.



Enclosure Drawing

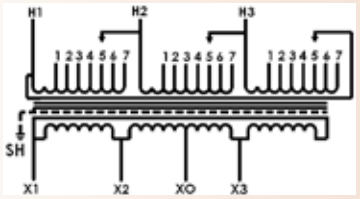
Three Phase TP-1 Compliant Transformers



43-63XXSH Series

480 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz
May be used on a 480Y/277 supply

kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-6315SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	23.5	18.8	18.5	260	BR-890
30	43-6330SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	29.0	24.3	20.9	420	BR-890
45	43-6345SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	29.0	24.3	20.9	480	BR-890
75	43-6375SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	32.0	27.3	26.3	690	BR-892
112.5	43-63112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	41.0	34.3	26.8	960	N.A.
150	43-63150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	41.0	34.3	26.8	1240	N.A.

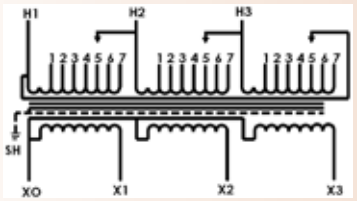


43-62XXSH Series

480 Volt Delta Primary, 240 Volt Secondary with reduced capacity center tap, 60Hz
May be used on a 480Y/277 supply

kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-6215SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	23.5	18.8	18.5	260	BR-890
30	43-6230SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	29.0	24.3	20.9	420	BR-890
45	43-6245SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	29.0	24.3	20.9	480	BR-890
75	43-6275SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	32.0	27.3	26.3	690	BR-892
112.5	43-62112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	16	41.0	34.3	26.8	960	N.A.
150	43-62150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	16	41.0	34.3	26.8	1240	N.A.

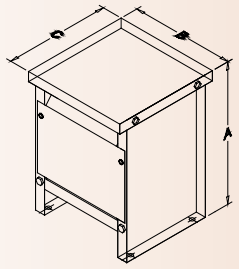
Transformers are equipped with a 120 volt lighting tap. Lighting tap capacity is limited to 5% of nameplate rating distributed equally on either side of XO.



43-XX-512SH Series

480 Volt Delta Primary, 480Y/277 Volt Secondary, 60Hz

kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-15-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	17	23.5	18.8	18.5	260	BR-890
30	43-30-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	17	29.0	24.3	20.9	420	BR-890
45	43-45-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	17	29.0	24.3	20.9	480	BR-890
75	43-75-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	17	32.0	27.3	26.3	690	BR-892
112.5	43-112-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	17	41.0	34.3	26.8	960	N.A.
150	43-150-512SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	17	41.0	34.3	26.8	1240	N.A.

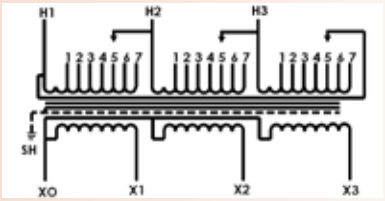


Enclosure Drawing

Wall mounting requires purchasing an optional Wall Mounting Bracket Set.
Complete Electrical connections may be found on Page 17
Transformers wound with a 240 volt secondary are equipped with a lighting tap. Lighting volt tap capacity is limited to 5% of nameplate rating distributed equally on either side of the X0 terminal.

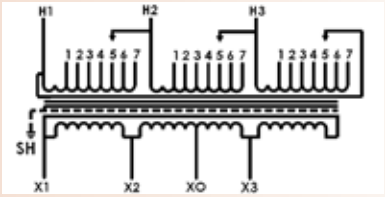
Three Phase TP-1 Compliant Transformers

600 Volt Delta Primary, 208Y/120 Volt Secondary, 60Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-6015SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	18	23.5	18.8	18.5	260	BR-890
30	43-6030SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	18	29.0	24.3	20.9	420	BR-890
45	43-6045SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	18	29.0	24.3	20.9	480	BR-890
75	43-6075SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	18	32.0	27.3	26.3	690	BR-892
112.5	43-60112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	18	41.0	34.3	26.8	960	N.A.
150	43-60150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	18	41.0	34.3	26.8	1240	N.A.



43-60XXSH Series
43-XX-1354SH Series

600 Volt Delta Primary, 240 Volt Secondary with reduced capacity center tap, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-61015SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	19	23.5	18.8	18.5	260	BR-890
30	43-61030SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	19	29.0	24.3	20.9	420	BR-890
45	43-61045SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	19	29.0	24.3	20.9	480	BR-890
75	43-61075SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	19	32.0	27.3	26.3	690	BR-892
112.5	43-610112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	19	41.0	34.3	26.8	960	N.A.
150	43-610150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	19	41.0	34.3	26.8	1240	N.A.

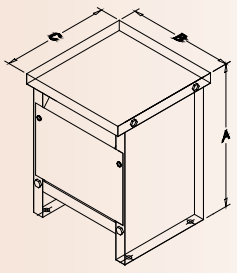


43-610XXSH Series

Transformers are equipped with a 120 volt lighting tap. Lighting tap capacity is limited to 5% of nameplate rating distributed equally on either side of XO.

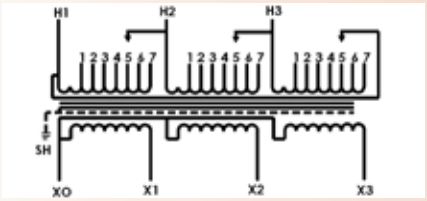
600 Volt Delta Primary, 480Y/120 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-15-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	20	23.5	18.8	18.5	260	BR-890
30	43-30-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	20	29.0	24.3	20.9	420	BR-890
45	43-45-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	20	29.0	24.3	20.9	480	BR-890
75	43-75-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	20	32.0	27.3	26.3	690	BR-892
112.5	43-112-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	20	41.0	34.3	26.8	960	N.A.
150	43-150-1354SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	20	41.0	34.3	26.8	1240	N.A.

Wall mounting requires purchasing an optional Wall Mounting Bracket Set.
Complete Electrical connections may be found on Page 18.
Transformers wound with a 240 volt secondary are equipped with a lighting tap. Lighting volt tap capacity is limited to 5% of nameplate rating distributed equally on either side of the X0 terminal.



Enclosure Drawing

240 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-6615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	21	23.5	18.8	18.5	260	BR-890
30	43-6630SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	21	29.0	24.3	20.9	420	BR-890
45	43-6645SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	21	29.0	24.3	20.9	480	BR-890
75	43-6675SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	21	32.0	27.3	26.3	690	BR-892
112.5	43-66112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	21	41.0	34.3	26.8	960	N.A.
150	43-66150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	21	41.0	34.3	26.8	1240	N.A.

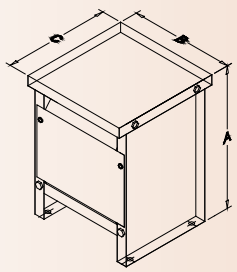


43-66XXSH Series
43-XX-2698SH Series
43-XX-615SH Series
43-XX-565SH Series

240 Volt Delta Primary, 480Y/277 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-15-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	22	23.5	18.8	18.5	260	BR-890
30	43-30-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	22	29.0	24.3	20.9	420	BR-890
45	43-45-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	22	29.0	24.3	20.9	480	BR-890
75	43-75-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	22	32.0	27.3	26.3	690	BR-892
112.5	43-112-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	22	41.0	34.3	26.8	960	N.A.
150	43-150-2698SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	22	41.0	34.3	26.8	1240	N.A.

208 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-15-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	23	23.5	18.8	18.5	260	BR-890
30	43-30-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	23	29.0	24.3	20.9	420	BR-890
45	43-45-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	23	29.0	24.3	20.9	480	BR-890
75	43-75-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	23	32.0	27.3	26.3	690	BR-892
112.5	43-112-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	23	41.0	34.3	26.8	960	N.A.
150	43-150-615SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	23	41.0	34.3	26.8	1240	N.A.

208 Volt Delta Primary, 480Y/277 Volt Secondary, 60 Hz									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	43-15-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	24	23.5	18.8	18.5	260	BR-890
30	43-30-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	24	29.0	24.3	20.9	420	BR-890
45	43-45-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	24	29.0	24.3	20.9	480	BR-890
75	43-75-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	24	32.0	27.3	26.3	690	BR-892
112.5	43-112-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	24	41.0	34.3	26.8	960	N.A.
150	43-150-565SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	24	41.0	34.3	26.8	1240	N.A.

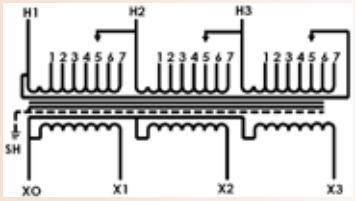


Enclosure Drawing

Three Phase TP-1 Compliant Transformers

Copper Wound - Three Phase - 44 Series

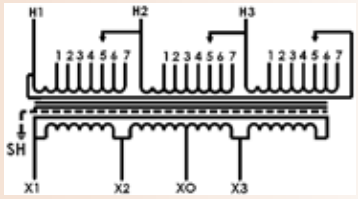
480 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz May be used on a 480Y/277 supply									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	44-6315SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	23.5	18.8	18.5	275	BR-890
30	44-6330SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	29.0	24.3	20.9	510	BR-890
45	44-6345SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	29.0	24.3	20.9	560	BR-890
75	44-6375SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	32.0	27.3	26.3	720	BR-892
112.5	44-63112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	41.0	34.3	26.8	1095	N.A.
150	44-63150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	41.0	34.3	26.8	1490	N.A.



44-63XXSH Series

Aluminum Wound
43-LTFXXXSH
43-LTHXXXSH

480 Volt Delta Primary, 240 Volt Secondary with reduced capacity center tap, 60 Hz May be used on a 480Y/277 supply									
kVA	Catalog Number	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
15	44-6215SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	23.5	18.8	18.5	275	BR-890
30	44-6230SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	29.0	24.3	20.9	510	BR-890
45	44-6245SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	29.0	24.3	20.9	560	BR-890
75	44-6275SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	16	32.0	27.3	26.3	720	BR-892
112.5	44-62112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	16	41.0	34.3	26.8	1095	N.A.
150	44-62150SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	16	41.0	34.3	26.8	1490	N.A.



44-62XXSH Series

Transformers are equipped with a 120 volt lighting tap. Lighting tap capacity is limited to 5% of nameplate rating distributed equally on either side of XO.

Low Temperature Rise Series - Three Phase

480 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz											
kVA	Catalog Number 80° C Rise	Catalog Number 115° C Rise	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Height A	Width B	Depth C	Est. Ship Weight (Lbs.) 80° C Rise	Est. Ship Weight (Lbs.) 115° C Rise	Wall Brackets (Optional)
15	43-LTF315SH	43-LTH315SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	Consult Factory for Certified Dimensions			300	280	N.A.
30	43-LTF330SH	43-LTH330SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15				580	450	N.A.
45	43-LTF345SH	43-LTH345SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15				1000	580	N.A.
75	43-LTF375SH	43-LTH375SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15				1200	1000	N.A.
112.5	43-LTF3112SH	43-LTH315SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15				1500	1200	N.A.

Wall mounting requires purchasing an optional Wall Mounting Bracket Set.
Complete Electrical connections may be found on Page 17
Transformers wound with a 240 volt secondary are equipped with a lighting tap. Lighting volt tap capacity is limited to 5% of nameplate rating distributed equally on either side of the X0 terminal.

K-Rated TP-1 Compliant Transformers

Traditionally, linear transformer loads exhibit voltage and current typically at the fundamental frequency and generally have little harmonic content. Nonlinear transformer loads, on the other hand, introduce significant harmonics into a distribution system.

Transformers operating in a distribution system containing significant harmonics will exhibit potentially serious effects of increased operating temperature. Additionally, it is common to find overloaded neutral conductors resulting from the additive effect of third harmonic and succeeding odd multiple harmonic current flow (triplen harmonics) as well as circulating currents in the primary, eddy current losses, and skin effect losses.

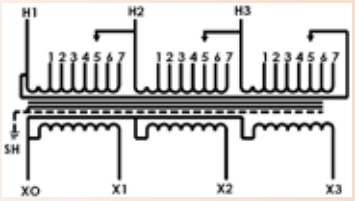
Nonlinear loads should be suspected where there is a presence of switch mode power supplies commonly found in desktop personal computers, printers, mainframes, and other electronic equipment. Other sources include electronic ballasts, variable speed AC motor drives, certain flourescent lighting fixtures, and some types of welders. As existing distribution systems have these types of devices installed, harmonic problems multiply!

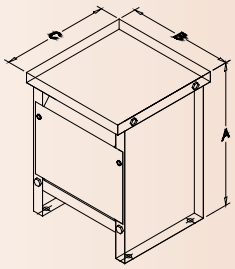
Harmonic content of a distribution system is indicated by a number called K-Factor. Larger values of "K" indicate the presence of more harmonics in the load. Linear loads have a K-Factor of 1. Switch mode power supplies have a K-Factor as high as K-20. Other nonlinear loads have a K-Factor which varies with the device.

Dongan K-Factor transformers are specifically engineered to operate at full load and full harmonic rating without exceeding the rated insulation system values - effectively neutralizing the dangerous effects of temperature and circulating currents. Windings and cores are designed to operate in the presence of triplen harmonics without overheating or forcing the core into saturation. These transformers will provide years of trouble free service to large office buildings, industrial plants, processing equipment and any load with a designated harmonic content.

480 Volt Delta Primary, 208Y/120 Volt Secondary, 60 Hz							
kVA	Catalog Number K-4	Catalog Number K-13	Catalog Number K-20	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia.	Wall Brackets (Optional)
15	TPK04-6315SH	TPK13-6315SH	TPK20-6315SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	BR-890
30	TPK04-6330SH	TPK13-6330SH	TPK20-6330SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	W or F	15	BR-890
45	TPK04-6345SH	TPK13-6345SH	TPK20-6345SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	N.A.
75	TPK04-6375SH	TPK13-6375SH	TPK20-6375SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	N.A.
112.5	TPK04-63112SH	TPK13-63112SH	TPK20-63112SH	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	N.A.
150	TPK04-63150SH	TPK13-63150SH	TPK20-63150SH*	2 - 2 ½% FCAN 4 - 2 ½% FCBN	F	15	N.A.

*TPK20-63150SH is wound with copper magnet wire.





Enclosure Drawing

Dimensions							
K Rating		15 kVA	30 kVA	45 kVA	75 kVA	112.5 kVA	150 kVA
4	A	23.50	29.00	29.00	32.00	41.00	41.00
	B	18.88	24.25	24.25	27.25	34.25	34.25
	C	18.5	20.88	20.88	26.25	26.75	26.75
13	A	29.00	29.00	32.00	41.00	41.00	41.00
	B	24.25	24.25	27.25	34.25	34.25	34.25
	C	20.88	20.88	26.25	26.75	26.75	26.75
20	A	29.00	29.00	32.00	41.00	41.00	44.00
	B	24.25	24.25	27.25	34.25	34.25	48.00
	C	20.88	20.88	26.25	26.75	26.75	30.00

Copper wound K-Rated transformers are also available. Please contact your Dongan Representative or Dongan Customer Service for a quotation.

Motor Drive Isolatin TP-1 Compliant Transformers

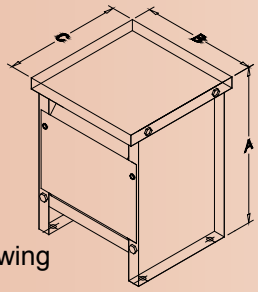
While Motor Drive Isolation Transformers are currently exempt from energy efficiency standards in the United States, compliance with the CAN/CSA-C802.2-00 energy efficiency standards is required in Canada. Voltages common to the Canadian distribution systems are included in the table below.

Dongan Motor Drive Isolation Transformers are specifically designed to meet the requirements of SCR controlled variable speed motor drives. They are ruggedly constructed to withstand the high mechanical forces associated with SCR drive duty cycles. The double-wound construction isolates the line from most SCR generated voltage spikes and transient feedback. These transformers also assist in reducing some types of line transient that can cause SCR misfiring.

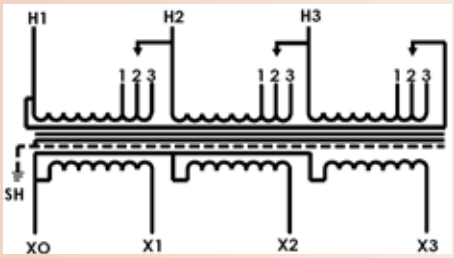
Features *Three Phase 3 - 145 kVA.*

- **Electrostatic shield** between windings provides cleaner output voltage and helps to reduce spikes and transients.
- **Vibration dampening pads** provide quiet operation
- **Wall Mounting brackets** are available for sizes 15 kVA through 75 kVA.
- **Ground studs** provided for bonding compatibility with both metallic and non-metallic conduit.
- **Core and coil and nonstandard designs** are available by consulting the factory or your Dongan Representative.
- **15 - 145 kVA** are aluminum wound and equipped with a UL 220°C insulation system and a 150°C temperature rise. Windings connect to buss bar style terminations equipped with NEMA standard holes for user supplied compression style terminals. **NEMA-3R,** ventilated, cabinet style, floor mount enclosure suitable for indoor or outdoor use. *No extra rain shields required for outdoor use.*

575 Volt Delta Primary, 230Y/133 or 460Y/266 Volt Secondaries, 60 Hz												
kVA	Motor HP	Pri. - 575 Delta Sec. - 230Y/133	Pri. - 575 Delta Sec. - 460Y/266	Taps	Mtg. Type W = Wall F = Floor	Conn. Dia. 230Y133 Secondary	Conn. Dia. 460Y266 Secondary	Height A	Width B	Depth C	Est. Ship Weight (Lbs.)	Wall Brackets (Optional)
20	15	43-2820SH	43-2920SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	29.0	24.3	20.9	275	BR-890
27	20	43-2827SH	43-2927SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	29.0	24.3	20.9	290	BR-890
34	25	43-2834SH	43-2934SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	29.0	24.3	20.9	415	BR-890
40	30	43-2840SH	43-2940SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	29.0	24.3	20.9	440	BR-890
51	40	43-2851SH	43-2951SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	32.0	27.3	26.3	500	BR-892
63	50	43-2863SH	43-2963SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	32.0	27.3	26.3	560	BR-892
75	60	43-2875SH	43-2975SH	1 - 5% FCAN 1 - 5% FCBN	W or F	25	26	32.0	27.3	26.3	580	BR-892
93	75	43-2893SH	43-2993SH	1 - 5% FCAN 1 - 5% FCBN	F	25	26	41.0	34.3	26.8	1000	N. A.
118	100	43-28118SH	43-29118SH	1 - 5% FCAN 1 - 5% FCBN	F	25	26	41.0	34.3	26.8	1100	N. A.
145	125	43-28145SH	43-29145SH	1 - 5% FCAN 1 - 5% FCBN	F	25	26	41.0	34.3	26.8	1200	N. A.



Enclosure Drawing



Shielding:

Most transformer installations today are used to power circuits containing solid state devices sensitive to electrical “noise”, transients and voltage spikes. While the possibility of voltage spikes due to lighting strikes on nearby transmission lines exists, the more frequent threat to electronic equipment comes from conducted electrical noise. Noise and transients can enter installations from distant external sources or from internal sources such as flourescent ballasts and switch mode power supplies. Shielded transformers mitigate the harmful effects of certain types of transients.

Transients are high energy, short duration bursts of electrical energy covering a wide range of frequencies other than the nominal, domestic 60 Hz distribution frequency. These bursts range from a high of 20 kHz to a low of about 25 Hz. Distribution systems encounter two types of transient noise: transverse mode and common mode noise. Differences in the two are found in their reference to ground.

Shielded isolation transformers attenuate common mode noise transients by providing a barrier, called a Faraday Shield, to the capacitive linking of the primary and secondary windings. The barrier reduces, or attenuates, the amount of non- 60 Hz frequencies passed through the transformer in either direction.

Typical attenuation levels of 50:1 (34 DB) are achievable with Dongan shielded isolation transformers. This attenuation provides noise levels generally considered to solve many noise and transient caused problems.

Temperature and Insulation

Ambient Temperature

The ambient temperature is the average temperature of the air in the immediate area surrounding the transformer. The transformer dissipates its heat into this ambient air.

All Dongan transformers are designed to operate in ambient temperatures of 40ºC (104ºF) maximum. De-rating of transformers is necessary when ambients exceed 40ºC (See Operations Section)

Temperature Rise:

Tempature between the ambient air temperature and the ***actual temperature of the windings or enclosure.***

Insulation System:

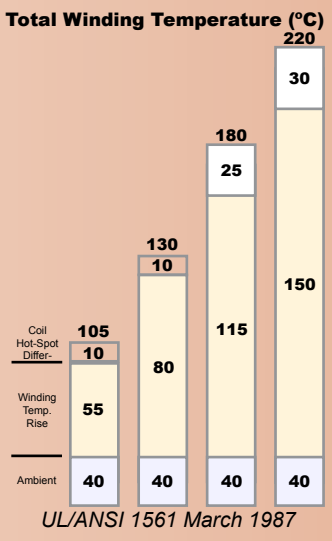
The collection of insulating components used to protect a transformer from the effects of heat and dielectric stress occurring during the normal operation of the transformer. Typically these components include insulation coatings on magnet wire, insulation between winding layers and between windings, tape, and other components.

Hot-Spot Temperature:

The hot-spot temperature refers to the highest temperature found inside the transformer winding. Hot-spot temperature allowances vary with insulation classes. See the Total Winding Temperature, Chart 1.1, for a graphical representation of hot spot temperature values.

Insulation System Temperature and Class:

The insulation system temperature indicates the insulation system’s maximum operating temperature in service. This temperature is determined by the temperature rating of the insulation components in a particular design including tape, layer insulation, magnet wire insulation coatings and impregnation materials. The system temperature is determined by adding the ambient temperature, temperature rise and the hot spot temperature. Transformers operated under normal operating conditions will not exceed this temperature, and will enjoy a long service life.



UL/ANSI 1561 March 1987

Chart 1.1

Dongan transformers use UL approved insulation systems whose constituent parts have been extensively tested for compatability and long life.

Insulation Class:

This is an older letter classification reference to an insulation material’s ability to protect a transformer operating at different temperature rises and various total operating temperatures. The original letter designations have given way to numerical Centigrade insulation system temperatures, the most popular of which are 105°C, 130°C, 180°C, 200°C, and 220°C. Please see Chart 1.2 to see how these classes and temperature ratings are derived.

A transformer operating within its insulation system will have the same life expectancy as any other insulation system. In other words, a high temperature rise system is designed for the same service life as the low temperature rise system.

Transformer Operations

Overloading Transformers:

The life of a transformer is dependent on the life of its insulation. Transformers loaded in excess of nameplate rated kVA develop excessive heat. Excessive heat will lead to degradation of the insulation system and premature failure of the transformer. For this reason, transformers should not be overloaded. Transformers should be sized with future loads in mind to reduce the possibility of overloading and consequently reducing service ife.

Maximum Ambient Temperature	Maximum Percentage of Loading
40°C (104°F)	100 %
50°C (122°F)	92 %
60°C (140°F)	84 %

Operation of transformers in ambient temperatures exceeding 40°C:

Operating transformers in ambient air exceeding 40°C will reduce operational life unless the transformer is allowed to operate under conditions of reduced maximum load. The chart below indicates recommended de-rating for various ambient temperatures. While special designs for high ambient temperatures can be supplied, standard transformers de-rated are both more economical and more readily available. Consult the factory for ambient temperatures exceeding 60°C.

Chart 1.3

Operation of transformers at frequencies other than 60 Hz:

Any transformer rated for use with 50 Hz, or 50/60 Hz distribution systems, is suitable for operation at either 50 Hz or 60 Hz. Transformers rated for operation at 60 Hz only are not suitable for operation at 50 Hz due to core saturation. This causes higher losses and excessive heat inherently created in transformers not engineered for 50 Hz applications.

Dongan transformers rated 50/60 Hz and 60 Hz are suitable for operation at frequencies up to and including 400 Hz provided supply voltages do not exceed rated nameplate voltages. Transformers used at 400 Hz will have output voltages slightly higher than output voltage at standard frequency ratings, and voltage regulation at 400 Hz will be slightly less accurate.

General purpose transformers are designed to change voltage. They are not capable of changing, or converting frequency from one value to another. Frequency converters or generators are necessary if frequency conversion is required.

Operation of transformers at other than nameplate voltages:

Transformers must not be operated at voltages higher than indicated on the nameplate. The only exception to this rule is when Full Capacity Above Normal (FCAN) taps are provided to accommodate higher voltage.

Transformers may be operated at lower than nameplate voltage provided the transformer's capacity is de-rated in the same ratio as the voltage reduction. For instance, suppose a 5 kVA transformer with a 480 volt primary and 240 volt secondary is connected to a 240 volt source, resulting in a 120 volt output. Since the transformer capacity must be de-rated in the same ratio as the voltage, the capacity for this example will be 2.5 kVA, or a 50% reduction.

Balanced & Overloading of Single Phase, 120 / 240 Volt Secondaries:

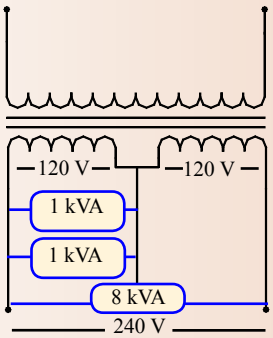
Many single phase transformers are wound with 120 / 240 volt secondaries suitable for 3 wire, 120 / 240 volt service. This feature means the transformer is wound with 2 separate 120 volt windings designed for series or parallel connection. When these 120 volt windings are connected in series, the transformer is capable of delivering both 120 and 240 volts simultaneously. It is important to assure that each 120 volt winding is not overloaded since each 120 volt winding is designed to carry only one-half of the nameplate kVA of the transformer.

Loading on each 120 volt winding is determined by adding the 120 volt load(s) plus one-half of the 240 volt load.

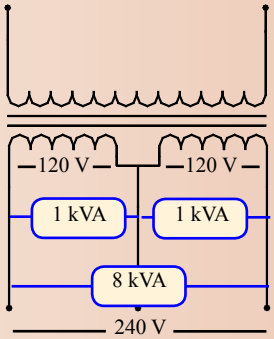
Example:
Suppose we have a 10 kVA transformer with multiple single phase loads of both 120 and 240 volts as follows:

120 volts, 1 kVA (8.3 Amps)
120 volts, 1 kVA (8.3 Amps)
240 volts, 8 kVA (33.3 Amps)

The load must be divided so as not to overload or imbalance any winding. The diagrams on the next page indicate correct and incorrect connection methods where each winding does not exceed one-half of the rated kVA.



Incorrect - the left 120 V winding is overloaded and imbalanced at 6 kVA . (2 kVA of 120 Volts, and 4 kVA of 240 volts)



Correct - Both 120 V windings are loaded at 5 kVA. (2 kVA of 120 Volts, and 4 kVA of 240 Volts).

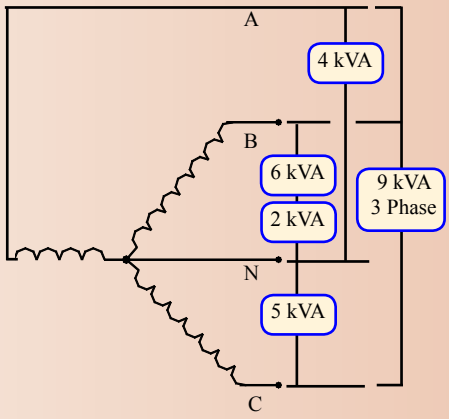
Balanced Loading of Three Phase Transformers:

Three phase transformers have balanced loading considerations similar to single phase in that no phase can be overloaded. Each phase must not be loaded at more than one-third of the nameplate kVA of the transformer. For example, a 30 kVA transformer may be loaded at no more than 10 kVA per phase (one-third of 30 kVA). Load per phase is determined by adding the single phase load on any phase plus one-third of the total three phase load.

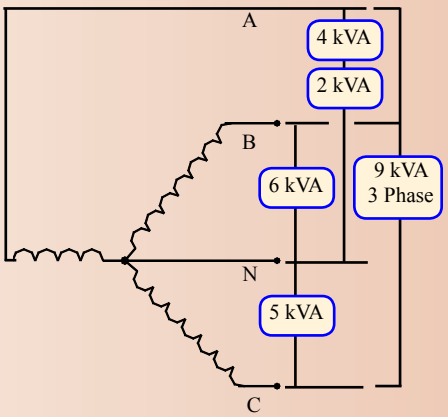
Suppose we have a three phase, 30 kVA transformer with a 208 Y/120 secondary and multiple single and three phase loads as follows:

120 volts, 4 kVA, single phase
120 volts, 2 kVA, single phase
120 volts, 6 kVA, single phase
120 volts, 5 kVA, single phase
208 volts, 9 kVA, three phase

The load must be divided so as not to load any phase at more than 10 kVA. The diagram below indicates correct and incorrect connections.



Incorrect - Phase B has a total load of 11 kVA when the maximum allowed is 10 kVA



Correct - Phase A Load = 9 kVA, Phase B Load = 9 kVA, and Phase C Load = 8 kVA

Balanced Loading of a Three Phase Transformer with a Center Tapped 240 Volt Delta Winding:

A common application for three phase transformers with a 240 volt Delta, center tapped winding is to provide power for three phase 240 volt loads and single phase 120 volt lighting loads at the same time. Balanced loading is essential to assure transformer life is not compromised.

For example, suppose a 45 kVA, three phase transformer is to have 36 kVA of three phase load. We know that each phase can carry one-third of the total nameplate kVA (15 kVA), and that the three phase load splits one-third per phase. In this example, each phase would see one- third of 36 kVA, or 12 kVA per phase. This means that no more than 3 kVA of single phase load can be applied to the center tapped leg.

Additionally, the single phase load must be equally divided on either side of the center tap so that 1.5 kVA is connected between X0 and X2 and 1.5 kVA is connected between X0 and X3.

Applications of this type can severely limit three phase capacity. For this reason, we recommend ingle phase loads not exceed 5% of nameplate capacity. Installers should consider the use of a separate single phase transformer when single phase loads are excessive.

Choosing the Right Size

How to Determine Transformer kVA Ratings

Transformer Load expressed in amperes:

Select the appropriate kVA size from the selection charts listed on this page or by using the single phase or three phase sizing formula listed below. Be sure to select a transformer kVA rating equal to or greater than the anticipated connected load.

$$\text{Single Phase kVA} = \frac{\text{Load Voltage x Load Amps}}{1000}$$

$$\text{Three Phase kVA} = \frac{\text{Load Voltage x Load Amps x 1.73}}{1000}$$

$$\text{kVA} = \frac{\text{Volt Amperes}}{1000}$$

$$\text{VA} = \text{kVA x 1000}$$

Transformer Load expressed in kVA:

Select the appropriate size from the selection charts. Be sure to select a transformer kVA rating equal to or greater than the anticipated connected load.

Transformer Load expressed in wattage:

Convert wattage into a kVA rating by using the formula listed below. Or you may refer to the equipment nameplate to obtain the ampere requirements of the connected load. Be sure to select a transformer kVA rating equal to or greater than the anticipated connected load.

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

Transformer Load expressed in motor horsepower:

Select the appropriate size kVA rating from the motor horsepower charts on this page. Be sure to select a transformer kVA rating equal to or greater than the anticipated load requirements.

Note: High Ambient Temperature Applications: Derate the transformer nameplate kVA 8% for each 10°C above 40°C up to 60°C. Consult factory for ambients above 60°C.

High Altitude Applications: To allow for reduced cooling at higher elevations derate the transformer nameplate kVA by .3% for each 330 feet over 3300 feet above sea level.

kVA / Ampacity Ratings for Single Phase AC Voltages

Volts □ kVA □	12	16	24	32	48	120	208	240	277	380	415	480	600
.050	4.2	3.1	2.1	1.6	1.0	.42	.24	.21	.18	.13	.12	.10	.08
.100	8.3	6.2	4.2	3.3	2.0	.83	.48	.42	.36	.26	.24	.21	.17
.150	12.5	9.4	6.3	4.6	3.1	1.3	.72	.63	.54	.39	.36	.31	.25
.250	20.8	15.6	10.4	7.8	5.2	2.1	1.2	1.0	.9	.66	.6	.52	.42
.500	41.7	31.2	20.8	15.6	10.4	4.2	2.4	2.1	1.8	1.3	1.2	1.0	.83
.750	62	47	31.3	23.4	16.6	6.3	3.6	3.1	2.7	2.0	1.8	1.6	1.3
1	83	62	41.7	31.2	20.8	8.3	4.8	4.2	3.6	2.6	2.4	2.1	1.7
1.5	125	94	62	47	31.2	12.5	7.2	6.3	5.4	3.9	3.6	3.1	2.5
2	166	125	83	62.5	41.6	16.7	9.6	8.3	7.2	5.3	4.8	4.2	3.3
3	250	188	125	94	62	25.0	14.4	12.5	10.8	7.9	7.2	6.3	5.0
5	416	312	208	156	104	41.7	24.0	20.8	18.1	13.2	12.0	10.4	8.3
7.5						62	36.1	31.3	27.1	19.7	18.1	15.6	12.5
10						83	48.1	41.7	36.1	26.3	24.1	20.8	16.7
15						125	72	62	54	39.5	36.1	31.3	25.0
25						208	120	104	90	65	60	52	41.7
37.5						312	180	156	135	98	90	78	62
50						416	240	208	180	131	120	104	83
75						625	360	312	270	197	180	156	125
100						833	480	416	361	263	240	208	166

Note: Increase transformer kVA by 20% when motors are started more than once per hour. Multiply motor ampacity by 1.1 and 1.25 respectively for 90% and 80% power factors.

Full Load Amperes - Single Phase AC Motors

HP	115V	200V	208V	230V	Min. kVA	Std. Dongan Size
1/6	4.4	2.5	2.4	2.2	.53	.750
1/4	5.8	3.3	3.2	2.9	.70	.750
1/3	7.2	4.1	4.0	3.6	.87	1
1/2	9.8	5.6	5.4	4.9	1.18	1.5
3/4	13.8	7.9	7.6	6.9	1.68	2
1	16	9.2	8.8	8	1.92	2
1 ½	20	11.5	11.0	10	2.40	3
2	24	13.8	13.2	12	2.88	3
3	34	19.6	18.7	17	4.10	5
5	56	32.2	30.8	28	6.72	7.5
7 ½	80	46	44	40	9.60	10
10	100	57.5	55	50	12.0	15

Full Load Amperes - Three Phase AC Motors

HP	208V	230V	460V	575V	Min. kVA	Std. Dongan Size
1/2	2.4	2.2	1.1	.9	0.9	3
3/4	3.5	3.2	1.6	1.3	1.2	3
1	4.6	4.2	2.1	1.7	1.5	3
1 ½	6.6	6.0	3.0	2.4	2.1	3
2	7.5	6.8	3.4	2.7	2.7	3
3	10.6	9.6	4.8	3.9	3.8	6
5	16.7	15.2	7.6	6.1	6.3	9
7 ½	24.2	22	11	9	9.2	15
10	30.8	28	14	11	11.2	15
15	46.2	42	21	17	16.6	25
20	59.4	54	27	22	21.6	25
25	74.8	68	34	27	26.6	30
30	88	80	40	32	32.4	45
40	114	104	52	41	43.2	45
50	143	130	65	52	52	75
60	169	154	77	62	64	75
75	211	192	96	77	80	112.5
100	273	248	124	99	103	112.5
125	343	312	156	125	130	150
150	396	360	180	144	150	150

kVA / Ampacity Ratings for Three Phase AC Voltages

Volts □ kVA □	200	208	240	380	415	480	575	600
3	8.6	8.3	7.2	4.5	4.1	3.6	3.0	2.8
6	17.3	16.6	14.4	9.1	8.3	7.2	6.0	5.7
9	26.0	25.0	21.6	13.6	12.5	10.8	9.0	8.6
15	43.3	41.6	36.1	22.8	20.8	18.0	15.0	14.4
25	72	69	60	38.0	34.8	30.1	25.1	24.0
30	86	83	72	45.6	41.7	36.1	30.1	28.9
45	130	125	108	68	62	54	45.2	43.3
75	216	208	180	114	104	90	75	72
112.5	325	312	270	171	156	135	113	108
150	433	416	361	228	208	180	150	144
225	649	624	541	341	313	270	225	216

Connection Diagrams

Dia. 1	Catalog Series 41-14XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 240 x 480	Intercon-nect	Connect High Voltage Lines To
105	252	H1 to 2 H2 to 1	H1 & H2
100	240	H1 to 4 H2 to 3	
95	228	H1 to 6 H2 to 5	
105	504	1 to 2	
102.5	492	2 to 3	
100	480	3 to 4	
97.5	468	4 to 5	
95	456	5 to 6	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 2	Catalog Series 41-16XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 240 x 480	Intercon-nect	Connect High Voltage Lines To
105	252	H1 to 2 H2 to 1	H1 & H2
100	240	H1 to 4 H2 to 3	
95	228	H1 to 6 H2 to 5	
90	216	H1 to 8 H2 to 7	
105	504	1 to 2	
102.5	492	2 to 3	
100	480	3 to 4	
97.5	468	4 to 5	
95	456	5 to 6	
92.5	444	6 to 7	
90	432	7 to 8	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 3	Catalog Series 41-34XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 208	Intercon-nect	Connect High Voltage Lines To
105	218	1 to 2	H1 & H2
102.5	213	2 to 3	
100	208	3 to 4	
97.5	203	4 to 5	
95	198	5 to 6	
% Low Voltage	Load Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 4	Catalog Series 41-36XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 208	Intercon-nect	Connect High Voltage Lines To
105	218	1 to 2	H1 & H2
102.5	213	2 to 3	
100	208	3 to 4	
97.5	203	4 to 5	
95	198	5 to 6	
92.5	192	6 to 7	
90	187	7 to 8	
% Low Voltage	Load Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 5	Catalog Series 41-44XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 277	Intercon-nect	Connect High Voltage Lines To
105	291	1 to 2	H1 & H2
102.5	284	2 to 3	
100	277	3 to 4	
97.5	270	4 to 5	
95	263	5 to 6	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 6	Catalog Series 41-46XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 277	Intercon-nect	Connect High Voltage Lines To
105	291	1 to 2	H1 & H2
102.5	284	2 to 3	
100	277	3 to 4	
97.5	270	4 to 5	
95	263	5 to 6	
92.5	256	6 to 7	
90	249	7 to 8	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 7	Catalog Series 41-54XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
105	630	1 to 2	H1 & H2
102.5	615	2 to 3	
100	600	3 to 4	
97.5	585	4 to 5	
95	570	5 to 6	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 8	Catalog Series 41-56XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
105	630	1 to 2	H1 & H2
102.5	615	2 to 3	
100	600	3 to 4	
97.5	585	4 to 5	
95	570	5 to 6	
92.5	555	6 to 7	
90	540	7 to 8	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 9	Catalog Series 41-64XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 120 x 240	Intercon-nect	Connect High Voltage Lines To
105	126	H1 to 2 H2 to 1	H1 & H2
100	120	H1 to 4 H2 to 3	
95	114	H1 to 6 H2 to 5	
105	252	1 to 2	
102.5	246	2 to 3	
100	240	3 to 4	
97.5	234	4 to 5	
95	228	5 to 6	
% Low Voltage	Load Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Connection Diagrams (cont.)

Dia. 10	Catalog Series 42-10XXSH & 45-10XXSH		
Tap Arrangement	None		
% High Voltage	High Voltage 240 x 480	Intercon-nect	Connect High Voltage Lines To
100	240	H1 to H3 H2 to H4	H1H3 & H2H4
100	480	H2 to H3	H1 & H4
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 11	Catalog Series 42-14XXSH & 45-14XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 240 x 480	Intercon-nect	Connect High Voltage Lines To
105	252	H1 to 2 H2 to 1	H1 & H2
100	240	H1 to 4 H2 to 3	
95	228	H1 to 6 H2 to 5	
105	504	1 to 2	
102.5	492	2 to 3	
100	480	3 to 4	
97.5	468	4 to 5	
95	456	5 to 6	
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 12	Catalog Series 42-30XXSH & 45-30XXSH		
Tap Arrangement	None		
% High Voltage	Line Voltage 208	Intercon-nect	Connect High Voltage Lines To
100	208	-	H1 & H2
% Low Voltage	Load Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 13	Catalog Series 42-40XXSH & 45-40XXSH		
Tap Arrangement	None		
% High Voltage	High Voltage 277	Intercon-nect	Connect High Voltage Lines To
100	277	-	H1 & H2
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 14	Catalog Series 42-54XXSH & 45-54XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 2 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
105	630		H1 & 4
102.5	615		H1 & 3
100	600		H1 & H2
97.5	585		H1 & 2
95	570		H1 & 1
% Low Voltage	Low Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

Dia. 15	Catalog Series 43-63XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 480	Intercon-nect	Connect High Voltage Lines To
90	432	1	H1-H2-H3
92.5	444	2	
95	456	3	
97.5	468	4	
100	480	5	
102.5	492	6	
105	504	7	
% Low Voltage	Low Voltage 208Y / 120	Intercon-nect	Connect Low Voltage Lines To
100	208		X1 & X2 & X3
100	120		X1 to X0 X2 to X0 X3 to X0

Dia. 16	Catalog Series 43-62XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 480	Intercon-nect	Connect High Voltage Lines To
90	432	1	H1-H2-H3
92.5	444	2	
95	456	3	
97.5	468	4	
100	480	5	
102.5	492	6	
105	504	7	
% Low Voltage	Low Voltage 240	Intercon-nect	Connect Low Voltage Lines To
100	240		X1 & X2 & X3
100	120*		X2 to X0 or X3 to X0

Dia. 17	Catalog Series 43-XX-512SH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 480	Intercon-nect	Connect High Voltage Lines To
90	432	1	H1-H2-H3
92.5	444	2	
95	456	3	
97.5	468	4	
100	480	5	
102.5	492	6	
105	504	7	
% Low Voltage	Load Voltage 480Y / 277	Intercon-nect	Connect Low Voltage Lines To
100	480		X1 & X2 & X3
100	277		X1 to X0 X2 to X0 X3 to X0

Dia. 18	Catalog Series 43-60XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
90	540	1	H1-H2-H3
92.5	555	2	
95	570	3	
97.5	585	4	
100	600	5	
102.5	615	6	
105	630	7	
% Low Voltage	Low Voltage 208Y / 120	Intercon-nect	Connect Low Voltage Lines To
100	208		X1 & X2 & X3
100	120		X1 to X0 X2 to X0 X3 to X0

*Lighting tap capacity is limited to 5% of nameplate rating distributed equally on either side of X0

Dia. 19	Catalog Series 43-610XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
90	540	1	H1-H2-H3
92.5	555	2	
95	570	3	
97.5	585	4	
100	600	5	
102.5	615	6	
105	630	7	
% Low Voltage	Low Voltage 240	Intercon-nect	Connect Low Voltage Lines To
100	240		X1 & X2 & X3

Dia. 20	Catalog Series 43-XX-1354SH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 600	Intercon-nect	Connect High Voltage Lines To
90	540	1	H1-H2-H3
92.5	555	2	
95	570	3	
97.5	585	4	
100	600	5	
102.5	615	6	
105	630	7	
% Low Voltage	Low Voltage 480Y / 277	Intercon-nect	Connect Low Voltage Lines To
100	480		X1 & X2 & X3
100	277		X1 to X0 X2 to X0 X3 to X0

Dia.21	Catalog Series 43-66XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 240	Intercon-nect	Connect High Voltage Lines To
90	216	1	H1-H2-H3
92.5	222	2	
95	228	3	
97.5	234	4	
100	240	5	
102.5	246	6	
105	252	7	
% Low Voltage	Low Voltage 208Y / 120	Intercon-nect	Connect Low Voltage Lines To
100	208		X1 & X2 & X3
100	120		X1 to X0 X2 to X0 X3 to X0

*Lighting tap capacity is limited to 5% of nameplate rating distributed equally on either side of X0

Dia. 22	Catalog Series 43-XX-2698SH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% Low Voltage	Line Voltage 240	Intercon-nect	Connect Low Voltage Lines To
90	216	1	H1-H2-H3
92.5	222	2	
95	228	3	
97.5	234	4	
100	240	5	
102.5	246	6	
105	252	7	
% High Voltage	Load Voltage 480Y / 277	Intercon-nect	Connect High Voltage Lines To
100	480		X1 & X2 & X3
100	277		X1 to X0 X2 to X0 X3 to X0

Dia. 23	Catalog Series 43-XX-615SH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 208	Intercon-nect	Connect High Voltage Lines To
90	187	1	H1-H2-H3
92.5	192	2	
95	197	3	
97.5	202	4	
100	208	5	
102.5	213	6	
105	218	7	
% Low Voltage	Load Voltage 208Y / 120	Intercon-nect	Connect Low Voltage Lines To
100	208		X1 & X2 & X3
100	120		X1 to X0 X2 to X0 X3 to X0

Dia. 24	Catalog Series 43-XX-565H		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% Low Voltage	Line Voltage 208	Intercon-nect	Connect Low Voltage Lines To
90	187	1	H1-H2-H3
92.5	192	2	
95	197	3	
97.5	202	4	
100	208	5	
102.5	213	6	
105	218	7	
% High Voltage	Load Voltage 480Y / 277	Intercon-nect	Connect High Voltage Lines To
100	480		X1 & X2 & X3
100	277		X1 to X0 X2 to X0 X3 to X0

Dia. 25	Catalog Series 43-28XXSH		
Tap Arrangement	1 - 5 % FCAN (Full Capacity Above Normal) 1 - 5 % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 575	Intercon-nect	Connect High Voltage Lines To
95	546	1	H1-H2-H3
100	575	2	
105	604	3	
% Low Voltage	Low Voltage 230Y / 133	Intercon-nect	Connect Low Voltage Lines To
100	230		X1 & X2 & X3
100	133		X1 to X0 X2 to X0 X3 to X0

Dia. 26	Catalog Series 43-29XXSH		
Tap Arrangement	1 - 5 % FCAN (Full Capacity Above Normal) 1 - 5 % FCBN (Full Capacity Below Normal)		
% High Voltage	High Voltage 575	Intercon-nect	Connect High Voltage Lines To
95	546	1	H1-H2-H3
100	575	2	
105	604	3	
% Low Voltage	Low Voltage 460Y / 266	Intercon-nect	Connect Low Voltage Lines To
100	460		X1 & X2 & X3
100	266		X1 to X0 X2 to X0 X3 to X0

Dia. 27	Catalog Series 41-66XXSH		
Tap Arrangement	2 - 2 ½ % FCAN (Full Capacity Above Normal) 4 - 2 ½ % FCBN (Full Capacity Below Normal)		
% High Voltage	Line Voltage 120 x 240	Intercon-nect	Connect High Voltage Lines To
105	126	H1 to 2 H2 to 1	H1 & H2
100	120	H1 to 4 H2 to 3	
95	114	H1 to 6 H2 to 5	
90	108	H1 to 8 H2 to 7	
105	252	1 to 2	
102.5	246	2 to 3	
100	240	3 to 4	
97.5	234	4 to 5	
95	228	5 to 6	
92.5	222	6 to 7	
90	216	7 to 8	
% Low Voltage	Load Voltage 120 / 240	Intercon-nect	Connect Low Voltage Lines To
100	120	X1 to X3 X2 to X4	X1X3 & X2X4
100	120 / 240	X2 to X3	X1 & X2X3 & X4
100	240	X2 to X3	X1 &X4

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