The Energy Policy Act of 2005 (H.R. 6) requires Distribution Transformers manufactured after January 1, 2007 to meet specific energy efficiency requirements. EPAct 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.

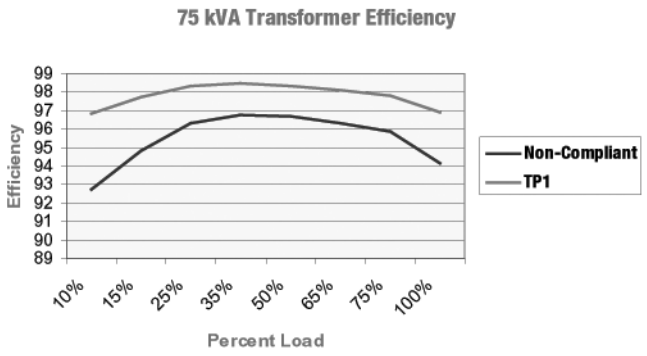

Figure 1

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.

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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.

UL Listed
E25872

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
- 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
- Electrostatically shielded for quality power
- Terminal board connections and spacious wiring compartment
- 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.

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Selection Tables: Single Phase

Group 3 – 600 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	**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

CE UL Listed E25872

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

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	**ET2H15S**	**WS-02**	23	18	14	187	1	5	18.1	41.7
30	**ET2H30S**	**WS-14**	28	23	16	292	1	5	36.1	83.4
45	**ET2H45S**	**WS-14**	28	23	16	376	1	5	54.2	125.0
75	**ET2H75S**	**WS-30**	34	28	22	569	1	5	90.3	208.0
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

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Selection Tables: Three Phase

Group B: 480 Volt Δ Primary, 240 Volt Δ, Secondary with reduced capacity center tap*, 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	**ET5H15S**	**WS-02**	23	19	14	189	1	6	18.1	36.1
30	**ET5H30S**	**WS-14**	28	23	16	292	1	6	36.1	72.3
45	**ET5H45S**	**WS-14**	28	23	16	381	1	6	54.2	108.0
75	**ET5H75S**	**WS-30**	34	28	22	560	1	6	90.3	181.0
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

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	**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

UL Listed E25872

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.

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

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

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Selection Tables: Three Phase

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

UL Listed E25872

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

UL Listed E25872

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

UL Listed E25872

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

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	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.

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Selection Tables: Three Phase

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

UL Listed E25872

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

UL Listed E25872

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

UL Listed E25872

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.

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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.

UL Listed E25872

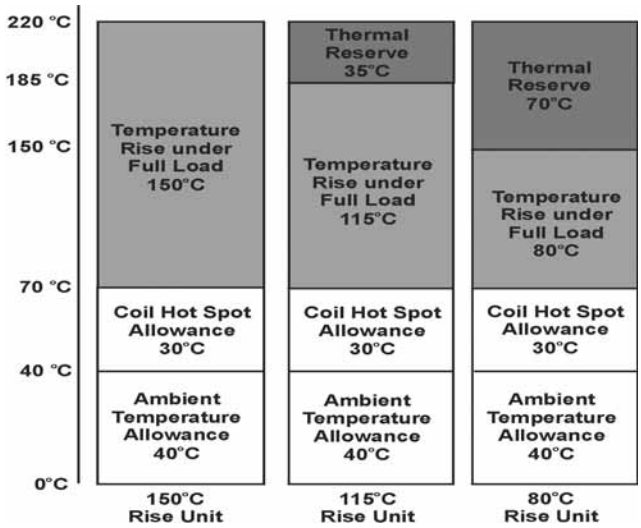

Figure 2

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*

UL Listed E25872

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.

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

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

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

UL Listed E25872

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*

UL Listed E25872

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*

UL Listed E25872

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	7	18.1	36.1
30	**ET5HB30S**	**WS-14**	28	23	16	381	1	7	36.1	72.3
45	**ET5HB45S**	**WS-30**	34	28	22	580	1	7	54.2	108.0
75	**ET5HB75S**	**WS-30**	34	28	22	760	1	7	90.3	181.0
112.5	**ET5HB112S**	**WS-10**	44	33	21	940	1	7	135.0	271.0
150	**ET5HB150S**	**WS-11**	46	36	24	1342	1	7	181.0	361.0
225	**ET5HB225S**	**WS-11**	46	36	24	1525	1	7	271.0	542.0
300	**ET5HB300S**	**WS-12**	65	45	35	2460	1	7	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.

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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*

UL Listed E25872

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*

UL Listed E25872

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.

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Selection Tables: Low Temperature Rise, Three Phase, ***115°C Rise***

Group A: 480 Δ Primary, 208Y/120 Secondary, 60 Hz, *115°C Rise*

Listed E25872

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*

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	**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.

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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

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	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

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	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

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	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.

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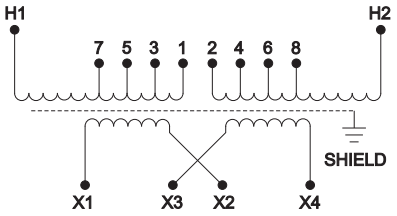
Electrical Connections (Single Phase)

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

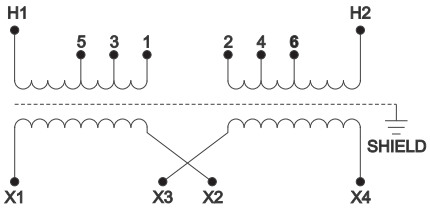
1



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 ⏚	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

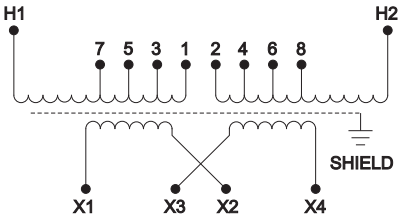
2



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 ⏚	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

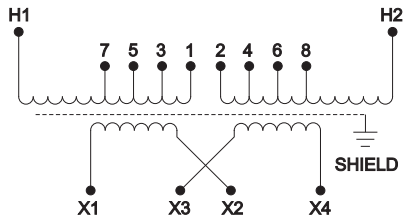
3



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 ⏚	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

4



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 ⏚	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4
ES10 Series		

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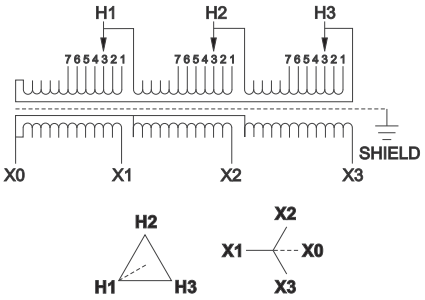
Electrical Connections (Three Phase)

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

5

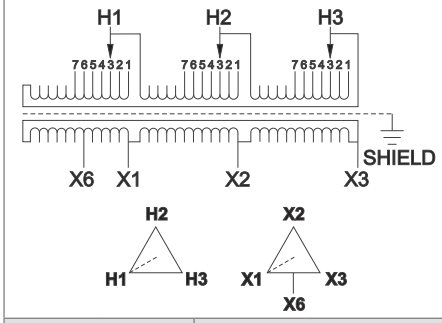


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	208	120
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET2 and 3H Series

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

6

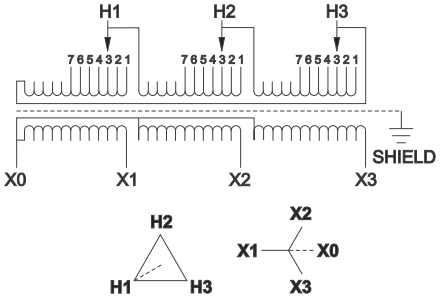


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X6-X1, X6-X3
1	504	240	120
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET5 Series

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

7

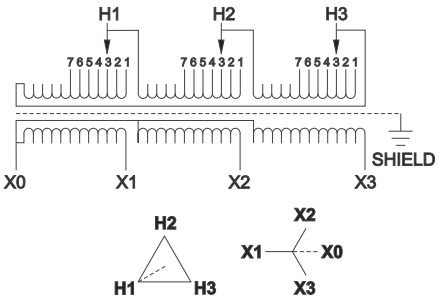


Primary H1 - H2 - H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0 - X1, X2, X3
1	504	380	220
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET79 Series

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

8

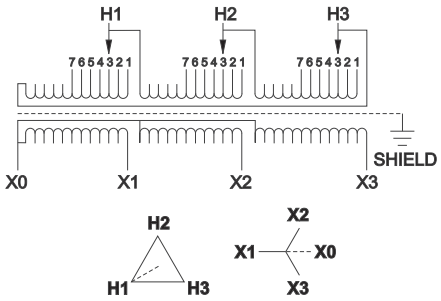


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	480	277
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

ET81 Series

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

9

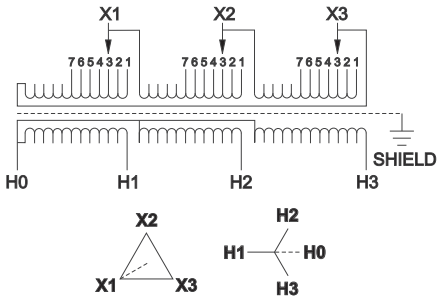


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	218	208	120
2	213		
3	208		
4	203		
5	198		
6	192		
7	187		

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

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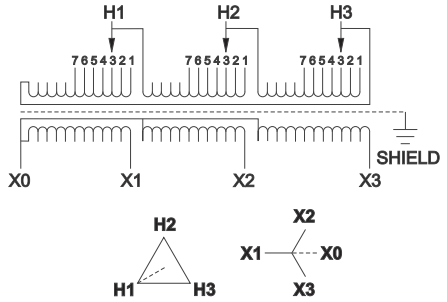
Electrical Connections (Three Phase)

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

11

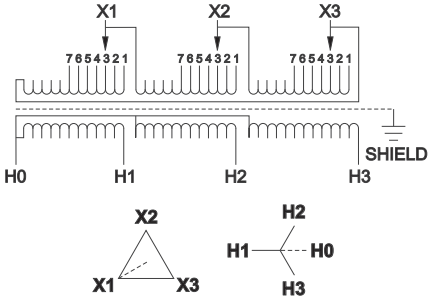


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	252	208	120
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

ET6 Series

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

12

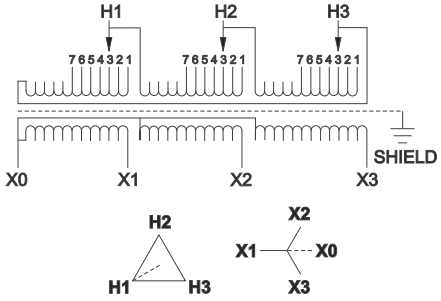


Primary X1 - X2 - X3		**Secondary Voltage**	
@ Tap	**Voltage**	**H1, H2, H3**	**H0 - H1, H2, H3**
1	252	480	277
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

ET85 Series

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

13

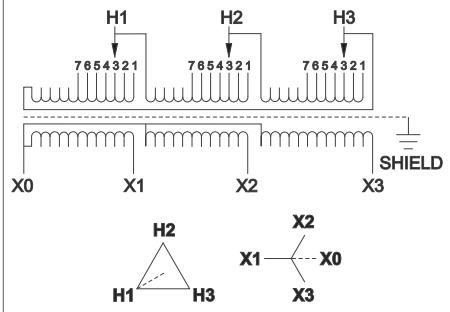


Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	630	208	120
2	615		
3	600		
4	585		
5	570		
6	555		
7	540		

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

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