

Transformers



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Hevi-Duty Family of Transformers

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

Applications

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

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

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

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

Distribution Transformers - Ventilated 15 kVA to 500 kVA

General Purpose

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

Low Temperature Rise

Lower thermal stress on transformer insulation increases useful life.

K-Factor

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

Copper Wound

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



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

General Purpose

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

Hazardous Location (Encapsulated)

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

Buck-Boost

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

Drive Isolation

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

Industrial Control

The units supply inrush current demands of electromagnetic loads and are designed to keep the secondary voltage from dropping below 85% of nominal.

Selection Steps

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

B. Find the electrical load requirements. These are:

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

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

C. Know the supply voltage conditions:

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

D. Determine the transformer kVA rating:

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

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

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



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

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

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

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

Always size the transformer to the load requirements.

Single Phase: Full Load Current Chart

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

Three Phase: Full Load Current Chart

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

Single Phase Motor Chart: AC, Motor Horsepower Amperage

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

Three Phase Motor Chart: AC, Motor Horsepower Amperage

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

Three things to keep in mind:

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

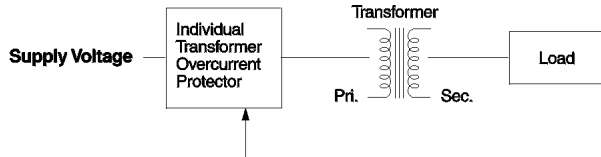
Are there any special application considerations?

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

Overcurrent Protection

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

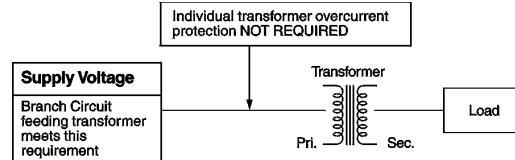
1. Primary protection only is required if the transformer is single-phase and the secondary has only two wires. Overcurrent protection rating and location are shown in Diagram A.



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

Diagram A

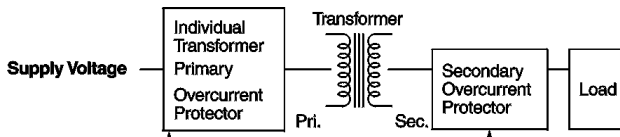
2. If the branch circuit feeding the transformer has overcurrent protection to meet the individual protection requirements in Example 1, then individual transformer protection is **not** required.



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

Diagram B

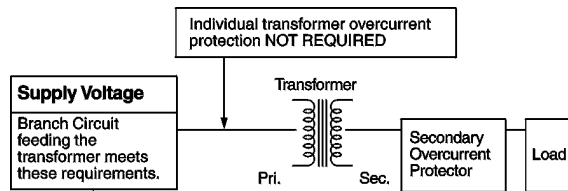
3. Primary and secondary protection is required if the transformer has more than two wires on the secondary circuit.



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

Diagram C

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



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

Diagram D

Section 240.6 (a) of the 2005 National Electrical Code*

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

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Primary Fuse Recommendations

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

Fuse = I*300% next size smaller if primary current is less than 2 amp. No secondary fusing required.
 (Fuse) = (I*500%) next size smaller if used for a motor control circuit per NEC 430-72[C] exception No. 4

Fuse = I*167% next size smaller if primary current is less than 9 amp. No secondary fusing required.
 (Fuse) = (I*250%) next size smaller if primary current is less than 9 Amps. and secondary fusing is required see chart for size.

Fuse = I*125% next size higher if primary current is 9 amp. or higher. No secondary fusing required.
 (Fuse) = (I*250%) next size smaller if primary current is 9 Amps. or higher. Secondary fusing is required see chart for size.

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

Secondary Fuse Recommendations

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

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

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

Primary Overcurrent Protection

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

Secondary Overcurrent Protection

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

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

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

- Has an input voltage of 34.5 kV 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 percent 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.

Sola/Hevi-Duty has been engineering and producing energy efficient transformers for the past six years. The Sola/Hevi-Duty 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.

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

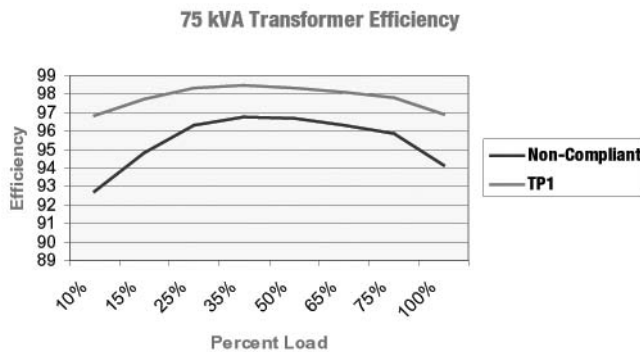


Figure 1

Hevi-Duty 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, T2, T5 and S5.

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).

Copper Wound Transformers

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

Ventilated Distribution Transformers

General Purpose

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

Accessories and Optional Design Styles

- Wall mounting brackets (500 lbs maximum)
- Weather Shields (UL-3R)*
- Stainless Steel Enclosures
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Open core and coil designs (UR) (Non CSA)
- 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 + 2 years warranty

Selection Tables: Single Phase

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

kVA	Catalog Number	NEMA 3R WeatherShield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES5H15S	WS-15	23	16	16	175	1	1	62.5/31.3	125/62.5
25	ES5H25S	WS-15	28	16	16	265	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	425	1	1	208/104	416/208
75	ES5H75S	WS-09	44	23	21	655	1	1	313/156	625/313
100	ES5H100S	WS-09	44	23	21	750	1	1	417/208	833/417
167	ES5H167S	WS-16	46	26	24	980	1	1	695/348	1392/695

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

kVA	Catalog Number	NEMA 3R WeatherShield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ES10H15S	WS-15	23	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	425	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

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

**Design Style and Electrical Connections can be found on pages 165-166.

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

Selection Tables: Three Phase

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2H15S	WS-02	23	18	14	187	1	2	18.1	41.7
30	ET2H30S	WS-14	28	23	16	292	1	2	36.1	83.4
45	ET2H45S	WS-14	28	23	16	376	1	2	54.2	125.0
75	ET2H75S	WS-30	34	28	22	569	1	2	90.3	208.0
112.5	ET2H112S	WS-30	34	28	22	768	1	2	135.0	313.0
150	ET2H150S	WS-10	44	33	21	933	1	2	181.0	417.0
225	ET2H225S	WS-11	46	36	24	1342	1	2	271.0	625.0
300	ET2H300S	WS-11	46	36	24	1525	1	2	361.0	834.0
500	ET2H500S	WS-12	65	45	35	2460	1	2	602.0	1390.0

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

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

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET81H15S	WS-02	23	18	14	189	1	5	18.1	18.1
30	ET81H30S	WS-14	28	23	16	295	1	5	36.1	36.1
45	ET81H45S	WS-14	28	23	16	380	1	5	54.2	54.2
75	ET81H75S	WS-30	34	28	22	560	1	5	90.3	90.3
112.5	ET81H112S	WS-30	34	28	22	780	1	5	135.0	135.0
150	ET81H150S	WS-10	44	33	21	933	1	5	181.0	181.0
225	ET81H225S	WS-11	46	36	24	1342	1	5	271.0	271.0
300	ET81H300S	WS-11	46	36	24	1525	1	5	361.0	361.0
500	ET81H500S	WS-12	65	45	35	2460	1	5	602.0	602.0

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

**Design Style and Electrical Connections can be found on pages 165-166.

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Ventilated Distribution Transformers



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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET84H15S	WS-02	23	18	14	195	1	7	41.7	18.1
30	ET84H30S	WS-14	28	23	16	295	1	7	83.4	36.1
45	ET84H45S	WS-14	28	23	16	375	1	7	125.0	54.2
75	ET84H75S	WS-30	34	28	22	570	1	7	208.0	90.3
112.5	ET84H112S	WS-30	34	28	22	780	1	7	313.0	135.0
150	ET84H150S	WS-10	44	33	21	972	1	7	417.0	181.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET3H15S	WS-02	23	18	14	205	1	6	41.7	41.7
30	ET3H30S	WS-14	28	23	16	385	1	6	83.4	83.4
45	ET3H45S	WS-14	28	23	16	405	1	6	125.0	125.0
75	ET3H75S	WS-30	34	28	22	535	1	6	208.0	208.0
112.5	ET3H112S	WS-30	34	28	22	805	1	6	313.0	313.0
150	ET3H150S	WS-10	44	33	21	1350	1	6	416.0	416.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET6H15S	WS-02	23	18	14	190	1	8	36.1	41.7
30	ET6H30S	WS-14	28	23	16	295	1	8	72.3	83.4
45	ET6H45S	WS-14	28	23	16	380	1	8	108.0	125.0
75	ET6H75S	WS-30	34	28	22	570	1	8	181.0	208.0
112.5	ET6H112S	WS-30	34	28	22	805	1	8	271.0	313.0
150	ET6H150S	WS-10	44	33	21	972	1	8	361.0	417.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET85H15S	WS-02	23	18	14	190	1	9	36.1	18.1
30	ET85H30S	WS-14	28	23	16	300	1	9	72.3	36.1
45	ET85H45S	WS-14	28	23	16	405	1	9	108.0	54.2
75	ET85H75S	WS-30	34	28	22	560	1	9	181.0	90.3
112.5	ET85H112S	WS-30	34	28	22	805	1	9	271.0	135.0
150	ET85H150S	WS-10	44	33	21	972	1	9	361.0	181.0

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

**Design Style and Electrical Connections can be found on pages 165-166.

Ventilated Distribution Transformers

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET7H15S	WS-02	23	18	14	190	1	10	14.5	41.7
30	ET7H30S	WS-14	28	23	16	305	1	10	28.9	83.4
45	ET7H45S	WS-14	28	23	16	405	1	10	43.4	125.0
75	ET7H75S	WS-30	34	28	22	535	1	10	72.3	208.0
112.5	ET7H112S	WS-30	34	28	22	805	1	10	108.0	313.0
150	ET7H150S	WS-10	44	33	21	972	1	10	145.0	417.0
225	ET7H225S	WS-11	46	36	24	1325	1	10	217.0	625.0
300	ET7H300S	WS-11	46	36	24	1525	1	10	289.0	834.0
500	ET7H500S	WS-12	65	45	35	2460	1	10	482.0	1390.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET71H15S	WS-02	23	18	14	190	1	11	14.5	18.1
30	ET71H30S	WS-14	28	23	16	305	1	11	28.9	36.1
45	ET71H45S	WS-14	28	23	16	380	1	11	43.4	54.2
75	ET71H75S	WS-30	34	28	22	560	1	11	72.3	90.3
112.5	ET71H112S	WS-30	34	28	22	780	1	11	108.2	135.3
150	ET71H150S	WS-10	44	33	21	975	1	11	144.3	180.4

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET2H15SCU	WS-02	23	18	14	205	1	2	18.1	41.7
30	ET2H30SCU	WS-14	28	23	16	305	1	2	36.1	83.4
45	ET2H45SCU	WS-14	28	23	16	405	1	2	54.2	125.0
75	ET2H75SCU	WS-30	34	28	22	535	1	2	90.3	208.0
112.5	ET2H112SCU	WS-30	34	28	22	805	1	2	135.0	313.0
150	ET2H150SCU	WS-10	44	33	21	972	1	2	181.0	417.0
225	ET2H225SCU	WS-11	46	36	24	1325	1	2	271.0	625.0
300	ET2H300SCU	WS-11	46	36	24	1515	1	2	361.0	834.0
500	ET2H500SCU	WS-12	65	45	35	2460	1	2	602.0	1390.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	ET79H15S	WS-02	23	18	14	173	1	5	18.1	22.8
30	ET79H30S	WS-14	28	23	16	243	1	5	36.1	45.6
45	ET79H45S	WS-14	28	23	16	333	1	5	54.2	68.4
75	ET79H75S	WS-30	34	28	22	495	1	5	90.3	114.0
112.5	ET79H112S	WS-30	34	28	22	780	1	5	135.3	170.9
150	ET79H150S	WS-10	44	33	21	975	1	5	180.4	227.9

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

**Design Style and Electrical Connections can be found on pages 165-166.

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

Low Temperature Rise

Hevi-Duty 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.



Listed



Certified

Accessories and Optional Design Styles

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

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

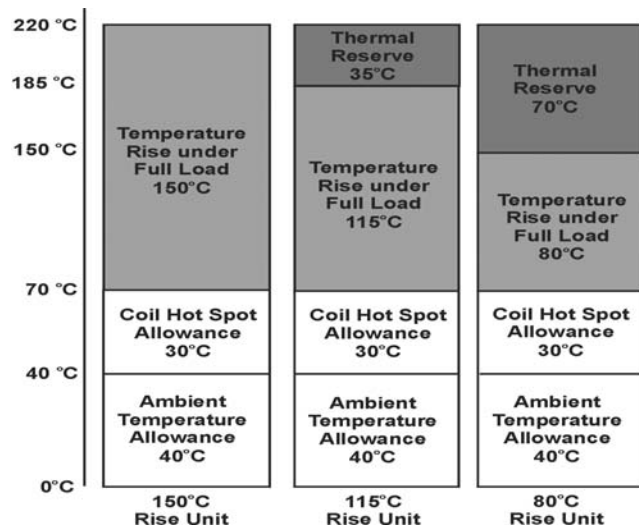


Figure 2

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



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

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	199	1	1	62.5/31.3	125/62.5
25	ES5HB25S	WS-17	31	18	18	239	1	1	104/52.1	208/104
37.5	ES5HB37S	WS-17	31	18	18	308	1	1	156/78	313/156
50	ES5HB50S	WS-09	44	23	21	398	1	1	208/104	416/208
75	ES5HB75S	WS-09	44	23	21	560	1	1	313/156	625/313
100	ES5HB100S	WS-16	46	26	24	980	1	1	417/208	833/417

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

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	199	1	4	25.0	125/62.5
25	ES10HB25S	WS-17	31	18	18	239	1	4	41.7	208/104
37.5	ES10HB37S	WS-17	31	18	18	308	1	4	62.5	313/156
50	ES10HB50S	WS-09	44	23	21	398	1	4	83.3	416/208
75	ES10HB75S	WS-09	44	23	21	555	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

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	305	1	2	18.1	41.7
30	ET2HB30S	WS-14	28	23	18	405	1	2	36.1	83.4
45	ET2HB45S	WS-30	34	28	22	535	1	2	54.2	125.0
75	ET2HB75S	WS-30	34	28	22	805	1	2	90.3	208.0
112.5	ET2HB112S	WS-10	44	33	21	972	1	2	135.0	313.0
150	ET2HB150S	WS-11	46	36	24	1325	1	2	181.0	417.0
225	ET2HB225S	WS-11	46	36	24	1515	1	2	271.0	625.0
300	ET2HB300S	WS-12	65	45	35	2460	1	2	361.0	834.0

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

**Design Style and Electrical Connections can be found on pages 165-166.

Ventilated Distribution Transformers



Selection Tables: Low Temperature Rise Single Phase, 115°C Rise



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

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	23	16	16	175	1	1	62.5/31.3	125/62.5
25	ES5HF25S	WS-15	28	16	16	265	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	655	1	1	313/156	625/313
100	ES5HF100S	WS-09	44	23	21	750	1	1	417/208	833/417
167	ES5HF167S	WS-16	46	26	24	980	1	1	695/348	1392/695

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

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	23	16	16	175	1	4	25.0	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	125.0	625/313
100	ES10HF100S	WS-09	44	23	21	750	1	4	167.0	833/417
167	ES10HF167S	WS-16	46	26	24	980	1	4	278.0	1392/695

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

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

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	2	18.1	41.7
30	ET2HF30S	WS-14	28	23	16	292	1	2	36.1	83.4
45	ET2HF45S	WS-14	28	23	16	376	1	2	54.2	125.0
75	ET2HF75S	WS-30	34	28	22	569	1	2	90.3	208.0
112.5	ET2HF112S	WS-30	34	28	22	768	1	2	135.0	313.0
150	ET2HF150S	WS-10	44	33	21	933	1	2	181.0	417.0
225	ET2HF225S	WS-11	46	36	24	1342	1	2	271.0	625.0
300	ET2HF300S	WS-11	46	36	24	1525	1	2	361.0	834.0
500	ET2HF500S	WS-12	65	45	35	2460	1	2	602.0	1390.0

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

**Design Style and Electrical Connections can be found on pages 165-166.

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. Hevi-Duty K-Factor transformers have UL ratings of K-4, K-13, and K-20.

The Hevi-Duty 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



Accessories and Optional Design Styles*

- Wall mounting brackets (500 lbs maximum)
- Weather Shields (UL-3R)
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Low temperature rise units available
- Open core and coil designs (UR) (Non CSA)
- 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 filtering	K-4
Welders	K-4
Induction heating equipment	K-4
PLCs and solid state controls (other than variable speed drives)	K-4
Telecommunications equipment (e.g., PBX)	K-13
UPS without input filtering.....	K-13
Multewire receptacle circuits in general care areas of health care facilities and classrooms of schools, etc.	K-13
Multewire 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
Multewire receptacle circuits in critical care areas and operating/recovery rooms of hospitals	K-20

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Ventilated Distribution Transformers



Selection Tables: Three Phase

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H4T2H15S	WS-02	23	18	14	180	1	2	18.1	41.7
30	3H4T2H30S	WS-14	28	23	16	329	1	2	36.1	83.4
45	3H4T2H45S	WS-14	28	23	16	357	1	2	54.2	125.0
75	3H4T2H75S	WS-30	34	28	22	647	1	2	90.3	208.0
112.5	3H4T2H112S	WS-10	44	33	21	890	1	2	135.0	313.0
150	3H4T2H150S	WS-10	44	33	21	1045	1	2	181.0	417.0
225	3H4T2H225S	WS-11	46	36	24	1230	1	2	271.0	625.0
300	3H4T2H300S	WS-11	46	36	24	1420	1	2	361.0	834.0
500	3H4T2H500S	WS-12	65	45	35	2460	1	2	602.0	1390.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H13T2H15S	WS-14	28	23	16	305	1	2	18.1	41.7
30	3H13T2H30S	WS-30	34	28	22	405	1	2	36.1	83.4
45	3H13T2H45S	WS-30	34	28	22	535	1	2	54.2	125.0
75	3H13T2H75S	WS-30	34	28	22	805	1	2	90.3	208.0
112.5	3H13T2H112S	WS-10	44	33	21	972	1	2	135.0	313.0
150	3H13T2H150S	WS-11	46	36	24	1325	1	2	181.0	417.0
225	3H13T2H225S	WS-11	46	36	24	1515	1	2	271.0	625.0
300	3H13T2H300S	WS-12	65	45	35	2460	1	2	361.0	834.0

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

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H20T2H15S	WS-14	28	23	16	305	1	2	18.1	41.7
30	3H20T2H30S	WS-30	34	28	22	405	1	2	36.1	83.4
45	3H20T2H45S	WS-30	34	28	22	535	1	2	54.2	125.0
75	3H20T2H75S	WS-30	34	28	22	805	1	2	90.3	208.0
112.5	3H20T2H112S	WS-10	44	33	21	972	1	2	135.0	313.0
150	3H20T2H150S	WS-11	46	36	24	1325	1	2	181.0	417.0
225	3H20T2H225S	WS-11	46	36	24	1515	1	2	271.0	625.0
300	3H20T2H300S	WS-12	65	45	35	2460	1	2	361.0	834.0

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

Electrical Connections

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

Primary Voltage	Interconnect	Connect Lines To
504	1 to 2	H1 & H2
492	2 to 3	H1 & H2
480	3 to 4	H1 & H2
468	4 to 5	H1 & H2
456	5 to 6	H1 & H2
444	6 to 7	H1 & H2
432	7 to 8	H1 & H2
252	H1 to 2 H2 to 1	H1 & H2
240	H1 to 4 H2 to 3	H1 & H2
228	H1 to 6 H2 to 5	H1 & H2
216	H1 to 8 H2 to 7	H1 & H2

Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to ⚬	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

S5 Series

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

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		

T2 Series

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

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		

T5 Series

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

Primary H1-H2-H3	Interconnect	Connect Lines To
630	1 to 2	H1 & H2
615	2 to 3	H1 & H2
600	3 to 4	H1 & H2
585	4 to 5	H1 & H2
570	5 to 6	H1 & H2
555	6 to 7	H1 & H2
540	7 to 8	H1 & H2

Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to ⚬	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

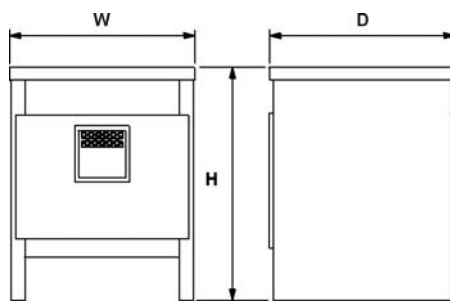
S10 Series

480 Δ Volt Primary
380/220 or 480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary H1-H2-H3		Secondary Voltage	
@ Tap	Voltage	X1, X2, X3	X0- X1, X2, X3
1	504	380 480	220 277
2	492		
3	480		
4	468		
5	456		
6	444		
7	432		

T79 & T81 Series

Design Style



Ventilated Design Style 1

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Electrical Connections

208 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN **6**

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		

T3 Series

208 Δ Volt Primary
480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN **7**

Primary H1-H2-H3		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		

T84 Series

240 Δ Volt Primary
208Y/120 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	252	208	120
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

T6 Series

240 Δ Volt Primary
480Y/277 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	252	480	277
2	246		
3	240		
4	234		
5	228		
6	222		
7	216		

T85 Series

600 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN **10**

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		

T7 Series

600 Δ Volt Primary
480Y/277 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	630	480	277
2	615		
3	600		
4	585		
5	570		
6	555		
7	540		

T71 Series

Automation Transformers – Non-Ventilated 50 VA to 45 kVA

Hevi-Duty encapsulated transformers are rated for Hazardous Locations (Class 1, Division 2, Group A-D) as well as harsh industrial environments. Encapsulation and rugged NEMA 3R enclosures protect the transformer from dust, moisture, and provide extra shock and vibration resistance. Hevi-Duty UL listed transformers fully comply with the latest addition of the National Electrical Code for Class 1, Division 2, Group A-D locations when installed in compliance with NEC 501-2(b).

Features

Single Phase: .05 – .250 kVA

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

Single Phase: 0.500 – 25 kVA

Three Phase: 3 – 45 kVA

- UL-3R non encapsulated enclosure for indoor and outdoor service
- Electrostatically shielded for quality power on sizes 1 kVA and larger
- UL Class 180°C or 200°C insulation system, 115°C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment
- Copper lead wire terminations
- .500 - 10 kVA units are encapsulated with electrical grade silica and epoxy for industrial applications



Related Products

- Some Sola DC power supplies are available with Class 1, Division 2 ratings or encapsulation.
- Surge Suppression products (Chapter 1)

Accessories and Optional Design Styles*

- Wall mounting brackets (500 lbs maximum)
- Weather Shields
- Stainless Steel Enclosures
- Totally enclosed non-ventilated designs (TENV)
- Open core and coil designs
- Copper Wound designs
- NEMA 4/12 or 4X Encapsulated Enclosures
- Low temperature designs (see page 160)

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

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

6 Non-Ventilated Automation Transformers



Selection Table: Single Phase, Encapsulated



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

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
Non-Encapsulated										
.050	HS1B50		6	4	3	3	2	12	.208/1.04	4.16/2.08
.075	HS1B75		6	4	3	3	2	12	.312/.156	6.25/3.12
.100	HS1B100		6	4	3	4	2	12	.417/.208	8.33/4.17
.150	HS1B150		8	4	4	5	2	12	.625/.313	1.25/.625
.250	HS1B250		8	4	4	8	2	12	1.04/.512	2.08/1.04
Encapsulated										
0.5	HS1F500B	HSS1F500B	10	6	5	22	3	12	2.08/1.04	4.16/2.08
0.75	HS1F750B	HSS1F750B	10	6	5	27	3	12	3.13/1.56	6.25/3.13
1	HS1F1BS	HSS1F1BS	10	6	5	28	3	13	4.17/2.08	8.33/4.17
1.5	HS1F1.5AS	HSS1F1.5AS	12	10	7	38	4	13	6.25/3.13	12.5/6.25
2	HS1F2AS	HSS1F2AS	12	10	7	45	4	13	8.33/4.17	16.7/8.33
3	HS5F3AS	HSS5F3AS	12	10	7	55	4	14	12.5/6.25	25.0/12.5
5	HS5F5AS	HSS5F5AS	17	14	9	131	4	14	20.8/10.4	41.6/20.8
7.5	HS5F7.5AS	HSS5F7.5AS	17	14	9	156	4	15	31.3/15.6	62.5/31.3
10	HS5F10AS	HSS5F10AS	17	14	9	156	4	15	41.7/20.8	83.3/41.7
15*	HS5F15AS	HSS5F15AS	30	29	12	549	4	15	62.5/31.2	125.0/62.5
25*	HS5F25AS	HSS5F25AS	30	29	12	637	4	15	104.0/52.0	208.0/104.0

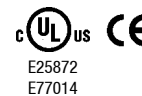
* cUL Underwriters tested to CSA standards.

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

kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
Non-Encapsulated										
.100	HS10B100		6	4	3	4	2	18	0.167	.833/4.17
.150	HS10B150		8	4	4	5	2	18	0.25	1.25/.625
.250	HS10B250		8	4	4	8	2	18	0.417	2.08/1.04
Encapsulated										
.500	HS10F500B	HSS10F500B	10	6	5	22	3	18	0.833	4.16/2.08
.750	HS10F750B	HSS10F750B	10	6	5	23	3	18	1.25	6.25/3.13
1	HS10F1BS	HSS10F1BS	10	6	5	28	3	18	1.67	8.33/4.17
1.5	HS10F1.5AS	HSS10F1.5AS	12	10	7	38	4	18	2.5	12.5/6.25
2	HS10F2AS	HSS10F2AS	12	10	7	60	4	18	3.33	16.7/8.33
3	HS10F3AS	HSS10F3AS	12	10	7	66	4	19	5.0	25.0/12.5
5	HS10F5AS	HSS10F5AS	17	14	9	100	4	19	8.3	41.6/20.8
7.5	HS10F7.5AS	HSS10F7.5AS	17	14	9	135	4	19	12.5	62.5/31.3
10	HS10F10AS	HSS10F10AS	17	14	9	150	4	19	16.7	83.3/41.7

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Selection Table: Single Phase, Encapsulated



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

kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps*	Secondary Amps
Encapsulated										
1	HS12F1BS	HSS12F1BS	10	6	5	29	3	16	3.6	8.33/4.17
1.5	HS12F1.5BS	HSS12F1.5BS	12	10	7	40	4	17	5.4	12.5/6.25
2	HS12F2BS	HSS12F2BS	12	10	7	60	4	17	7.2	16.7/8.33
3	HS12F3BS	HSS12F3BS	12	10	7	66	4	17	10.8	25.0/12.5
5	HS12F5BS	HSS12F5BS	17	14	9	104	4	17	18.0	41.6/20.8
7.5	HS12F7.5BS	HSS12F7.5BS	17	14	9	135	4	17	27.1	62.5/31.3
10	HS12F10BS	HSS12F10BS	17	14	9	156	4	17	36.1	83.3/41.7

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

kVA	Catalog Number Group 1 Rolled Steel	Catalog Number Group 2 Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps*	Secondary Amps
Encapsulated, Copper Wound										
1	HS14F1BS	HSS14F1BS	10	6	5	34	3	20	4.5/2.3	9.1/4.5
1.5	HS14F1.5BS	HSS14F1.5BS	12	10	7	40	4	21	6.8/3.4	13.6/6.8
2	HS14F2BS	HSS14F2BS	12	10	7	60	4	21	9.1/4.5	18.2/9.1
3	HS14F3BS	HSS14F3BS	12	10	7	73	4	21	13.6/6.8	27.3/13.6
5	HS14F5BS	HSS14F5BS	17	14	9	100	4	21	22.7/11.4	45.5/22.7
7.5	HS14F7.5BS	HSS14F7.5BS	17	14	9	140	4	21	34.1/17.0	68.2/34.1
10	HS14F10BS	HSS14F10BS	17	14	9	175	4	21	45.5/22.7	90.9/45.5

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

6 Non-Ventilated Automation Transformers



Selection Tables: Three Phase, Encapsulated



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

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
3	HT1F3AS	HTS1F3AS	13	16	9	105	4	23	3.6	8.3
6	HT1F6AS	HTS1F6AS	13	16	9	110	4	23	7.2	16.6
9	HT1F9AS	HTS1F9AS	17	20	11	250	4	23	10.8	25.0
15	HT1F15AS	HTS1F15AS	17	20	11	261	4	23	18.1	41.7
30*	HT1F30AS	HTS1F30AS	30	29	12	696	4	23	36.1	83.4
45*	HT1F45AS	HTS1F45AS	30	29	12	844	4	23	54.2	125.0

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

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
3	HT5F3AS	HTS5F3AS	13	16	9	105	4	24	3.6	7.2
6	HT5F6AS	HTS5F6AS	13	16	9	110	4	24	7.2	14.4
9	HT5F9AS	HTS5F9AS	17	20	11	250	4	24	10.8	21.7
15	HT5F15AS	HTS5F15AS	17	20	11	305	4	24	18.1	36.1
30*	HT5F30AS	HTS5F30AS	29	25	12	698	4	24	36.1	72.2
45*	HT5F45AS	HTS5F45AS	29	25	12	876	4	24	54.2	108.3

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

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
3	HT6F3AS	HTS6F3AS	13	16	9	97	4	22	7.2	8.3
6	HT6F6AS	HTS6F6AS	13	16	9	141	4	22	14.4	16.6
9	HT6F9AS	HTS6F9AS	17	20	11	256	4	22	21.7	25.0

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

kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
3	HT79F3AS	HTS79F3AS	13	16	9	121	4	25	3.6	4.6
6	HT79F6AS	HTS79F6AS	13	16	9	141	4	25	7.2	9.1
9	HT79F9AS	HTS79F9AS	17	20	11	255	4	25	10.8	13.6

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

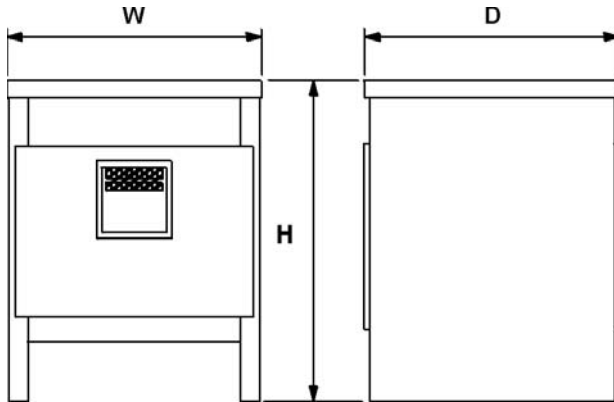
kVA	Catalog Number Group I Rolled Steel	Catalog Number Group II Stainless Steel	Height (inch)	Width (inch)	Depth (inch)	Ship Weight Approx. (lbs)	Design Style	Elec Conn	Primary Amps	Secondary Amps
3	HT7F3AS	HTS7F3AS	13	16	9	116	4	26	2.9	8.3
6	HT7F6AS	HTS7F6AS	13	16	9	145	4	26	5.8	16.6
9	HT7F9AS	HTS7F9AS	17	20	11	225	4	26	8.7	25.0

* cUL Underwriters tested to CSA standards.

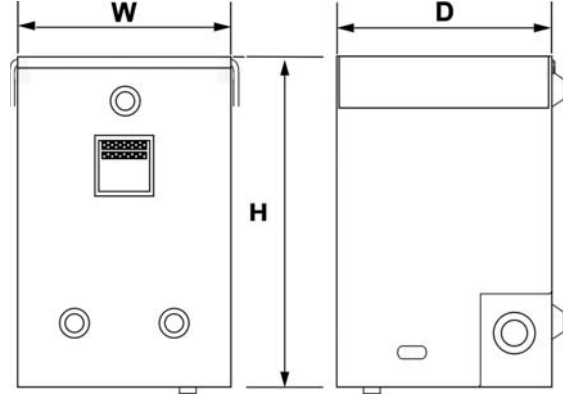
** See the Technical Notes section with respect to capacity of center tap.

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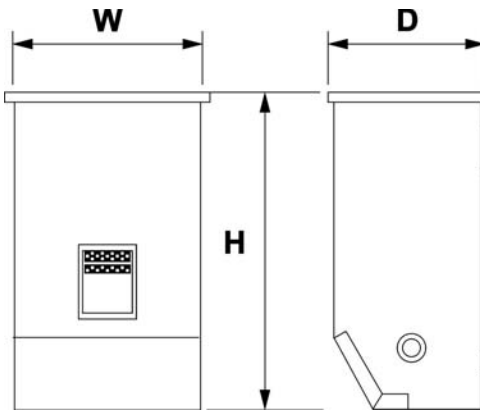
Design Styles



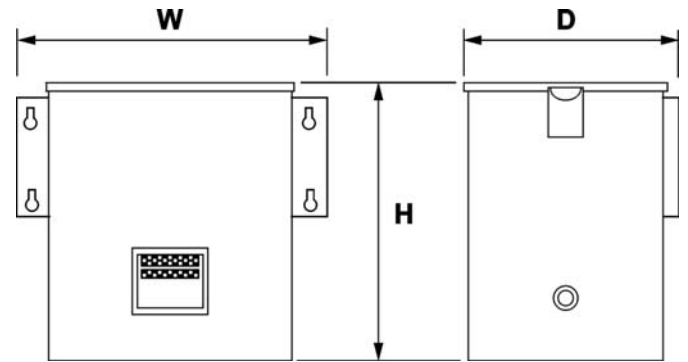
Style 1 – Ventilated



Style 2 – Non-Encapsulated

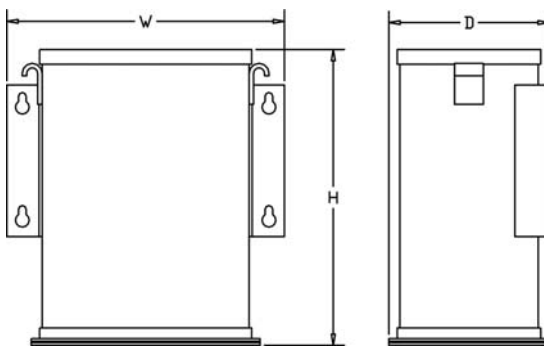


Style 3 – Encapsulated



Style 4 – Encapsulated

Customized Enclosures – Contact Technical Services



Style 5 – Encapsulated

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

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6 Non-Ventilated Automation Transformers



Electrical Connections (Single Phase)

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

12

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

HS1 Series

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

13

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

HS1 Series

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

14

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

HS5 Series

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

15

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

HS5 Series

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

16

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

HS12 Series

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

17

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

HS12 Series

Note:

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

Electrical Connections (Single Phase)

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

18

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

HS10 Series

Note: 1 through 2 kVA units have electrostatic shielding.

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

19

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

HS10 Series

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

20

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

HS14 Series

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

21

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

HS14 Series

Notes:

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

6 Non-Ventilated Automation Transformers



Electrical Connections (Three Phase)

22
240 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 5% FCBN

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

HT6 Series

23
480 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 5% FCBN

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

HT1 Series

24
480 Δ Volt Primary
240 Δ w/120 CT Volt Secondary
Taps: 2, 5% FCBN

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

HT5 Series

25
480 Δ Volt Primary
380Y/220 Volt Secondary
Taps: 2, 5% FCBN

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

HT9 Series

26
600 Δ Volt Primary
208Y/120 Volt Secondary
Taps: 2, 5% FCBN

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

HT7 Series

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

Custom Transformers

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

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

Specification Guide for Low Voltage, General Purpose, Dry Type Transformers (600 Volt Class) – .05 kVA to 10 kVA

General

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

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

Standards

- Transformers must be listed by Underwriters Laboratory, certified with Canadian Standards Association and designed, constructed and rated in accordance with NEMA ST 20 and applicable IEEE & OSHA specifications.

Construction

Cores

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

Coils

- Coil conductors shall be either aluminum or copper and must be continuous. The entire core and coil assembly shall be impregnated with a thermal setting varnish and cured to reduce hot spots in the coils and seal out moisture. Coils with exposed magnet wire will not be acceptable. Transformers shall have common core construction.

- All transformers 1 kVA or larger shall incorporate a faraday (electrostatic) shield between primary and secondary windings for the attenuation of voltage spikes, line noise and voltage transients.
- General purpose transformers are classified as isolation transformers.

Enclosures

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

Specification Guide for Low Voltage, General Purpose, Dry Type Transformers (600 Volt class) – .05 kVA to 10 kVA - continued

Performance

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

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

- Transformers shall incorporate a UL recognized insulation system per the following table:

kVA	Insulation System	Temperature Rise
.05-.250	130°C or 180°C	80°C
.500-10	180°C or 200°C	115°C
15-500	180°C or 200°C	115°C

Warranty

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

Approval

- Typical performance and dimensional data on similar units must be submitted on all transformers for approval. Factory testing must have been conducted in accordance with NEMA ST20. Submitted performance and dimensional data must include, but is not limited to, the following:
 - Height, width, depth, mounting dimensions, conduit entry locations and lifting provisions
 - Weight
 - Transformer losses
 - Regulation - both at unity and 80% power factor.
 - Potential tests both applied and induced
 - Temperature - both reference and ambient
 - Temperature rise under full load
 - Insulation class
 - % excitation current
 - Electrical schematic including taps
 - Polarity and phase rotation
 - kVA, frequency and voltage rating
 - IR, IX, and IZ percentages at reference temperature
 - Audible sound level
- Alternate manufacturers seeking approval consideration must submit to the consulting engineer no less than fourteen (14) days prior to bid date, guaranteed performance and dimensional data for each size specified. Data submitted may be typical performance data on similar units.