DOE 2016 ENERGY EFFICIENT DRY-TYPE TRANSFORMERS | UPDATE

SUITABLE 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 line 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 needed. Common applications include inductive and resistive loads such as motors, lighting and heating.

FEATURES

- Energy Efficient Compliant to DOE 2016 ①
- UL Listed/NEMA Type 3R ventilated outdoor enclosures when used with optional weather shields (order separately)
- UL Class 220°C insulation system, 150°C temperature rise under full load
- Terminal board connections and spacious wiring compartment
- Panel enclosure design reduces labor time. Wiring diagram on inside front cover.
- High efficiency for low cost operation
- Single and three phase availability
- Enhanced Enclosures features:
  - Made in the USA
  - Lower Center of Gravity with line of site mounting feet – easily lifted by a forklift for placement from base.
  - Replaceable panels: L,R, F, B and top
  - Enhanced Fasteners – Cage - Nuts with hex – star bolts
  - Adequate Wiring compartment - Top termination or Top with Bottom Terminations styles available depending on kVA
  - Enhanced Packaging tested to ISTA3B standards
- Fast delivery
- 10 year limited warranty

CERTIFICATIONS AND COMPLIANCES

- c UL us LISTED: E25872 ②
  - UL 1561/CSA C22.2 No. 47
- c UL Energy Verified / Rendement Énergétique Vérifié: EV33981
  - CSA No. 802.2-18

kVA	Type 3R Weather Shield ③	H x W x D	Approx. Ship Weight (lbs)	Elec Conn ③	Primary Amps	Secondary Amps	SolaHD Catalog Number
Single Phase: 240 x 480 Volt Primary, 120/240 Secondary 60 Hz, Design Style 1 ④							
15	WS-15	28 x 16 x 16	210	1	62.5/31.3	125/62.5	**ES5H15S**
25	WS-15	28 x 16 x 16	245	1	104/52.1	208/104	**ES5H25S**
37.5	WS-17	31 x 18 x 18	340	1	156/78	313/156	**ES5H37S**
50	WS-17	31 x 18 x 18	415	1	208/104	416/208	**ES5H50S**
75	WS-09	44 x 23 x 21	610	1	313/156	625/313	**ES5H75S**
100	WS-09	44 x 23 x 21	705	1	417/208	833/417	**ES5H100S**
167	WS-16	46 x 26 x 24	980	1	695/348	1392/695	**ES5H167S**
Three Phase: 480 Volt Δ Primary, 208/120 Secondary 60 Hz, Design Style 1 ④							
15	WS-02	23 x 18 x 14	221	5	18.1	41.7	**EE2H15S** ⑤
30	WS-14	28 x 23 x 16	310	5	36.1	83.4	**EE2H30S** ⑤
45	WS-14	28 x 23 x 16	387	5	54.2	125	**EE2H45S** ⑤
75	WS-30	34 x 28 x 22	678	5	90.3	208	**EE2H75S** ⑤
112.5	WS-30	34 x 28 x 22	794	5	135	313	**EE2H112S** ⑤
150	WS-10	44 x 33 x 21	1006	5	181	417	**E2H150S**
225	WS-11	46 x 36 x 24	1368	5	271	625	**E2H225S**
300	WS-11	46 x 36 x 24	1479	5	361	834	**E2H300S**
500	WS-12	65 x 45 x 35	2457	5	602	1390	**E2H500S**
Three Phase: 480 Volt Δ Primary, 240 Volt Δ, Secondary with reduced capacity center tap ⑥ 60 Hz, Design Style 1 ④							
15	WS-02	23 x 19 x 14	221	6	18.1	36.1	**EE5H15S** ⑤
30	WS-14	28 x 23 x 16	322	6	36.1	72.3	**EE5H30S** ⑤
45	WS-14	28 x 23 x 16	387	6	54.2	108	**EE5H45S** ⑤
75	WS-30	34 x 28 x 22	678	6	90.3	181	**EE5H75S** ⑤
112.5	WS-30	34 x 28 x 22	792	6	135	271	**EE5H112S** ⑤
150	WS-10	44 x 33 x 21	1009	6	181	361	**E5H150S**
225	WS-11	46 x 36 x 24	1367	6	271	542	**E5H225S**
300	WS-11	46 x 36 x 24	1478	6	361	723	**E5H300S**
500	WS-12	65 x 45 x 35	2457	6	602	1204	**E5H500S**

① DOE DOE 2016 refers to Department of Energy CFR (Code of Federal Regulations) title 10, part 431.196. NRCan 2019 refers to Natural Resources Canada CSA C802.2, Minimum Efficiency Values for Dry-Type Transformers.
② Not all designs may be c UL us LISTED initially; contact Technical Services.
③ Weather shields (set of two) must be ordered separately.
④ Design Styles and Electrical Connections can be found at the end of the Ventilated Distribution Transformers section.
⑤ EE indicates this is an Enhanced Enclosure. Unshielded model is available, contact your local SolaHD sales representative for details.
⑥ For information regarding the Capacity of Center Tap in Center Tap Delta Transformers contact SolaHD technical support at 1-800-377-4384 or solahd.technicalservices@emerson.com.

SOLAHD™
For product information:
www.Emerson.com/SolaHD
1.800.377.4384

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Selection steps to manually select a transformer *(see Full Load Current Chart).*

Find the electrical load requirements. *This information is available from the equipment manufacturer and is typically listed on the nameplate of the equipment.*

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?

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.

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).

$$\text{kVA (1Ø)} = \frac{\text{Volts x Amps}}{1000}$$

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.

$$\text{kVA (3Ø)} = \frac{\text{Volts x Amps x 1.732}}{1000}$$

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.

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

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.

Three things to keep in mind for AC, Motor Horsepower Amperage:

1. 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.
2. Increase required transformer kVAby 20% if motors are started more than once per hour.
3. 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.

kVA Rating	120 V	208 V	240 V	277 V	480 V	600 V
	Amperes					
SINGLE PHASE: FULL LOAD CURRENT CHART						
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
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
100	833	481	417	361	208	167
167	1392	803	696	603	348	278
200	1667	962	833	722	417	333
250	2083	1202	1042	903	521	417
THREE PHASE: FULL LOAD CURRENT CHART						
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
150	—	416	361	—	180	144
225	—	625	541	—	271	217
300	—	833	722	—	361	289
500	—	1388	1203	—	601	481

Horse Power	115 V	208 V	230 V	460 V	575 V	Mini Tfmr. kVA	Std. NEMA kVA Size
SINGLE PHASE MOTOR CHART: AC, MOTOR HORSEPOWER AMPERAGE							
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							
½	—	2.2	2	1	0.8	0.9	3
¾	—	3.1	2.8	1.4	1.1	1.2	3
1	—	4	3.6	1.8	1.4	1.5	3
1½	—	5.7	5.2	2.6	2.1	2.1	3
2	—	7.5	6.8	3.4	2.7	2.7	3
3	—	10.7	9.6	4.8	3.9	3.8	6
5	—	16.7	15.2	7.6	6.1	6.3	9
7½	—	24	22	11	9	9.2	15
10	—	31	28	14	11	11.2	15
15	—	46	42	21	17	16.6	30
20	—	59	54	27	22	21.6	30
25	—	75	68	34	27	26.6	30
30	—	88	80	40	32	32.4	45
40	—	114	104	52	41	43.2	45
50	—	143	130	65	52	52	75
60	—	170	154	77	62	64	75
75	—	211	192	96	77	80	112.5
100	—	273	248	124	99	103	112.5
125	—	342	312	156	125	130	150
150	—	396	360	180	144	150	150
200	—	528	480	240	192	200	225