Dry-Type Encapsulated Single-Phase Distribution Transformers



TF252795S



T2536171S



T2535183S



T1001K0220C



T279746S

Acme Electric offers a complete range of Dry-type Distribution Transformers optimized to provide long life in general-purpose applications. Dry-type transformers are smaller and easier to maintain than liquid-filled transformers. These 600V class and below single-phase transformers are listed as Styles SR and ER.

Applications

- Healthcare facilities, educational facilities, theaters, stadiums, and entertainment venues
- Lighting
- Motors
- C&C equipment
- Power loads from power distribution systems

Agency Approvals

cULus (file no. E79947). Standard UL 506, listed in UL file as Style SR and ER for units 150 VA and below.

CE (RoHS Directive 2011/65/EU and 2015/863/EU). Export models.

General Specifications

- Keyhole mounting slots for mounting bolts prior to installation.
- Mounting slots are accessible from the front.
- Flexible copper lead wire terminations for easy connections outside the front access wiring compartment.
- Frequency: 60 Hz on standard models and 50/60 Hz on CE models.
- Winding material:
  - CE export models–Cu
  - Standard models–Al

Features

- Electrostatic shield standard on 7.5kVA and larger for clean, noise-free power.
- Lifting ears are included on 3–25 kVA units.
- Dual size knockouts in both sides and the bottom of the wiring compartment for greater wiring convenience and flexibility.
- UL and cUL listed and UL-3R enclosures meet or exceed all listing criteria, including NEMA, ANSI and OSHA standards.
- Encapsulated and completely enclosed design: electrical-grade silica and resin compounds completely enclose the core and coil to seal out all moisture and air. UL Type 3R enclosure for indoor or outdoor service. Encapsulation eliminates corrosion and insulation deterioration.
- Quiet operation with sound levels well below NEMA standards.

Dry-Type Encapsulated Single-Phase Distribution Transformers

How to Compute the kVA Required (Single-Phase Loads):

1. Determine electrical load

A. Voltage required by load.
B. Amperes or kVA capacity required by load.
C. Frequency in Hz (cycles per second).
D. Verify load is designed to operate on a single-phase supply.

The above information is standard data normally obtained from equipment nameplates or instruction manuals.

2. Determine supply voltage

A. Voltage of supply (source).
B. Frequency in Hz (cycles per second).

The frequency of the line supply and electrical load must be the same. Select single-phase transformers designed to operate at this frequency, having a primary (input) equal to the supply voltage and a secondary (output) equal to the voltage required by the load.

3. If the load nameplate expresses a rating in kVA, a transformer can be directly selected from the charts. Choose from a group of transformers with primary and secondary voltages matching those you have just determined.

A. Select a transformer with a standard kVA capacity equal to or greater than that needed to operate the load.
B. Primary taps are available on most models to compensate for line voltage variations.

Full Load Current (A) – Single-Phase Circuits

kVA	120V	208V	240V	277V	380V	440V	480V	600V
0.25	2.0	1.2	1.0	0.9	0.6	0.5	0.5	0.4
0.50	4.2	2.4	2.1	1.8	1.3	1.1	1.0	0.8
0.75	6.3	3.6	3.1	2.7	2.0	1.7	1.6	1.3
1.0	8.3	4.8	4.2	3.6	2.6	2.3	2.1	1.7
1.5	12.5	7.2	6.2	5.4	3.9	3.4	3.1	2.5
2.0	16.7	9.6	8.3	7.2	5.2	4.5	4.2	3.3
3.0	25	14.4	12.5	10.8	7.9	6.8	6.2	5.0
5.0	41	24.0	20.8	18.0	13.1	11.3	10.4	8.3
7.5	62	36	31	27	19.7	17	15.6	12.5
10	83	48	41	36	26	22.7	20.8	16.7
15	125	72	62	54	39	34	31	25
25	208	120	104	90	65	57	52	41

Full Load Current (A) – Single-Phase AC Motors[1]

Horsepower	115V	208V	230V	Minimum Transformer kVA
1/6	4.4	2.4	2.2	0.53
1/4	5.8	3.2	2.9	0.70
1/3	7.2	4.0	3.6	0.87
1/2	9.8	5.4	4.9	1.18
3/4	13.8	7.6	6.9	1.66
1	16	8.8	8	1.92
1.5	20	11.0	10	2.40
2.0	24	13.2	12	2.88
3.0	34	18.7	17	4.10
5.0	56	30.8	28	6.72
7.5	80	44	40	9.6
10	100	55	50	12.0

1) When motor service factor is greater than 1, increase full load amps proportionally. Example: If service factor is 1.15, increase above amp values by 15%.

Note: If motors are started more than once per hour, increase minimum transformer kVA by 20%.

$$\text{1 Phase kVA} = \frac{\text{Volts x Amps}}{1000}$$

C. When load ratings are given only in amperes, tables 1 and 2 or the following formulas may be used to determine proper kVA size for the required transformer.

(1) To determine kVA when volts and amps are known:

$$\text{kVA} = \frac{\text{Volts x Amps}}{1000}$$

(2) To determine Amperes when volts and amps are known:

$$\text{Amps} = \frac{\text{kVA x 1000}}{\text{Volts}}$$

Single-Phase Example

Select a transformer to meet the following conditions:

- Load is single-phase lighting using incandescent lamps.
- Each fixture requires 1.3A @ 120V, 1-phase, 60 Hz, power factor of unity.
- The installation requires a total of 52 100-watt fixtures.
- The desired circuit distributing power to the light fixtures is 120/240 volt, three wire, single-phase. The supply voltage is 460 volt, 3 phase.

To compute the kVA required:

$$\frac{\text{1.3A x 120V}}{1000} = \text{0.156 kVA for each lighting fixture}$$

Always use amps x volts to compute VA; never use lamp wattage. 0.156 kVA/fixture x 52 fixtures = 8.11 kVA. The two sizes (kVA nearest 8.11 kVA) are 7.5 kVA and 10 kVA. Use the 10 kVA. This will not overload the transformer and allows some capacity (1.89 kVA) for future loads. Since the supply is 460V (not 480V), use the 456V tap. This will produce approximately 120V on output. If the tap is not used, the output will be 115V compared to the desired 120V. Note the transformer selected is single-phase, but the supply is 480V, three-phase. Single-phase is obtained by using any two wires of the three-phase supply.

For the latest prices, please check AutomationDirect.com.

Dry-Type Encapsulated Single-Phase Distribution Transformers

Acme Dry-Type Encapsulated Single-Phase Distribution Transformers Selection Guide

Part Number	Price	kVA Rating	Primary (Volts)	Secondary (Volts)	Impedance %Z	Total Heat Dissipation (W)	Mounting Type	Weight lb [kg]	Wiring Diagram	Drawing
T1250V0190C		0.25	240x480 60 Hz	120/240	9.88%	29.5	Wall	11 [0]	A	PDF
T1500V0190C		0.50			10.83%	29.5		15 [6.8]	A	PDF
T1750V0190C		0.75			12.83%	73.7		19 [8.6]	A	PDF
T1001K0190C		1.0	240x480 60 Hz	120/240	10.63%	92.5	Wall	26 [11.8]	A	PDF
T1105K0190C		1.5			11.63%	132		41 [18.6]	A	PDF
T1002K0190C		2.0			9.58%	140		48 [21.8]	A	PDF
T1003K0194C		3.0			9.79%	187		67 [30.4]	B	PDF
T1005K0194C		5.0			10.48%	243		110 [49.9]	B	PDF
T2535153S		7.5			2.16%	665.31		115 [52.2]	C	PDF
T2535163S		10			3.48%	1371.04		125 [56.7]	C	PDF
T2535173S		15			3.29%	971.81		170 [77.1]	C	PDF
T2535183S		25			1.31%	1263.63		250 [113.0]	C	PDF
T1500V0200C		0.50	600 60 Hz	120/240	10.93%	50	Wall	16 [7.3]	D	PDF
T1750V0200C		0.75			11.98%	60		19 [8.6]	D	PDF
T1001K0200C		1.0			10.68%	83		26 [11.8]	D	PDF
T1105K0200C		1.5			10.58%	150		40 [18.1]	D	PDF
T1002K0200C		2.0			7.83%	150		48 [21.8]	D	PDF
T1003K0201C		3.0			10.02%	160		69 [31.3]	E	PDF
T1005K0201C		5.0			10.48%	225		110 [49.9]	E	PDF
T2536151S		7.5			4.10%	642.00		115 [52.2]	E	PDF
T2536161S		10			2.71%	727.64		125 [56.7]	E	PDF
T2536171S		15			3.35%	911.31		170 [77.1]	E	PDF
T1001K0220C		1.0	120/208/240/277 60 Hz	120/240	10.42%	85	Wall	27 [12.2]	G	PDF
T1105K0220C		1.5			5.65%	105		43 [19.5]	G	PDF
T1002K0220C		2.0			7.28%	150		51 [23.1]	G	PDF
T1003K0220C		3.0			10.58%	160		69 [31.3]	G	PDF
T1005K0220C		5.0			7.42%	225		112 [50.8]	G	PDF
T279745S		7.5			2.69%	483.00		105 [47.6]	H	PDF
T279746S		10			1.78%	594.71		124 [56.2]	H	PDF

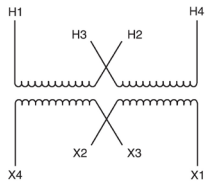
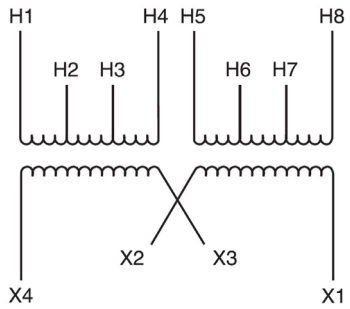
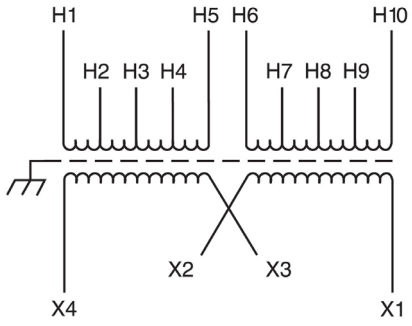
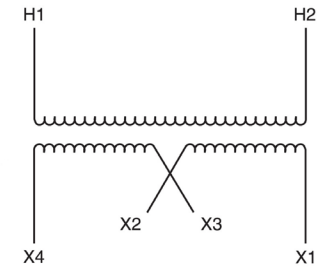
CE Marked Export Models Selection Guide

TF217437S		1.0	190/200/208/220 x 380/400/416/440 50/60 Hz	120/240	8.08%	398.83	Wall	24 [10.9]	F	PDF
TF217439S		2.0			4.67%	630.16		38 [17.2]	F	PDF
TF252520S		5.0			2.95%	1159.36		75 [34.0]	F	PDF
TF252794S		7.5			2.86%	695.40		115 [52.2]	F	PDF
TF252795S		10			3.01%	827.48		125 [56.7]	F	PDF

Note: A wall mounting bracket is included with each transformer. The bracket may ship loose; however, it is located in the wiring compartment on most units.
Note: See Acme drawing for unit-specific temperature rise

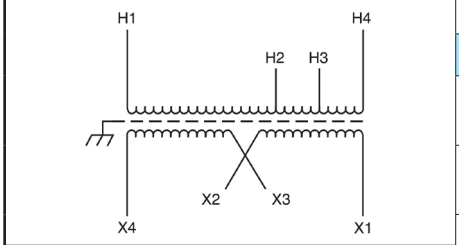
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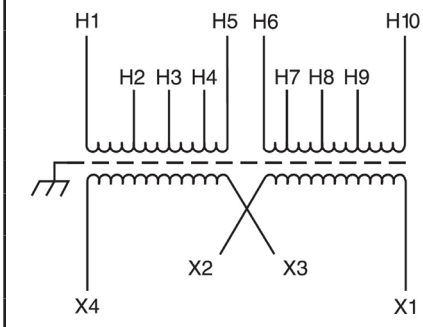
Wiring Diagrams

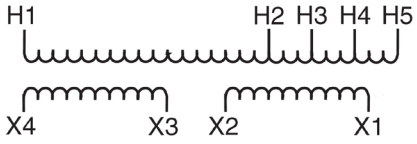
WIRING DIAGRAM A ***Primary: 240x480*** ***Secondary: 120/240*** ***Taps: None***	***Primary Volts***	***Connect Primary Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	480	H1-H4	H2 to H3	–
	240	H1-H3 & H2-H4	–	–
	***Secondary Volts***	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X2-X4
	120	–	X1 to X3, X2 to X4	X1-X4
WIRING DIAGRAM B ***Primary: 240x480*** ***Secondary: 120/240*** ***Taps: 2, 2.5% ANFC, 2, 2.5% BNFC***	***Primary Volts***	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	252	H1-H8	H1 to H5, H4 to H8	–
	240	H1-H7	H1 to H5, H3 to H7	–
	228	H1-H6	H1 to H5,H2 to H6	–
	504	H1-H8	H4 to H5	–
	492	H1-H8	H3 to H5	–
	480	H1-H7	H3 to H5	–
	468	H1-H7	H2 to H5	–
	456	H1-H6	H2 to H5	–
	Secondary Volts	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X2-X4
	120	–	X1 to X3, X2 to X4	X1-X4
WIRING DIAGRAM C ***Primary: 240x480*** ***Secondary: 120/240*** ***Taps: 2, 2.5% ANFC, 4, 2.5% BNFC***	***Primary Volts***	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	216	H1-H10	H1 to H9, H10 to H2	–
	228	H1-H10	H1 to H8, H10 to H3	–
	240	H1-H10	H1 to H7, H10 to H4	–
	252	H1-H10	H1 to H6, H10 to H5	–
	432	H1-H10	H2 to H9	–
	444	H1-H10	H3 to H9	–
	456	H1-H10	H3 to H8	–
	468	H1-H10	H4 to H8	–
	480	H1-H10	H4 to H7	–
	492	H1-H10	H5 to H7	–
	504	H1-H10	H5 to H6	–
	Secondary Volts	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X3-X4
	120	–	X1 to X3, X2 to X4	X1-X4
WIRING DIAGRAM D ***Primary: 600*** ***Secondary: 120/240*** ***Taps: None***	***Primary Volts***	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	600	H1-H2	–	–
	Secondary Volts	***Connect Lines To***	***Inter-connect***	***Connect Secondary Lines To***
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X2-X4
	120	–	X1 to X3, X2 to X4	X1-X4

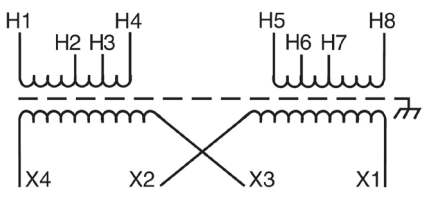
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Wiring Diagrams (continued)

WIRING DIAGRAM E Primary: 600 Secondary:120/240 Taps: 2, 5% BNFC	Primary Volts	Connect Primary Lines To	Inter-connect	Connect Secondary Lines To
	600	H1-H4	–	–
	570	H1-H3	–	–
	540	H1-H2	–	–
Note: T1003 and T1005 units do not include ground shields.	**Secondary Volts**	**Connect Lines To**	**Inter-connect**	
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X2-X4
	120	–	X1 to X3, X2 to X4	X1-X4

WIRING DIAGRAM F Primary: 190-220 x 380-440 Secondary: 120/240	Primary Volts	Connect Lines To	Inter-connect	
	190	H1 & H7	H1 to H6, H2 to H7	–
	200	H1 & H8	H1 to H6, H3 to H8	–
	208	H1 & H9	H1 to H6, H4 to H9	–
	220	H1 & H10	H1 to H6, H5 to H10	–
	380	H1 & H7	H2 & H6	–
	400	H1 & H8	H3 & H6	–
	416	H1 & H9	H4 & H6	–
	440	H1 & H10	H5 & H6	–
	Secondary Volts	**Connect Lines To**	**Inter-connect**	
	240	–	X2 to X3	X1-X4
	120/240	–	X2 to X3	X1-X2-X4
	120	–	X1 to X3, X2 to X4	X1-X4

WIRING DIAGRAM G Primary: 120/208/240/277 Secondary: 120/240	Primary Volts	Connect Lines To	Inter-connect	
	277	H1, H5	–	–
	240	H1, H4	–	–
	208	H1, H3	–	–
	120	H1, H2	–	–
	Secondary Volts	**Connect Lines To**	**Inter-connect**	
	120		X1 to X3, X2 to X4	X1-X4
	120/240		X2 to X3	X1-X2-X4
	240		X2 to X3	X1-X4

WIRING DIAGRAM H Primary: 120/208/240/277 Secondary: 120/240	Primary Volts	Connect Lines To	Inter-connect	
	120	H1 & H8	H1 to H6, H3 to H8	–
	208	H1 & H8	H2 to H7	–
	240	H1 & H8	H3 to H6	–
	277	H1 & H8	H4 to H5	–
	Secondary Volts	**Connect Lines To**	**Inter-connect**	
	240	–	X2 to X3	X1 & X4
	120/240	–	X2 to X3	X1, X3, X4
	120	–	X1 to X3, X2 to X4	X1 & X4

Acme Transformers Frequently Asked Questions

1. Can transformers be used in parallel?

Single phase transformers can be used in parallel only when their impedances and voltages are equal. If unequal voltages are used, a circulating current exists in the closed network between the two transformers, which will cause excess heating and result in a shorter life of the transformer. In addition, impedance values of each transformer must be within 7.5% of each other. For example: Transformer A has an impedance of 4%, transformer B, which is to be parallel to A, must have an impedance between the limits of 3.7% and 4.3%. When paralleling 3-phase transformers, the same precautions must be observed as listed above, plus the angular displacement and phasing between the two transformers must be identical.

2. Can Acme Transformers be reverse connected?

ACME dry-type distribution transformers can be reverse connected without a loss of kVA rating, but there are certain limitations. Transformers rated 3 kVA and larger can be reverse connected without any adverse effects or loss in kVA capacity. The reason for this limitation in kVA size is that the turns ratio is the same as the voltage ratio. Example: A transformer with a 480V input, 240V output can have the output connected to a 240V source and thereby become the primary or input to the transformer, then the original 480V primary winding will become the output or 480V secondary. The transformer will not be damaged if used in a reverse connection; however, the output voltage will be lower than is indicated by the nameplate.

3. What is meant by regulation in a transformer?

Voltage regulation in transformers is the difference between the no load voltage and the full load voltage. This is usually expressed in terms of percentage. For example: A transformer delivers 100V at no load and the voltage drops to 95V at full load, the regulation would be 5%. ACME dry-type distribution transformers generally have regulation from 2% to 4%, depending on the size and the application for which they are used.

4. Why is impedance important?

It is used for determining the interrupting capacity of a circuit breaker or fuse employed to protect the primary of a transformer. Example: Determine a minimum circuit breaker trip rating and interrupting capacity for a 10 kVA single phase transformer with 4% impedance, to be operated from a 480V 60 Hz source. Calculate as follows:

$$\text{Normal Full Load Current} = \frac{\text{Nameplate Volt Amps}}{\text{Line Volts}} = \frac{10{,}000\ \text{VA}}{480\text{V}} = 20.8\text{A}$$

$$\text{Maximum Short Circuit Amps} = \frac{\text{Full Load Amps}}{4\%} = \frac{20.8\text{A}}{4\%} = 520\text{A}$$

The breaker or fuse would have a minimum interrupting rating of 520A at 480V.

Example: Determine the interrupting capacity, in amperes, of a circuit breaker or fuse required for a 75 kVA, 3-phase transformer, with a primary of 480V delta and secondary of 208Y/120 V. The transformer impedance (Z) = 5%. If the secondary is short circuited (faulted), the following capacities are required:

$$\text{Normal Full Load Current} = \frac{\text{Volt Amps}}{\sqrt{3} \times \text{Line Volts}} = \frac{75{,}000\ \text{VA}}{\sqrt{3} \times 480\text{V}} = 90\text{A}$$

$$\text{Maximum Short Circuit Amps} = \frac{\text{Full Load Amps}}{5\%} = \frac{90\text{A}}{5\%} = 1{,}800\text{A}$$

The breaker or fuse would have a minimum interrupting rating of 1,800A at 480V.

Note: The secondary voltage is not used in the calculation. The reason is the primary circuit of the transformer is the only winding being interrupted.

5.Can 60 Hz transformers be used at higher frequencies?

ACME transformers can be used at frequencies above 60 Hz up to 400 Hz with no limitations provided nameplate voltages are not exceeded. However, 60 Hz transformers will have less voltage regulation at 400 Hz than at 60 Hz.

Acme Transformers Frequently Asked Questions

6. What color are ACME Dry-Type Transformers?

ASA 61 (NEMA) light gray is used on all enclosed transformers from 0.050 to 1000 kVA

7. How do you select a transformer to operate in an ambient higher than 40°C?

When the ambient exceeds 40°C use the following chart for de-rating standard transformers.

Maximum Ambient Temperature	*Maximum Percentage of Loading*
40 °C [104 °F]	100%
50 °C [122 °F]	92%
60 °C [140 °F]	84%

Instead of ordering custom built transformers to operate in ambients higher than 40°C, it is more economical to use a standard transformer of a larger kVA rating.