

Three-Phase Type DT-3E Totally Enclosed Non-Ventilated

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Totally Enclosed Non-Ventilated Transformers

Product Description

Note: The following pages provide listings for most standard transformer ratings and styles. For other ratings or styles not shown, or for special enclosure types (including stainless steel), refer to Eaton.

- Suitable for indoor or outdoor applications
- Totally enclosed, non-ventilated enclosures rated NEMA 3R
- 220°C insulation system
- 150°C rise standard; 115°C or 80°C rise optional

Application Description

Totally enclosed non-ventilated dry-type transformers are for special applications, where because of adverse atmospheric conditions it is desirable to use a dry-type non-ventilated transformer vs. the ventilated standard unit, which has openings in its enclosure to allow air to flow directly over the core and coil.

In applications where the atmosphere contains conductive, corrosive, or combustible materials, which might damage a transformer, or lint and dust flyings that might block the ventilation passages, the non-ventilated transformer is highly suited. It has no openings in the enclosure. Heat is dissipated by radiating from the surface area of the enclosure. Consequently, the enclosures are larger than those of the standard ventilated type. Non-ventilated transformers are suited for application in the textile, chemical, automotive, petrochemical, foundry, cement, food, paper and other industries where the transformer is subject to spray or washdown conditions.

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Features, Benefits and Functions

- 60 Hz operation (50/60 Hz operation available)
- Short-term overload capability as required by ANSI
- Meet NEMA ST-20 sound levels

Standards and Certifications

- UL listed



Industry Standards

All Eaton dry-type distribution and control transformers are built and tested in accordance with applicable NEMA, ANSI and IEEE Standards.

Seismically Qualified

Eaton manufactured dry-type distribution transformers are seismically qualified and exceed requirements of the Uniform Building Code (UBC), International Building Code (IBC) and California Code Title 24.

Catalog Number Selection

Please refer to Section 2.7 **Page V2-T2-185**.

Product Selection

Additional Product Selection information begins on **Page V2-T2-187**.

Single-Phase—Type DS-3E, 60 Hz ^①

240 x 480 Volts to 120/240 Volts +1–5%, –2–5% at 240 Volts Primary; +2–2.5%, –4–2.5% at 480 Volts Primary

kVA	Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Style Number
15	DS-3E	150	FR817N	3XA	350 (159)	T20P11S15NV
25	DS-3E	150	FR818N	3XA	350 (159)	T20P11S25NV
37.5	DS-3E	150	FR820N	3XA	600 (274)	T20P11S37NV
50	DS-3E	150	FR820N	3XA	720 (329)	T20P11S50NV

Three-Phase—Type DT-3E, 60 Hz ^①

480 Delta Volts to 208Y/120 Volts +2–2.5% FCAN, 4–2.5% FCBN Taps

kVA	Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Style Number
15	DT-3E	150	FR914AN	280B	480 (217)	V48M28T15NV
30	DT-3E	150	FR914AN	280B	480 (217)	V48M28T30NV
45	DT-3E	150	FR915BN	280B	600 (272)	V48M28T45NV
75	DT-3E	150	FR916AN	280B	760 (344)	V48M28T75NV
112.5	DT-3E	150	FR917N	280B	1100 (499)	V48M28T12NV
150	DT-3E	150	FR918AN	280B	1300 (589)	V48M28T49NV
225	DT-3E	150	FR919EN	275A	2400 (1088)	V48M28T22NV
300	DT-3E	150	FR920EN	275A	2900 (1315)	V48M28T33NV

Notes

^① Transformers Type EPT 75 kVA and smaller three-phase, and Type EP 37.5 kVA and smaller single-phase, are furnished non-ventilated normally, as standard. See general-purpose transformers. Contact your local Eaton sales office for availability of additional totally enclosed non-ventilated transformers. Contact your local Eaton sales office for CE Mark transformer requirements. For other ratings or styles not shown, or for special enclosure types (including stainless steel), refer to Eaton. Frame drawings/dimensions information begins on **Page V2-T2-213**.

Accessories

Please refer to Section 2.7 **Page V2-T2-189**.

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Technical Data and Specifications**Frequency**

Eaton standard dry-type distribution transformers are designed for 60 Hz operation. Transformers required for other frequencies are available and must be specifically designed.

Overload Capability

Short-term overload is designed into transformers as required by ANSI. Dry-type distribution transformers will deliver 200% nameplate load for one-half hour, 150% load for one hour and 125% load for four hours without being damaged, provided that a constant 50% load precedes and follows the overload. See ANSI C57.96-01.250 for additional limitations.

Continuous overload capacity is not deliberately designed into a transformer because the design objective is to be within the allowed winding temperature rise with nameplate loading.

Insulation System and Temperature Rise

Industry standards classify insulation systems and rise as shown below:

Insulation System Classification

Ambient	+ Winding Rise	+ Hot Spot	= Temp. Class
40°C	55°C	10°C	105°C
40°C	80°C	30°C	150°C
25°C	135°C	20°C	180°C
40°C	115°C	30°C	185°C
40°C	150°C	30°C	220°C

The design life of transformers having different insulation systems is the same—the lower-temperature systems are designed for the same life as the higher-temperature systems.

Enclosures

Eaton totally enclosed, non-ventilated transformers, Types DS-3E and DT-3E, use a NEMA 3R rated enclosure as standard.

Winding Terminations

Primary and secondary windings are terminated in the wiring compartment.

Totally enclosed non-ventilated transformers have leads brought out to aluminum pads that are pre-drilled to accept Cu/Al lugs. **Lugs are not supplied with these transformers.**

Eaton recommends external cables be rated 75°C for ventilated designs.

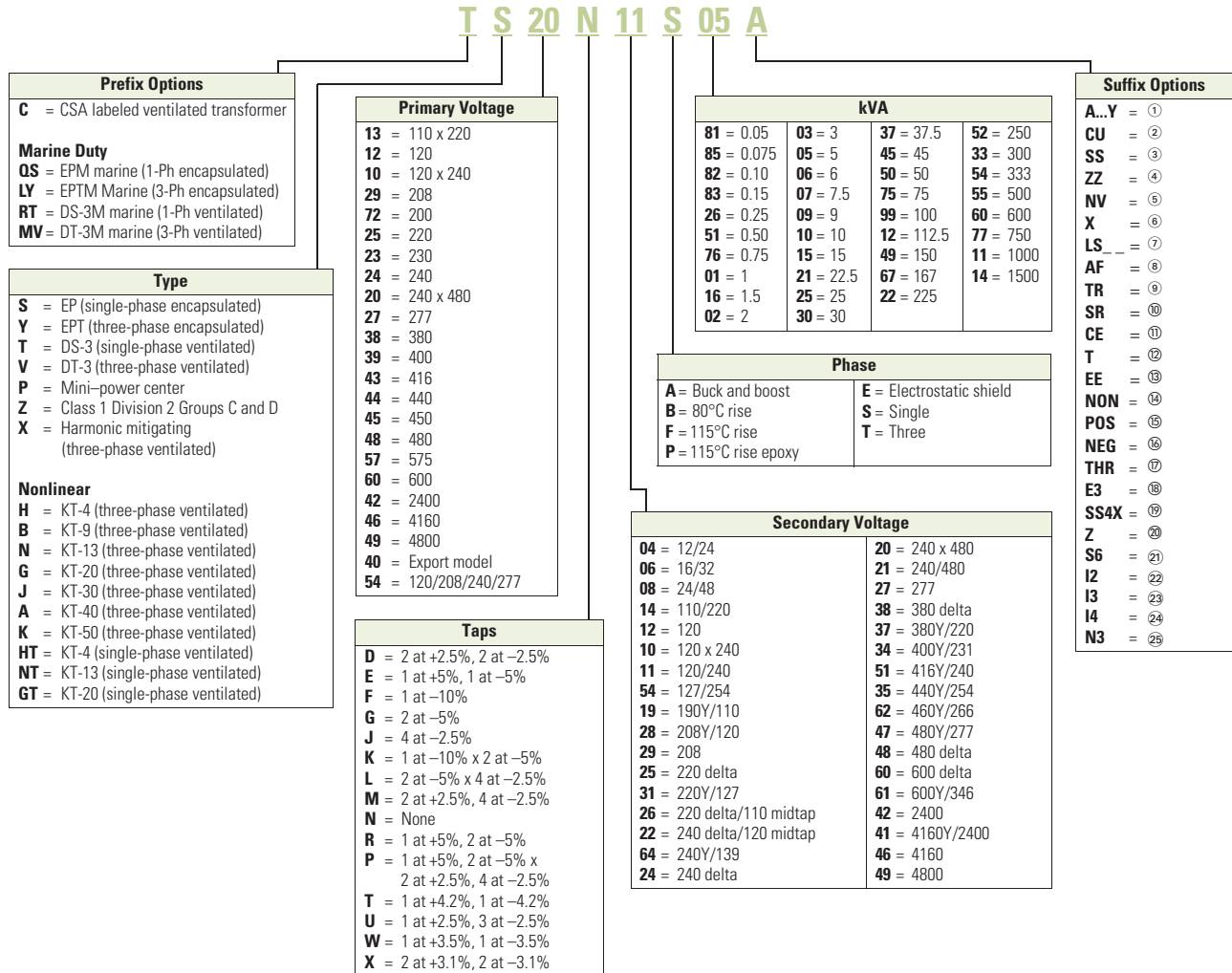
Series-Multiple Windings

Series-multiple windings consist of two similar coils in each winding that can be connected in series or parallel (multiple). Transformers with series-multiple windings are designated with an "x" or "/" between the voltage ratings, such as voltages of "120/240" or "240 x 480." If the series-multiple winding is designated by an "x," the winding can be connected only for a series or parallel. With the "/" designation, a mid-point also becomes available in addition to the series or parallel connection. As an example, a 120 x 240 winding can be connected for either 120 (parallel) or 240 (series), but a 120/240 winding can be connected for 120 (parallel), or 240 (series), or 240 with a 120 mid-point.

Note: The preceding pages provide listings for most standard transformer ratings and styles. For all-copper and bolt-on-breaker designs, contact Eaton. For other ratings or styles not shown, or for special enclosure types (including stainless steel), refer to Eaton.

Catalog Number Selection

General-Purpose, Energy-Efficient, Mini-Power Center, Shielded Isolation, Nonlinear, Buck-Boost, Marine Duty Transformers—
Example: S20N11S05A



Notes

- ① Model number is not used on newly designed/re-designed transformers.
 - ② Copper windings.
 - ③ Grade 304 stainless steel enclosure (does not imply a NEMA 4X rating).
 - ④ Open type core and coil assembly.
 - ⑤ Totally enclosed non-ventilated DS-3 or DT-3.
 - ⑥ 50/60 Hz.
 - ⑦ Low sound design. LS47 indicates low sound equal to 47 dB; LS42 indicates 42 dB.
 - ⑧ Fungus proof.
 - ⑨ Certified test report of standard production tests for the specific serial number to be shipped.
 - ⑩ Certified sound level report.
 - ⑪ CE Marked.
 - ⑫ Thermal indicator embedded in center coil. Suffix "TT" indicates two thermal indicators of different temperature ratings, are installed.
 - ⑬ NEMA TP-1 efficient.
 - ⑭ 0° phase-shift (used with HMTs).
 - ⑮ +15° phase-shift (used with HMTs).
 - ⑯ -15° phase-shift (used with HMTs).
 - ⑰ -30° phase-shift (used with HMTs).
 - ⑱ CSL3 DOE 2007 energy-efficient.
 - ⑲ NEMA 4X Grade 304 stainless steel enclosure.
 - ⑳ Easy install base.
 - ㉑ Grade 316 stainless steel enclosure (does not imply NEMA 4X rating).
 - ㉒ Integral 2-inch infrared viewing window.
 - ㉓ Integral 3-inch infrared viewing window.
 - ㉔ Integral 4-inch infrared viewing window.
 - ㉕ NEMA Premium® Efficient.
- For Eaton's industrial control transformers catalog number selection, see **Page V2-T2-186**.
- Contact your local Eaton sales office for voltage combinations not shown. Use table for catalog number breakdown only. Do not use to create catalog numbers because all combinations may not be valid.

Product Selection

Single-Phase Transformers

How to Select Single-Phase Units

1. Determine the primary (source) voltage—the voltage presently available.
2. Determine the secondary (load) voltage—the voltage needed at the load.
3. Determine the kVA load:
 - If the load is defined in kVA, a transformer can be selected from the tabulated data
 - If the load rating is given in amperes, determine the load kVA from the chart (below right). To determine kVA when volts and amperes are known, use the formula:

$$\text{kVA} = \frac{\text{Volts} \times \text{Amperes}}{1000}$$

- If the load is an AC motor, determine the minimum transformer kVA from the chart at the right
 - Select a transformer rating equal to or greater than the load kVA.
4. Define tap arrangements needed.
 5. Define temperature rise.

Using the above procedure, select the transformer from the listings in this catalog.

Single-Phase AC Motors

Horsepower	Full Load Amperes				Minimum Transformer kVA ^①
	115 Volts	208 Volts	220 Volts	230 Volts	
1/6	4.4	2.4	2.3	2.2	0.53
1/4	5.8	3.2	3.0	2.9	0.70
1/3	7.2	4.0	3.8	3.6	0.87
1/2	9.8	5.4	5.1	4.9	1.18
3/4	13.8	7.6	7.2	6.9	1.66
1	16	8.8	8.4	8	1.92
1-1/2	20	11.0	10.4	10	2.40
2	24	13.2	12.5	12	2.88
3	34	18.7	17.8	17	4.10
5	56	30.8	29.3	28	6.72
7-1/2	80	44	42	40	9.6
10	100	55	52	50	12.0

Full Load Current in Amperes—Single-Phase Circuits

kVA	Voltage									
	120	208	220	240	277	480	600	2400	4160	
0.25	2.0	1.2	1.1	1.0	0.9	0.5	0.4	0.10	0.06	
0.50	4.2	2.4	2.3	2.1	1.8	1.0	0.8	0.21	0.12	
0.75	6.3	3.6	3.4	3.1	2.7	1.6	1.3	0.31	0.18	
1	8.3	4.8	4.5	4.2	3.6	2.1	1.7	0.42	0.24	
1.5	12.5	7.2	6.8	6.2	5.4	3.1	2.5	0.63	0.36	
2	16.7	9.6	9.1	8.3	7.2	4.2	3.3	0.83	0.48	
3	25	14.4	13.6	12.5	10.8	6.2	5.0	1.2	0.72	
5	41	24.0	22.7	20.8	18.0	10.4	8.3	2.1	1.2	
7.5	62	36	34	31	27	15.6	12.5	3.1	1.8	
10	83	48	45	41	36	20.8	16.7	4.2	2.4	
15	125	72	68	62	54	31	25	6.2	3.6	
25	208	120	114	104	90	52	41	10.4	6.0	
37.5	312	180	170	156	135	78	62	15.6	9.0	
50	416	240	227	208	180	104	83	20.8	12.0	
75	625	360	341	312	270	156	125	31.3	18.0	
100	833	480	455	416	361	208	166	41.7	24.0	
167	1391	802	759	695	602	347	278	69.6	40.1	

Notes

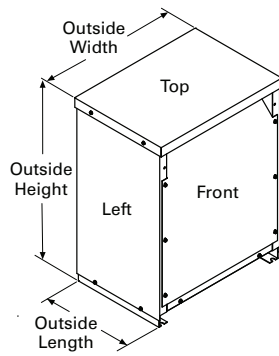
① If motors are started more than once per hour, increase minimum transformer kVA by 20%.

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

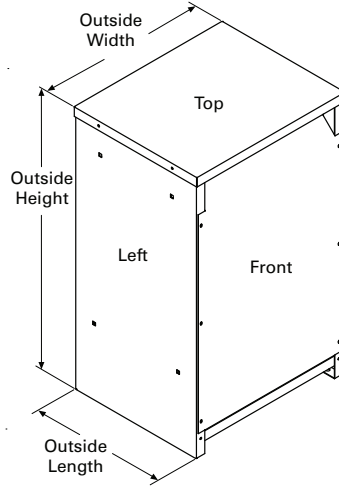
Dimensions

Approximate Dimensions in Inches (mm)

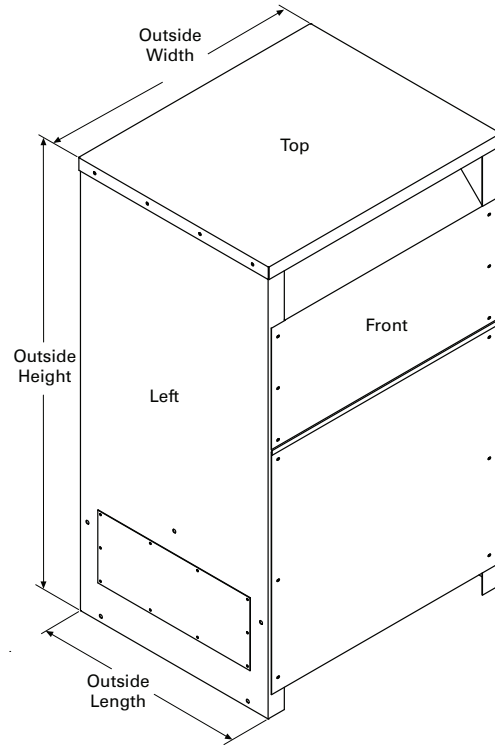
Enclosure Dimensional Drawings—Ventilated Transformers



Drawing 1



Drawing 2



Drawing 3

Frame	Drawing Number	Dimensions		
		Height	Width	Length
FR816	1	31.30 (795.0)	22.89 (581.4)	18.39 (467.2)
FR818	1	37.59 (954.8)	22.89 (581.4)	20.36 (517.1)
FR819	2	42.03 (1067.6)	24.22 (615.2)	23.84 (605.5)
FR820	2	42.03 (1067.6)	24.22 (615.2)	23.84 (605.5)
FR814	2	62.91 (1597.9)	29.97 (761.2)	33.97 (862.8)
FR842	1	33.75 (857.3)	22.45 (570.2)	17.40 (442.0)
FR843	1	38.70 (983.0)	23.51 (597.2)	24.38 (619.3)
FR844	2	44.92 (1141.0)	26.27 (667.3)	27.12 (688.8)
FR821	2	62.91 (1597.9)	29.97 (761.2)	33.97 (862.8)
FR912B	1	30.00 (762.0)	23.00 (584.2)	16.50 (419.1)
FR914D	1	39.00 (990.6)	29.00 (736.6)	22.00 (558.8)
FR915D	1	39.00 (990.6)	29.00 (736.6)	22.00 (558.8)
FR916A	2	48.56 (1233.4)	28.22 (716.8)	23.42 (594.9)
FR917	2	56.17 (1426.7)	31.44 (798.6)	24.67 (626.6)
FR918A	2	62.18 (1579.4)	31.44 (798.6)	30.68 (779.3)
FR923	2	57.54 (1461.5)	36.69 (931.9)	32.65 (829.3)
FR924	2	68.37 (1736.6)	44.46 (1129.3)	36.44 (925.6)
FR928	2	56.16 (1426.5)	32.93 (836.4)	27.97 (710.4)
FR929	2	59.56 (1512.8)	36.72 (932.7)	32.50 (825.5)
FR919	3	75.00 (1905.0)	44.20 (1122.7)	36.23 (920.2)
FR920	3	75.00 (1905.0)	44.20 (1122.7)	36.23 (920.2)
FR922	3	90.00 (2286.0)	69.26 (1759.2)	42.65 (1083.3)