Low-voltage power distribution and control systems >Transformers >

Low-voltage dry-type harsh environment transformers

Contents

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Overview

Eaton's harsh environment transformers combine the proven dry-type distribution transformer technology with NEMA® Type enclosures engineered and manufactured to perform through the most demanding conditions needed by chemical plants, food processing, petrochemical and wastewater treatment facilities. These exceptionally durable, corrosion-resistant enclosures (3RX and 4X) can withstand exposure to chemicals, water and other severe conditions.

The harsh environment transformers are available in a comprehensive range of kVA, enclosure type and voltage configurations for a multitude of applications.

Technical Data

Table 19.5-1. Enclosure Specifications

Locations	Enclosure rating type				
	3R	3RX	4	4X	12
	Encapsulated, Mini–Power Center and TENV (Totally Enclosed Non-Ventilated)	Encapsulated, Mini–Power Center and TENV	TENV	Encapsulated, Mini–Power Center and TENV	TENV
	Indoor Outdoor	Indoor Outdoor	Indoor Outdoor	Indoor Outdoor	Indoor
Incidental contact with the enclosed equipment	■	■	■	■	■
Ingress of solid foreign objects (falling dirt)	■	■	■	■	■
Ingress of water (dripping and light splashing of non-corrosive liquids)	■	■	■	■	■
Ingress of water (rain, snow and sleet)	■	■	■	■	—
Ingress of solid foreign objects (circulating dust, lint, fibers and flyings ①)	—	—	■	■	■
Ingress of solid foreign objects (settling airborne dust, lint, fibers, and flyings ①)	—	—	■	■	■
Windblown dust	—	—	■	■	—
Ingress of water (hose-down and splashing water)	—	—	■	■	—
Oil and coolant seepage	—	—	—	—	■
Corrosive agents	—	■	—	■	—

① These fibers and flyings are non-hazardous materials and are not considered Class III type ignitable fibers or combustible flying's. For Class III type ignitable fibers or combustible flying's, see the National Electrical Code®, Article 500.

Note: Class I, Division 2 Hazardous Locations units are encapsulated transformers.

Overview

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

Totally enclosed non-ventilated transformers are highly suited for applications where the atmosphere contains conductive, corrosive or combustible materials that might damage a transformer, or lint and dust that might block the ventilation passages. There are no openings in the enclosure, so heat is dissipated by radiating from the surface area of the enclosure.

NEMA Type 3R TENV

NEMA Type 4X

Technical Data

Ratings

- Single-phase ratings 15–75 kVA
- Three-phase ratings 15–225 kVA
- Aluminum or copper windings
- 220 °C insulation system
- 150 °C winding temperature rise; 80 °C and 115 °C temperature rise available as an option
- Any voltage combination below 600 V
- Totally enclosed non-ventilated transformers are excluded from the scope of U.S. DOE energy efficiency requirements

Enclosure Ratings

- NEMA 3R, suffix NV
- NEMA 4, suffix N4
- NEMA 4X, suffix 4X
- NEMA 12, suffix N12

Standards

- UL® listed per UL 1561
- UL 50 and UL 50E
- Meets applicable ANSI, NEMA and IEEE® standards
- Include bonding/grounding bar in compliance with NEC 450.10(A)

Finish

- Types 3R, 4 and 12 enclosures have a washed and phosphate undercoat with ANSI 61 gray polyester powder inside and out
- Type 4X and 3RX stainless steel 304 as standard; 316 Grade stainless steel available as an option. Replace suffix "SS" with suffix "S6"

Options

- Electrostatic shield
- Reduced audible sound level
- 50/60 Hz operation
- Other options available through the Transformer Flex Center

Table 19.5-2. Technical Specifications

Style Number	kVA	Frame	Wiring Diagram	Weight Lb (kg)	Total Losses at 170 °C	% Z	Sound Level dB	Practical Inrush (Amperes)
480 V–208Y/120 V, 150 °C Rise Three-Phase Al Wound; NEMA Type 3R TENV								
V48M28T15NV	15	FR912DN	280B	480 (217)	573	1.88	45	142
V48M28T30NV	30	FR912DN	280B	480 (217)	910	2.09	50	244
V48M28T45NV	45	FR915DN	280B	600 (272)	1422	2.64	50	284
V48M28T75NV	75	FR916AN	280B	760 (344)	2173	2.48	50	556
V48M28T12NV	112.5	FR917N	280B	1100 (499)	3160	3.44	55	501
V48M28T49NV	150	FR918AN	280B	1300 (499)	3574	3.33	55	557
V48M28T22NV	225	FR919EN	280B	2400 (1088)	4103	4.19	55	786
V48M28T33NV	300	FR920EN	280B	2900 (1315)	5100	4.90	63	1442
480 V–208Y/120 V, 150 °C Rise Three-Phase Al Wound; NEMA Type 4X								
V48M28T15SS4X	15	FR940NV	280B	552 (251)	573	1.88	45	142
V48M28T30SS4X	30	FR942NV	280B	715 (325)	910	2.09	50	244
V48M28T45SS4X	45	FR943NV	280B	887 (403)	1422	2.64	50	284
V48M28T75SS4X	75	FR943NV	280B	1151 (523)	2173	2.48	50	556
V48M28T12SS4X	112.5	FR945NV	280B	1622 (736)	3160	3.44	55	501
V48M28T49SS4X	150	FR945NV	280B	1945 (883)	3574	3.33	55	557
V48M28T22SS4X	225	FR945NV	280B	2750 (1249)	4103	4.19	55	786
480 V–208Y/120 V, 150 °C Rise Three-Phase Al Wound; NEMA Type 4								
V48M28T15N4	15	FR940NV	280B	552 (251)	573	1.88	45	142
V48M28T30N4	30	FR942NV	280B	715 (325)	910	2.09	50	244
V48M28T45N4	45	FR943NV	280B	887 (403)	1422	2.64	50	284
V48M28T75N4	75	FR943NV	280B	1151 (523)	2173	2.48	50	556
V48M28T12N4	112.5	FR945NV	280B	1622 (736)	3160	3.44	55	501
V48M28T49N4	150	FR945NV	280B	1945 (883)	3574	3.33	55	557
V48M28T22N4	225	FR945NV	280B	2750 (1249)	4103	4.19	55	786
480 V–208Y/120 V, 150 °C Rise Three-Phase Al Wound; NEMA Type 12								
V48M28T15N12	15	FR940NV	280B	552 (251)	573	1.88	45	142
V48M28T30N12	30	FR942NV	280B	715 (325)	910	2.09	50	244
V48M28T45N12	45	FR943NV	280B	887 (403)	1422	2.64	50	284
V48M28T75N12	75	FR943NV	280B	1151 (523)	2173	2.48	50	556
V48M28T12N12	112.5	FR945NV	280B	1622 (736)	3160	3.44	55	501
V48M28T49N12	150	FR945NV	280B	1945 (883)	3574	3.33	55	557
V48M28T22N12	225	FR945NV	280B	2750 (1249)	4103	4.19	55	786

Dimensions

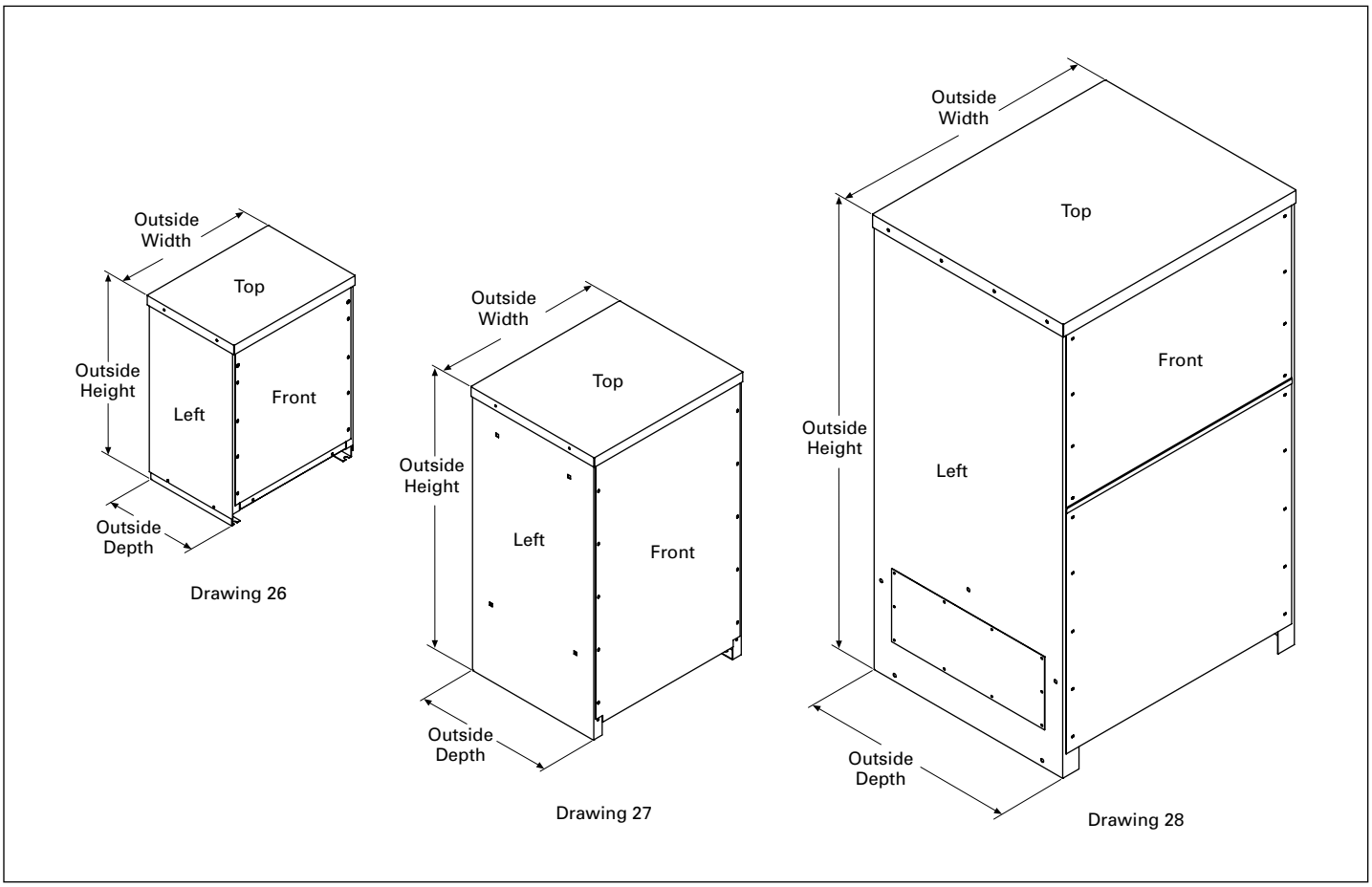

Figure 19.5-1. Enclosure Dimensional Drawings—Totally Enclosed Non-Ventilated Transformers NEMA Type 3R

Table 19.5-3. Totally Enclosed Non-Ventilated Transformers NEMA Type 3R—Approximate Dimensions in Inches (mm)

Frame	Drawing Number	Dimensions		
		Height	Width	Depth
FR912DN FR915DN	26 26	30.00 (762.0) 39.18 (995.2)	23.00 (584.2) 29.00 (736.6)	16.50 (419.1) 22.00 (558.8)
FR916AN FR917N FR918AN	27 27 27	46.58 (1183.1) 56.18 (1427.0) 62.18 (1579.4)	28.22 (716.8) 31.44 (798.6) 31.44 (798.6)	23.42 (594.9) 24.67 (626.8) 30.68 (779.3)
FR919N	28	75.00 (1905.0)	44.21 (1122.9)	36.23 (920.2)

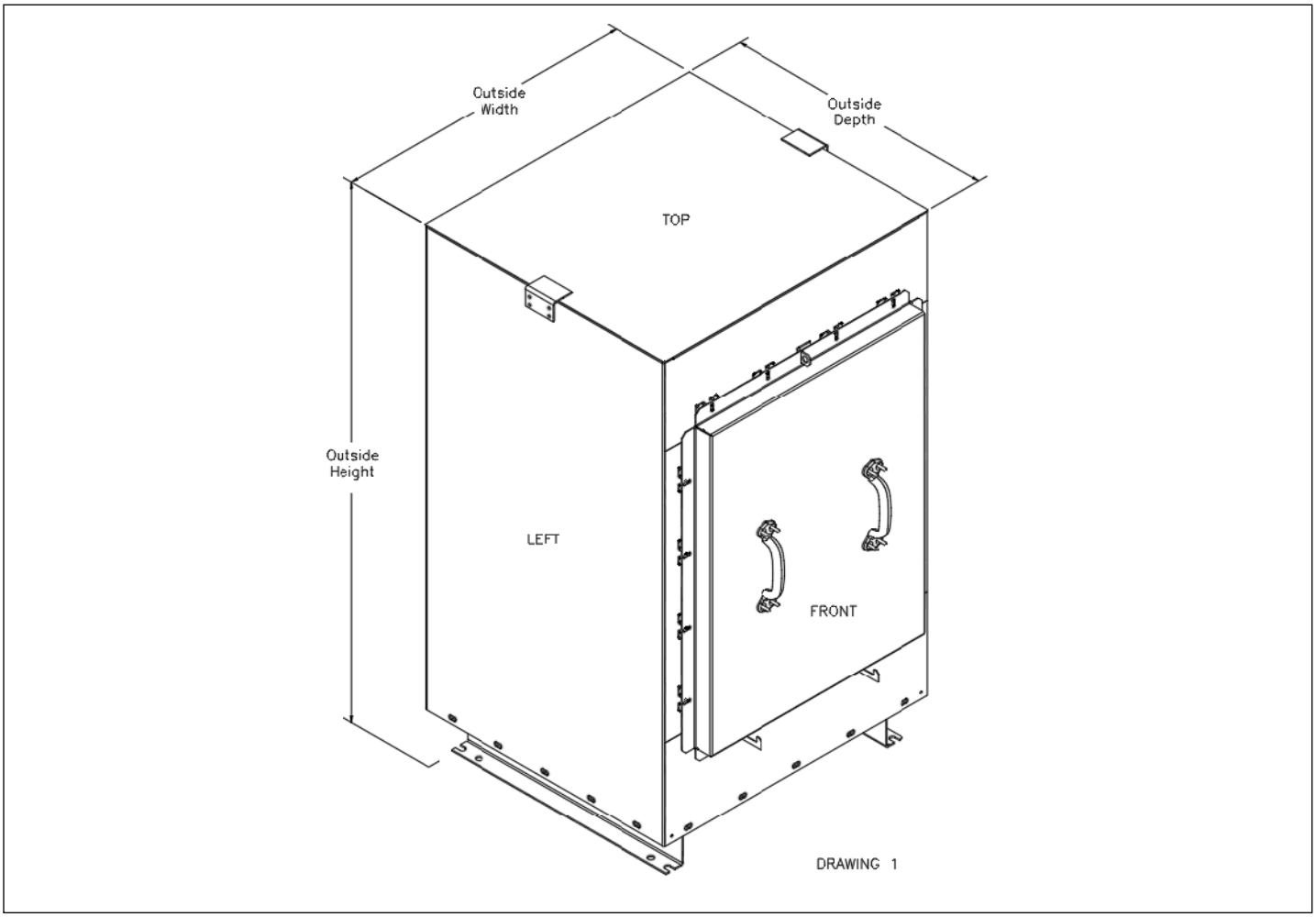

Figure 19.5-2. Enclosure Dimensional Drawing— Totally Enclosed Non-Ventilated Transformers NEMA Type 4, 4X and 12

Table 19.5-4. Totally Enclosed Non-Ventilated Transformers NEMA Type 4, 4X and 12—Approximate Dimensions in Inches (mm)

Frame	Drawing Number	Dimensions		
		Height	Width	Depth
940NV	1	50.52 (1283.2)	29.77 (756.1)	25.69 (652.5)
942NV	1	54.50 (1384.3)	33.77 (857.8)	28.25 (717.6)
943NV	1	56.22 (1428.0)	39.27 (9975)	35.74 (907.8)
945NV	1	68.28 (1734.3)	45.81(1163.6)	37.76 (959.1)

Overview

Apply Eaton NEMA Type 4X transformer enclosures in environments where equipment can suffer damage from dust, wind, ice and water ingress. The NEMA Type 4X encapsulated dry-type transformer is designed to withstand tough environments and protect personnel from hazardous electrical parts.

In encapsulated transformers, the core-coil assembly is completely encased in a proportioned mixture of resin or epoxy, and aggregate to provide a moisture-proof, shock-resistant seal designed to completely seal out moisture and other contaminants.

Technical Data

Ratings

- Single-phase ratings 100 VA–37.5 kVA
- Three-phase ratings 3–75 kVA
- Aluminum or copper windings
- 180 °C insulation system
- 115 °C winding temperature rise; 80 °C temperature rise available as an option
- Any voltage combination below 600 V
- Low-voltage encapsulated transformers are excluded from the scope of U.S. DOE energy efficiency requirements

Enclosure Ratings

- NEMA 4X

Standards

- UL listed per UL 1561 or UL 5085
- UL 50 and UL 50E
- Meets applicable ANSI, NEMA and IEEE standards
- cUL® Listed per CSA® C22.2

Finish

- Grade 304 stainless steel standard; Grade 316 stainless steel available as an option. Replace suffix "SS" with suffix "S6"

Options

- Electrostatic shield
- Reduced audible sound level
- 50/60 Hz operation
- Other options available through the Transformer Flex Center
- Class I, Division 2 Hazardous Locations

Table 19.5-5. Technical Specifications

Style Number	kVA	Frame	Diagram Number	Weight Lb (kg)	FCAN	FCBN	Mounting Type
240 X 480 V–120/240 V, 115 °C Rise Single-Phase Encapsulated; NEMA Type 4X							
S20N11S82SS4X	0.100	FR544X	3A	7 (3)	—	—	Wall
S20N11S83SS4X	0.015	FR554X	3A	9 (4)	—	—	Wall
S20N11P26SS4X	0.250	FR57P4X	3A	15 (7)	—	—	Wall
S20N11P51SS4X	0.500	FR57P4X	3A	14 (6)	—	—	Wall
S20N11P76SS4X	0.750	FR58AP4X	3A	22 (10)	—	—	Wall
S20N11P01SS4X	1	FR67P4X	3A	30 (14)	—	—	Wall
S20N11P16SS4X	1.5	FR67P4X	3A	41 (19)	—	—	Wall
S20N11P02SS4X	2	FR68P4X	3A	41 (19)	—	—	Wall
S20N11S03SS4X	3	FR1764X	3A	75 (34)	—	—	Wall
S20K11S03SS4X	3	FR1764X	9A	75 (34)	①	①	Wall
S20N11S05SS4X	5	FR1774X	3A	107 (49)	—	—	Wall
S20K11S05SS4X	5	FR1774X	9A	105 (48)	①	①	Wall
S20N11S07SS4X	7.5	FR1784X	3A	136 (62)	—	—	Wall
S20K11S07SS4X	7.5	FR1784X	9A	130 (59)	①	①	Wall
S20N11S10SS4X	10	FR1794X	3A	196 (89)	—	—	Wall
S20K11S10SS4X	10	FR1794X	9A	198 (90)	①	①	Wall
S20N11S15SS4X	15	FR1804X	3A	215 (98	—	—	Wall
S20L11S15SS4X	15	FR1804X	23A	215 (98)	①	①	Wall
S20N11S25SS4X	25	FR1824X	3A	393 (178)	—	—	Wall
S20L11S25SS4X	25	FR1824X	23A	453 (206)	②	②	Wall
S20L11S37SS4X	37.5	FR300A4X	248A	735 (334)	②	②	Floor
480 V–208Y/120 V, 115 °C Rise Three-Phase Al Wound; NEMA Type 4X							
Y48G28T03SS4X	3	FR2014X	70A ③	125 (57)	—	2 at –5%	Wall
Y48G28T06SS4X	6	FR2004X	70A ③	165 (75)	—	2 at –5%	Wall
Y48D28T06SS4X	6	FR2004X	72B ③	171 (78	2 at +2.5%	2 at –2.5%	Wall
Y48G28T09SS4X	9	FR1034X	70A ③	180 (82)	—	2 at –5%	Wall
Y48J28T09SS4X	9	FR1034X	503A ③	192 (87)	—	4 at –2.5%	Wall
Y48D28T09SS4X	9	FR1034X	72B ③	196 (89)	2 at +2.5%	2 at –2.5%	Wall
Y48D28T15SS4X	15	FR954X	72B ③	281 (128)	—	2 at –2.5%	Wall
Y48G28T15SS4X	15	FR954X	70A ③	269 (122)	—	2 at –5%	Wall
Y48J28T15SS4X	15	FR954X	503A ③	268 (121)	—	4 at –2.5%	Wall
Y48M28T30SS4X	30	FR2434X	84A	539 (245)	2 at +2.5%	4 at –2.5%	Wall/Floor
Y48M28T45SS4X	45	FR2444X	84A	723 (328)	2 at +2.5%	4 at –2.5%	Wall/Floor
Y48M28T75SS4X	75	FR2454X	84A	1277 (580)	—	4 at –2.5%	Floor

① 1 at +10% FCBN at 240 V; 2 at +5% FCBN at 480 V.
② 2 at +5% FCBN at 240 V; 4 at +2.5% FCBN at 480 V.
③ T-T connected (Scott T) winding configuration.

Dimensions

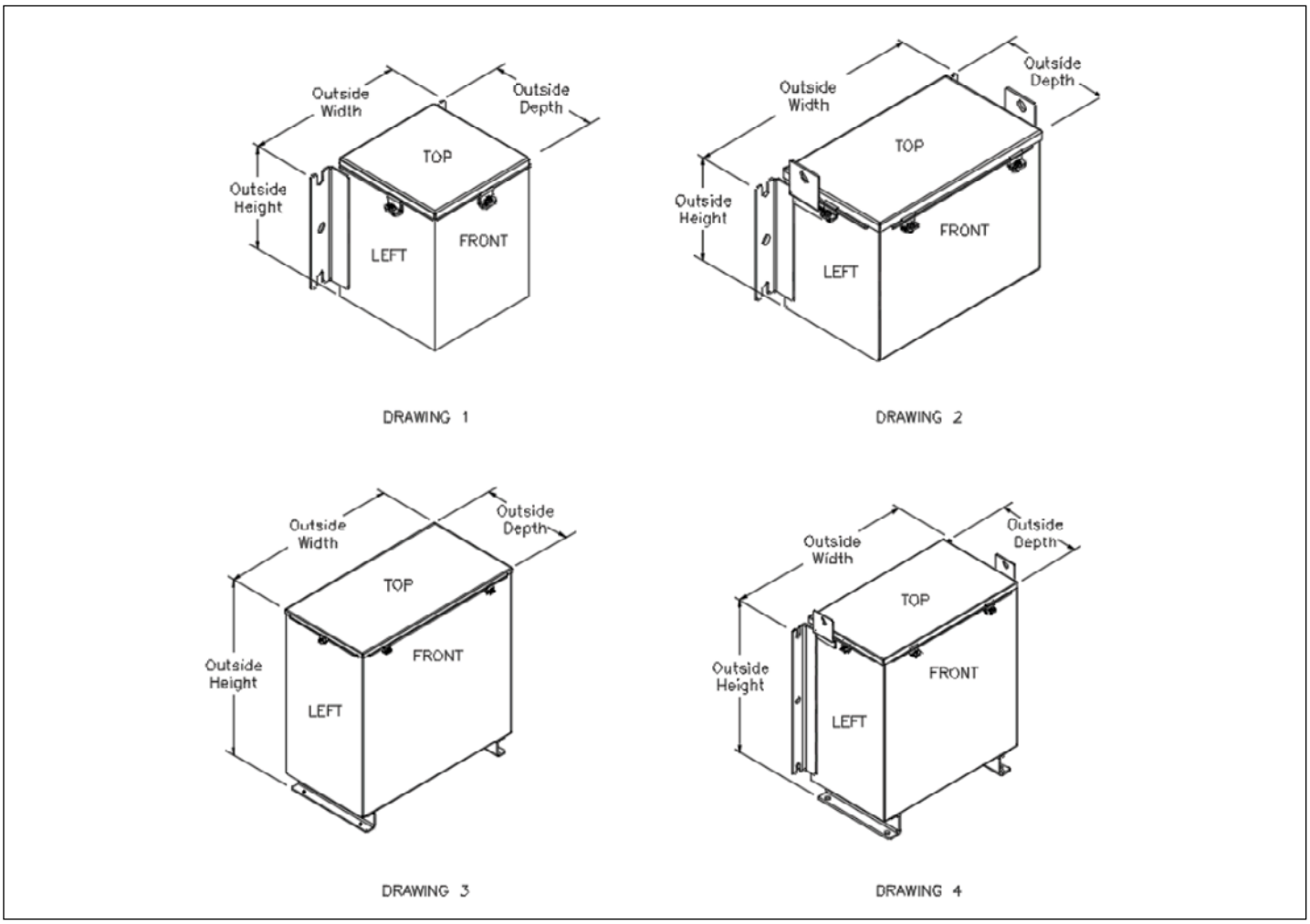

Figure 19.5-3. Enclosure Dimensional Drawings—NEMA 4X Encapsulated Transformers

Table 19.5-6. NEMA 4X Encapsulated Transformers—Approximate Dimensions in Inches (mm)

Frame	Drawing Number	Dimensions		
		Height	Width	Depth
544X 57P4X 58AP4X 67P4X	1 1 1 1	6.58 (167) 6.58 (167) 9.06 (230) 10.37 (263)	8.37 (213) 8.75 (222) 9.12 (232) 9.87 (251)	5.38 (137) 6.60 (168) 7.65 (194) 7.76 (197)
68P4X 1764X 1774X 1784X	1 1 2 2	11.28 (287) 11.32 (288) 14.60 (371) 14.61 (371)	10.37 (263) 11.69 (297) 13.88 (353) 13.88 (353)	7.82 (199) 9.51 (242) 10.01 (254) 11.18 (284)
1794X 1804X 1824X 300A4X	2 2 2 3	17.60 (447) 17.67 (449) 18.85 (504) 28.55 (725)	16.88 (429) 16.88 (429) 19.87 (505) 22.45 (570)	11.93 (303) 11.93 (303) 15.10 (384) 16.39 (416)
2014X 2004X 1034X 954X	2 2 2 2	11.34 (288) 13.76 (349) 13.91 (353) 15.55 (395)	19.37 (492) 20.37 (517) 20.37 (517) 23.48 (596)	9.56 (243) 10.63 (270) 11.31 (287) 11.91 (303)
2434X 2444X 2454X	4 4 3	27.28 (693) 27.50 (698) 32.38 (822)	25.00 (635) 28.00 (711) 30.50 (775)	13.00 (330) 15.03 (382) 17.03 (432)

Overview

The mini–power center combines three individual components into one NEMA enclosure, rated either NEMA 3R, or for harsh environments (corrosion, dust, hose-directed water) NEMA 4X: a primary main circuit breaker, an encapsulated single-phase or three-phase dry-type transformer, and a secondary distribution loadcenter with main breaker. Interconnecting wiring is completed at the factory.

A mini–power center is delivered ready for installation.

Technical Data

Ratings

- Single-phase ratings 3–25 kVA
- Three-phase ratings 15–30 kVA
- Aluminum or copper windings
- Aluminum chassis standard for plug-in Type BR feeder breakers
- Copper chassis standard for bolt-on Type BAB feeder breakers
- 180 °C insulation system
- 115 °C winding temperature rise; 80 °C temperature rise available as an option
- Sand and resin encapsulated core-coil assembly

Enclosure Ratings

- NEMA 3R stainless steel, suffix SS
- NEMA 4X, suffix S64X

Standards

- UL listed per UL 1062
- UL 50 and UL 50E
- Meets applicable ANSI, NEMA and IEEE standards
- CSA C22.2

Features, Benefits and Functions

- Secondary main breaker (Type BR plug-in andType BAB bolt-on branch breakers not included)
- Neutral bar is grounded to the enclosure
- Tin-plated copper and aluminum chassis
- Silver-plated copper chassis available on bolt-on three-phase units as an option
- Space for up to 26 feeder breakers on aluminum chassis and 30 feeder breakers for copper chassis
- Custom options available through the Transformer Flex Center

Finish

- NEMA 4X, Grade 316 stainless steel standard
- NEMA 3R, Grade 304 stainless steel standard; Grade 316 stainless steel available as an option. Replace suffix “SS” with suffix “S6”

NEMA Type 4X Plug-In and Bolt-On Selection Tables

Table 19.5-7. Plug-In Mini–Power Center (Aluminum-Wound Transformer and Loadcenter Chassis Standard) Catalog Number Information—NEMA Type 4X

kVA	Catalog Number	Full Capacity Taps FCBN	Dimensions in Inches (mm) ①			Weight	Frame	Main Circuit Breaker ②		Branch Breakers Max. Number ④⑤			Max. Amp
			Height	Width	Depth	Lb (kg)		Primary ③	Secondary	Single-Pole	Two-Pole	Three-Pole	
Single-Phase													
480 V to 120/240 V													
3	**P48G11S0312S64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	306 (139)	FR2854X	EHD2015	BR215	12	6	—	12
5	**P48G11S0512S64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	306 (139)	FR2854X	EHD2020	BR225	12	6	—	20
7.5	**P48G11S0712S64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	306 (139)	FR2854X	EHD2030	BR230	12	6	—	30
10	**P48G11S1020S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	EHD2040	BR250	20	10	—	40
15	**P48G11S1526S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	EHD2060	BR270	26	13	—	60
25	**P48G11S2526S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	EHD2100	BR2125	26	13	—	100
600 V to 120/240 V													
5	**P60G11S0512S64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	306 (139)	FR2854X	FDB2015	BR225	12	6	—	20
7.5	**P60G11S0712S64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	306 (139)	FR2854X	FDB2030	BR230	12	6	—	30
10	**P60G11S1020S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	FDB2040	BR250	20	10	—	40
15	**P60G11S1526S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	FDB2060	BR270	26	13	—	60
25	**P60G11S2526S64X**	2 at –5%	39.81 (1011.2)	19.74 (501.4)	15.94 (404.9)	546 (248)	FR2874X	FDB2100	BR2125	26	13	—	100
Three-Phase													
480 V to 208Y/120 V													
15	**P48G28T1524S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	EHD3040	EHD3050	24	12	8	40
22.5	**P48G28T2124S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	EHD3070	EHD3070	24	12	8	60
30	**P48G28T3024S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	EHD3090	EHD3100	24	12	8	80
600 V to 208Y/120 V													
15	**P60G28T1524S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	FDB3030	EHD3050	24	12	8	40
22.5	**P60G28T2124S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	FDB3050	EHD3070	24	12	8	60
30	**P60G28T3024S64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	728 (330)	FR2914X	FDB3070	EHD3100	24	12	8	80

① Not for construction purposes.
② Secondary main breakers fixed only. No substitutes for ampere rating.
③ Optional AIC rated main breakers available.
④ Combinations can be selected.
⑤ Branch breakers not included. Use Eaton's Type BR family.

Table 19.5-8. Bolt-On Mini–Power Center (Copper-Wound Transformer and Loadcenter Chassis Standard) Catalog Number Information—NEMA Type 4X

kVA	Catalog Number	Full Capacity Taps FCBN	Dimensions in Inches (mm) ⑥			Weight	Frame	Main Circuit Breaker ⑦		Branch Breakers Max. Number ⑨⑩			Max. Amp
			Height	Width	Depth	Lb (kg)		Primary ⑧	Secondary	Single-Pole	Two-Pole	Three-Pole	
Single-Phase													
480 V to 120/240 V													
3	**P48G11S0318CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2854X	EHD2015	BAB2015	18	9	—	12
5	**P48G11S0518CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	EHD2020	BAB2025	18	9	—	20
7.5	**P48G11S0718CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	EHD2030	BAB2030	18	9	—	30
10	**P48G11S1024CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	EHD2040	BAB2050	24	12	—	40
15	**P48G11S1530CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	650 (295)	FR2914X	EHD2060	BAB2070	30	15	—	60
25	**P48G11S2530CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	650 (295)	FR2914X	EHD2100	BAB2125	30	15	—	100
600 V to 120/240 V													
3	**P60G11S0318CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2854X	FDB2015	BAB2015	18	9	—	12
5	**P60G11S0518CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	FDB2020	BAB2025	18	9	—	20
7.5	**P60G11S0718CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	FDB2030	BAB2030	18	9	—	30
10	**P60G11S1024CUBS64X**	2 at –5%	34.25 (870.0)	16.00 (406.4)	11.35 (288.3)	340 (154)	FR2874X	FDB2040	BAB2050	24	12	—	60
15	**P60G11S1530CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	650 (295)	FR2914X	FDB2060	BAB2070	30	15	—	60
25	**P60G11S2530CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	650 (295)	FR2914X	FDB2100	BAB2125	30	15	—	100
Three-Phase													
480 V to 208Y/120 V													
15	**P48G28T1524CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	EHD3040	BAB3050H	24	12	8	40
22.5	**P48G28T2124CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	EHD3070	BAB3070H	24	12	8	60
30	**P48G28T3024CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	EHD3090	BAB3100H	24	12	8	80
600 V to 208Y/120 V													
15	**P60G28T1524CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	FDB3030	BAB3050H	24	12	8	40
22.5	**P60G28T2124CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	FDB3050	BAB3070H	24	12	8	60
30	**P60G28T3024CUBS64X**	2 at –5%	37.63 (955.8)	30.84 (783.3)	14.50 (368.3)	898 (407)	FR2914X	FDB3070	BAB3100H	24	12	8	80

⑥ Not for construction purposes.
⑦ Main breakers fixed only. No substitutes for ampere rating.
⑧ Optional AIC rated main breakers available.
⑨ Combinations can be selected.
⑩ Branch breakers not included. Use Eaton's Type BAB family.

Dimensions

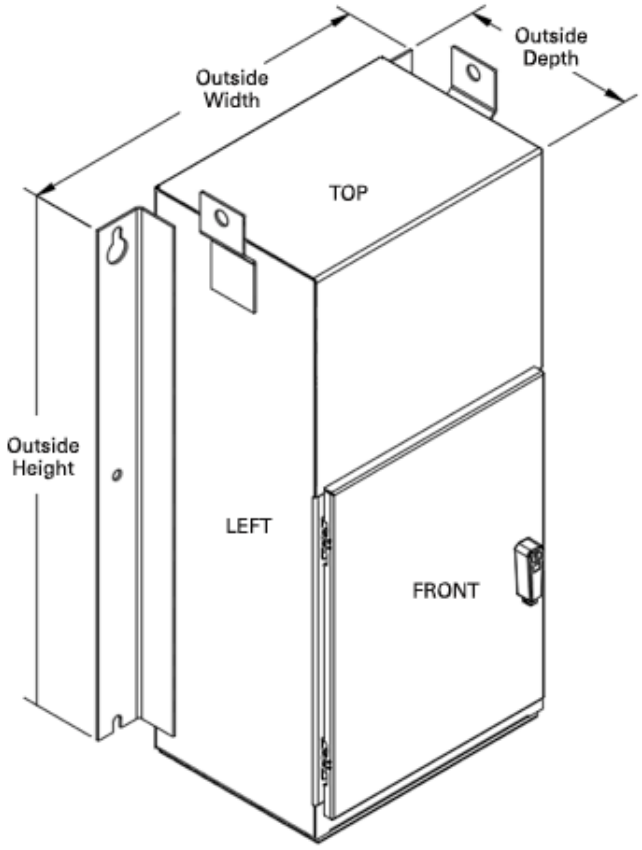

Figure 19.5-4. Enclosure Dimensional Drawing—Mini–Power Centers—NEMA Type 4X

Table 19.5-9. Mini–Power Centers—NEMA Type 4X—Approximate Dimensions in Inches (mm

Frame	Drawing Number	Dimensions		
		Height	Width	Depth
FR2854X FR2874X FR2914X	3 3 3	36.32 (922) 42.07 (1069) 39.88 (1013)	22.01 (559) 25.75 (654) 36.85 (936)	14.35 (365) 18.94 (481) 17.50 (445)

Transformer Selection

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 following chart. 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 **Table 19.5-10** at the right.

   —Select a transformer rating equal to or greater than the load kVA.
4. Define tap arrangements needed.
5. Define temperature rise.

Table 19.5-10. Single-Phase AC Motors
Note: When motor service factor is greater than 1, increase full load amperes proportionally. Example: If service factor is 1.15, increase ampere values by 15%.

Horsepower	Full Load Amperes				Minimum Transformer kVA ①
	115V	208V	220V	230V	
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

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

Table 19.5-11. Full Load Current in Amperes—Single-Phase Circuits ②

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

② Table of standard transformer ratings used to power single-phase motors in **Table 19.5-10**.

Three-Phase Transformers

How to Select Three-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 following chart. To determine kVA when volts and amperes are known, use the formula:

$$\text{kVA} = \frac{\text{Volts} \times \text{Amperes} \times 1.732}{1000}$$

   - If the load is an AC motor, determine the minimum transformer kVA from **Table 19.5-12** 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.

Table 19.5-12. Three-Phase AC Motors

Horsepower	Full Load Amperes					Minimum Transformer kVA ①
	208 V	230 V	380 V	460 V	575 V	
1/2	2.2	2.0	1.2	1.0	0.8	0.9
3/4	3.1	2.8	1.7	1.4	1.1	1.2
1	4.0	3.6	2.2	1.8	1.4	1.5
1-1/2	5.7	5.2	3.1	2.6	2.1	2.1
2	7.5	6.8	4.1	3.4	2.7	2.7
3	10.7	9.6	5.8	4.8	3.9	3.8
5	16.7	15.2	9.2	7.6	6.1	6.3
7-1/2	24	22	14	11	9	9.2
10	31	28	17	14	11	11.2
15	46	42	26	21	17	16.6
20	59	54	33	27	22	21.6
25	75	68	41	34	27	26.6
30	88	80	48	40	32	32.4
40	114	104	63	52	41	43.2
50	143	130	79	65	52	52
60	170	154	93	77	62	64
75	211	192	116	96	77	80
100	273	248	150	124	99	103
125	342	312	189	156	125	130
150	396	360	218	180	144	150
200	528	480	291	240	192	200

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

Note: 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%.

Table 19.5-13. Full Load Current in Amperes—Three-Phase Circuits

kVA	Voltage						
	208	240	380	480	600	2400	4160
3	8.3	7.2	4.6	3.6	2.9	0.72	0.42
6	16.6	14.4	9.1	7.2	5.8	1.4	0.83
9	25	21.6	13.7	10.8	8.6	2.2	1.2
15	41.7	36.1	22.8	18.0	14.4	3.6	2.1
22.5	62.4	54.1	34.2	27.1	21.6	5.4	3.1
30	83.4	72.3	45.6	36.1	28.9	7.2	4.2
37.5	104	90.3	57.0	45.2	36.1	9.0	5.2
45	124	108	68.4	54.2	43.4	10.8	6.3
50	139	120	76	60.1	48.1	12.0	6.9
75	208	180	114	90	72	18.0	10.4
112.5	312	270	171	135	108	27.1	15.6
150	416	360	228	180	144	36.1	20.8
225	624	541	342	270	216	54.2	31.3
300	832	721	456	360	288	72.2	41.6
500	1387	1202	760	601	481	120	69.4
750	2084	1806	1140	903	723	180	104
1000	2779	2408	1519	1204	963	241	139

Standards and Certifications

Eaton dry-type distribution transformers are approved, listed, recognized or may comply with the following standards.

Table 19.5-14. Engineering Standards

Catalog Product Name	UL Standard ①	UL/cUL File Number	UL Listed Control Number	cUL Energy Efficiency Verification File Number	CSA File Number	Insulation System Temp/°C	kVA Single-Phase	kVA Three-Phase	Applicable IEC Standard
Industrial Control Transformer									
MTE	5085	E46323	702X	—	—	105	0.025–1.5	N/A	61558
MTE	5085	E46323	702X	—	—	180	0.05–5	N/A	61558
Encapsulated Transformer									
AP	5085	E10156	591H	—	—	180	3–10	N/A	61558
AP	1561	E78389	591H	—	—	180	15	N/A	61558
EP	5085	E10156	591H	—	LR60545	180	0.05–10	N/A	61558
EP	1561	E78389	591H	—	LR60545 ②	180	15–37.5	N/A	61558 ③ / 726 ④
EPT	5085	E10156	591H	—	LR60545	180	N/A	3–9	61558 ⑤ / 726 ⑥
EP	1561	E78389	591H	—	LR60545 ⑦	180	N/A	15–75	726
MPC	1062	E53449	591H	—	LR60546	180	3–25	15–30	—
Ventilated Transformer									
DS-3	1561	E78389	591H	EV33871 ⑧	—	220	7.5–167	N/A	60726
DS-3	1561	E78389	591H	EV33871 ⑨	—	220	N/A	7.5–750	60726
KT	1561	E78389	591H	EV33871 ⑨	—	220	N/A	7.5–750	N/A

① UL 5085 replaces UL 506.
② Applies to 25 kVA.
③ Applies to 15–25 kVA.
④ Applies to 37.5 kVA.
⑤ Applies to 3 kVA.
⑥ Applies to 5–9 kVA.
⑦ Applies to 30 kVA.
⑧ Applies to 15–167 kVA.
⑨ Applies to 15–300 kVA.

In addition to the above standards, Eaton dry-type distribution transformers are also manufactured in compliance with the applicable standards listed below.

Not all of the following standards apply to every transformer.

NEC: National Electrical Code.

NEMA ST-1: Specialty Transformers (C89.1) (control transformers).

NEMA ST-20: General-Purpose Transformers.

DOE 2016 Final Rule: CFR Title 10 Chapter II Part 431, Appendix A of Subpart K 2016.

NEMA 250: Enclosures for Electrical Equipment (1000 volts maximum).

IEEE C57.12.01: General Requirements for Dry-Type Distribution and Power Transformers (including those with solidcast and/or resin-encapsulated windings).

ANSI C57.12.70: Terminal Markings and Connections for Distribution and Power Transformers.

ANSI C57.12.91: Standard Test Code for Dry-Type Distribution and Power Transformers.

CSA C22 No. 47-M90: Air-Cooled Transformers (Dry-Type).

CSA C9-M1981: Dry-Type Transformers.

CSA C22.2 No. 66: Specialty Transformers.

CSA 802-94: Maximum Losses for Distribution, Power and Dry-Type Transformers.

NEMA TP-1: Guide for Determining Energy Efficiency for Distribution Transformers (rescinded).

NEMA TP-2: Standard Test Method for Measuring the Energy Consumption of Distribution Transformers (rescinded).

NEMA TP-3: Standard for the Labeling of Distribution Transformer Efficiency (rescinded).

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