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Unitized power centers

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Powering Business Worldwide

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General Description and Application

Unitized Power Center

Eaton's unitized dry-type power centers are self-contained metal-enclosed unit substations especially designed to supply and distribute low-voltage power from medium-voltage lines in modern commercial and industrial systems. They are ideal where considerations of equipment size, accessibility, maintainability, ease of installation and overall economy are of utmost importance.

Due to the inherent compactness of unitized power centers, they are easily and conveniently applied in multiples throughout a distribution system at physical locations close to centers of load concentration. The distribution voltage is thus stepped down to the utilization voltage only at or near the areas of demand with kVA being allocated as required for new construction or renovation in existing buildings. The application of unitized power centers in this manner results in several advantages not available with conventional secondary unit substations.

Ratings

- Three-phase kVA:
  - 112.5–1000
- Primary voltages:
  - 2.4 kV Class with 20 kV LIWV (BIL), 60 Hz
  - 5 kV Class with 30 kV LIWV (BIL), 60 Hz
  - 15 kV Class with 60 kV LIWV (BIL), 60 Hz
  - MV power system grounding—solid or low resistance grounded (≥100 A) only. UPC product is not to be used on high-resistance or ungrounded MV power systems
- Transformer windings:
  - Primary connections—three-wire delta only
  - Copper or aluminum
  - Type AA, ventilated dry-type
  - NEMA® Class 220 °C insulation
  - 80, 115, 150 °C rise. When transformer must meet requirements of Federal 10CFR-431K, the 750 and 1000 kVA units are only available in 150 °C rise
  - Type FA (forced air) available, increases kVA ratings by 33%
  - Primary taps at 95%, 97.5%, 100%, 102.5%, 105% of rated primary voltage
- Secondary voltages:
  - 208Y/120 V, four-wire
  - 240 V, three-wire
  - 480Y/277 V, four-wire
  - 480 V, three-wire
  - 575/380 V, four-wire
- Transformer efficiency per 10CFR431K

MV Power System Grounding

Please note that due to lower LIVW (BIL) and power frequency withstand ratings of the UPC transformers, the UPC product is not suitable for use on high-resistance or ungrounded MV power systems where a voltage escalation caused by an arcing type single phase-to-ground fault can cause insulation failures within the UPC. The UPC product should only be applied on solidly grounded systems or low-resistance grounded power systems designed to allow minimum 100 A primary ground fault current during a single phase-to-ground fault.

Advantages

- Moving into place is facilitated by the rugged channel base construction and lifting eyes included with each assembly
- All standard unitized power centers are especially designed to minimum dimensions consistent with safety and reliability
- Standard unitized power centers are front-only accessible, making against-the-wall installations possible—minimum of 6.00 inches (152.4 mm) from wall for seismic applications, 2.00 inches (50.8 mm) for non-seismic
- Future load growth is easily accommodated by the addition of unitized power centers to the system without affecting the units serving the original load areas
- Losses in the medium-voltage portion of the distribution system are lower, resulting in a continuous operating savings
- Secondary output voltage may be adjusted at each unitized power center to compensate for unusual load conditions without affecting the voltage setting of other apparatus in the system
- Trouble is more quickly isolated with individual units located at or near their served loads
- Primary power is purchased from the utility at the lower primary power rates, resulting in operational cost savings throughout the life of the equipment
- Overall installed cost is lower because of the cost benefits of medium-voltage distribution cable as compared to low-voltage cable or busway
- The IQ family of electronic meters can be provided to monitor the parameters unique to each type of device

Third-Party Listing

The UPC is UL® listed.

Seismic Qualification

For information on seismic qualification for this and other Eaton products, refer to www.eaton.com/seismic.

Medium-Voltage Switch

Table 15.1-1. Primary Disconnect Switch Ratings—Type MVS Load Interrupter ①

Rated Max. Voltage kV rms	Impulse Withstand Voltage kV peak	Continuous and Load Break Current Ampere	Short-Time Short-Circuit Withstand Current (2 second) kA, rms sym	Non-Fused Switch Fault Close and Momentary Rating (10 cycles) kA, rms Asym	Fused Switch Fault Close Rating kA, rms Asym
4.76	60	600	25	40	101
4.76	60	600	38	61	101
15	95	600	25	40	101
15	95	600	38	61	101

① UL listing available with fused switch only.

Fuses

Table 15.1-2. Primary Fuse Ampere Rating Current Limiting Eaton Type HCL, 63,000 A Symmetrical Interrupting Rating

kVA	Primary Fuse Ampere Rating at, kV						
	2.4	4.16	4.8	7.2	12.0	13.2	13.8
112.5	45	25	18	15	7	7	7
150	50	35	25	18	10	10	10
225	75	45	40	25	15	15	15
300	100	60	50	35	20	20	18
500	200	100	80	60	40	30	30
750	—	150	120	85	60	45	45
1000	—	200	175	125	75	60	60

Molded Case Circuit Breakers

Table 15.1-3. Unitized Power Center, Circuit Breaker Interrupting Ratings

Breaker Type	Range of Rated Continuous Current, Amperes	Rated Maximum Interrupting Capability, kA Sym.	
		240V	480V
EDB	100–225	22	—
EDS	100–225	42	—
ED	15–225	65	—
EDH	15–225	100	—
EDC	100–225	200	—
EHD	15–100	18	14
FDB	15–150	18	14
FD	15–225	65	35
HFD	15–225	100	65
FDC	15–225	200	100
FDE	15–225	65	35
HFDE	15–225	100	65
JD	70–250	65	35
HJD	70–250	100	65
JDC	70–250	200	100
DK	250–400	65	—
KD	100–400	65	35
HKD	100–400	100	65
KDC	100–400	200	100
LGE	250–600	65	35
LGH	250–600	100	65
LD	300–600	65	35
HLD	300–600	100	65
LDC	250–600	200	100
LGE	250–600	65	35
LGH	250–600	100	65
LGC	250–600	200	100
LGU	250–600	200	150
MDL	300–800	65	50
HMDL	300–800	100	65
NGS	500–1200	65	50
NGH	500–1200	100	65
NGC	500–1200	200	100
RGH ②	1600–2500	125	65
RGC ②	1600–2500	200	100

② Not panel mounted; supplied only in added auxiliary distribution section.

Transformers

Table 15.1-4. Ventilated Dry-Type Transformer Standard Ratings ③

kVA	Impedance %	kV Class	i Primary Volts	LIWV (BIL)	Primary Taps	Wye Secondary Volts	Self-Cooled		Fan Cooled (Optional)			Transformer Maximum Short-Circuit Amperes rms Symmetrical ④	
							Secondary Full Load Amperes		kVA	Secondary Full Load Amperes			
							208V	480V		208V	480V	208V	480V
112.5	4.5	5	2400, 4160 or 4800	20 kV, 30 kV, or 30 kV	±2–2-1/2%	208Y/120 or 480Y/277	312	135	150	416	180	11,566	5012
150	4.5						416	180	200	555	241	11,896	5155
225	4.5						625	271	300	833	361	14,194	6151
300	4.5						833	361	400	1110	481	15,840	6561
500	4.5						1389	601	667	1200 ⑤	802	24,136	10,459
750	5.5						2082	902	1000	2776	1203	36,205	15,689
1000	5.5						2776	1203	1333	3000 ⑥	1604	48,274	20,918
112.5	4.5	15	7200, 12,470 13,200 or 13,800	30 kV, 60 kV, 60 kV or 60 kV	±2–2-1/2%	208Y/120 or 480Y/277	312	135	150	416	180	6245	2706
150	4.5						416	180	200	555	241	8327	3608
225	4.5						625	271	300	833	361	12,491	5413
300	4.5						833	361	400	1110	481	15,140	6561
500	4.5						1389	601	667	1200 ⑤	802	24,136	10,459
750	5.5						2082	902	1000	2776	1203	36,205	15,689
1000	5.5						2776	1203	1333	3000 ⑥	1604	48,274	20,918

③ Refer to **Table 15.1-5** for available temperature rise, fan and secondary voltage options.
④ Short circuit currents assume unlimited utility source, and do not include motor contributions.
⑤ Maximum load/output is limited to 1200 A due to chassis limitation.
⑥ Maximum load/output is limited to 3000 A (cross bus limitation).
Note: All units are three-phase, 60 Hz, 150 °C rise, 220 °C insulation system.

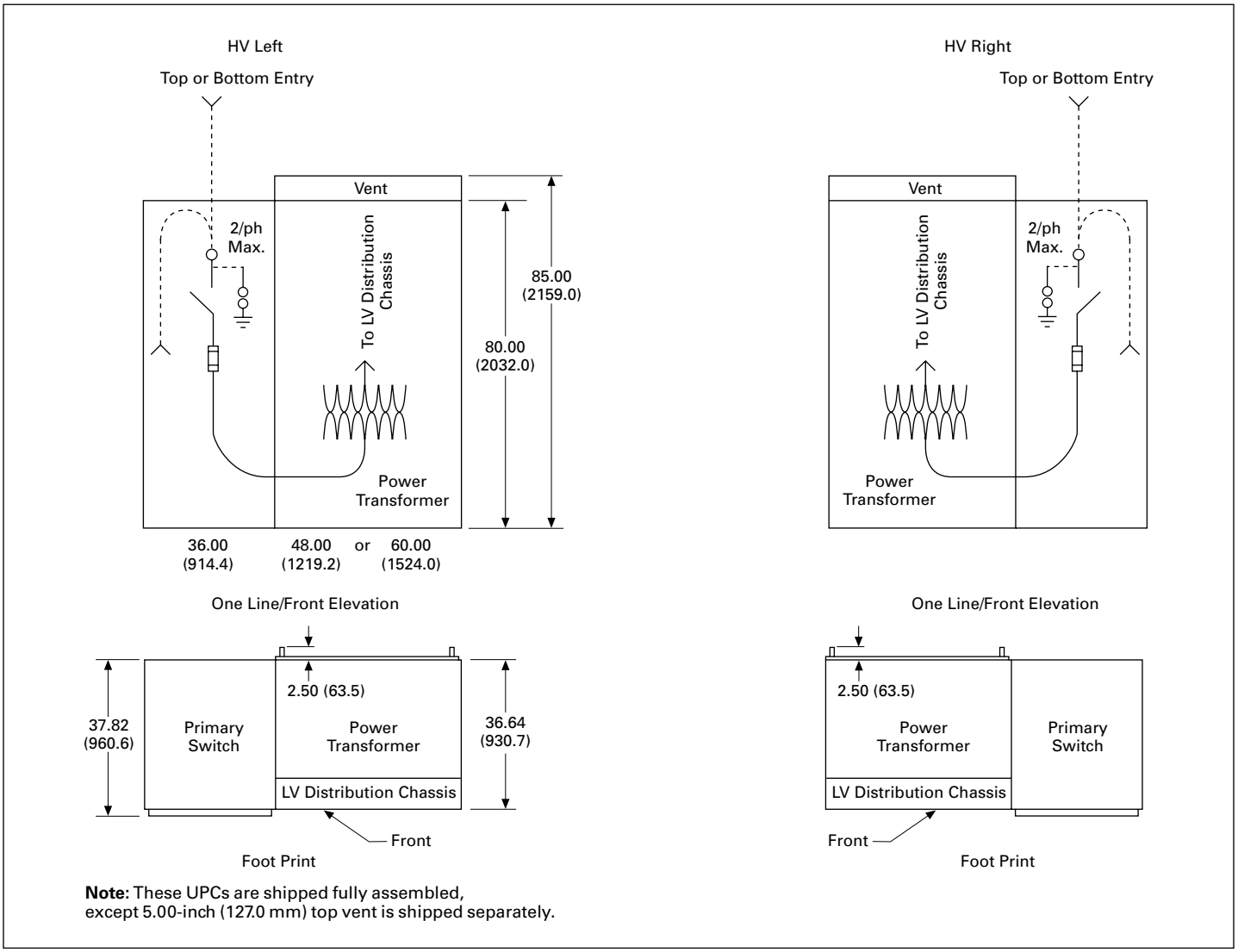
Unitized Power Centers—Available Configurations

- MV switch will be fused or non-fused. UL listing available with fused switch only
- MV fuse class: current limiting, Eaton Type HCL only
- Primary surge protection shown is optional
- Use separate LV switchboard if:
  - ❑ LV distribution chassis required is >1200 A
  - ❑ LV chassis-mounted devices will consume more than 36X of available chassis space
- Bottom or top entry incoming high-voltage cable size and quantity is limited to 250 kcmil, two per phase
- Vent screens, filters, door gaskets or space heaters are not available in this product
- FA rating (33% increase in kVA) is optional
- Available transformer options—see **Table 15.1-5**
- Optional low-voltage side customer metering and surge protection devices are chassis mounted in panelboard or switchboard

Table 15.1-5. Available Transformer Options ①

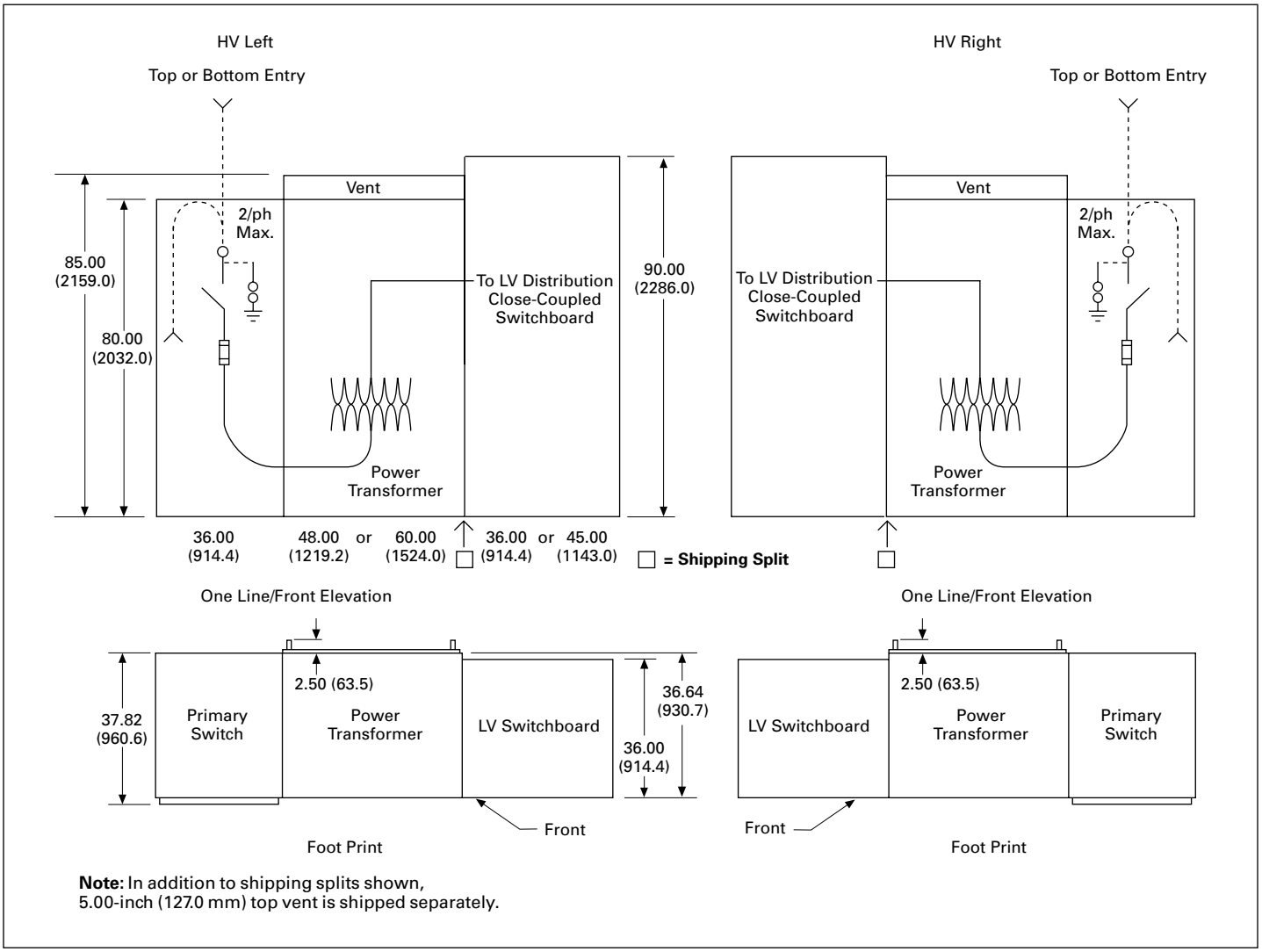
Transformer Section 48-Inch Wide With LV Distribution in Front				Transformer Section 48-Inch Wide With Separate LV Distribution			
Trans. kVA	**Temp. Rise °C**	**Optional Fan** ②	**Secondary Voltage**	**Trans. kVA**	**Temp. Rise °C**	**Optional Fan** ②	**Secondary Voltage**
112.5	80, 115, 150	Yes	All	112.5	80, 115, 150	Yes	All
150	80, 115, 150	Yes	All	150	80, 115, 150	Yes	All
225	80, 115, 150	Yes	All	225	80, 115, 150	Yes	All
300	80, 115, 150	Yes	All	300	80, 115, 150	Yes	All
Transformer Section 60-Inch Wide With LV Distribution in Front				**Transformer Section 60-Inch Wide With Separate LV Distribution**			
Trans. kVA	**Temp. Rise °C**	**Optional Fan** ②	**Secondary Voltage**	**Trans. kVA**	**Temp. Rise °C**	**Optional Fan** ④	**Secondary Voltage**
500	150	Yes	All ③	500	80, 115	Yes	All
500	80, 115	Yes	480 V, 600 V	750	150	Yes	All
500	150	Yes	All	1000	150	Yes	All
750	150	Yes	480 V, 600 V	—	—	—	—

① Available secondary voltages: 208/120 V wye (four-wire), 240 V delta (three-wire), 480/277 V wye (four-wire), 480 V delta (three-wire) and 575/380 V wye (four-wire).
② 33% increased kVA capacity with fans.
③ At 208 or 240 V secondary, maximum load (output) is limited to 1200 A due to chassis limitation.
④ 33% increased kVA capacity with fans, except for 1000 kVA transformer using 208 V secondary, maximum load/output is limited to 3000 A (cross bus limitation).



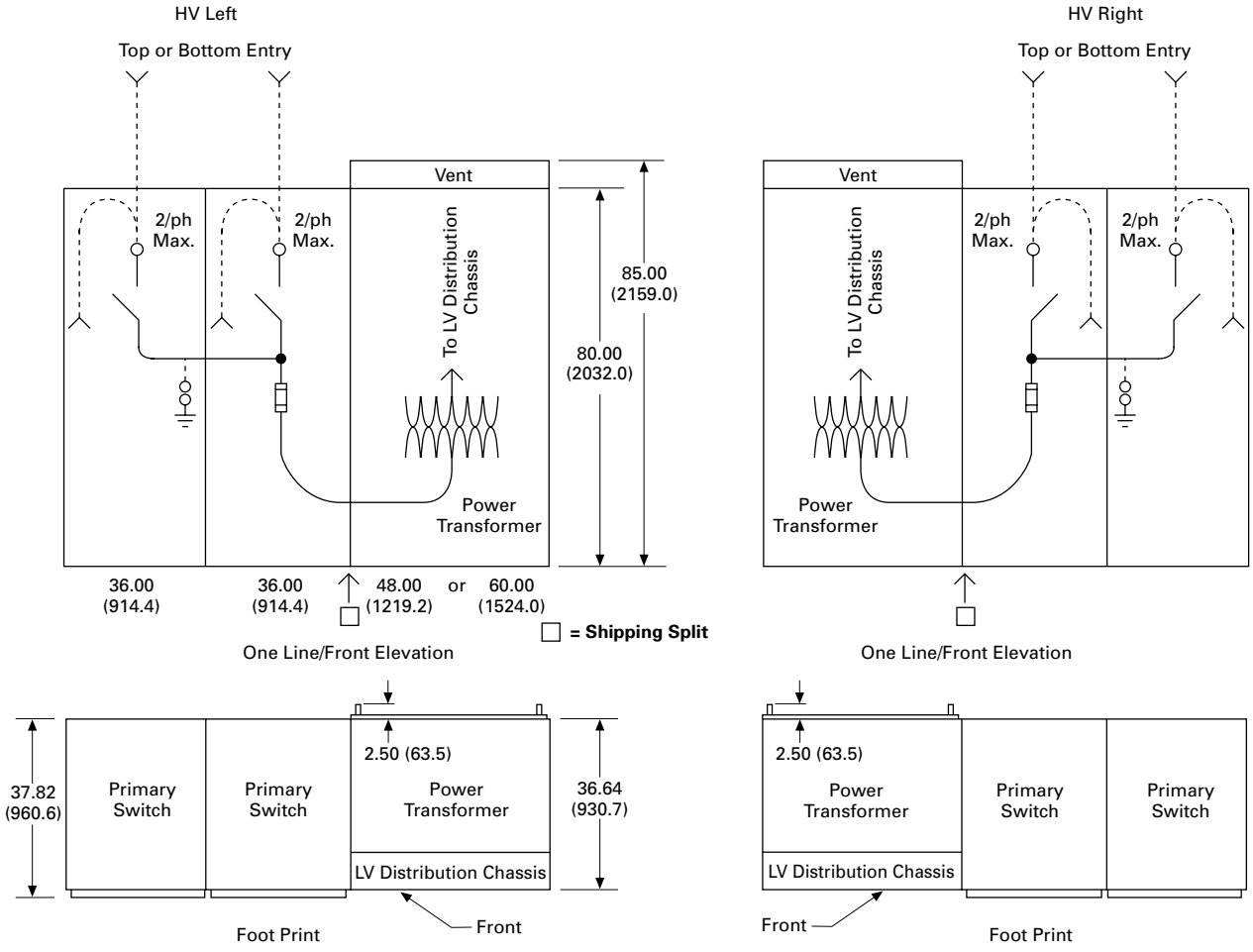
Note: These UPCs are shipped fully assembled, except 5.00-inch (127.0 mm) top vent is shipped separately.

Figure 15.1-1. Single Primary, LV Distribution in Front of the Transformer



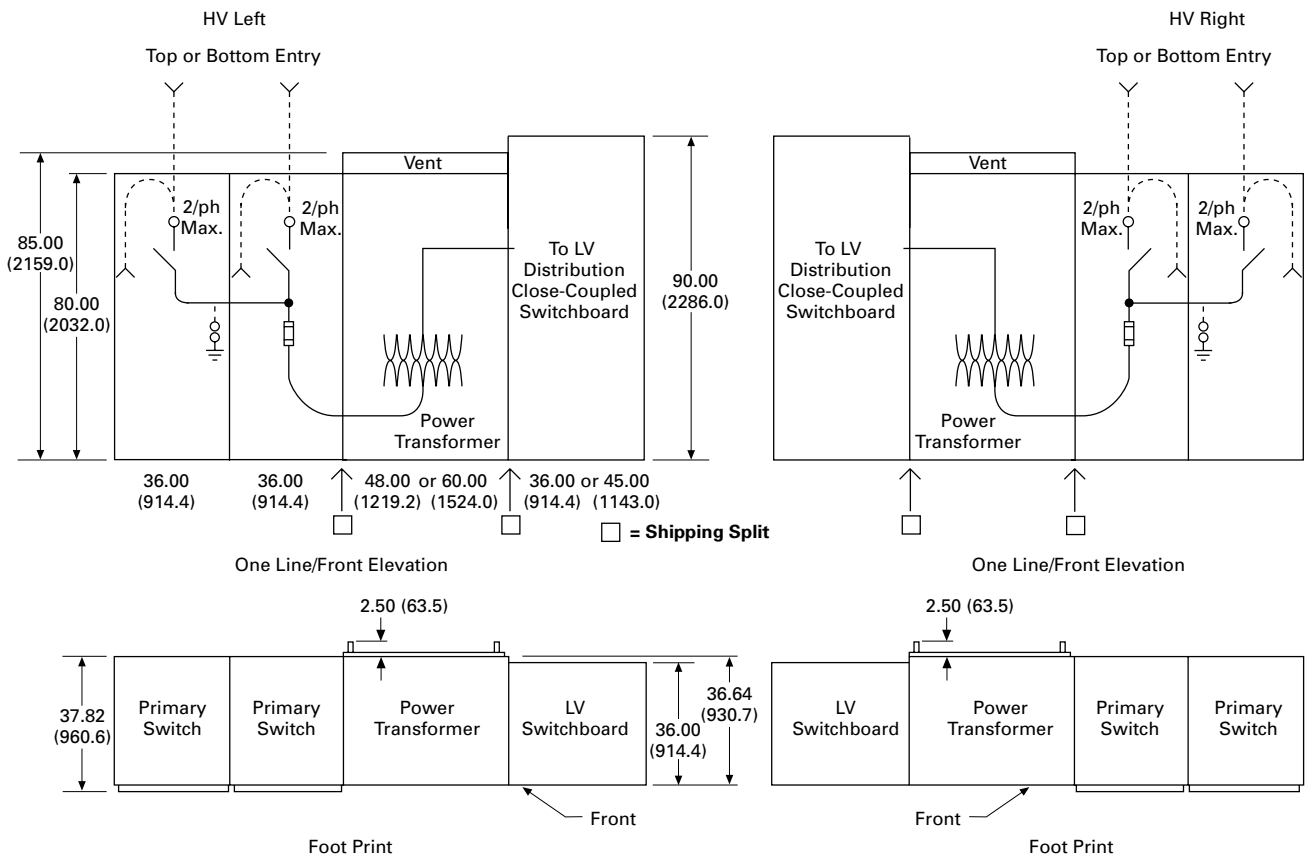
Note: In addition to shipping splits shown, 5.00-inch (127.0 mm) top vent is shipped separately.

Figure 15.1-2. Single Primary, Separate LV Distribution Switchboard Close-Coupled to Transformer



Note: In addition to shipping splits shown, 5.00-inch (127.0 mm) top vent is shipped separately.

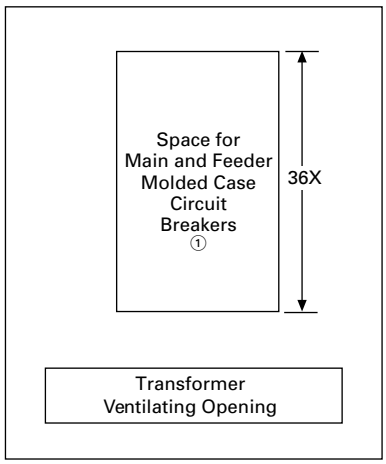
Figure 15.1-3. Duplex Primary, LV Distribution in Front of the Transformer



Note: In addition to shipping splits shown, 5.00-inch (127.0 mm) top vent is shipped separately.

Figure 15.1-4. Duplex Primary, Separate LV Distribution Switchboard Close-Coupled to Transformer

Secondary Distribution Panelboard Maximum Panel Height—"X" Unit



Molded Case Circuit Breaker—Layout ①
See Table 15.1-4 for Ampere Ratings

Two-Pole	ED, EDH, EDC, EHD, FD, FDB FDC, HFD FDE, HFDE EDB, EDS	Two-Pole	ED, EDH, EDC, EHD, FD, FDB FDC, HFD FDE, HFDE EDB, EDS	2X 2X 2X 2X 2X 2X
Three-Pole	ED, EDH, EDC, EHD, FD, FDB FDC, HFD FDE, HFDE EDB, EDS JD, HJD, JDC	Three-Pole	ED, EDH, EDC, EHD, FD, FDB FDC, HFD FDE, HFDE EDB, EDS JD, HJD, JDC	3X 3X 3X 3X 3X 3X 3X
Two- or Three-Pole	DK, KD, HKD, KDC	Two- or Three-Pole	DK, KD, HKD, KDC	4X 4X
Two- or Three-Pole	LGE, LGH, LGC, LGU			4X
Two- or Three-Pole	LD, HLD, LDC, MDL, HMDL, NGS, NGH, NGC			6X
Customer Metering IQ130/140/150/250/260 PXM2250/2260/2270/2280/2290				 9X 9X
Surge Protection Device (SPD)				7X

Figure 15.1-5. Distribution Panel Layout Mounted in Front of Transformer up to 1200 A Panel-Mounted Main and Feeder Devices

① 100% rated main and feeder electronic trip breakers are available rated 400–1200 A. 90 °C wire rated at 75 °C ampacity must be used.

Note: For main devices or main bus 1200 A and below. Feeder devices mounted in front of transformer. For auxiliary switchboard section layout—adjacent to transformer, refer to **Figure 15.1-7** for switchboard section information. Neutral conductor is always gutter mounted.

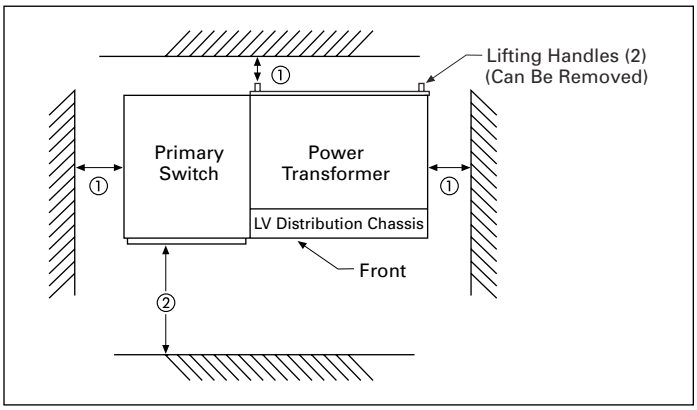


Figure 15.1-6. Base Plan View—HV Left, LV Distribution in Front of the Transformer

① Minimum recommended clearance on each side and rear = 2.00 inches (51.0 mm) for non-seismic applications, 6.00 inches (152.4 mm) for seismic applications. Local jurisdictions may require more.

② Minimum recommended clearance in the front = 36.00 inches (863.6 mm). Local jurisdictions may require more.

Note: Finished foundation surface shall be level within 0.06 inches (1.5 mm) in 36.00 inches (914.4 mm) left-to-right, front-to-back and diagonally, as measured by a laser level. Refer to actual order drawings for power cable conduit entrance locations.

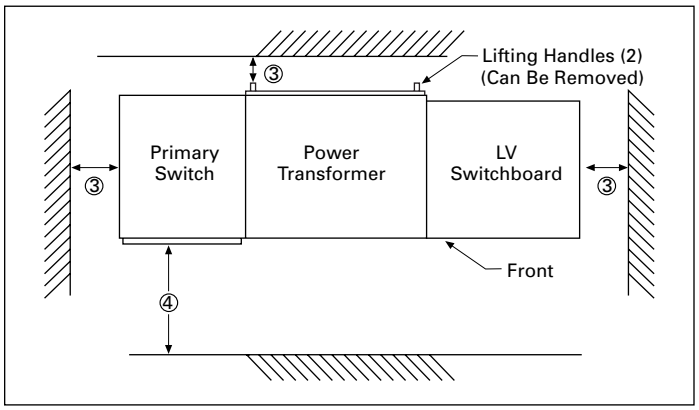


Figure 15.1-7. Base Plan View—HV Left, LV Switchboard Close-Coupled to Transformer on the Right

③ Minimum recommended clearance on each side and rear = 2.00 inches (51.0 mm) for non-seismic applications, 6.00 inches (152.4 mm) for seismic applications. Local jurisdictions may require more.

④ Minimum recommended clearance in the front = 36.00 inches (863.6 mm). Local jurisdictions may require more.

Note: Finished foundation surface shall be level within 0.06 inches (1.5 mm) in 36.00 inches (914.4 mm) left-to-right, front-to-back and diagonally, as measured by a laser level. Refer to actual order drawings for power cable conduit entrance locations.s

Weights

Table 15.1-6. Unit Weights—Lb (kg)

kVA	Weight in Lb (kg)
112.5 ①	4097 (1858)
150 ①	4317 (1958)
225 ①	4744 (2152)
300 ①	5247 (2380)
500 ①	5659 (2567)
750 ①	6721 (3049)
1000 ②	10,834 (4924)

① Single primary, LV distribution in front of the transformer.
② Single primary. Separate LV switchboard close coupled to transformer.

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