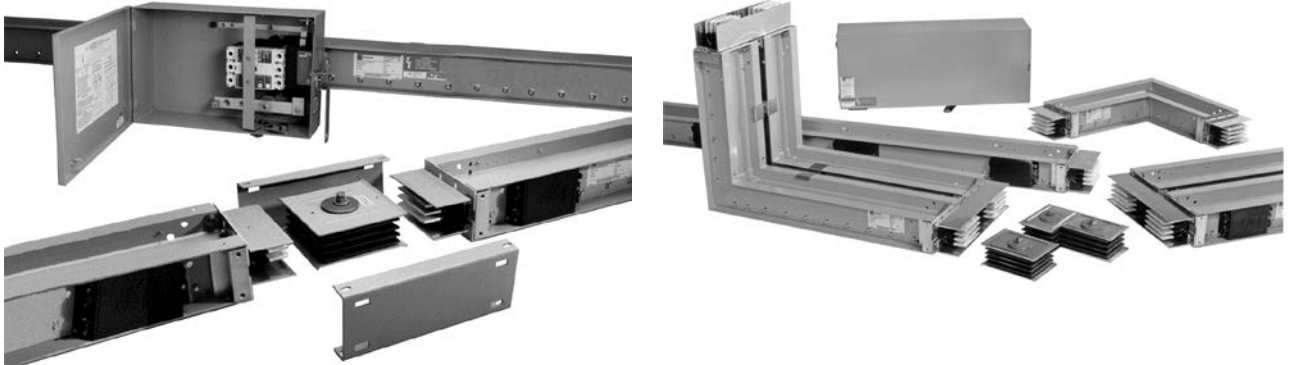


# IEC low voltage busway Pow-R-Way III



## Contents

Description	Page	Description	Page
General description . . . . .	2	Plug-in protective devices . . . . .	35
Standards . . . . .	2	SPD plug-in devices . . . . .	37
Construction details . . . . .	2	Special plug-in devices . . . . .	38
Electrical data . . . . .	8	OPTIM plug-in devices . . . . .	39
Physical data . . . . .	10	Power takeoff sections . . . . .	40
Fittings . . . . .	13	Plug-in device electrical data . . . . .	41
Elbows . . . . .	14	Plug-in device physical data . . . . .	42
Flanges . . . . .	18	Construction drawing . . . . .	43
Offsets . . . . .	20	Installation data . . . . .	44
Tees . . . . .	22	Final field fit program . . . . .	45
Crosses . . . . .	23	Specifications . . . . .	47
Tap boxes . . . . .	24		
Weatherheads . . . . .	26		
Expansion joints . . . . .	27		
Phase transpositions . . . . .	27		
Transformer taps . . . . .	28		
Transformer throat connections . . . . .	29		
Reducers . . . . .	30		
Pow-R-Way III adapters . . . . .	31		
Wall/floor/roof flanges and end closures . . . . .	32		
Hangers . . . . .	33		



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## General description

Eaton Pow-R-Way III® is a 660 V, totally enclosed, non-ventilated, sandwich bus design available with copper busbars in ratings from 225 to 6300 A or with aluminum busbars from 225 to 4800 A. Pow-R-Way III is available in outdoor feeder, indoor feeder, indoor plug-in, and indoor sprinkler-proof configurations. All four types can be used interchangeably without adapters or special splice plates, provided they are of the same current and system rating. The short-circuit withstand ratings for plug-in busway are equal to those of indoor and outdoor feeder busway.

## Standards

Pow-R-Way III meets the requirements of IEC, NEMA,® UL® 857, CSA® C22.2 No. 27-94, IEEE, ANSI, and CE, and is manufactured in an ISO® 9001 certified facility. Pow-R-Way III is also certified for Seismic Withstand Capability in accordance with the earthquake requirements as specified in both the International Building Code (IBC) and the California Building Code. Pow-R-Way III exceeds the worst-case Zone 4 required levels and meets all applicable seismic standards for the International Building Code (IBC).

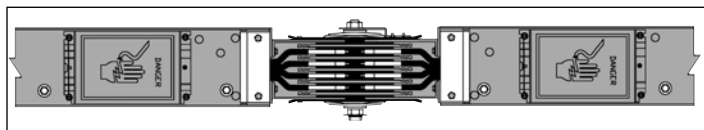


Figure 1. Pow-R-Way III joint design

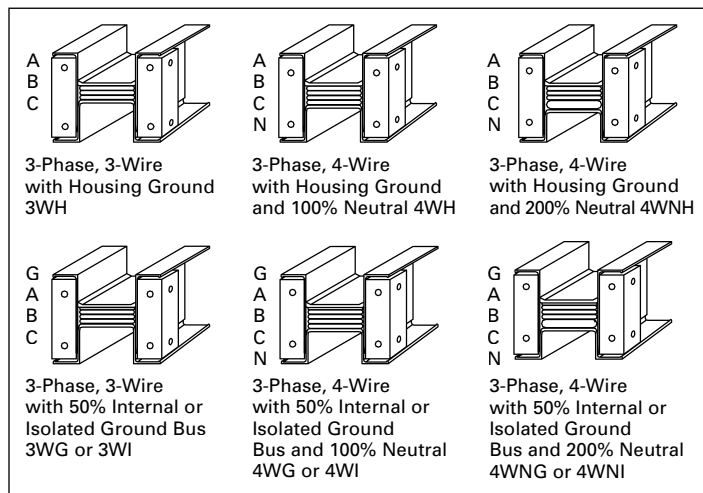


Figure 2. Conductor configurations

Table 1. Pow-R-Way designations (see Figure 2)

Available conductor configurations including grounding and neutral options

3WG	Three-phase, three-wire, 50% internal ground
3WI	Three-phase, three-wire, 50% isolated internal ground
3WH	Three-phase, three-wire, 50% integral housing ground
3WHG	Three-phase, three-wire, 100% ground ①
4WG	Three-phase, four-wire, 50% internal ground, 100% neutral
4WI	Three-phase, four-wire, 50% isolated internal ground, 100% neutral
4WH	Three-phase, four-wire, 50% integral housing ground, 100% neutral
4WHG	Three-phase, four-wire, 100% ground ①, 100% neutral
4WNG	Three-phase, four-wire, 50% internal ground, 200% neutral
4WNI	Three-phase, four-wire, isolated internal ground, 200% neutral
4WNH	Three-phase, four-wire, 50% integral housing ground, 200% neutral
4WNGH	Three-phase, four-wire, 100% ground ①, 200% neutral

① 100% ground consists of two 50% internal ground bars.

## IEC standards

Pow-R-Way III busway has been third-party tested and certified through DEKRA/KEMA to conform to the following IEC Standards: EN 60439-1, EN 61439-6, EN 60529, and EN 60332-3.

## KEMA certification

Pow-R-Way III busway has been tested and certified by DEKRA/KEMA for the following IEC 61439-6 subclauses:

Table 2. IEC 61439-6 type tests

IEC 439-6 subclause	Description
10.2.2	Resistance to corrosion
10.2.3.1	Thermal stability
10.2.3.2	Resistance to abnormal heat and fire due to internal electric effects
10.2.4	Resistance to ultra-violet (UV) radiation
10.2.5	Lifting
10.2.6	Mechanical impact
10.2.7	Marking
10.2.101	Ability to withstand mechanical loads
10.3	Degree of protection of enclosures
10.4	Creepage distances
10.5	Protection against electric shock and integrity of protective circuits
10.9	Dielectric properties
10.10	Temperature-rise limits
10.11	Short-circuit withstand strength
5.101	Phase conductors characteristics / voltage drop

Table 3. IEC 60529 IP ratings

IEC 529 IP Rating	Busway type
IP2X	Pow-R-Way III plug-in busway; Plug-in outlet protects against access to live parts
IP40	Pow-R-Way III indoor plug-in and feeder busway
IP55	Pow-R-Way III sprinkler-proof plug-in busway
IP66	Pow-R-Way III outdoor feeder busway

Table 4. IEC 60529 degrees of protection

IEC 529 IP rating	Description
IP40	Protection against access to hazardous parts with a wire or solid foreign object 1 mm diameter. No protection against water.
IP55	Protection against access to hazardous parts with a wire and dust shall not penetrate in quantity to interfere with satisfactory operation or to impair safety. Protects against splashing water.
IP66	Protection against access to hazardous parts with a wire and dust shall not penetrate in quantity to interfere with satisfactory operation or to impair safety. Protects against powerful water jets.

## Manufacturing location

Pow-R-Way III busway is engineered and manufactured in Greenwood, SC, since 1980. Prior to 1980, Eaton busbar trunking systems were manufactured in Beaver, PA.

### Construction details (Figure 3)

#### Conductor/insulation system

Busbars are fabricated from high-strength, 99.9% conductivity copper or 56.5% conductivity aluminum. Copper busbars are 99.9% pure copper. The joint edge of each busway conductor bar is beveled while the Pow-R-Bridge™ conductor bars have full rounded edges. This makes for a smooth and easy connection between the busway and Pow-R-Bridge joint. The phase and neutral bars are insulated with Class B 130 °C epoxy insulation. The epoxy powder is applied by an automated fluidized bed process to ensure uniform thickness. The epoxy powder is applied over the full length of the preheated bar except for the joint and plug-in contact surfaces. After the powder has been fused to the busbar, the bars enter an oven to cure. This process ensures that all of the epoxy powder cross links and hardens to the busbar.

Fluidized bed applied epoxy provides resistance to water absorption and chemical erosion. Epoxy has outstanding heat transfer characteristics and is ideally suited for sandwich bus applications. The uniform thickness and smooth surface provided by epoxy ensures that the insulation will have no cavities or voids, and also provides excellent edge coverage to the bars. Epoxy has excellent dielectric strength, is flame-retardant and resists impacts that other Class B insulating material could not withstand.

Busbars for plug-in applications have full-sized welded conductor tabs at the contact location points of the plug-in outlet. The tabs are of the same thickness as the conductor bars. The plug-in conductor tabs extend into the plug-in outlet, maintaining a true sandwich design throughout the entire busway length.

The result is improved heat dissipation, better bracing, and elimination of the need to separate, or flare, the conductor bars at the plug-in opening. Maintaining a true sandwich design also eliminates potential pathways for the propagation of flame, smoke, and gas through the busway housing, commonly referred to as the “chimney effect.”

Silver- or tin-plating is applied to all joint and contact surfaces after the fluidized bed epoxy is applied. Aluminum busbars are plated by the Alstan® 88C process. Copper busbars are plated with a flashing process. The plating of the conductor tabs provides an extremely durable contact surface for the spring-loaded connections of bus plug stab assemblies.

#### Housing details (see Figure 3)

Pow-R-Way III is constructed with a rugged two-piece extruded aluminum housing. There are no seams or welds across the top or bottom sides of the housing. The housing is bolted along the bottom sides below the busbars with high tensile strength zinc-plated hardware. No fastening bolts or screws penetrate the housing or enter the busbar package.

Pow-R-Way III achieves the highest 6-cycle short-circuit withstand ratings available in the industry today. The non-magnetic, all-aluminum housing provides for excellent heat dissipation and a significant reduction in reactance and magnetic flux leakage as compared to a steel or steel and aluminum combination housing. The integrity and strength of the housing ensures specifiers and users of a safe and durable installation over a broad spectrum of industrial and commercial applications.

A protective finish of ANSI 61, epoxy powder paint is applied by an automated electrostatic process.

#### Integral ground

The two-piece, extruded aluminum housing is designed and manufactured as a 50% integral ground path (integral earth) and is fully fault rated. The system ground continuity is maintained through each joint by the ground path end blocks, ground path plates, and joint covers. The aluminum joint covers are furnished with ground path contact surfaces on the inside of each end. When the covers are installed, the contact surfaces are bolted directly to the ground path end blocks with four 3/8-16 0.50 inch (12.7 mm) hex bolts per cover.

A highly visible label is furnished on each joint cover to alert the installer that the covers must be properly installed to maintain the ground path. The result is a 50% ground path that ensures ground continuity with very low resistance characteristics.

#### Internal ground

Pow-R-Way III offers a 50% ground bus (copper or aluminum) that is internal to the busway. Pow-R-Way III also offers a 100% internal ground bus for copper ratings only. 100% internal ground bus comprises two 50% ground busbars; one before the A phase bar and one after the neutral bar.

#### Isolated ground option

To meet the growing demand for grounding isolation, Pow-R-Way III offers a 50% isolated ground bus that is insulated and internal to the busway. This option is available for application to operations with heavy microprocessor-based loads or large computer installations where grounding isolation is essential.

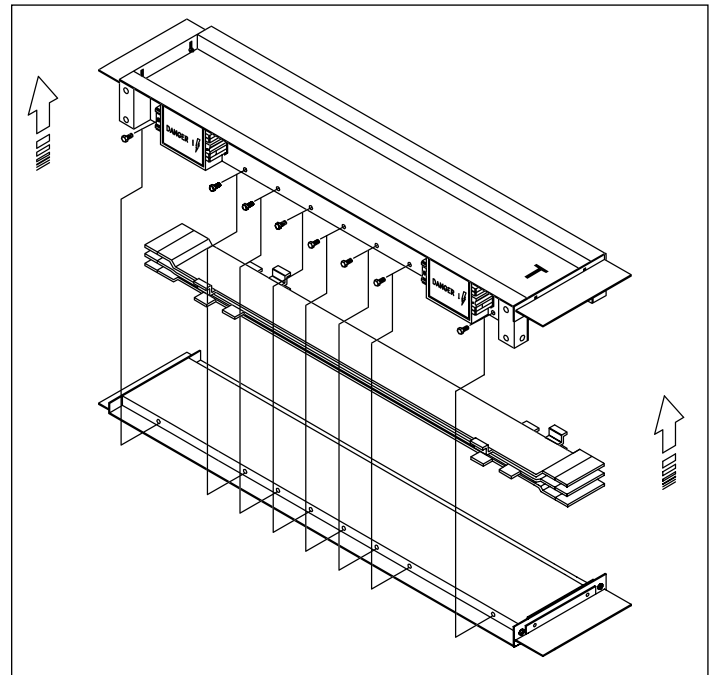


Figure 3. Housing assembly

## Construction details (continued)

### 200% neutral option (Figure 4)

Pow-R-Way III offers a fully rated, 200% neutral bus option for busway fed distribution systems with nonlinear loads. The additional neutral capacity prevents the overheating caused by zero sequence harmonic currents. The Pow-R-Way III 200% neutral is manufactured with a single 12.7 mm (0.50 inch) thick busbar that receives the same silver-plating and Class B, 130 °C Epoxy insulation as the phase bars.

Power system harmonics are generated by various types of non-linear loads. A sinusoidal voltage applied to a nonlinear load will result in a non-sinusoidal current and waveform distortion. Loads that are switched or pulsed, such as rectifiers, thyristors, and switch-mode power supplies, are nonlinear. With the proliferation of electronics into industrial, commercial, and institutional applications, nonlinear loads have become a significant and critical component of most modern distribution and control systems. Examples of nonlinear loads are personal computers, UPS systems, variable frequency motor controllers, electronic lighting ballasts, fax and copying machines, medical test equipment, and many other microprocessor-based apparatus.

Nonlinear load currents typically are extremely high in harmonic content. The harmonics create numerous problems in electrical systems and equipment. Some harmonics are negative sequence with 120° phase displacement (this means the phase rotation is ACB instead of ABC). Positive sequence harmonics have 120° phase displacement, but are of the same rotation as the distribution system. Certain nonlinear loads cause odd triplen harmonics, which are zero sequence with no phase displacement.

Balancing the phase load currents in a three-phase, four-wire system will normally reduce neutral currents to zero if load currents have an undistorted sinusoidal waveform. However, because zero sequence harmonics are additive and will not cancel each other in the neutral, the neutral current can be as high as 1.73 times the phase current, even with the phase currents perfectly balanced. This can result in overheated neutrals and lead to deterioration of equipment performance and a shortened equipment life cycle.

The Computer and Business Equipment Manufacturers Association (CBEMA) recommends that neutrals be oversized to at least 173% of the ampacity of the phase conductors to prevent problems. Pow-R-Way III offers a fully rated, 200% neutral bus option for busway fed distribution systems with non-sinusoidal loads. The additional neutral capacity prevents the overheating caused by high harmonic neutral currents.

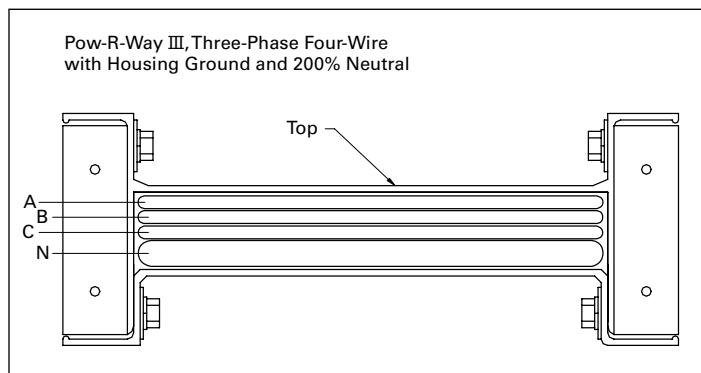


Figure 4. 200% neutral cross section

### DTI SmartBolts®

DTI SmartBolts are optional torque/tension indicating bolts that can be used in any standard Pow-R-Way III bridge joint. (See **Page 5**, Pow-R-Bridge Joint.) In place of checking each joint connection with a torque wrench, DTI SmartBolts provide a visible indication of a loose or tensioned condition. The bright red indication of a loose fastener will gradually darken as the fastener is tightened until it turns to a deep black color, indicating that the joint has been tightened to the proper torque/tension. Standard preventive maintenance becomes a simple and safe visual inspection.

**Note:** DTI SmartBolt is a registered trademark of Stress Indicators, Inc.

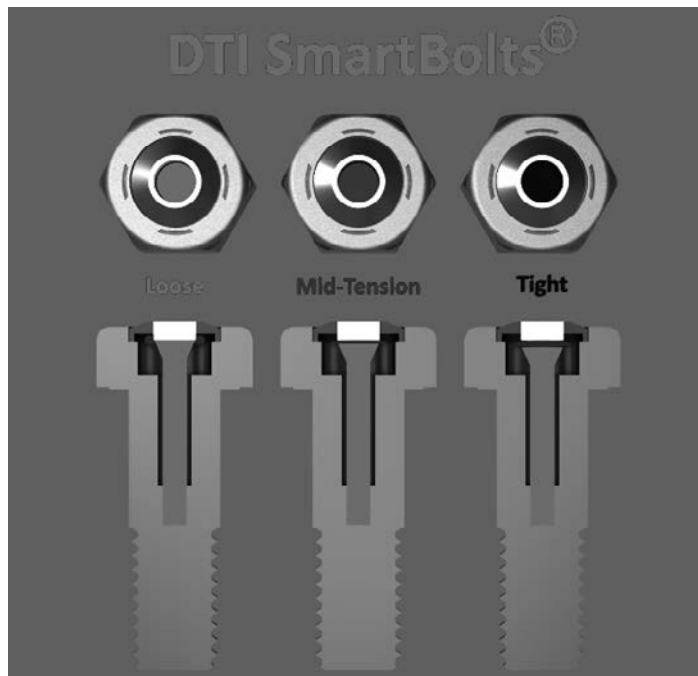


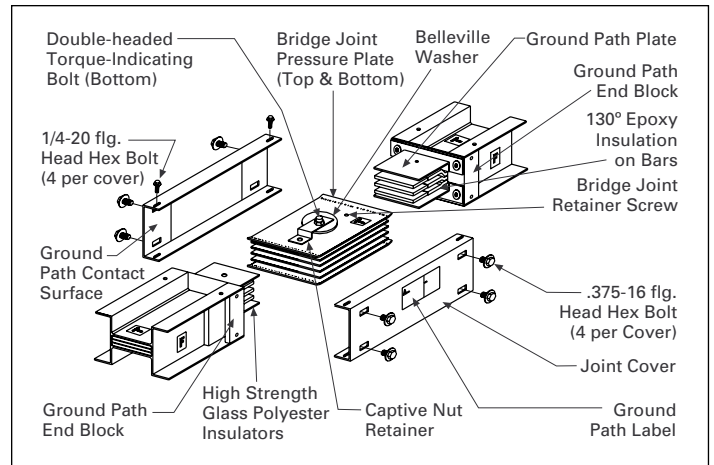
Figure 5. DTI SmartBolts

**Construction details (continued)**

**Pow-R-Bridge (Figure 6)**

Pow-R-Way III joint connections are made with the Pow-R-Bridge joint package, which is installed on each section of busway prior to shipment. A double-headed, torque-indicating bolt is provided to ensure that proper installation torque is achieved. Fall-away instruction tags are furnished on the torque-indicating bolt heads to allow for visual inspection from a distance. When the proper torque value is achieved, the top bolt head will shear off and allow the tag to fall to the floor. Any joint that is improperly torqued will retain the highly visible (caution yellow) tag at the bolt head.

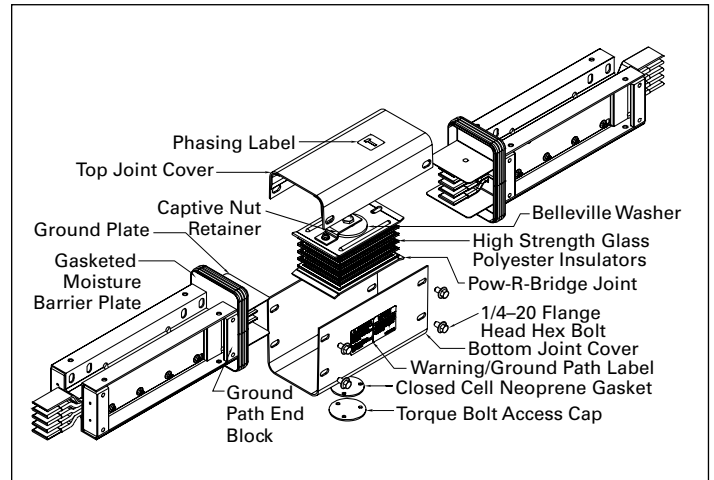
The Pow-R-Bridge can provide an adjustment of 12.7 mm (±0.50 inch) at each joint. Over adjustment is prevented by the joint covers, which will only allow a 12.7 mm (0.50 inch) adjustment to be made and by stopping lances on the conductor bars of the Pow-R-Bridge. The non-rotating design of the Pow-R-Bridge maintains its configuration integrity when it has been removed from a section of busway. The conductors and insulators will not displace or swivel, making reinstallation of the Pow-R-Bridge quick and easy.



**Figure 6. Indoor bridge joint features**

**Outdoor Pow-R-Bridge (Figure 7)**

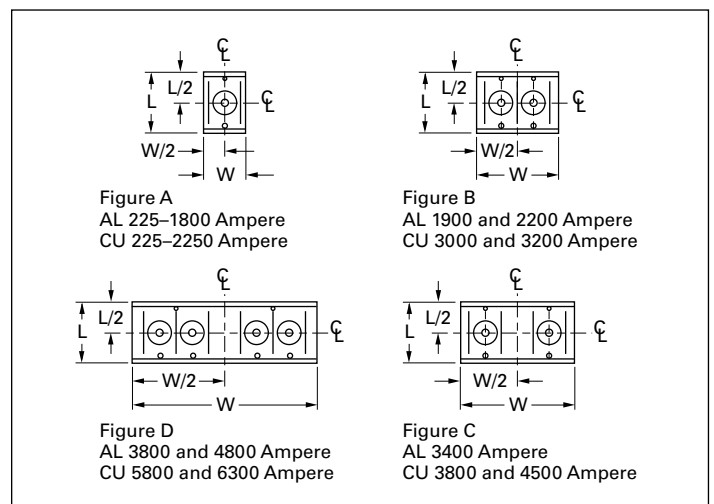
Joint connections for IP66 feeder busway and IP54 tap-off busway are made with two gasketed joint covers. The top cover overlaps the adjoining bottom cover, sealing around the moisture barrier plates on each end of the busway sections and creating a moisture-proof barrier around the joint. Each cover is made from rigid aluminum to ensure earth conductivity through each joint. No special tools or sealants are required.



**Figure 7. Outdoor bridge joint features**

**Table 5. Pow-R-Bridge joint dimensions**

IEC 439 ampere rating			Dimensions in mm	
Cu	Al	Figure 8 configurations	W	L
225	225	A	114.3	187.5
400	400	A	114.3	187.5
630	630	A	114.3	187.5
800	—	A	114.3	187.5
1000	—	A	114.3	187.5
1200	—	A	530.0	187.5
1400	800	A	142.8	187.5
—	1000	A	142.8	187.5
1550	1150	A	155.4	187.5
1800	1450	A	180.9	187.5
2250	1800	A	212.9	187.5
—	1900	B	231.6	187.5
3000	2200	B	276.4	187.5
3200	—	B	276.4	187.5
3800	—	C	403.4	187.5
4500	3400	C	466.9	187.5
—	3800	D	505.0	187.5
5800	4800	D	594.6	187.5
6300	—	D	594.6	187.5



**Figure 8. Pow-R-Bridge joint**

**Construction details (continued)**

**Pow-R-Way III feeder busway (Figure 9 and Table 6)**

- 225 to 6300 A copper
- 225 to 4800 A aluminum

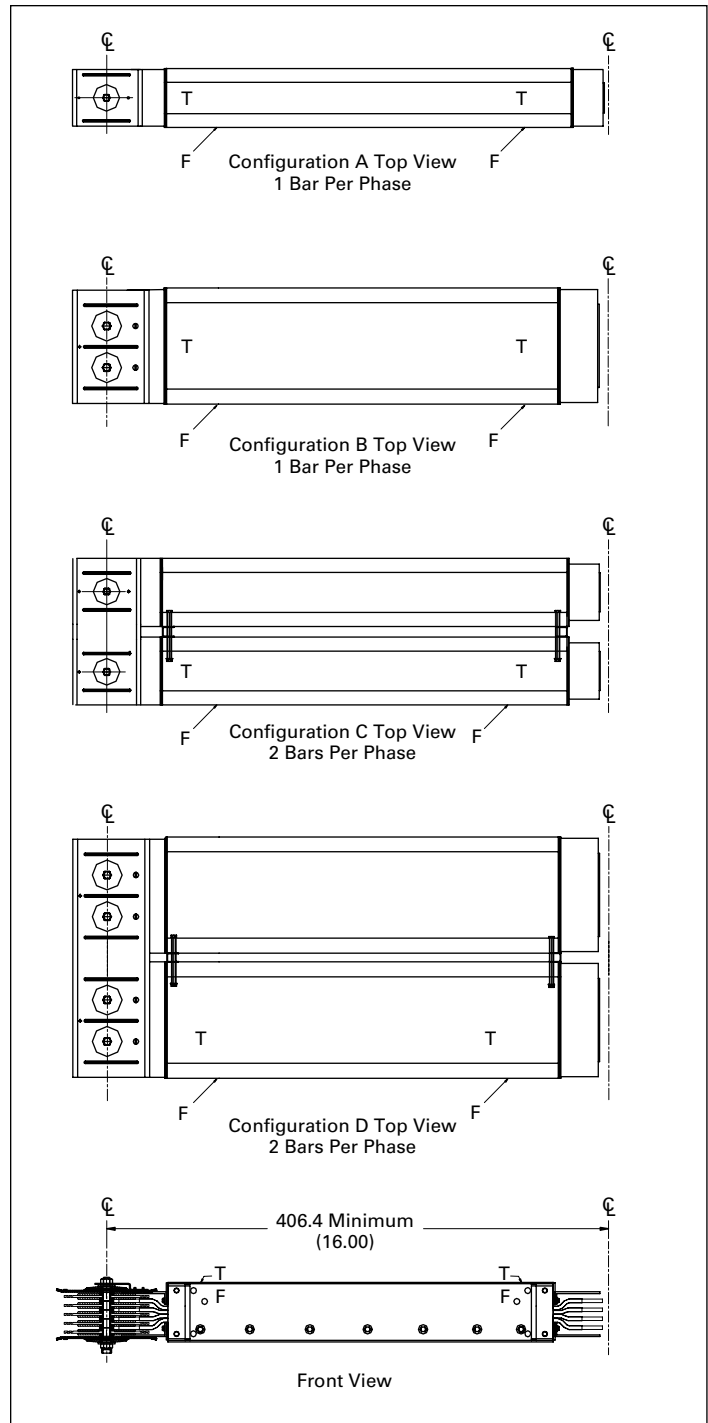
Straight sections of feeder busway can be supplied in any length, at 3.2 mm (1/8 inch) increments, from a 406.4 mm (16.00 inch) minimum to a 3 m (10 ft) maximum. **Figure 9** illustrates the configuration of feeder busway and Pow-R-Bridge for the available ampere ratings. See **Table 6** below for reference to the proper configuration.

**Table 6. Configuration**

**IEC 439 ampere rating**

Cu	Al	Figure 9 configuration
225	225	A
400	400	A
630	630	A
800	—	A
1000	—	A
1200	—	A
1400	800	A
—	1000	A
1550	1150	A
1800	1450	A
2250	1800	A
—	1900	B
3000	2200	B
3200	—	B
3800	—	C
4500	3400	C
—	3800	D
5800	4800	D
6300	—	D

Each section will include one, factory-installed Pow-R-Bridge mounted to the left end of the busway (with the "T" to the top, when viewing the bus from the "F" side). Each Pow-R-Bridge will have a "T" label that must always match the "T" orientation of the busway.



**Figure 9. Feeder busway**

**Construction details (continued)**

**Pow-R-Way III plug-in busway (Figure 10 and Table 7 and Table 8)**

- 225 to 6300 A copper
- 225 to 4800 A aluminum

Straight sections of plug-in busway are made only in 609.6 mm (24.00 inch) incremental lengths with a maximum length of 3 m (10 ft). **Figure 10** depicts the configuration of plug-in busway and Pow-R-Bridge for the available ampere ratings. See **Table 7** below for reference to the proper configuration.

**Table 7. Configuration**

IEC 439 ampere rating		Figure 10 configuration
Cu	Al	
225	225	A
400	400	A
630	630	A
800	—	A
1000	—	A
1200	—	A
1400	800	A
—	1000	A
1550	1150	A
1800	1450	A
2250	1800	A
—	1900	B
3000	2200	B
3200	—	B
3800	—	C
4500	3400	C
—	3800	D
5800	4800	D
6300	—	D

**Table 8** below illustrates the quantity of plug-in openings per side that are available per standard section.

**Table 8. Number of plug-in openings**

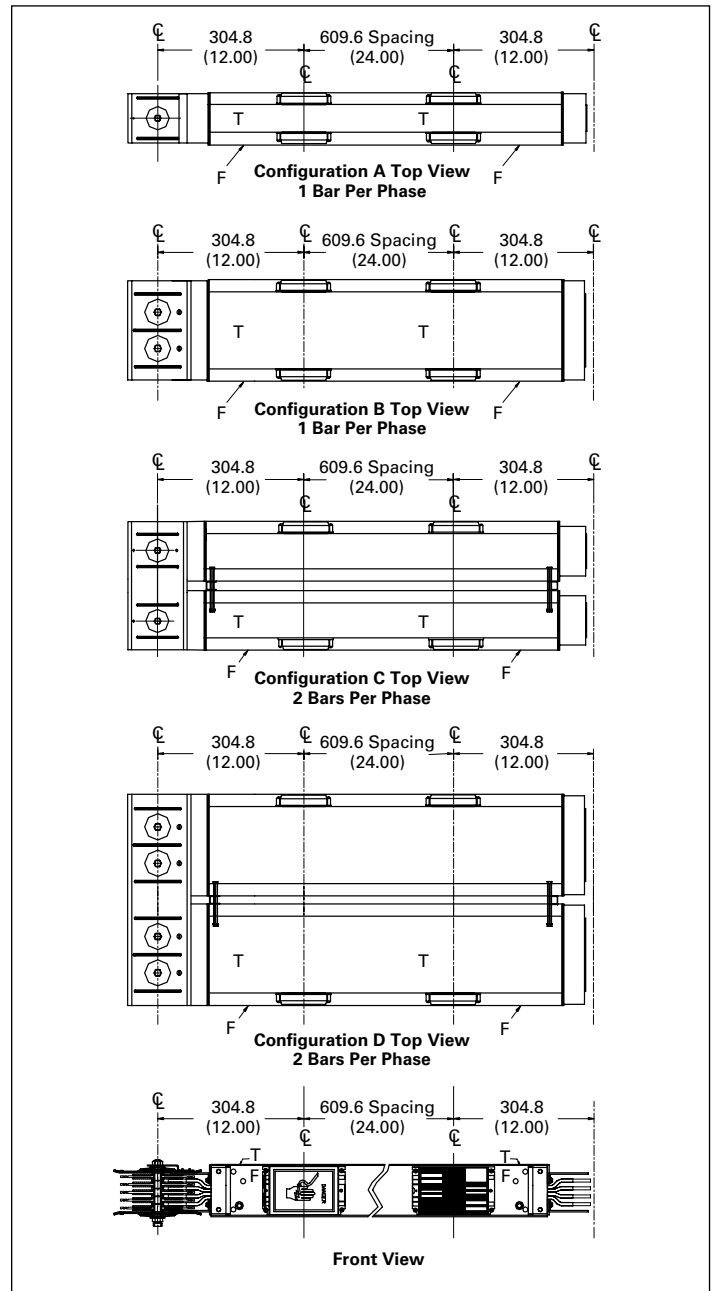
Dimensions in millimeters	Number of plug-in openings	
	Front	Back
609.6	1	1
1219.2	2	2
1828.8	3	3
2438.4	4	4
3048.0	5	5

Each section will include one, factory-installed Pow-R-Bridge mounted to the left end of the busway (with the "T" label to the top, when viewing the bus from the "F" side). Each Pow-R-Bridge will have a "T" label that must always match the "T" orientation of the busway.

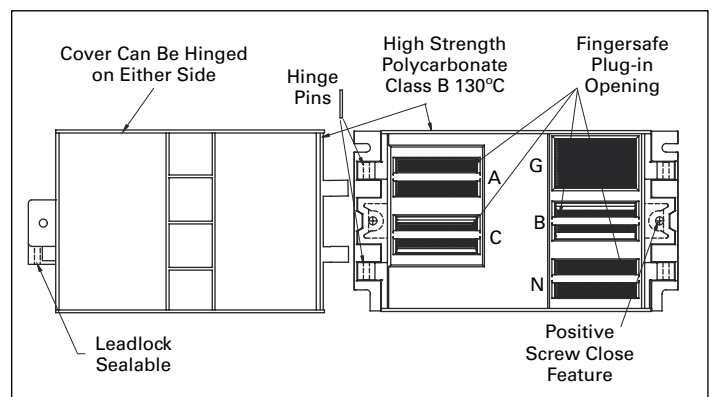
**Plug-in outlet**

The plug-in outlet and cover are made from a durable, high-strength, polycarbonate material, which is rated as Class B, 130°C, insulation. The plug-in cover is designed to protect the contact surfaces and to prevent the entry of dirt, dust, or moisture. The cover has a positive screw close feature that prohibits the opening of the cover without the use of a tool. The cover is also Utility "leadlock" sealable.

As a countermeasure to the effects of thermal expansion and mechanical vibration, the plug-in outlet is secured to the busway housing with high tensile strength locking hardware.



**Figure 10. Plug-in busway**



**Figure 11. Plug-in outlet cover**

**Electrical data**

**Table 9. Line-to-line voltage drop (mV per meter)**

IEC 439 ampere rating	Percent power factor					
	50	60	70	80	90	100
<b>Copper</b>						
225	26.23	27.87	29.18	29.84	30.16	26.23
400	47.21	50.16	52.46	54.10	54.10	47.54
630	72.46	77.05	80.98	83.28	83.97	74.10
800	99.34	106.2	111.5	115.4	117.0	104.3
1000	94.43	100.6	104.6	107.9	108.5	95.08
1200	94.43	100.6	104.6	107.9	108.5	95.08
1400	93.44	99.34	103.9	107.2	107.9	95.08
1550	89.84	95.74	100.3	103.7	104.3	92.13
1800	82.62	87.87	92.46	95.41	96.72	85.90
2250	81.31	86.89	91.74	94.75	96.07	85.90
3000	72.13	77.38	81.64	84.92	86.56	78.36
3200	85.04	92.35	98.75	103.9	107.3	99.70
3800	86.23	90.49	93.77	95.74	94.75	80.66
4500	90.49	95.41	99.21	101.0	100.7	85.90
5800	80.00	84.59	88.20	90.62	90.49	78.36
6300	85.64	92.35	98.45	103.0	105.7	96.32
<b>Aluminum</b>						
225	38.36	42.30	45.90	49.18	51.80	50.49
400	69.18	76.72	83.61	89.84	94.43	92.13
630	109.2	121.3	132.5	142.6	151.1	149.2
800	99.34	108.5	116.4	123.3	127.9	121.0
1000	99.34	108.5	116.4	123.3	127.9	121.0
1150	106.2	116.1	124.6	132.1	137.0	130.5
1450	97.71	106.6	114.8	121.3	126.2	119.7
1800	85.90	94.10	101.3	107.5	111.8	106.6
1900	91.15	99.67	107.5	114.1	119.0	113.4
2200	91.15	100.0	107.9	115.1	120.0	115.1
3400	84.26	91.80	98.03	103.6	107.2	100.7
3800	88.85	97.05	103.6	109.5	113.4	106.6
4800	94.75	103.6	111.1	117.7	122.0	115.4

**Note:** For plug-in distributed loads, divide the voltage drop by 2.

**Note:** Actual voltage drop for loads less than full rated current and different lengths may be calculated by multiplying the feeder values from **Table 9** by (actual/rated current) x (actual length / 30.5 m).

**Table 10. IEC 439-2 ratings**

IEC 439 ampere rating	1-second rms symmetrical short-circuit rating	Micro-ohms per meter		
		Resistance R	Reactance X	Impedance Z
<b>Copper</b>				
225	35,000	80.8	27.0	85.2
400	35,000	80.8	27.0	85.2
630	35,000	80.8	27.0	85.2
800	35,000	80.8	27.0	85.2
1000	35,000	80.8	27.0	85.2
1200	55,000	63.4	22.3	67.2
1400	65,000	50.8	22.6	55.6
1550	70,000	39.7	26.9	48.0
1800	80,000	29.4	22.9	37.3
2250	85,000	26.2	11.6	28.8
3000	100,000	17.8	9.1	20.0
3200	100,000	18.1	7.4	19.6
3800	120,000	13.9	10.3	17.3
4500	120,000	13.1	7.1	14.9
5800	120,000	9.11	5.0	10.4
6300	120,000	9.02	3.99	9.87
<b>Aluminum</b>				
225	25,000	156	28.9	159
400	25,000	156	28.9	159
630	25,000	156	28.9	159
800	45,000	90.0	19.7	92.1
1000	45,000	90.0	19.7	92.1
1150	45,000	79.0	17.9	80.9
1450	55,000	57.3	12.9	58.7
1800	80,000	44.6	10.2	45.7
1900	100,000	39.0	9.12	40.6
2200	100,000	31.2	7.32	32.1
3400	100,000	22.5	5.35	23.1
3800	120,000	20.4	4.44	20.9
4800	120,000	15.8	2.83	16.0



## Electrical data (continued)

### Housing ground vs. internal ground

Eaton Pow-R-Way III busway offers a variety of grounding options. Two of which are 50% integral housing ground and 50% internal ground.

The 50% internal ground option has a separate ground conductor internal to the housing, which is rated 50% of the phase conductor.

The integral housing ground is where the extruded aluminum housing is used as the ground path and no internal ground conductor is provided. The housing is a 50% integral ground path. This type of ground path is as effective of a ground conductor as an internal ground bar.

**Table 11** shows a cross-sectional comparison between the aluminum housing and internal ground bar. The integral housing ground provides a larger ground path that is over 100% of the cross-sectional area of the phase conductors. **Figure 12** illustrates the difference between the two grounding options.

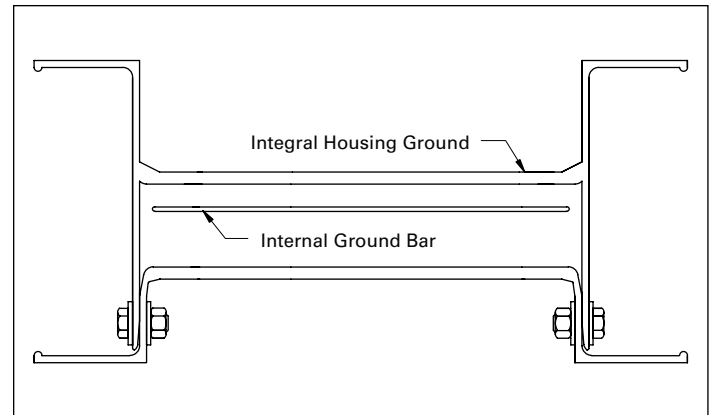


Figure 12. Housing ground vs. internal ground

Table 11. Housing ground vs. internal ground comparison

IEC 439 ampere rating		Bar size (mm)	Bar per phase	Cross-sectional area (sq mm)	
Cu	Al			Internal ground	Housing ground
225	225	3.2 x 41.1	1	131.5	1600.0
400	400	3.2 x 41.1	1	131.5	1600.0
630	630	3.2 x 41.1	1	131.5	1600.0
800	—	3.2 x 41.1	1	131.5	1600.0
1000	—	3.2 x 41.1	1	131.5	1600.0
1200	—	3.2 x 57.2	1	183.0	1638.7
1400	800	3.2 x 69.9	1	223.7	1735.5
—	1000	3.2 x 69.9	1	223.7	1735.5
1550	1150	3.2 x 82.6	1	264.3	1825.8
1800	1450	3.2 x 108.0	1	345.6	2006.5
2250	1800	3.2 x 139.7	1	447.0	2232.3
—	1900	3.2 x 158.8	1	508.2	2374.2
3000	2200	3.2 x 203.2	1	650.2	2690.3
3200	—	3.2 x 215.9	1	690.9	2851.6
3800	—	3.2 x 108.0	2	691.2	4012.9
4500	3400	3.2 x 139.7	2	894.1	4464.5
—	3800	3.2 x 158.8	2	1016.3	4748.4
5800	4800	3.2 x 203.2	2	1300.5	5380.6
6300	—	3.2 x 215.9	2	1381.8	5702.2

## Physical data

### Dimensions—busbar and housing

Table 12. Three-wire with no neutral

IEC 439 ampere rating		Phase bar size (depth and width) (mm)	Bar per phase	Conductor configuration and housing size (width x height) (mm)				Figure 13 config. ②
Cu	Al			50% integral housing ground 3WH	50% internal ground bus 3WHG	50% internal isolated ground bus 3WI	100% internal ground bus 3WHG ①	
225	225	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 117.6	A
400	400	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 117.6	A
630	630	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 117.6	A
800	—	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 117.6	A
1000	—	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 117.6	A
1200	—	6.4 x 57.2	1	136.7 x 111.3	136.7 x 114.3	136.7 x 115.6	136.7 x 117.6	A
1400	800	6.4 x 69.9	1	149.3 x 111.3	149.3 x 114.3	149.3 x 115.6	149.3 x 117.6	A
—	1000	6.4 x 69.9	1	149.3 x 111.3	149.3 x 114.3	149.3 x 115.6	149.3 x 117.6	A
1550	1150	6.4 x 82.6	1	162.1 x 111.3	162.1 x 114.3	162.1 x 115.6	162.1 x 117.6	A
1800	1450	6.4 x 108.0	1	187.5 x 111.3	187.5 x 114.3	187.5 x 115.6	187.5 x 117.6	A
2250	1800	6.4 x 139.7	1	219.5 x 111.3	219.5 x 114.3	219.5 x 115.6	219.5 x 117.6	A
—	1900	6.4 x 158.8	1	238.8 x 111.3	238.8 x 114.3	238.8 x 115.6	238.8 x 117.6	A
3000	2200	6.4 x 203.2	1	283.7 x 111.3	283.7 x 114.3	283.7 x 115.6	283.7 x 117.6	A
3200	—	6.4 x 215.9	1	296.2 x 111.3	296.2 x 114.3	296.2 x 115.6	296.2 x 117.6	A
3800	—	6.4 x 108.0	2	410.0 x 111.3	410.0 x 114.3	410.0 x 115.6	410.0 x 117.6	B
4500	3400	6.4 x 139.7	2	473.5 x 111.3	473.5 x 114.3	473.5 x 115.6	473.5 x 117.6	B
—	3800	6.4 x 158.8	2	512.1 x 111.3	512.1 x 114.3	512.1 x 115.6	512.1 x 117.6	B
5800	4800	6.4 x 203.2	2	602.0 x 111.3	602.0 x 114.3	602.0 x 115.6	602.0 x 117.6	B
6300	—	6.4 x 215.9	2	626.9 x 111.3	626.9 x 114.3	626.9 x 115.6	626.9 x 117.6	B

① 100% ground consists of two 50% rated internal ground bars inside of the enclosure.

② Refer to Figure 13 on Page 11 for configuration A and B.

Table 13. Four-wire with 100% neutral

IEC 439 ampere rating		Phase and neutral bar size (depth and width) (mm)	Bar per phase	Conductor configuration and housing size (width x height) (mm)				Figure 13 config. ②
Cu	Al			50% integral housing ground 4WH	50% internal ground bus 4WHG	50% internal isolated ground bus 4WI	100% internal ground bus 4WHG ①	
225	225	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 128.2	A
400	400	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 128.2	A
630	630	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 128.2	A
800	—	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 128.2	A
1000	—	6.4 x 41.1	1	120.7 x 111.3	120.7 x 114.3	120.7 x 115.6	120.7 x 128.2	A
1200	—	6.4 x 57.2	1	136.7 x 111.3	136.7 x 114.3	136.7 x 115.6	136.7 x 128.2	A
1400	800	6.4 x 69.9	1	149.3 x 111.3	149.3 x 114.3	149.3 x 115.6	149.3 x 128.2	A
—	1000	6.4 x 69.9	1	149.3 x 111.3	149.3 x 114.3	149.3 x 115.6	149.3 x 128.2	A
1550	1150	6.4 x 82.6	1	162.1 x 111.3	162.1 x 114.3	162.1 x 115.6	162.1 x 128.2	A
1800	1450	6.4 x 108.0	1	187.5 x 111.3	187.5 x 114.3	187.5 x 115.6	187.5 x 128.2	A
2250	1800	6.4 x 139.7	1	219.5 x 111.3	219.5 x 114.3	219.5 x 115.6	219.5 x 128.2	A
—	1900	6.4 x 158.8	1	238.8 x 111.3	238.8 x 114.3	238.8 x 115.6	238.8 x 128.2	A
3000	2200	6.4 x 203.2	1	283.7 x 111.3	283.7 x 114.3	283.7 x 115.6	283.7 x 125.0	A
3200	—	6.4 x 215.9	1	296.2 x 111.3	296.2 x 114.3	296.2 x 115.6	296.2 x 125.0	A
3800	—	6.4 x 108.0	2	410.0 x 111.3	410.0 x 114.3	410.0 x 115.6	410.0 x 128.2	B
4500	3400	6.4 x 139.7	2	473.5 x 111.3	473.5 x 114.3	473.5 x 115.6	473.5 x 128.2	B
—	3800	6.4 x 158.8	2	512.1 x 111.3	512.1 x 114.3	512.1 x 115.6	512.1 x 128.2	B
5800	4800	6.4 x 203.2	2	602.0 x 111.3	602.0 x 114.3	602.0 x 115.6	602.0 x 128.2	B
6300	—	6.4 x 215.9	2	626.9 x 111.3	626.9 x 114.3	626.9 x 115.6	626.9 x 128.2	B

① 100% ground consists of two 50% rated internal ground bars inside of the enclosure.

② Refer to Figure 13 on Page 11 for configuration A and B.

**Physical data (continued)**

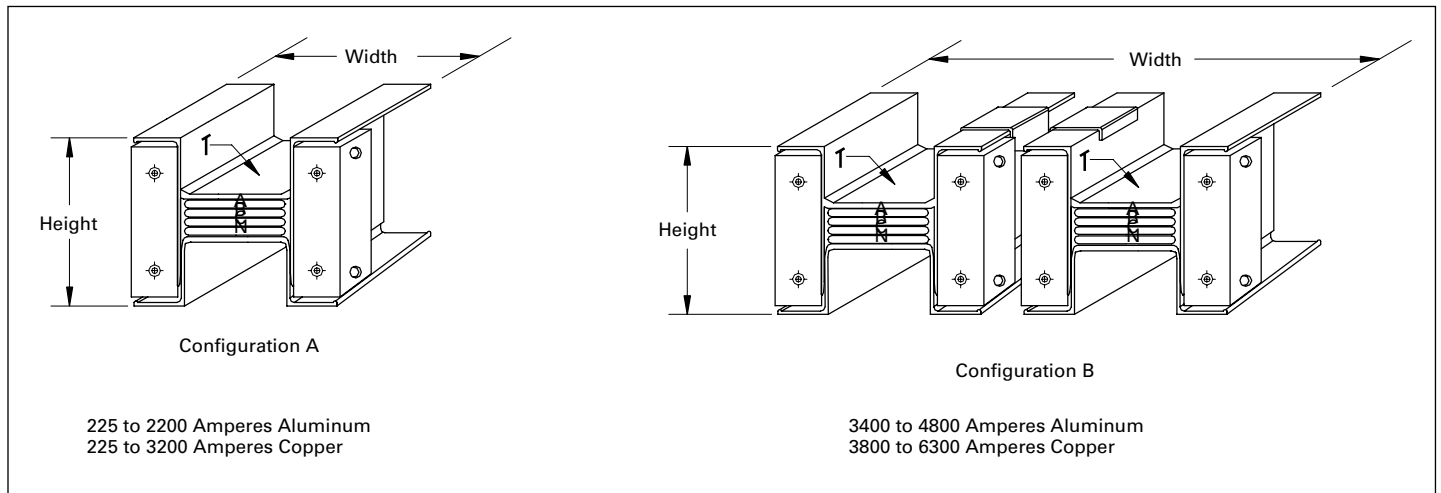
**Dimensions—busbar and housing (continued)**

**Table 14. Four-wire with 200% neutral**

IEC 439 ampere rating		Phase bar size (depth and width) (mm)	Bar per phase	Conductor configuration and housing size (width x height) (mm)				Figure 13 config. ②
Cu	Al			50% integral housing ground 4WH	50% internal ground bus 4WHG ①	50% internal isolated ground bus 4WI	100% internal ground bus 4WHG	
225	225	6.4 x 41.1	1	120.7 x 125.0	120.7 x 128.2	120.7 x 129.5	—	A
400	400	6.4 x 41.1	1	120.7 x 125.0	120.7 x 128.2	120.7 x 129.5	—	A
630	630	6.4 x 41.1	1	120.7 x 125.0	120.7 x 128.2	120.7 x 129.5	—	A
800	—	6.4 x 41.1	1	120.7 x 125.0	120.7 x 128.2	120.7 x 129.5	—	A
1000	—	6.4 x 41.1	1	120.7 x 125.0	120.7 x 128.2	120.7 x 129.5	—	A
1200	—	6.4 x 57.2	1	136.7 x 125.0	136.7 x 128.2	136.7 x 129.5	—	A
1400	800	6.4 x 69.9	1	149.3 x 125.0	149.3 x 128.2	149.3 x 129.5	—	A
—	1000	6.4 x 69.9	1	149.3 x 125.0	149.3 x 128.2	149.3 x 129.5	—	A
1550	1150	6.4 x 82.6	1	162.1 x 125.0	162.1 x 128.2	162.1 x 129.5	—	A
1800	1450	6.4 x 108.0	1	187.5 x 125.0	187.5 x 128.2	187.5 x 129.5	—	A
2250	1800	6.4 x 139.7	1	219.5 x 125.0	219.5 x 128.2	219.5 x 129.5	—	A
—	1900	6.4 x 158.8	1	238.8 x 125.0	238.8 x 128.2	238.8 x 129.5	—	A
3000	2200	6.4 x 203.2	1	283.7 x 125.0	283.7 x 125.0	283.7 x 125.0	—	A
3800	—	6.4 x 108.0	2	410.0 x 125.0	410.0 x 128.2	410.0 x 129.5	—	B
4500	3400	6.4 x 139.7	2	473.5 x 125.0	473.5 x 128.2	473.5 x 129.5	—	B
—	3800	6.4 x 158.8	2	512.1 x 125.0	512.1 x 128.2	512.1 x 129.5	—	B
5800	4800	6.4 x 203.2	2	602.0 x 125.0	602.0 x 128.2	602.0 x 129.5	—	B

① 100% ground available with the same dimensions, which uses 50% internal ground and 50% integral housing ground.

② Refer to **Figure 13** for configuration A and B.



**Figure 13. Pow-R-Way III cross-section dimensions**

**Physical data (continued)**

**Weights**

**Table 15. Weight (kg/M) and current density (amperes/cm<sup>2</sup>)**

IEC 439 ampere rating		IEC 439 current density amperes/cm <sup>2</sup>		Weight—including integral housing ground (kg/M)							
				Three-wire		Four-wire 100% neutral		Four-wire 200% neutral		Add for internal ground	
Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
225	225	86	86	12	7	15	9	17	11	1.17	0.35
400	400	153	153	12	7	15	9	17	11	1.17	0.35
630	630	229	229	12	7	15	9	17	11	1.17	0.35
800	—	—	—	12	—	15	—	17	—	1.17	—
1000	—	380	—	12	—	15	—	17	—	1.17	—
1200	—	328	—	15	—	18	—	21	—	1.62	—
1400	800	313	313	18	9	22	11	26	12	1.98	0.60
—	1000	—	224	—	9	—	11	—	12	—	0.60
1550	1150	293	293	21	11	25	12	30	14	2.34	0.71
1800	1450	260	260	25	12	32	15	37	16	3.06	0.92
2250	1800	233	233	34	16	42	18	49	20	3.96	1.20
—	1900	—	187	—	18	—	20	—	22	—	1.36
3000	2200	231	231	43	21	54	24	63	27	5.76	1.75
3200	—	232	—	36	—	44	—	—	—	4.00	—
3800	—	275	—	51	—	63	—	73	—	6.12	—
4500	3400	252	252	67	32	83	36	98	40	7.92	2.40
—	3800	—	374	—	34	—	39	—	43	—	2.73
5800	4800	223	223	94	42	108	48	126	54	11.53	3.50
6300	—	228	—	99	—	119	—	—	—	12.26	—

### Physical data (continued)

#### Fittings

There is a fitting to meet every application need: flanges, elbows, offsets, tees, cable tap boxes, weatherheads, transformer connections, power take-off sections, reducers, adapter cubicles, expansion joints, and end closures.

These fittings, along with standard and minimum dimensions, are described on the following pages.

When making field measurements and layouts, it should be remembered that the dimensions are given from the centerline of the Pow-R-Bridge.

The relationship of fittings to straight lengths (forward, rearward, upward, and downward) is illustrated in **Figure 15**.

All straight lengths and fittings are marked with a "T" label and an "F" label. The "T" and "F" locations will also be noted on the construction, or the as-built, Eaton drawings furnished. **When installing the busway, the "T" and "F" markings of each section must match. Failure to do so will result in an improper installation with the phase bars out of sequence.**

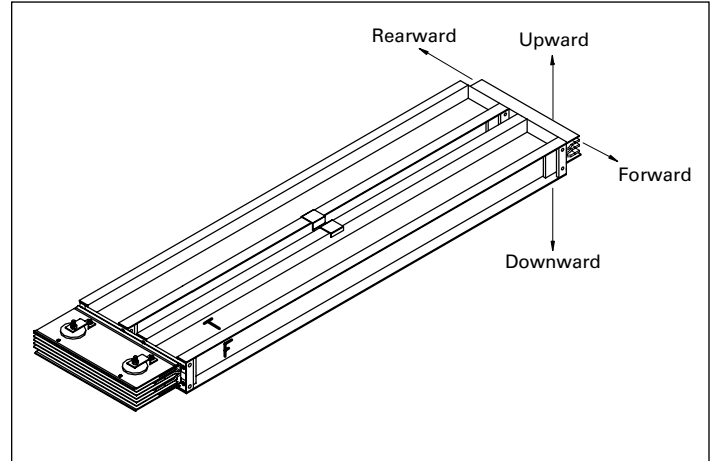


Figure 14. Typical busway components

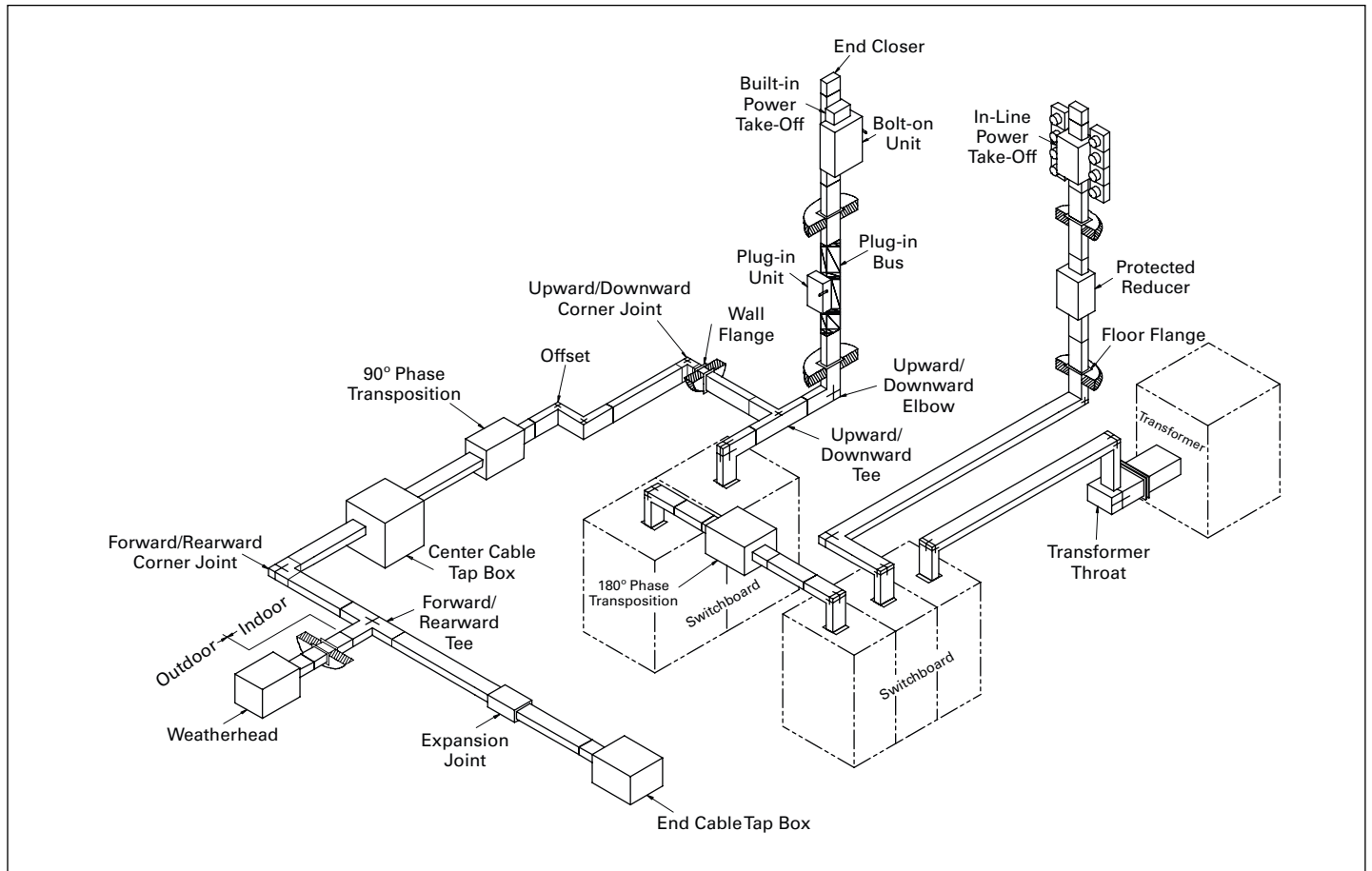


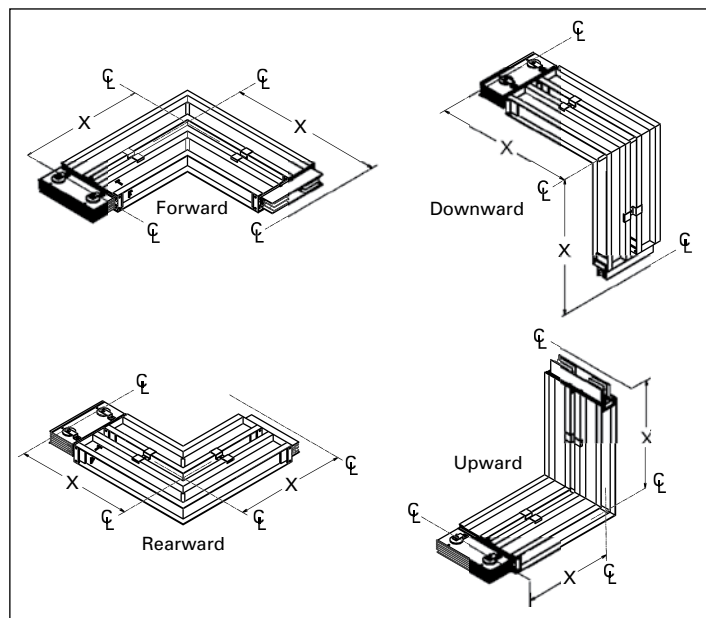
Figure 15. "T" and "F" orientation for fittings

**Physical data (continued)**

**Traditional indoor and outdoor elbows (Figure 16)**

Elbows are used to make 90° changes in the direction of busway runs. The four types that are available are forward, rearward, upward, and downward. See minimum leg lengths listed for each type in **Table 16** and **Table 17**.

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.



**Figure 16. Traditional elbows**

**Table 16. Forward and rearward elbows**

IEC 439 ampere rating		Dimensions in mm
Cu	Al	Minimum leg lengths X
225	225	330.2
400	400	330.2
630	630	330.2
800	—	330.2
1000	—	330.2
1200	—	330.2
1400	800	342.9
—	1000	342.9
1550	1150	342.9
1800	1450	355.6
2250	1800	368.3
—	1900	381.0
3000	2200	406.4
3200	—	419.1
3800	—	469.9
4500	3400	495.3
—	3800	520.7
5800	4800	571.5
6300	—	584.7

**Table 17. Upward and Downward Elbows**

IEC 439 ampere rating		Dimensions in mm	
Cu	Al	Upward	Downward
225	225	254.0	330.2
400	400	254.0	330.2
630	630	254.0	330.2
800	—	254.0	330.2
1000	—	254.0	330.2
1200	—	254.0	330.2
1400	800	254.0	330.2
—	1000	254.0	330.2
1550	1150	254.0	330.2
1800	1450	254.0	330.2
2250	1800	254.0	330.2
—	1900	254.0	330.2
3000	2200	254.0	330.2
3200	—	304.8	330.2
3800	—	304.8	330.2
4500	3400	304.8	330.2
—	3800	304.8	330.2
5800	4800	304.8	330.2
6300	—	304.8	330.2

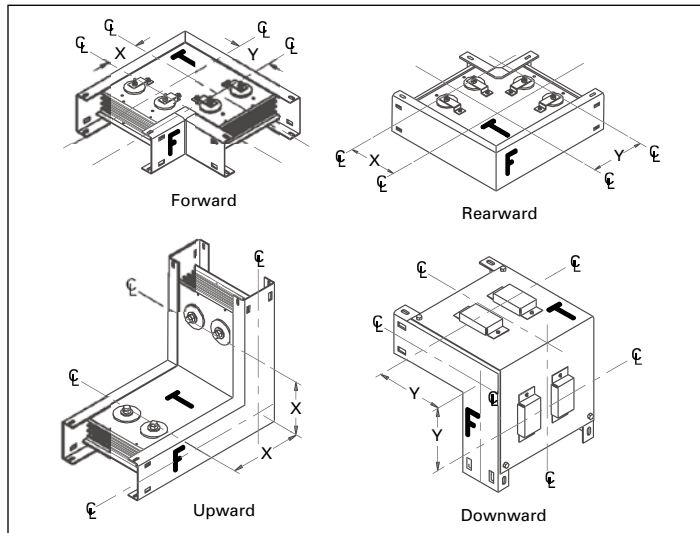
**Physical data (continued)**

**Corner joint elbows (Figure 17)**

The Pow-R-Way III corner joint elbow can be installed in areas where a traditional 90° turn could never have been accomplished before.

Pow-R-Way III corner joint elbows can solve any serious pathway problem and contribute to successful layouts with minimal space requirements. The corner joint elbow is certified for seismic withstand capability to worst-case, Zone 4 levels.

**Note:** All dimensions are to the centerline of the corner joint connection.



**Figure 17. Corner joint elbows (for indoor applications only)**

**Table 18. Forward/rearward corner joints**

IEC 439 ampere rating		Dimensions in mm	
Cu	Al	X	Y
225	225	23.9	136.7
400	400	23.9	136.7
630	630	23.9	136.7
800	—	23.9	136.7
1000	—	23.9	136.7
1200	—	31.8	144.5
1400	800	38.1	150.9
—	1000	38.1	150.9
1550	1150	44.5	157.2
1800	1450	57.2	169.9
2250	1800	73.2	185.7
—	1900	82.6	195.6
3000	2200	104.7	217.7
3200	—	104.7	217.7
3800	—	168.7	281.2
4500	3400	200.4	312.9
—	3800	219.7	332.2
5800	4800	264.7	377.2
6300	—	264.7	377.2

**Table 19. Upward/downward corner joints**

IEC 439 ampere rating		Dimensions in mm					
Cu	Al	Housing ground		Internal ground		Isolated ground	
		X	Y	X	Y	X	Y
<b>Three-wire</b>							
225	225	119.6	110.5	121.2	112.0	133.9	112.5
400	400	119.6	110.5	121.2	112.0	133.9	112.5
630	630	119.6	110.5	121.2	112.0	133.9	112.5
800	—	119.6	110.5	121.2	112.0	133.9	112.5
1000	—	119.6	110.5	121.2	112.0	133.9	112.5
1200	—	119.6	110.5	121.2	112.0	133.9	112.5
1400	800	119.6	110.5	121.2	112.0	133.9	112.5
—	1000	119.6	110.5	121.2	112.0	133.9	112.5
1550	1150	119.6	110.5	121.2	112.0	133.9	112.5
1800	1450	119.6	110.5	121.2	112.0	133.9	112.5
2250	1800	119.6	110.5	121.2	112.0	133.9	112.5
—	1900	119.6	110.5	121.2	112.0	133.9	112.5
3000	2200	119.6	110.5	121.2	112.0	133.9	112.5
3200	—	119.6	110.5	121.2	112.0	133.9	112.5
3800	—	119.6	110.5	121.2	112.0	133.9	112.5
4500	3400	119.6	110.5	121.2	112.0	133.9	112.5
—	3800	119.6	110.5	121.2	112.0	133.9	112.5
5800	4800	119.6	110.5	121.2	112.0	133.9	112.5
6300	—	119.6	110.5	121.2	112.0	133.9	112.5

**Physical data (continued)**

**Table 20. Upward/downward corner joints (continued)**

IEC 439 ampere rating		Dimensions in mm					
		Housing ground		Internal ground		Isolated ground	
Cu	Al	X	Y	X	Y	X	Y
<b>Four-wire (100%)</b>							
225	225	119.6	127.0	121.2	128.8	134.1	129.3
400	400	119.6	127.0	121.2	128.8	134.1	129.3
630	630	119.6	127.0	121.2	128.8	134.1	129.3
800	—	119.6	127.0	121.2	128.8	134.1	129.3
1000	—	119.6	127.0	121.2	128.8	134.1	129.3
1200	—	119.6	127.0	121.2	128.8	134.1	129.3
1400	800	119.6	127.0	121.2	128.8	134.1	129.3
—	1000	119.6	127.0	121.2	128.8	134.1	129.3
1550	1150	119.6	127.0	121.2	128.8	134.1	129.3
1800	1450	119.6	127.0	121.2	128.8	134.1	129.3
2250	1800	119.6	127.0	121.2	128.8	134.1	129.3
—	1900	119.6	127.0	121.2	128.8	134.1	129.3
3000	2200	119.6	127.0	121.2	128.8	134.1	129.3
3200	—	119.6	127.0	121.2	128.8	134.1	129.3
3800	—	119.6	127.0	121.2	128.8	134.1	129.3
4500	3400	119.6	127.0	121.2	128.8	134.1	129.3
—	3800	119.6	127.0	121.2	128.8	134.1	129.3
5800	4800	119.6	127.0	121.2	128.8	134.1	129.3
6300	—	119.6	127.0	121.2	128.8	134.1	129.3
<b>Four-wire (200%)</b>							
225	225	126.5	129.5	128.0	131.3	141.0	131.8
400	400	126.5	129.5	128.0	131.3	141.0	131.8
630	630	126.5	129.5	128.0	131.3	141.0	131.8
800	—	126.5	129.5	128.0	131.3	141.0	131.8
1000	—	126.5	129.5	128.0	131.3	141.0	131.8
1200	—	126.5	129.5	128.0	131.3	141.0	131.8
1400	800	126.5	129.5	128.0	131.3	141.0	131.8
—	1000	126.5	129.5	128.0	131.3	141.0	131.8
1550	1150	126.5	129.5	128.0	131.3	141.0	131.8
1800	1450	126.5	129.5	128.0	131.3	141.0	131.8
2250	1800	126.5	129.5	128.0	131.3	141.0	131.8
—	1900	126.5	129.5	128.0	131.3	141.0	131.8
3000	2200	119.6	127.0	121.2	128.8	134.1	129.3
3200	—	119.6	127.0	121.2	128.8	134.1	129.3
3800	—	126.5	129.5	128.0	131.3	141.0	131.8
4500	3400	126.5	129.5	128.0	131.3	141.0	131.8
—	3800	126.5	129.5	128.0	131.3	141.0	131.8
5800	4800	126.5	129.5	128.0	131.3	141.0	131.8
6300	—	126.5	129.5	128.0	131.3	141.0	131.8



**Physical data (continued)**

**Special angle elbows**

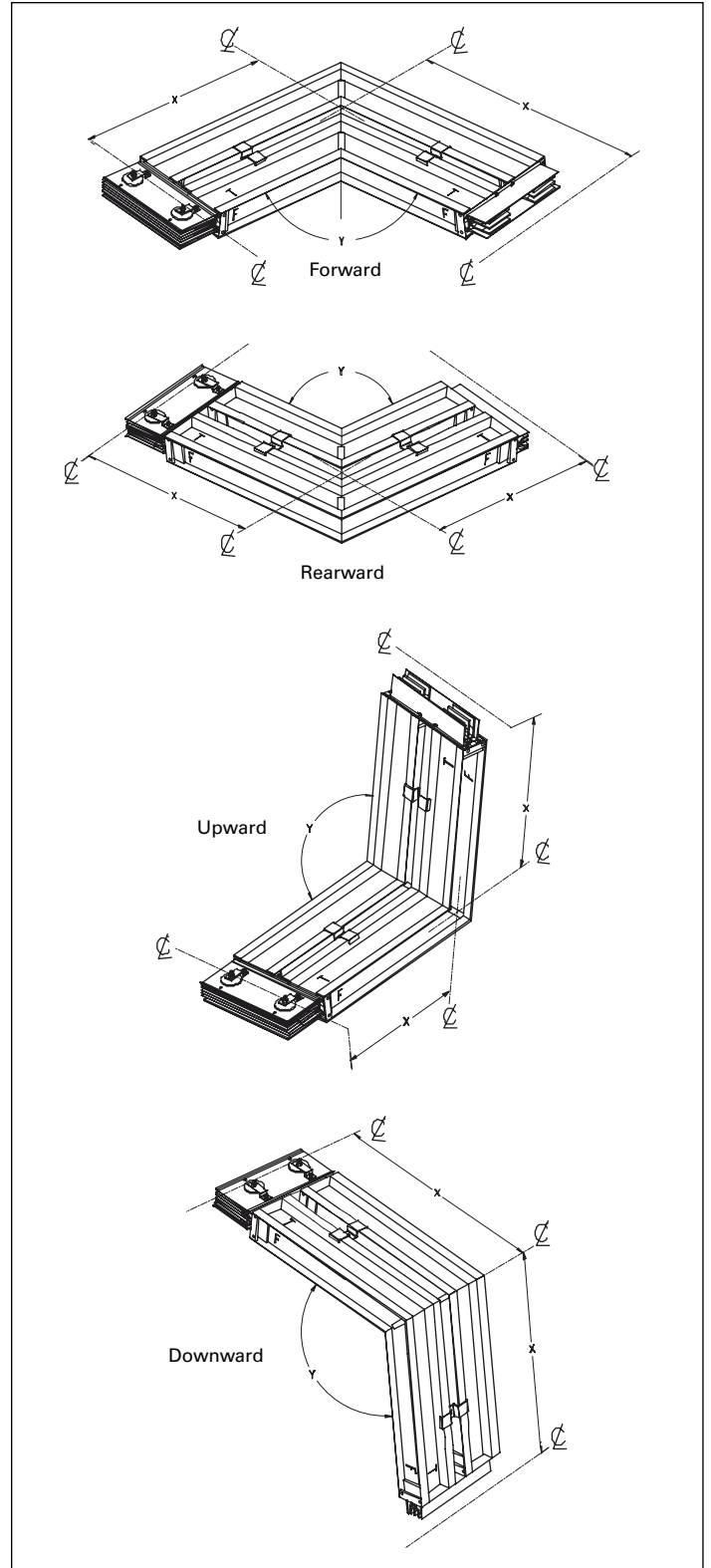
Special angle elbows are traditional elbows that allow the direction of the busway runs to change at angles greater than 90°. They allow easy routing through non-traditional corridors. The four types offered are forward, rearward, upward, and downward. See minimum leg lengths for each type listed in **Table 20** and **Table 21**.

**Table 20. Forward and rearward elbows**

IEC 439 ampere rating		Dimensions in mm	
Cu	Al	Minimum leg lengths X	
225	225	330.2	
400	400	330.2	
630	630	330.2	
800	—	330.2	
1000	—	330.2	
1200	—	330.2	
1400	800	342.9	
—	1000	342.9	
1550	1150	342.9	
1800	1450	355.6	
2250	1800	368.3	
—	1900	381.0	
3000	2200	406.4	
3200	—	419.1	
3800	—	469.9	
4500	3400	495.3	
—	3800	520.7	
5800	4800	571.5	
6300	—	584.7	

**Table 21. Upward and downward elbows**

IEC 439 ampere rating		Dimensions in mm	
Cu	Al	Upward	Downward
225	225	254.0	330.2
400	400	254.0	330.2
630	630	254.0	330.2
800	—	254.0	330.2
1000	—	254.0	330.2
1200	—	254.0	330.2
1400	800	254.0	330.2
—	1000	254.0	330.2
1550	1150	254.0	330.2
1800	1450	254.0	330.2
2250	1800	254.0	330.2
—	1900	254.0	330.2
3000	2200	254.0	330.2
3200	—	304.8	330.2
3800	—	304.8	330.2
4500	3400	304.8	330.2
—	3800	304.8	330.2
5800	4800	304.8	330.2
6300	—	304.8	330.2



**Figure 18. Special angle elbows**

**Physical data (continued)**

**Standard and flush flanges (Figure 19)**

Flanges provide a direct connection to low voltage switchgear, switchboards, motor control centers, and other apparatus. Cutout dimensions and drilling plans are provided with the customer drawings and it is the responsibility of the switchgear manufacturer to provide the opening, flange drillings, connecting hardware, and bus risers in their equipment. For proper coordination between busway and other equipment, detailed drawings, including switchgear orientation, must accompany the order. A standard flange can be supplied to the left or right of a section, as required. A flush flange is used when the busway must lay close to the top of a switchboard. The edge of the busway is 31.8 mm (1.25 inches) from the top of the switchboard.

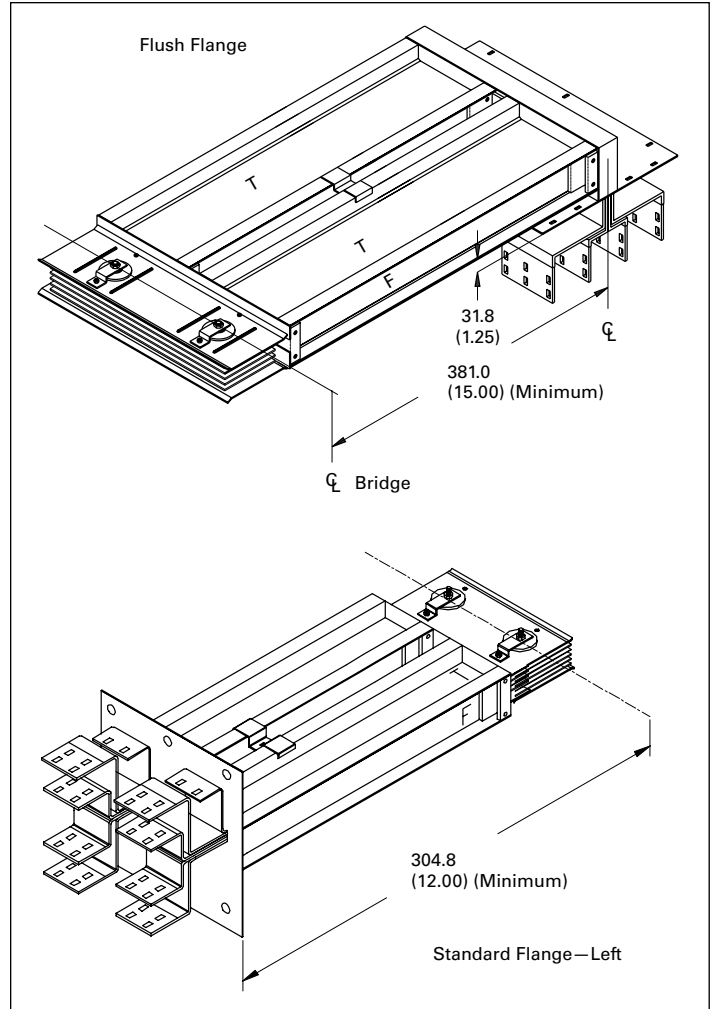
**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 22. Switchboard flanges**

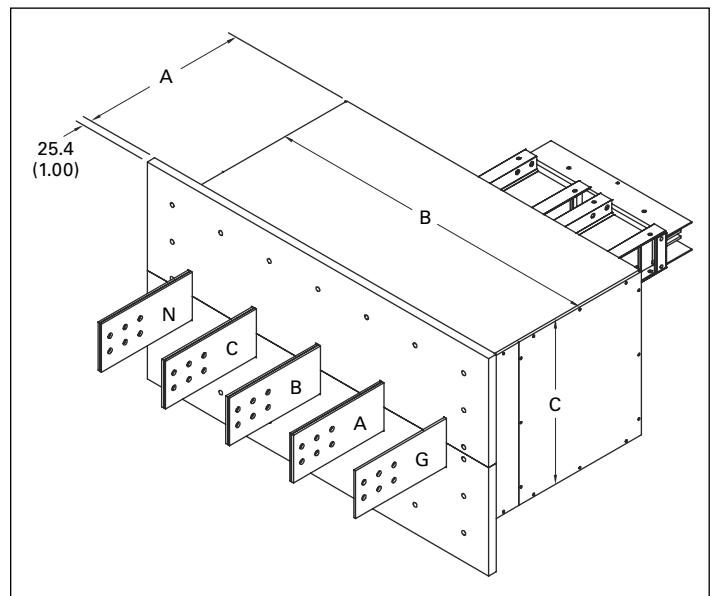
IEC 439 ampere rating		Dimensions in mm	
Cu	Al	Flush flange min. Leg length X	Standard flange min. Leg length X
225	225	381.0	304.8
400	400	381.0	304.8
630	630	381.0	304.8
800	—	381.0	304.8
1000	—	381.0	304.8
1200	—	381.0	304.8
1400	800	381.0	304.8
—	1000	381.0	304.8
1550	1150	381.0	304.8
1800	1450	381.0	304.8
2250	1800	381.0	304.8
—	1900	381.0	304.8
3000	2200	381.0	304.8
3200	—	381.0	304.8
3800	—	381.0	304.8
4500	3400	381.0	304.8
—	3800	381.0	304.8
5800	4800	381.0	304.8
6300	—	381.0	304.8

**Vault flanges**

Vault flanges are used to enter a utility vault for termination to the utility transformer. Each vault flange is custom designed to meet each specific utility specification. Vault flanges may look similar to those shown in **Figure 20**. Please consult the factory for specific dimensions based upon utility specifications.



**Figure 19. Flanges**



**Figure 20. Vault flanges**

**Physical data (continued)**

**Elbow flanges (Figure 21)**

An elbow flange is a combination of a standard elbow and a standard flange fabricated into a single fitting. Elbow flanges are typically used when the minimum leg lengths for either the standard elbow or standard flange cannot be maintained. Minimum leg lengths are listed in **Table 23** and **Table 24**.

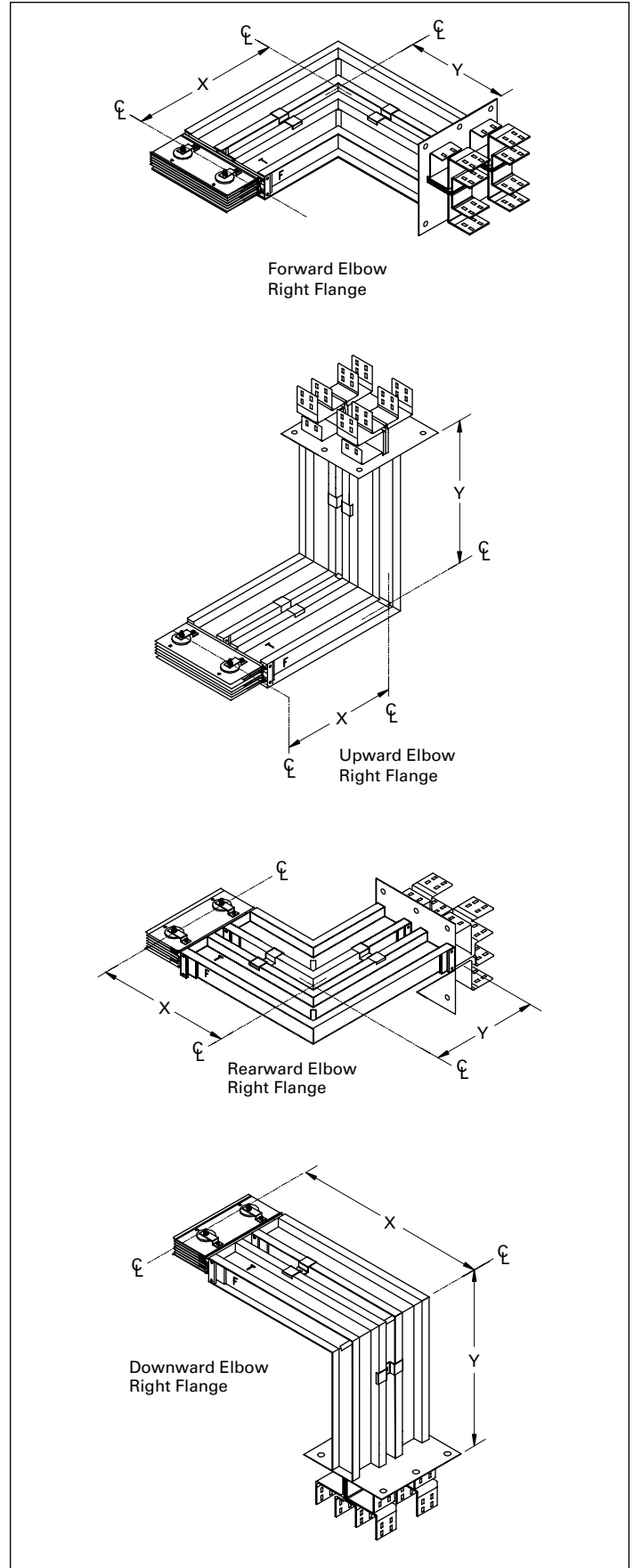
**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 23. Forward and rearward elbow flanges**

IEC 439 ampere rating		Minimum dimensions in mm	
Cu	Al	Joint leg X	Flange leg Y
225	225	330.2	222.3
400	400	330.2	222.3
630	630	330.2	222.3
800	—	330.2	222.3
1000	—	330.2	222.3
1200	—	330.2	222.3
1400	800	342.9	235.0
—	1000	342.9	235.0
1550	1150	342.9	235.0
1800	1450	355.6	247.7
2250	1800	368.3	260.4
—	1900	381.0	273.1
3000	2200	406.4	298.5
3200	—	419.1	304.8
3800	—	469.9	355.6
4500	3400	495.3	387.4
—	3800	520.7	406.4
5800	4800	571.5	450.9
6300	—	584.7	470.4

**Table 24. Upward and downward elbow flanges**

IEC 439 ampere rating		Minimum dimensions in mm			
Cu	Al	Joint leg X		Flange leg Y	
		Up	Down	Up	Down
225	225	254.0	330.2	146.1	222.3
400	400	254.0	330.2	146.1	222.3
630	630	254.0	330.2	146.1	222.3
800	—	254.0	330.2	146.1	222.3
1000	—	254.0	330.2	146.1	222.3
1200	—	254.0	330.2	146.1	222.3
1400	800	254.0	330.2	146.1	222.3
—	1000	254.0	330.2	146.1	222.3
1550	1150	254.0	330.2	146.1	222.3
1800	1450	254.0	330.2	146.1	222.3
2250	1800	254.0	330.2	146.1	222.3
—	1900	254.0	330.2	146.1	222.3
3000	2200	254.0	330.2	146.1	222.3
3200	—	304.8	330.2	196.9	222.3
3800	—	304.8	330.2	196.9	222.3
4500	3400	304.8	330.2	196.9	222.3
—	3800	304.8	330.2	196.9	222.3
5800	4800	304.8	330.2	196.9	222.3
6300	—	304.8	330.2	196.9	222.3



**Figure 21. Elbow flanges**

**Physical data (continued)**

**Offsets (Figure 22)**

An offset is used to avoid obstacles and to conform to the building's structure. It is two elbows fabricated into a single fitting for use where space restrictions prohibit the use of two standard 90° elbows. The minimum leg lengths are listed in **Table 25** and **Table 26**.

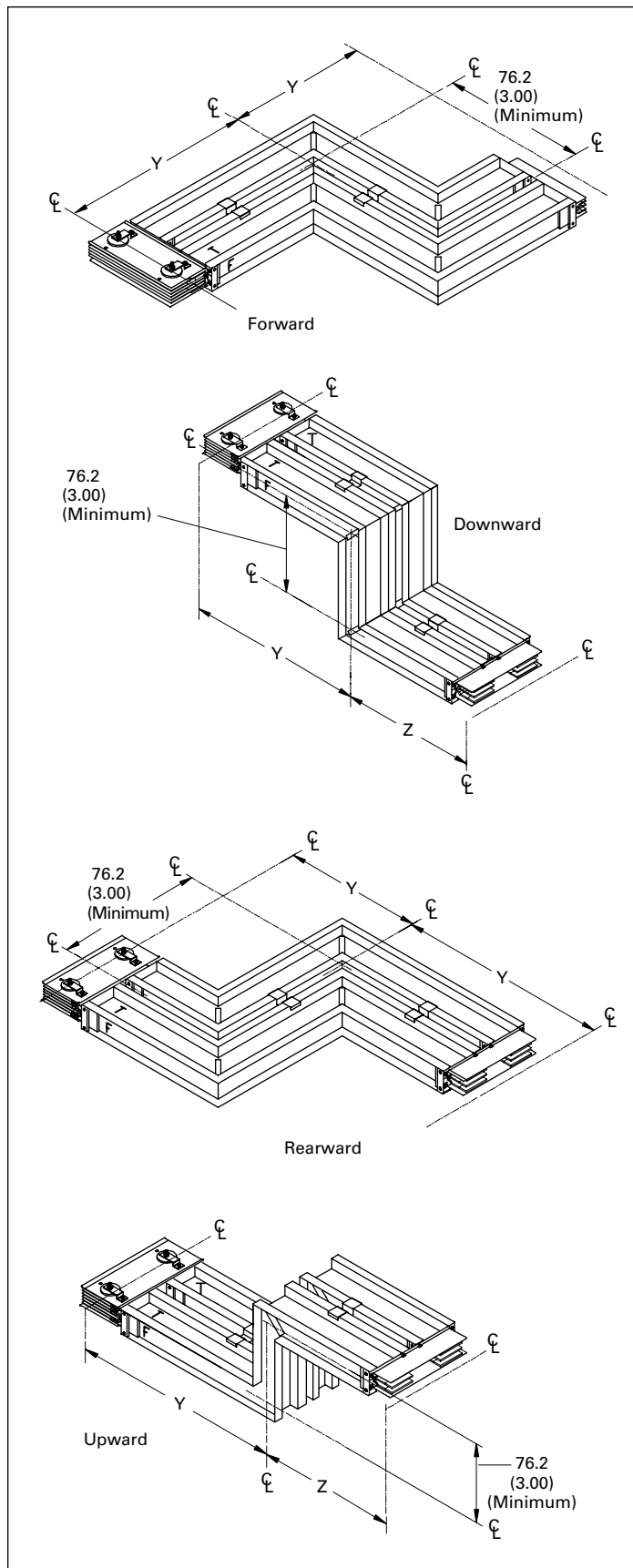
**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 25. Forward and rearward offsets**

IEC 439 ampere rating		Minimum dimensions Y in mm
Cu	Al	
225	225	330.2
400	400	330.2
630	630	330.2
800	—	330.2
1000	—	330.2
1200	—	330.2
1400	800	342.9
—	1000	342.9
1550	1150	342.9
1800	1450	355.6
2250	1800	368.3
—	1900	381.0
3000	2200	406.4
3200	—	469.9
3800	—	469.9
4500	3400	495.3
—	3800	520.7
5800	4800	571.5
6300	—	571.5

**Table 26. Upward and downward offsets**

IEC 439 ampere rating		Minimum dimensions in mm			
Cu	Al	Upward		Downward	
		Y	Z	Y	Z
225	225	254.0	330.2	330.2	254.0
400	400	254.0	330.2	330.2	254.0
630	630	254.0	330.2	330.2	254.0
800	—	254.0	330.2	330.2	254.0
1000	—	254.0	330.2	330.2	254.0
1200	—	254.0	330.2	330.2	254.0
1400	800	254.0	330.2	330.2	254.0
—	1000	254.0	330.2	330.2	254.0
1550	1150	254.0	330.2	330.2	254.0
1800	1450	254.0	330.2	330.2	254.0
2250	1800	254.0	330.2	330.2	254.0
—	1900	254.0	330.2	330.2	254.0
3000	2200	254.0	330.2	330.2	254.0
3200	—	304.8	330.2	330.2	304.8
3800	—	304.8	330.2	330.2	304.8
4500	3400	304.8	330.2	330.2	304.8
—	3800	304.8	330.2	330.2	304.8
5800	4800	304.8	330.2	330.2	304.8
6300	—	304.8	330.2	330.2	304.8



**Figure 22. Offsets**

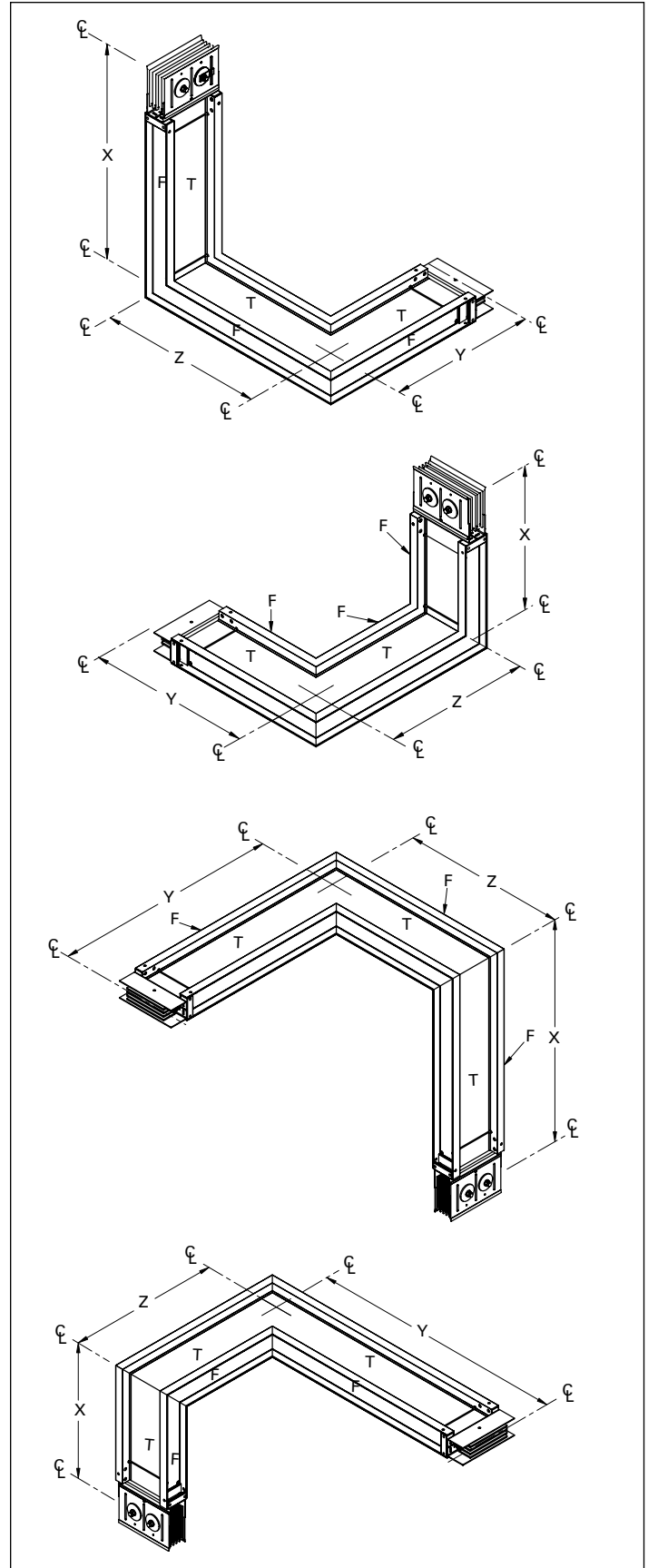
**Physical data (continued)**

**Combination offsets (Figure 23)**

Combination offsets are used to conform to the building's structure and change direction, using a small amount of space. They are two different oriented elbows fabricated into a single fitting. Forward or rearward directions are determined by the "T" and "F" locations. Please refer to **Page 14**. Minimum leg lengths are listed in **Table 16** and **Table 17**.

**Table 27. Combination offsets**

Dimensions in mm					
IEC 439 ampere rating		X	Y	Three-wire/ four-wire	Four-wire 200% N
Cu	Al			Z	Z
<b>Upward/forward/rearward</b>					
225	225	254.0	330.2	177.8	177.8
400	400	254.0	330.2	177.8	177.8
630	630	254.0	330.2	177.8	177.8
800	—	254.0	330.2	177.8	177.8
1000	—	254.0	330.2	177.8	177.8
1200	—	254.0	330.2	177.8	190.5
1400	800	254.0	342.9	190.5	190.5
—	1000	254.0	342.9	190.5	190.5
1550	1150	254.0	342.9	190.5	203.2
1800	1450	254.0	355.6	203.2	215.9
2250	1800	254.0	368.3	228.6	228.6
—	1900	254.0	381.0	228.6	241.3
3000	2200	254.0	406.4	254.0	266.7
3200	—	304.8	419.1	304.8	304.8
3800	—	304.8	469.9	317.5	330.2
4500	3400	304.8	495.3	355.6	355.6
—	3800	304.8	520.7	368.3	381.0
5800	4800	304.8	571.5	419.1	419.1
6300	—	304.8	584.7	419.1	419.1
<b>Downward/forward/rearward</b>					
225	225	330.2	330.2	177.8	177.8
400	400	330.2	330.2	177.8	177.8
630	630	330.2	330.2	177.8	177.8
800	—	330.2	330.2	177.8	177.8
1000	—	330.2	330.2	177.8	177.8
1200	—	330.2	330.2	177.8	190.5
1400	800	330.2	342.9	190.5	190.5
—	1000	330.2	342.9	190.5	190.5
1550	1150	330.2	342.9	190.5	203.2
1800	1450	330.2	355.6	203.2	215.9
2250	1800	330.2	368.3	228.6	228.6
—	1900	330.2	381.0	228.6	241.3
3000	2200	330.2	406.4	254.0	266.7
3200	—	330.2	419.1	304.8	304.8
3800	—	330.2	469.9	317.5	330.2
4500	3400	330.2	495.3	355.6	355.6
—	3800	330.2	520.7	368.3	381.0
5800	4800	330.2	571.5	419.1	419.1
6300	—	330.2	584.7	419.1	419.1



**Figure 23. Combination offsets**

**Physical data (continued)**

**Tees (Figure 24)**

A tee is a busway fitting suitable for connection in three directions. The minimum leg lengths are shown in **Table 28** and **Table 29**.

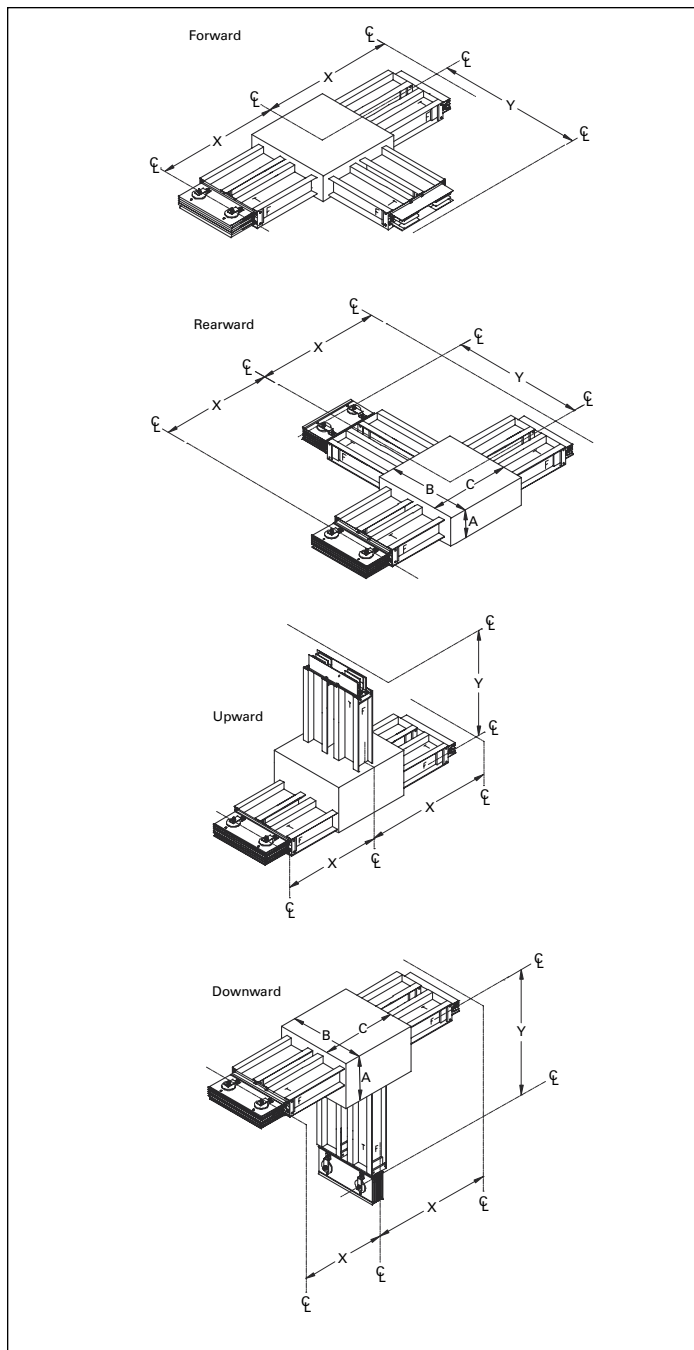
**Table 28. Forward and rearward tees**

IEC 439 ampere rating		Minimum leg dimensions in mm				
Cu	Al	X	A	Y	B	C
225	225	330.2	—	330.2	—	—
400	400	330.2	—	330.2	—	—
630	630	330.2	—	330.2	—	—
800	—	330.2	—	330.2	—	—
1000	—	330.2	—	330.2	—	—
1200	—	330.2	—	330.2	—	—
1400	800	342.9	—	342.9	—	—
—	1000	342.9	—	342.9	—	—
1550	1150	342.9	—	342.9	—	—
1800	1450	355.6	—	355.6	—	—
2250	1800	368.3	—	368.3	—	—
—	1900	381.0	—	381.0	—	—
3000	2200	406.4	—	406.4	—	—
3200	—	419.1	—	419.1	—	—
3800	—	692.2	203.2	670.1	492.5	536.4
4500	3400	723.9	203.2	701.6	555.8	600.2
—	3800	743.0	203.2	720.9	594.6	638.0
5800	4800	787.4	203.2	765.1	684.3	727.2
6300	—	—	—	—	—	—

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 29. Upward and downward tees**

IEC 439 ampere rating		Minimum leg dimensions in mm				
Cu	Al	X	A	Y	B	C
225	225	539.8	311.2	647.7	127.0	235.0
400	400	539.8	311.2	647.7	127.0	235.0
630	630	539.8	311.2	647.7	127.0	235.0
800	—	539.8	311.2	647.7	127.0	235.0
1000	—	539.8	311.2	647.7	127.0	235.0
1200	—	555.8	311.2	647.7	142.7	266.7
1400	800	568.5	311.2	647.7	155.4	292.1
—	1000	568.5	311.2	647.7	155.4	292.1
1550	1150	581.2	311.2	647.7	168.1	317.5
1800	1450	606.6	311.2	647.7	193.5	368.3
2250	1800	638.1	311.2	647.7	219.7	431.8
—	1900	657.4	311.2	647.7	245.1	470.0
3000	2200	701.6	311.2	647.7	290.1	558.8
3200	—	714.2	311.2	647.7	296.2	584.2
3800	—	606.6	311.2	647.7	416.1	368.3
4500	3400	638.1	311.2	647.7	473.7	473.7
—	3800	637.4	311.2	647.7	518.4	470.0
5800	4800	701.6	311.2	647.7	608.1	558.8
6300	—	—	—	—	—	—



**Figure 24. Tees**

## Physical data (continued)

### Crosses (Figure 25)

A cross is a busway fitting suitable for connection in four directions. It is applied when a bus run must branch off in three directions, all in the same plane.

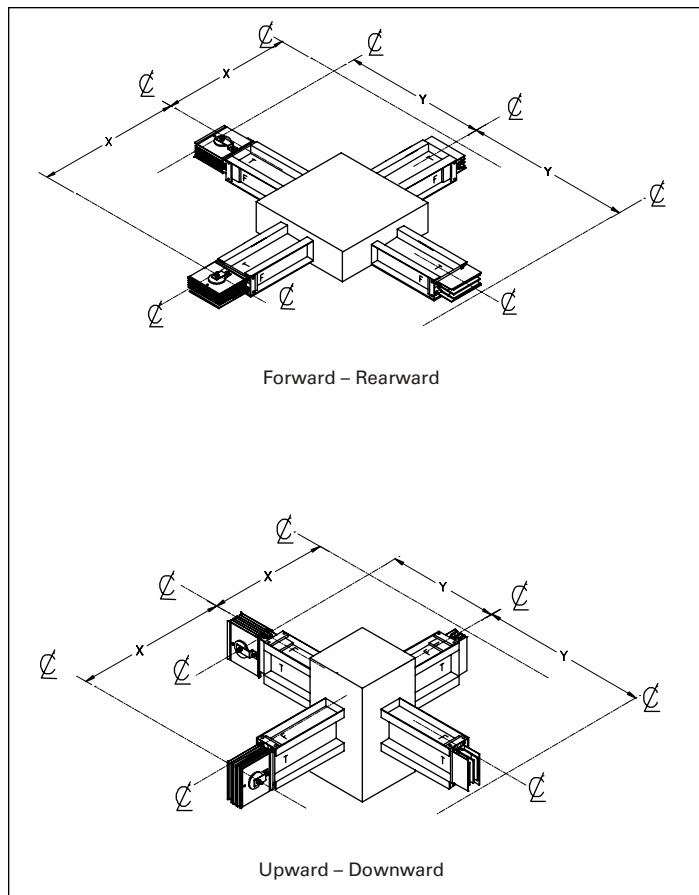
**Table 30. Forward and rearward crosses**

IEC 439 ampere rating		Minimum leg dimensions in mm	
Cu	Al	X	Y
225	225	330.2	330.2
400	400	330.2	330.2
630	630	330.2	330.2
800	—	330.2	330.2
1000	—	330.2	330.2
1200	—	330.2	330.2
1400	800	342.9	342.9
—	1000	342.9	342.9
1550	1150	342.9	342.9
1800	1450	355.6	355.6
2250	1800	368.3	368.3
—	1900	381.0	381.0
3000	2200	406.4	406.4
3200	—	—	—
3800	—	551.2	551.2
4500	3400	582.7	582.7
—	3800	602.2	602.2
5800	4800	637.3	637.3
6300	—	—	—

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 31. Upward and downward crosses**

IEC 439 ampere rating		Minimum leg dimensions in mm	
Cu	Al	X	Y
225	225	539.8	647.7
400	400	539.8	647.7
630	630	539.8	647.7
800	—	539.8	647.7
1000	—	539.8	647.7
1200	—	555.8	647.7
1400	800	568.5	647.7
—	1000	568.5	647.7
1550	1150	581.2	647.7
1800	1450	606.6	647.7
2250	1800	638.1	647.7
—	1900	657.4	647.7
3000	2200	701.6	647.7
3200	—	—	—
3800	—	606.6	647.7
4500	3400	638.1	647.7
—	3800	637.4	647.7
5800	4800	701.6	647.7
6300	—	—	—



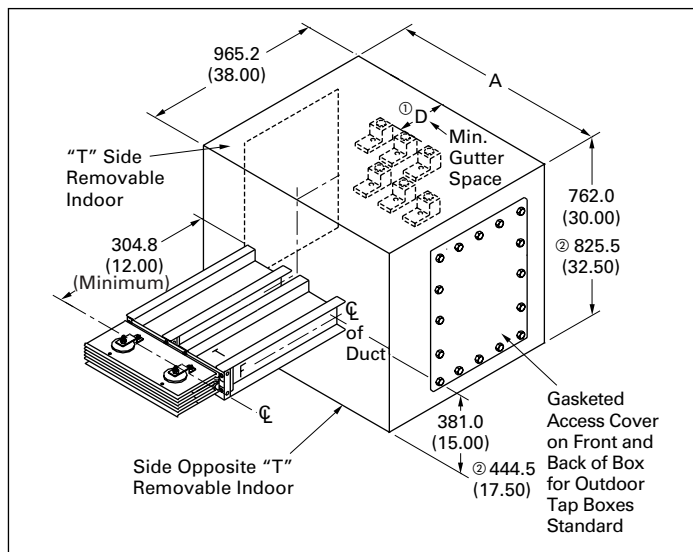
**Figure 25. Crosses**

**Physical data (continued)**

**End cable tap box (Figure 26)**

End cable tap boxes are used to feed a run of busway with cable and conduit or where loads served by busway are connected without the need for overcurrent protection. For indoor applications, the “T” side, side opposite “T” and the end panel are removable for access to the lugs. For outdoor applications, these panels are gasketed to prevent moisture from entering. In addition, the outdoor end cable tap boxes are provided with removable gasketed side access panels located on the “F” and side opposite “F” for more accessibility to the lugs. Removable side access panels are available on indoor cable tap boxes upon request.

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.



**Figure 26. End cable tap box**

① Dimension D: For mechanical lugs = 542.0 mm (21.34 inches).  
For compression lugs = 493.8 mm (19.44 inches).

② 200% neutral.

**Table 32. End cable tap box dimension**

Copper		Aluminum		Quantity of mechanical terminals, range—one #4 (20 mm <sup>2</sup> )—600 kcmil (300 mm <sup>2</sup> ), Two 1/0 (50 mm <sup>2</sup> )—250 kcmil (120 mm <sup>2</sup> ) ①					
IEC 439 ampere rating	Dimension A in mm ②	IEC 439 ampere rating	Dimension A in mm ②	Copper			Aluminum		
				G ③	P ④	N ⑤	G ③	P ④	N ⑤
225	304.8	225	304.8	1	2	4	1	2	4
400	304.8	400	304.8	1	2	4	1	2	4
630	304.8	630	304.8	1	2	4	1	2	4
800	304.8	—	—	1	2	4	—	—	—
1000	304.8	—	—	2	3	5	—	—	—
1200	304.8	—	—	2	3	6	—	—	—
1400	304.8	800	304.8	2	4	8	2	3	5
—	—	1000	304.8	—	—	—	2	3	5
1550	304.8	1150	304.8	2	4	8	2	3	6
1800	520.7	1450	304.8	3	5	9	2	4	8
2250	520.7	1800	520.7	3	6	12	2	—	8
—	—	1900	622.3	—	—	—	3	5	9
3000	622.3	2200	622.3	4	8	16	3	6	12
3200	723.9	—	—	5	9	18	—	—	—
3800	774.5	—	—	5	9	18	—	—	—
4500	1143.0	3400	774.5	6	12	24	4	8	16
—	—	3800	774.5	—	—	—	5	9	18
5800	1143.0	4800	1143.0	7	15	30	6	12	24
6300	1384.3	—	—	11	21	42	—	—	—

① For compression lugs, factory provides provisions only.

② All dimensions shown in **Figure 26** remain constant regardless of system wiring configuration.

③ Denotes quantity of terminals per ground bus.

④ Denotes quantity of terminals per phase and 100% neutral bus.

⑤ Denotes quantity of terminals per 200% neutral bus option.



**Physical data (continued)**

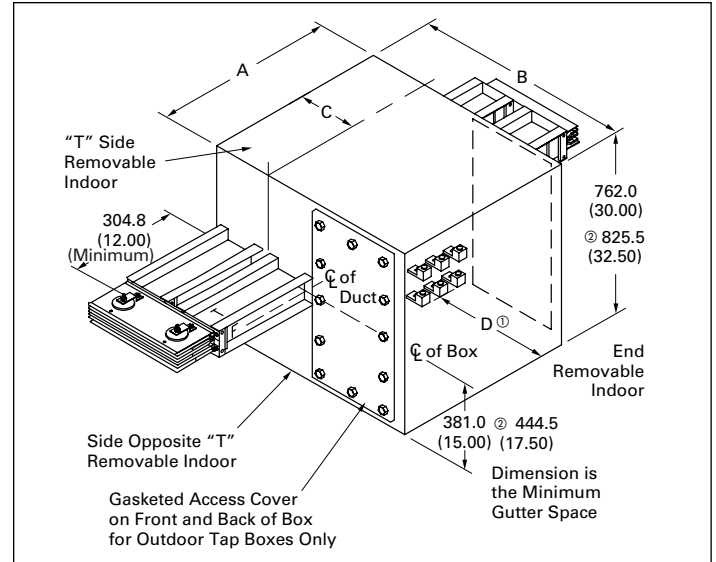
**Center cable tap box (Figure 27)**

Center cable tap boxes are used to center feed a run of busway with cable and conduit or where loads served by the busway are connected without the need for overcurrent protection. For indoor applications, the “T” side, side opposite “T,” and the end panel are removable for access to the lugs. For outdoor applications, these panels are gasketed to prevent moisture from entering. In addition, the outdoor center cable tap boxes are provided with removable gasketed access panels located on the front and back for more accessibility to the lugs.

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 33. Center tap box details—dimension C**

Dimension C in mm				
Copper				
225–1550 A	1800–2250 A	3000 A	3800 A	4500–5800 A
92.2	120.7	152.4	273.1	311.2
Aluminum				
225–1150 A	1450–1800 A	1900–2200 A	3400–3800 A	4800 A
92.2	120.7	152.4	273.1	311.2



**Figure 27. Center cable tap box**

- ① Dimension D: For mechanical lugs = 542.0 mm (21.34 inches).  
For compression lugs = 489.0 mm (19.25 inches).
- ② 200% neutral.

**Table 34. Center tap box details—dimensions A and B**

Copper			Aluminum			Quantity of mechanical terminals, range—one #4 (20 mm <sup>2</sup> )—600 kcmil (300 mm <sup>2</sup> )—Two 1/0 (50 mm <sup>2</sup> )—250 kcmil (120 mm <sup>2</sup> ) ①					
IEC 439 ampere rating	Dimensions in mm ②		IEC 439 ampere rating	Dimensions in mm		Copper			Aluminum		
	A	B		A	B	G ③	P ④	N ⑤	G ③	P ④	N ⑤
225	419.1	1016.0	225	419.1	1016.0	1	2	4	1	2	4
400	419.1	1016.0	400	419.1	1016.0	1	2	4	1	2	4
630	419.1	1016.0	630	419.1	1016.0	1	2	4	1	2	4
800	419.1	1016.0	—	—	—	1	2	4	—	—	—
1000	419.1	1016.0	—	—	—	2	3	5	—	—	—
1200	419.1	1016.0	—	—	—	2	3	6	—	—	—
1400	419.1	1016.0	800	419.1	1016.0	2	4	8	2	3	5
—	—	—	1000	419.1	1016.0	—	—	—	2	3	5
1550	419.1	1016.0	1150	419.1	1016.0	2	4	8	2	3	6
1800	520.7	1079.5	1450	520.7	1079.5	3	5	9	2	4	8
2250	520.7	1079.5	1800	520.7	1079.5	3	6	12	2	4	8
—	—	—	1900	622.3	1143.0	—	—	—	3	5	9
3000	622.3	1143.0	2200	622.3	1143.0	4	8	16	3	6	12
3200	723.9	1473.2	—	—	—	5	9	18	—	—	—
3800	774.5	1473.2	—	—	—	5	9	18	—	—	—
4500	1143.0	1536.7	3400	771.7	1473.0	6	12	24	4	8	16
—	—	—	3800	771.7	1473.0	—	—	—	5	9	18
5800	1143.0	1536.7	4800	1143.0	1536.7	7	15	30	6	12	24
6300	—	—	—	—	—	—	—	—	—	—	—

- ① For compression lugs, factory provides provisions only.
- ② All dimensions shown in **Figure 27** remain constant regardless of system wiring configuration.
- ③ Denotes quantity of terminals per ground bus.
- ④ Denotes quantity of terminals per phase and 100% neutral bus.
- ⑤ Denotes quantity of terminals per 200% neutral bus option.

### Physical data (continued)

#### Weatherheads (Figure 28)

Weatherheads are used for service entrance connections to busway. The side opposite of "T" is removable for access to the lugs.

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 35. Weatherhead details**

Copper		Aluminum		Quantity of mechanical terminals, range—one #4 (20 mm <sup>2</sup> )–600 kcmil (300 mm <sup>2</sup> ), Two 1/0 (50 mm <sup>2</sup> )–250 kcmil (120 mm <sup>2</sup> ) ①					
IEC 439 ampere rating	Minimum dimension in mm	IEC 439 ampere rating	Minimum dimension in mm	Copper			Aluminum		
	A		A	G ③	P ④	N ⑤	G ③	P ④	N ⑤
225	419.1	225	419.1	1	2	4	1	2	4
400	419.1	400	419.1	1	2	4	1	2	4
630	419.1	630	419.1	1	2	4	1	2	4
800	419.1	—	—	1	2	4	—	—	—
1000	419.1	—	—	2	3	5	—	—	—
1200	419.1	—	—	2	3	6	—	—	—
1400	419.1	800	419.1	2	4	8	2	3	5
—	—	1000	419.1	—	—	—	2	3	5
1550	419.1	1150	419.1	2	4	8	2	3	6
1800	419.1	1450	419.1	3	5	9	2	4	8
2250	419.1	1800	419.1	3	6	12	2	4	8
—	—	1900	419.1	—	—	—	3	5	9
3000	762.0	2200	419.1	4	8	16	3	6	12
3200	—	—	—	5	9	18	—	—	—
3800	762.0	—	—	5	9	18	—	—	—
4500	1016.0	3400	762.0	6	12	24	4	8	16
—	—	3800	762.0	—	—	—	5	9	18
5800	1016.0	4800	1016.0	7	15	30	6	12	24
6300	—	—	—	—	—	—	—	—	—

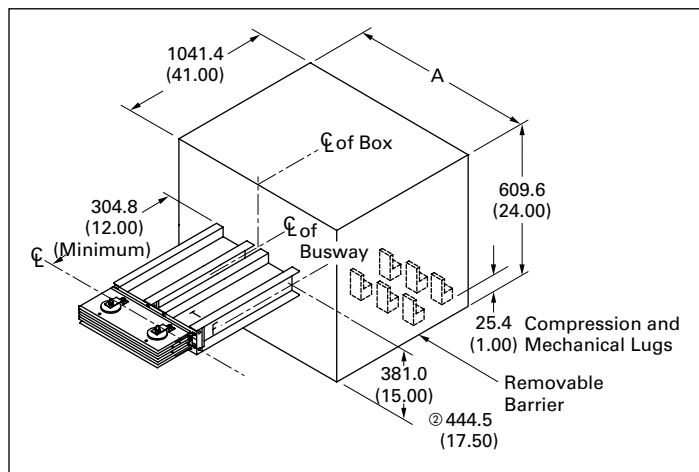
① For compression lugs, factory provides provisions only.

② 200% neutral.

③ Denotes quantity of terminals per ground bus.

④ Denotes quantity of terminals per phase and 100% neutral bus.

⑤ Denotes quantity of terminals per 200% neutral bus option.



**Figure 28. Weatherhead details**

**Physical data (continued)**

**Expansion joints (Figure 29)**

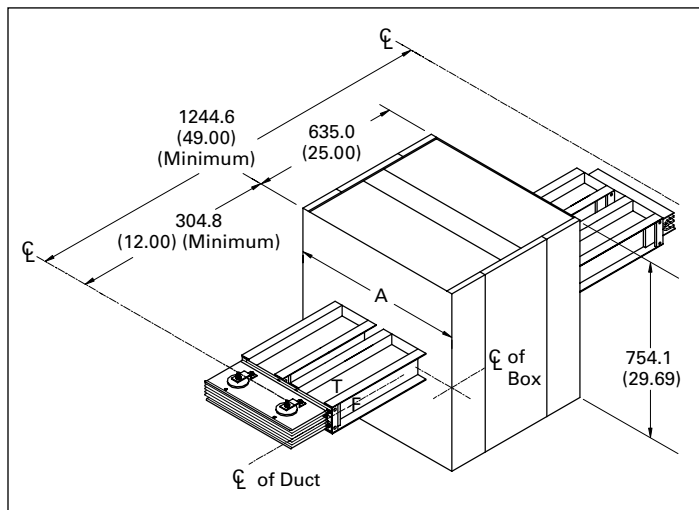
Expansion joints accommodate the expansion and contraction of busbars with respect to the enclosure. They compensate for the difference in the coefficient of expansion of the aluminum housing and the copper or aluminum busbars. Expansion joints must be used wherever a run of busway crosses an expansion joint of a building. They should also be installed in the center of extremely long straight runs of busway; one every 91 m (300 ft) for copper or one every 68 m (225 ft) for aluminum. The use of expansion joints should be engineered for individual installations. Minimum dimensions are shown in **Table 36**.

**Note:** All dimensions are to the centerline of the Pow-R-Bridge.

**Table 36. Expansion joints**

IEC 439 ampere rating		Dimensions in mm
Cu	Al	A ①
225	225	304.8
400	400	304.8
630	630	304.8
800	—	304.8
1000	—	304.8
1200	—	304.8
1400	800	304.8
—	1000	304.8
1550	1150	419.1
1800	1450	419.1
2250	1800	419.1
—	1900	520.7
3000	2200	520.7
3200	—	520.7
3800	—	520.7
4500	3400	622.3
—	3800	622.3
5800	4800	768.4
6300	—	—

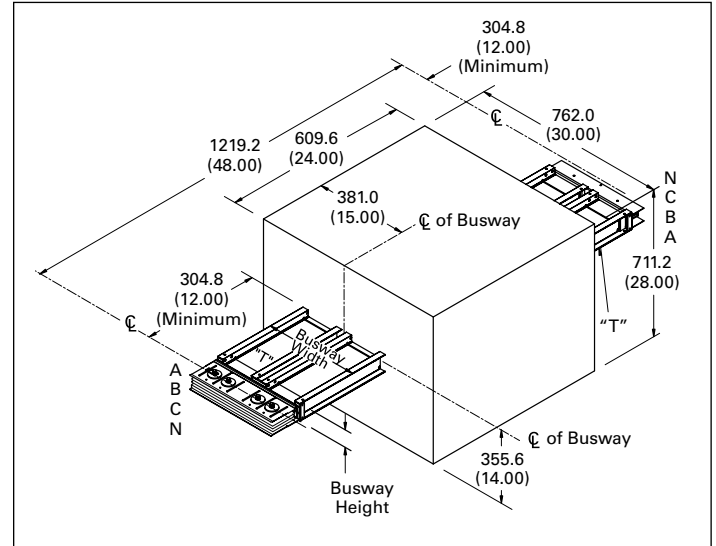
① Dimension remains as shown regardless of system configuration.



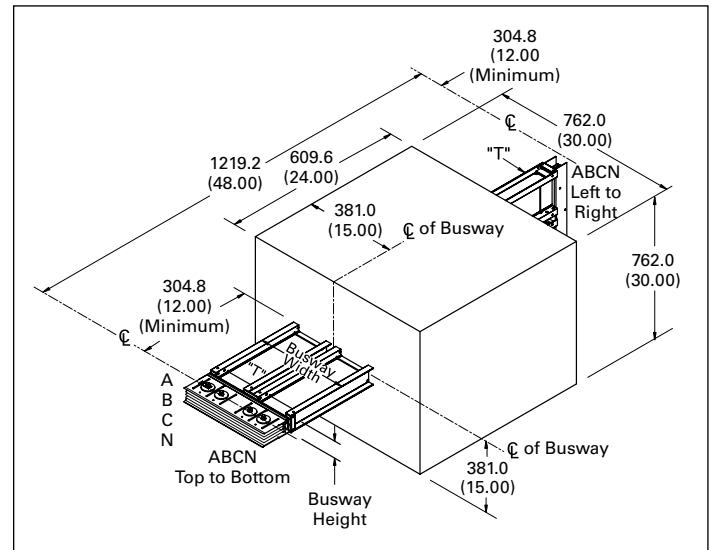
**Figure 29. Expansion joints**

**Phase Transpositions (Figure 30 and Figure 31)**

Phase transposition fittings are used in applications where a phase rotation is needed due to a change in phasing from the source equipment to the load equipment. Both 90° and 180° rotations are possible. In each case, all conductors are rotated.



**Figure 30. 180° transposition—dimensions in inches (mm)**



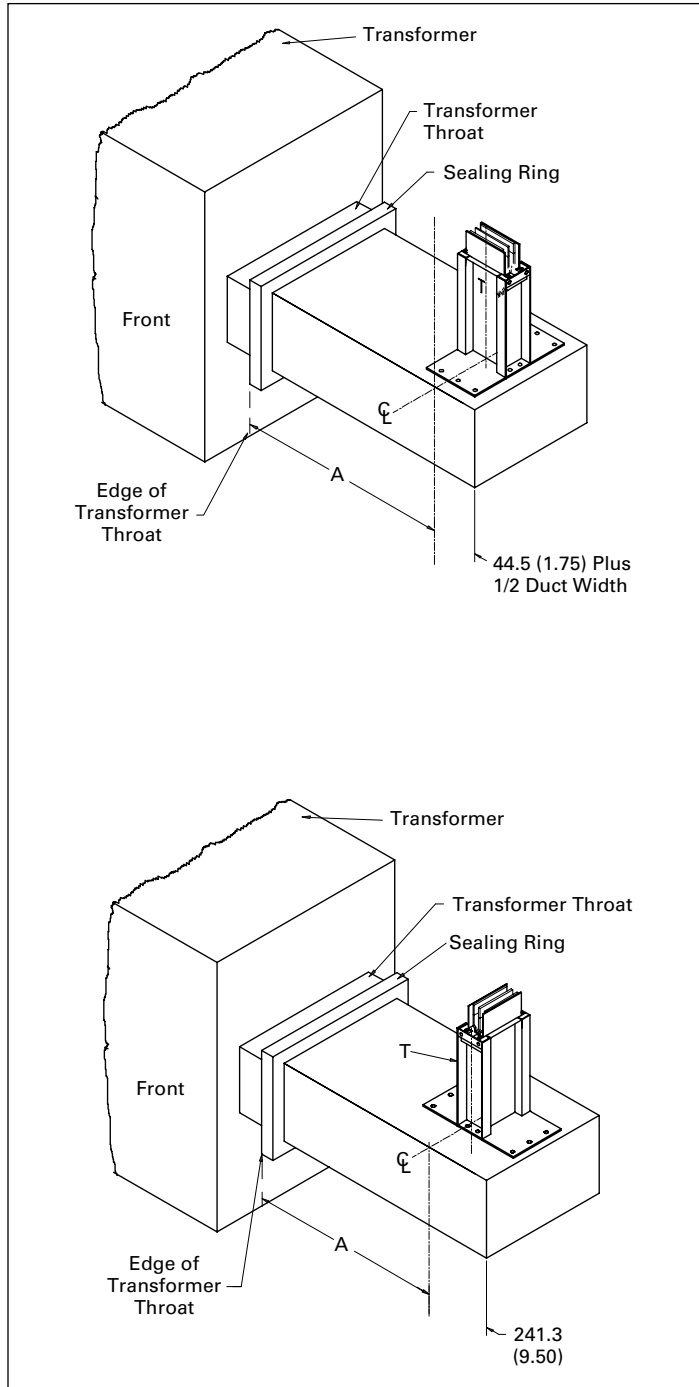
**Figure 31. 90° transposition—dimensions in inches (mm)**



**Physical data (continued)**

**Transformer throat connections (Figure 34 and Figure 35)**

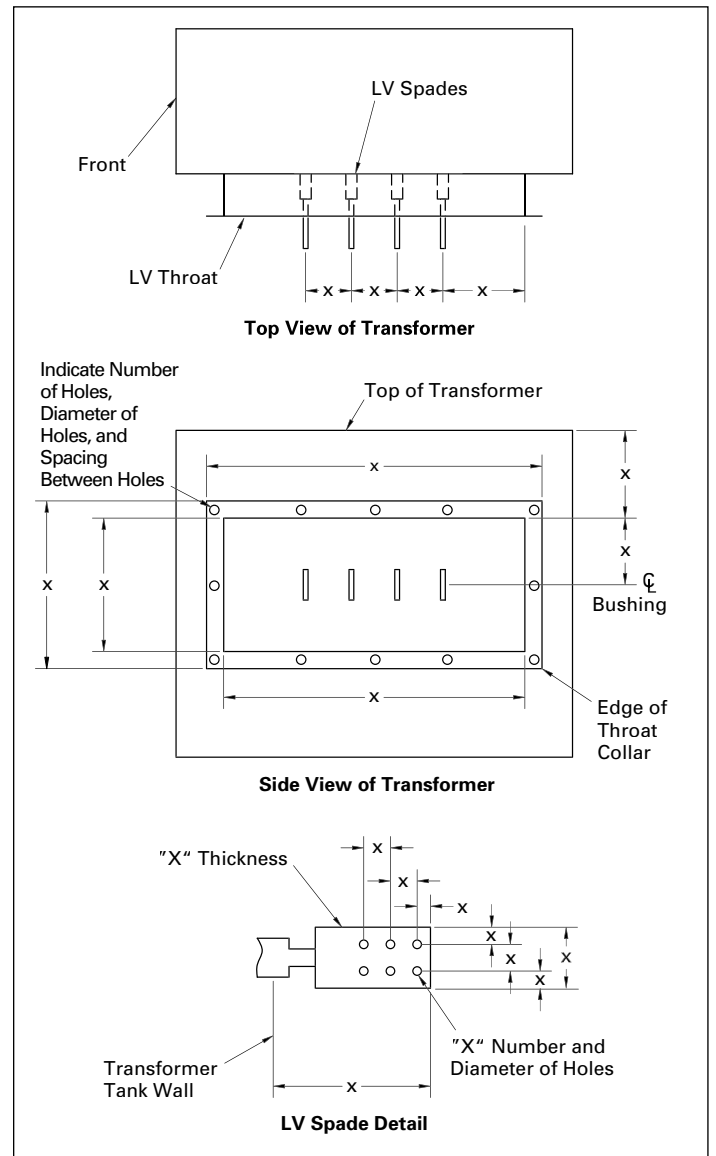
A transformer throat is used when making connections to a liquid-filled substation transformer. All transformer throat connections include flexible connectors between the transformer low voltage spades and Pow-R-Way III busbars. For transformers with drilled flanges, the busway will bolt to the transformer throat instead of using a sealing ring.



**Figure 34. Transformer throat**

**Table 41. Transformer throat connections**

IEC 439 ampere rating	Bars per phase	Minimum dimensions in mm	
		A	
<b>Aluminum</b>			
225–1800	1	660.4	
1900–2200	1	723.9	
3400–4800	2	800.1	
<b>Copper</b>			
225–2250	1	660.4	
3000–3200	1	723.9	
3800–6400	2	800.1	



**Figure 35. Transformer throat connection detail**

**Physical data (continued)**

**Transformer flange connections (Figure 36 and Figure 37)**

Transformer flange connections are used when making a connection to a dry-type substation transformer. Transformer flange connections include flexible connectors between the transformer low voltage spades and the Pow-R-Way III flange busbars. Hardware is supplied to bolt the flange plate to the transformer enclosure.

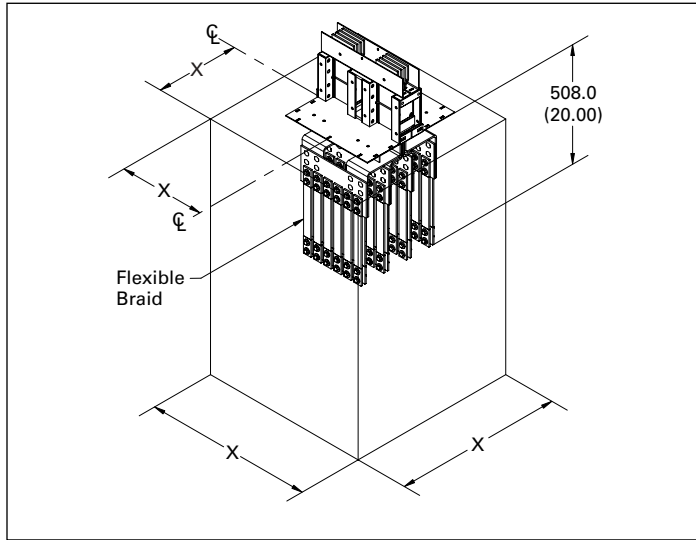


Figure 36. Transformer flange connections

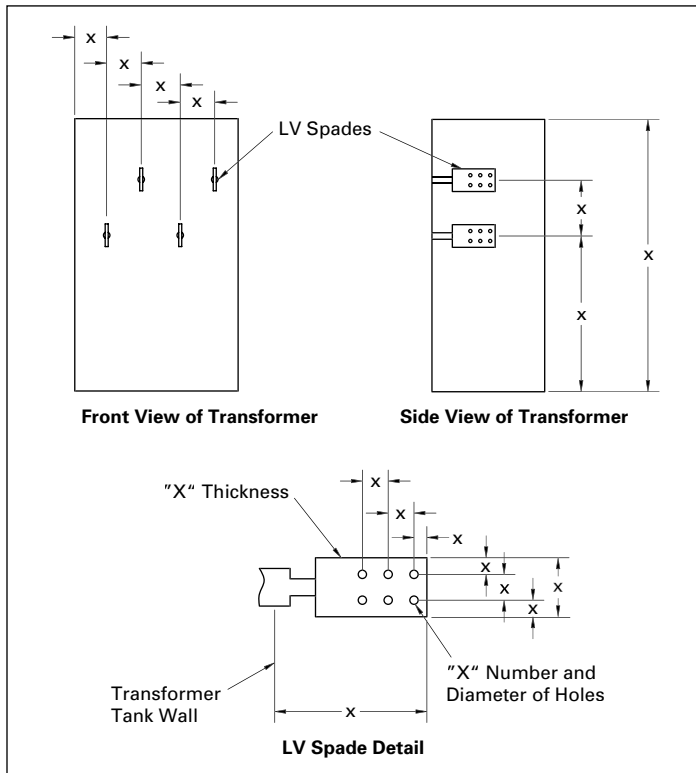


Figure 37. Transformer flange connection detail

**Protected reducers (Figure 38)**

Protected reducers are used to reduce the ampacity of busway using either a circuit breaker or a fused, non-automatic circuit breaker overprotection device. Both serve as a disconnecting means. The line side of the cubicle is connected to the higher rated busway and the load side is connected to the lower (reduced) rated busway.

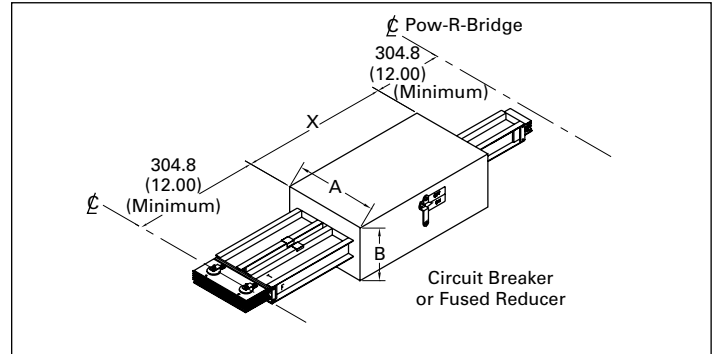


Figure 38. Circuit breaker or fused reducer

**Table 42. Circuit breaker and fused reducer dimensions**

Breaker amperes	Circuit breaker reducer			Fuse rating	Fusible switch reducer		
	mm				mm		
	A	B	X		A	B	X
225	463.6	457.2	863.6	225	463.6	457.2	1073.2
400	463.6	457.2	863.6	400	463.6	457.2	1371.6
600	463.6	457.2	863.6	600	463.6	457.2	1524.0
800	463.6	457.2	1073.2	800	463.6	457.2	1524.0
1000	463.6	457.2	1073.2	1000	463.6	457.2	1524.0
1200	463.6	457.2	1073.2	1200	463.6	457.2	1524.0
1600	666.8	508.0	1219.2	—	666.8	508.0	—
2000	666.8	508.0	1219.2	—	666.8	508.0	—
2500	666.8	508.0	1219.2	—	666.8	508.0	—

**Non-protected reducers (Figure 39)**

Non-protected reducers are used to reduce the ampacity of the busway without overcurrent devices. Per NEC Section 364.11, for industrial applications, no overcurrent protection is required where the busway is reduced in size, provided the length of the smaller busway does not extend more than 15.2 m (50 ft) and has a current rating of at least one-third of the first upstream overcurrent device.

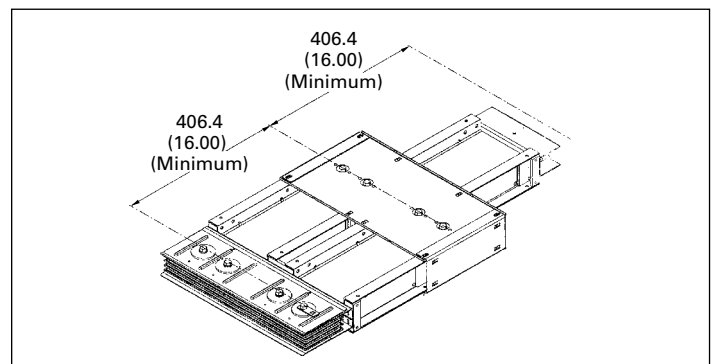


Figure 39. Non-fused reducer

**Physical data (continued)**

**Pow-R-Way III adapters (Figure 40 and Figure 41)**

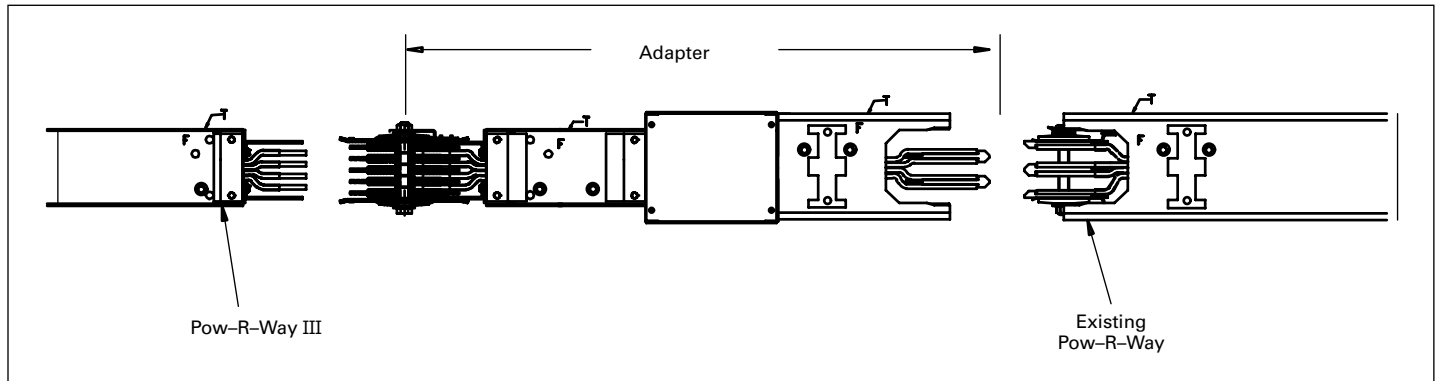
A complete line of adapters are available to enable the user to add to existing old-line Westinghouse or obsolete Eaton bus runs with the Pow-R-Way III design. The specific Westinghouse product lines are Low Impedance Busway, Current Limiting Busway, Pow-R-Way, and Pow-R-Way II. The obsolete Cutler-Hammer® designs are CP2, CP3, and CP4 Safetybus. See **Table 43**.

The adapters allow the incorporation of present day technologies, available in Pow-R-Way III plug-in units, into existing busway systems. State-of-the-art features such as energy monitoring, transient voltage surge suppression, and coordination/communication capabilities can all be added to existing distribution systems without having to upgrade and to replace entire runs of busway. See **Table 43**.

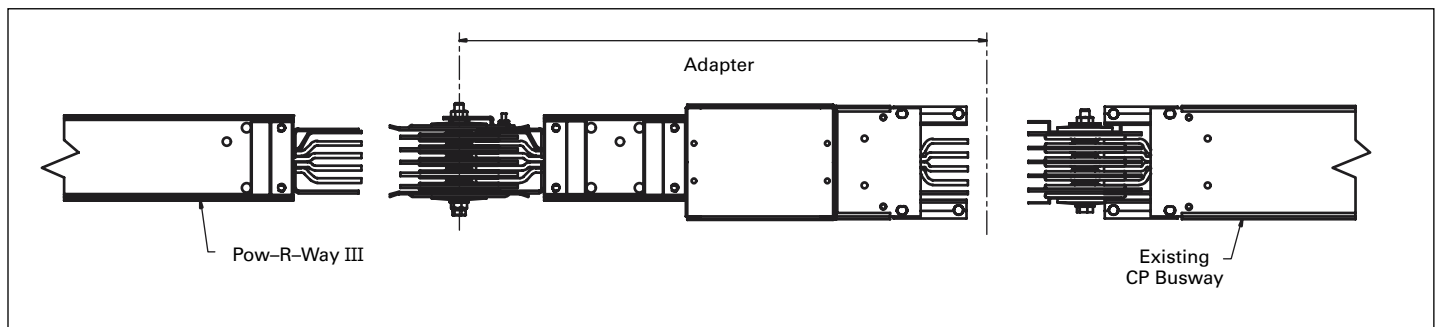
Special adapters to competitive busway products are also available. Please contact the Greenwood factory for information.

**Table 43. Available Pow-R-Way III adapters**

Busway types	Brand	Minimum adapter length in mm
Low impedance busway	Westinghouse	1524.0
Low impedance plug-in busway	Westinghouse	1524.0
Pow-R-Way busway	Westinghouse/Eaton	914.4
Pow-R-Way II busway	Westinghouse/Eaton	914.4
CP2 Safetybus	Eaton	914.4
CP3 Safetybus	Eaton	914.4
CP4 Safetybus	Eaton	914.4
Competitive busway	Contact factory	914.4



**Figure 40. Pow-R-Way III to Pow-R-Way adapter**



**Figure 41. Pow-R-Way III to CP adapter**

**Physical data (continued)**

**Wall/floor flanges (Figure 42)**

Wall and floor flanges are used to fit around the busway and close off the opening made to allow the bus run to pass through a floor or wall. Wall and floor flanges are for cosmetic purposes only and do not provide any type of vapor or fire barrier.

**Roof flange (Figure 43)**

A roof flange should always be used when outdoor busway penetrates a roof.

**End closures (Figure 44)**

End closures terminate a bus run and can be used to close either the right or left end (see **Figure 2** on **Page 2** for wiring conductor configurations).

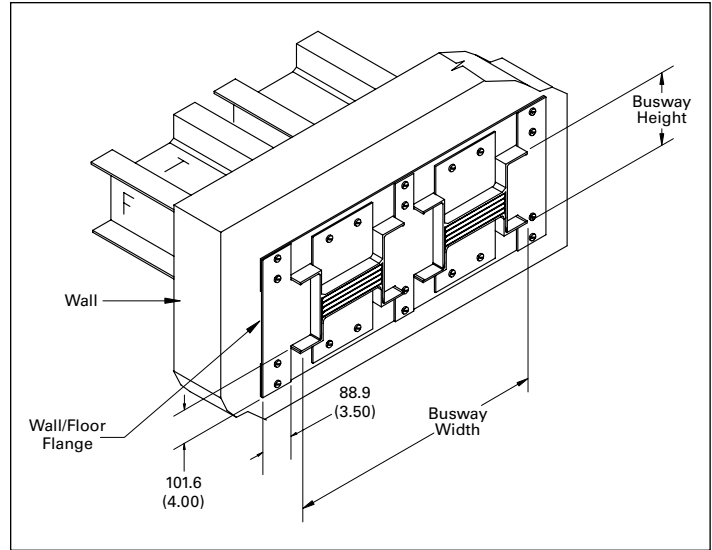
**Table 44. End closures**

IEC 439 ampere rating		Dimensions in mm
Cu	Al	A
225	225	130.3
400	400	130.3
630	630	130.3
800	—	130.3
1000	—	130.3
1200	—	146.1
1400	800	158.8
—	1000	158.8
1550	1150	171.5
1800	1450	197.4
2250	1800	229.1
—	1900	248.4
3000	2200	293.4
3200	—	306.1
3800	—	419.6
4500	3400	482.9
—	3800	521.7
5800	4800	611.6
6300	—	636.5

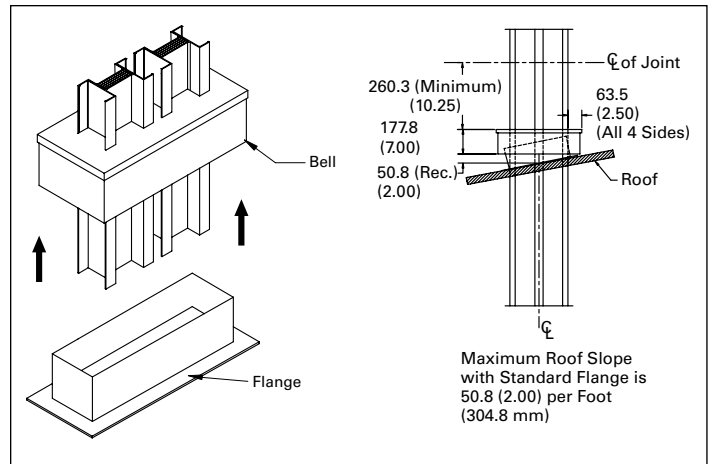
**Table 45. Dimensions**

Description	Dimensions in mm
	B
3WH, 3WG, 3WHG, 3WI, 4WH, 4WG, 4WHG, 4WI	127.0
4WNH, 4WNG, 4WNI, 4WNHG	139.7

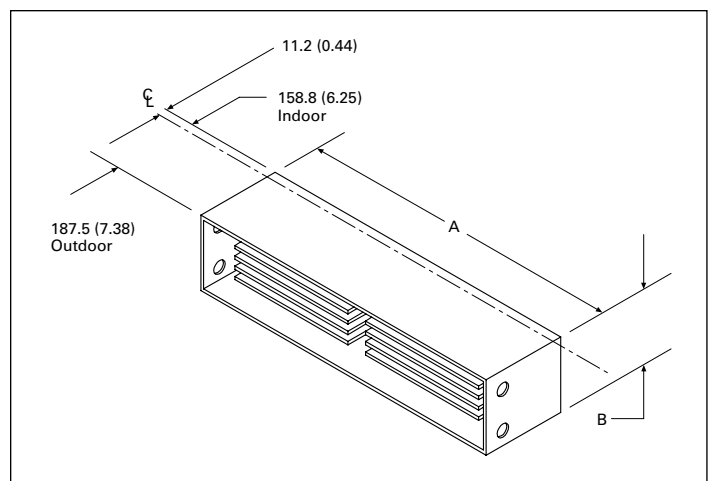
**Note:** End closure extends 11.2 mm (0.44 inches) beyond the centerline of the removed Pow-R-Bridge.



**Figure 42. Wall/floor flange**



**Figure 43. Roof flange**



**Figure 44. End closure with Pow-R-Bridge removed**



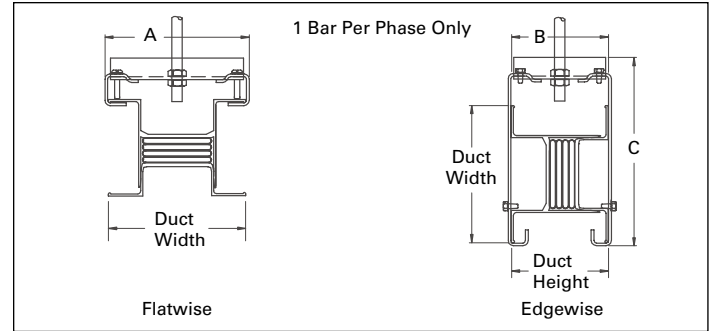
**Physical data (continued)**

**Horizontal hangers**

One hanger is provided for every 3 m (10 ft) of horizontally mounted busway. The type of hanger supplied is determined by the specific mounting requirements of the busway. (For hook hangers and angle hangers, see **Figure 45** and **Figure 46**.)

Drop rods 12.7 mm (0.50 inch) diameter are not included and must be furnished by the installer. Drop rods 19.1 mm (0.75 inch) diameter are required for seismic applications.

Horizontal angle hanger clips can be supplied as stand-alone parts on request. These clips are available for both flatwise and edgewise orientations for both seismic and non-seismic applications. Please see **Page 34** for part numbers and dimensions of the clips.



**Figure 45. Hook hangers—non-seismic only**

**Table 46. Flatwise hook hanger**

IEC 439 ampere rating		Dimensions in mm			
Cu	Al	Duct width	A	B	C
225	225	120.7	130.0	120.7	—
400	400	120.7	130.0	120.7	—
630	630	120.7	130.0	120.7	—
800	—	120.7	130.0	120.7	—
1000	—	120.7	130.0	120.7	—
1200	—	136.7	146.1	120.7	—
1400	800	149.4	158.8	120.7	—
—	1000	149.4	158.8	120.7	—
1550	1150	162.1	171.5	120.7	—
1800	1450	187.5	196.9	120.7	—
2250	1800	219.5	229.4	120.7	—
—	1900	238.8	248.4	120.7	—
3000	2200	283.7	294.1	120.7	—

**Table 47. Edgewise hook hanger**

Conductor configuration	Dimensions in mm		
	Duct height	Duct width	A
3WH/4WH/3WG/3WHG/4WG/4WHG	111.2–115.8	120.7–162.1	213.3
3WI/4WI	111.2–115.8	187.4–283.7	335.0
4WNH/4WNG	125.0–129.5	120.7–162.1	213.3
4WNHG/4WNI	125.0–129.5	187.4–283.7	335.0

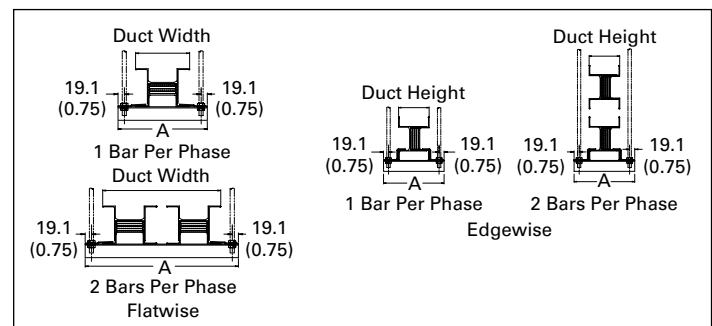
**Table 48. Flatwise angle hanger**

IEC 439 ampere rating		Conductor Bars per phase	Dimensions in mm	
Cu	Al		Busway width	A
225	225	1	120.7	228.6
400	400	1	120.7	228.6
630	630	1	120.7	228.6
800	—	1	120.7	228.6
1000	—	1	120.7	228.6
1200	—	1	136.7	244.6
1400	800	1	149.4	257.0
—	1000	1	149.4	257.0
1550	1150	1	162.1	270.0
1800	1450	1	187.5	295.4
2250	1800	1	219.5	327.2
—	1900	1	238.8	345.9
3000	2200	1	283.7	392.2
3200	—	2	410.0	517.9
3800	—	2	410.0	517.9
4500	3400	2	473.5	581.2
—	3800	2	512.1	619.5
5800	4800	2	602.0	711.2
6300	—	2	626.9	736.0

**Table 49. Edgewise angle hanger**

Conductor configuration	Dimensions in mm	
	Duct height	A
3WH/4WH/3WG/3WHG/4WG/4WHG/3WI/4WI	111.2–115.8	228.6
4WNH/4WNG/4WNHG/4WNI	125.0–129.5	237.7

**Note:** Angle hangers must be used for seismic applications.



**Figure 46. Angle hangers**

**Physical data (continued)**

**Vertical hangers (Figure 47 and Figure 48)**

When busway is to be installed vertically, a spring suspension type vertical hanger should be used. Vertical hangers are not provided unless specified.

This unique hanger equalizes the weight of vertically mounted busway along all supports. A vertical hanger must be used on each floor and at the end of the bus run on the last floor.

Intermediate hangers are required for floor heights exceeding 16 ft (4.9 m).

**Table 50. Edgewise vertical hangers (F and F-opposite sides)**

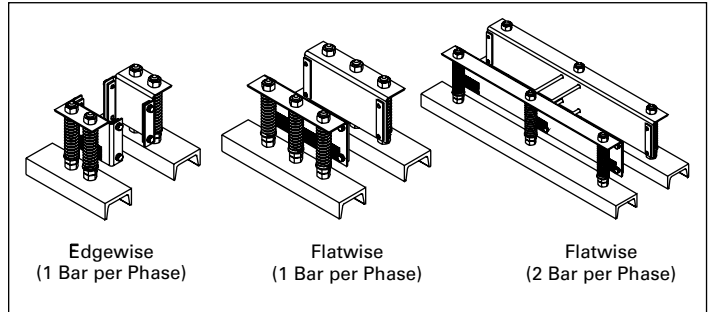
Conductor configuration	Busway height in mm	Hangers on "F" and "F" opposite sides	
		Dimension A in mm	Figure 48 configuration
3WH/4VH	111.3	119.9	A
3WG/3WHG/4WG/4WHG	114.3	124.7	A
3WI/4WI	115.8	124.7	A
4WHN	125.0	133.4	A
4WNG/4WNHG	128.3	138.2	A

**Table 51. Flatwise vertical hangers (T and T-opposite sides)**

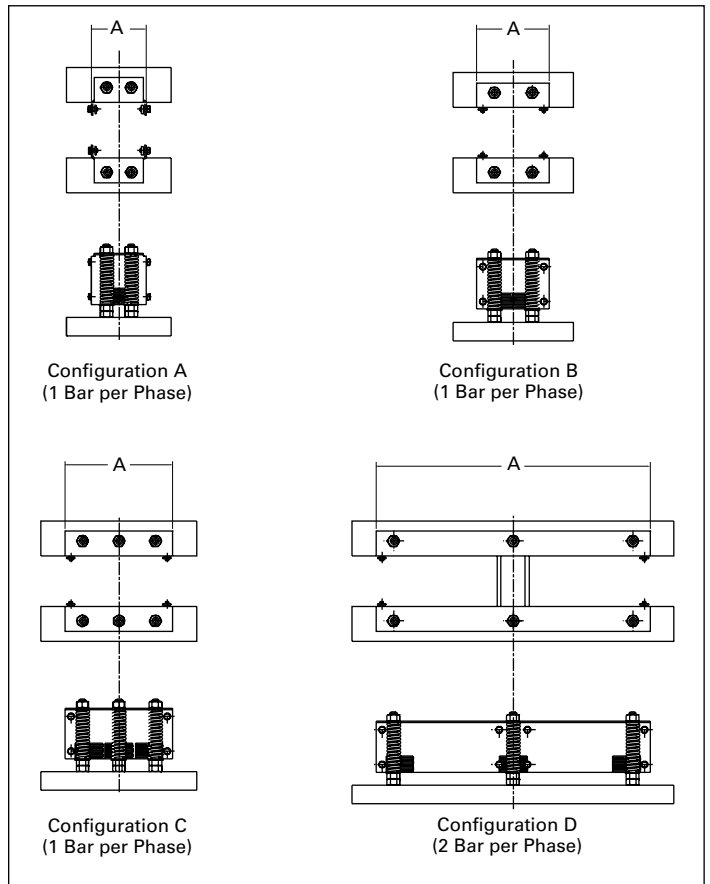
IEC 439 ampere rating		Busway width in mm	Hangers on "T" and "T" opposite sides	
Cu	Al		Dimension A in mm	Figure 48 configuration
225	225	120.7	117.3	B
400	400	120.7	117.3	B
630	630	120.7	117.3	B
800	—	120.7	117.3	B
1000	—	120.7	117.3	B
1200	—	136.7	133.4	B
1400	800	149.4	146.1	B
—	1000	149.4	146.1	B
1550	1150	162.1	158.8	B
1800	1450	187.5	184.2	B
2250	1800	219.5	215.9	B
—	1900	238.8	235.0	C
3000	2200	283.7	280.9	C
3200	—	296.2	294.0	C
3800	—	410.0	406.4	D
4500	3400	473.5	469.9	D
—	3800	512.1	510.0	D
5800	4800	602.0	600.0	D
6300	—	626.9	625.0	D

**Table 52. Angle hanger clips**

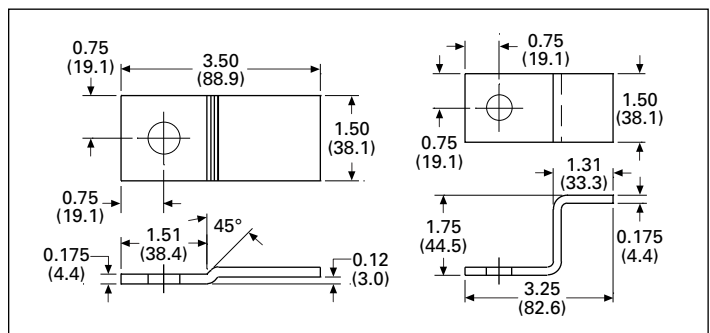
Orientation	Application	Hole diameter in mm	Part number
Flat	Standard	14.3	BVD0302H29
On edge	Standard	14.3	BVD0302H30
On edge	Seismic	22.2	BVD0302H56
Flat	Seismic	22.2	BVD0302H57



**Figure 47. Typical installation**



**Figure 48. Vertical hangers**



**Figure 49. Angle hanger clips**

### Plug-in protective devices

All Pow-R-Way III plug-in units are designed with the safety of the installer and user as the key criteria. The following features are standard for both fusible and circuit breaker type plug-in units:

Pow-R-Way III bus plugs have extended ground and neutral bars, which bring the termination points down into the cable entry area making for a safer, easier connection.

A barrier is provided over the line side connections from the bus plug assembly to the fusible switch or circuit breaker.

The bus plug ground stab makes positive contact with the busway ground (integral or internal) before the phase or neutral stabs contact the busbars.

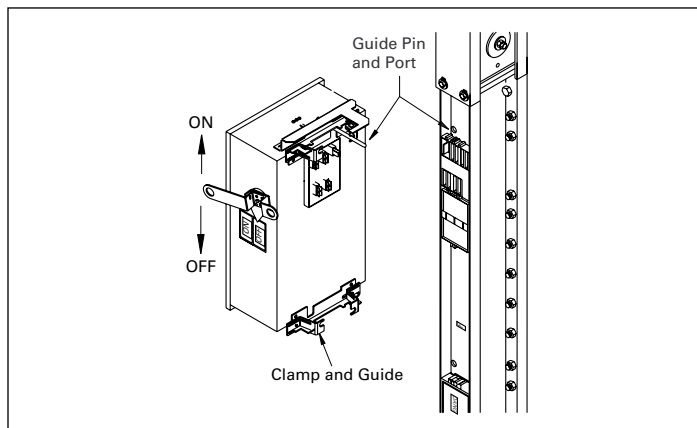
A bus plug guide port is provided in the busway housing, to the right of each plug-in outlet. A polarizing alignment pin is located at the line side end of each bus plug enclosure. The alignment pin must be inserted into the guide port for proper installation. The plug-in unit and the busway are interlocked to ensure that the device is in the OFF position prior to installation or removal of the unit.

To ensure that the bus plug is seated onto the busway, the clamping mechanism will draw the unit tight onto the busway housing as the installer tightens the clamps.

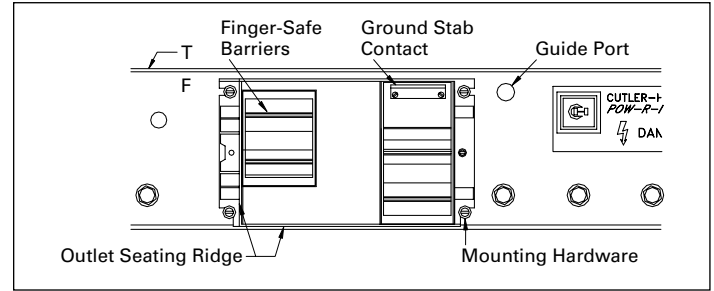
Plug-in units have an interference bracket that prevents the cover from being opened while the device is in the ON position and to prevent accidental closing of the device while the cover is open.

There are two locations available for field positioning of the bus plug operating handle. On vertical bus run applications, the handle can be mounted on the side of the plug, and for horizontal runs, the handle can be mounted on the (line side) end of the unit. Bus plugs are shipped with the handle mounted on the end as standard. Mounting positions are illustrated in **Figure 52**.

When a plug-in unit is installed, the bus plug stab base assembly engages a seating ridge provided on the plug-in outlet. The stab base is drawn in to overlap the ridge and to form a tight seal against moisture and dust.



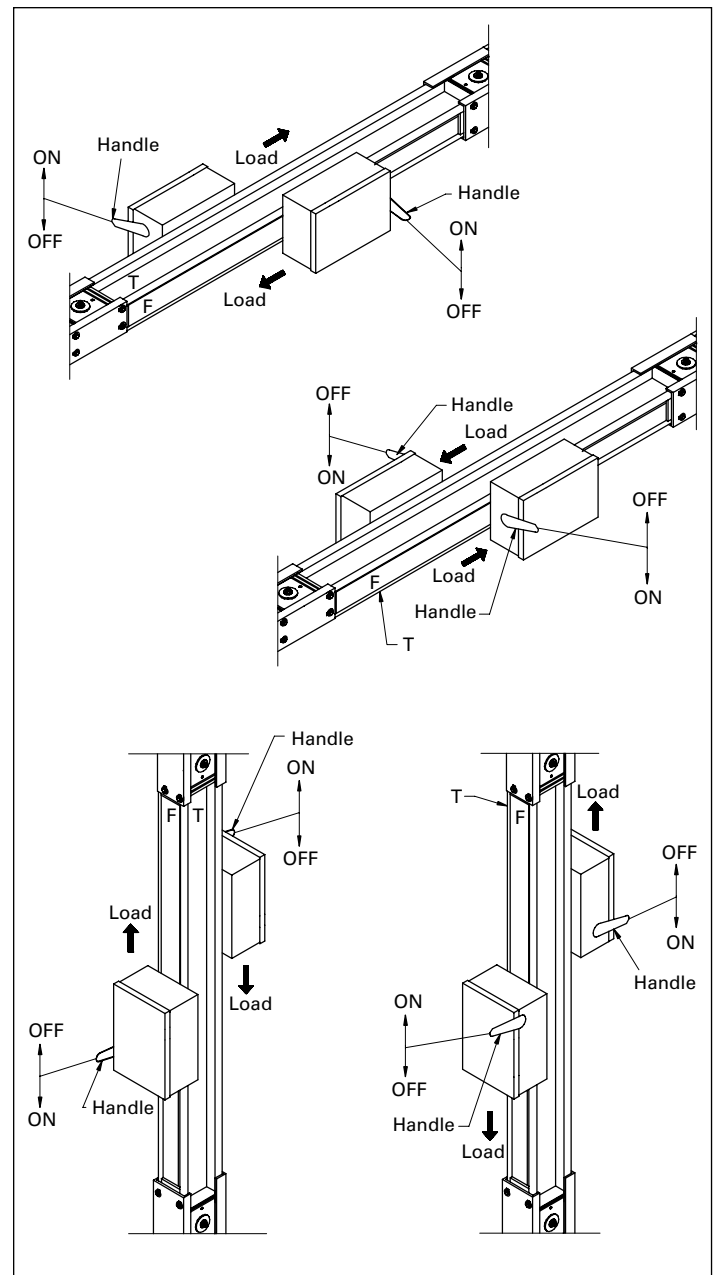
**Figure 50. Plug-in stab details**



**Figure 51. Plug-in outlet details**

### Plug-in device mounting

The load end of a plug-in unit varies with the orientation of the busway as determined by the "F" and "T" markings (see **Figure 52** below).

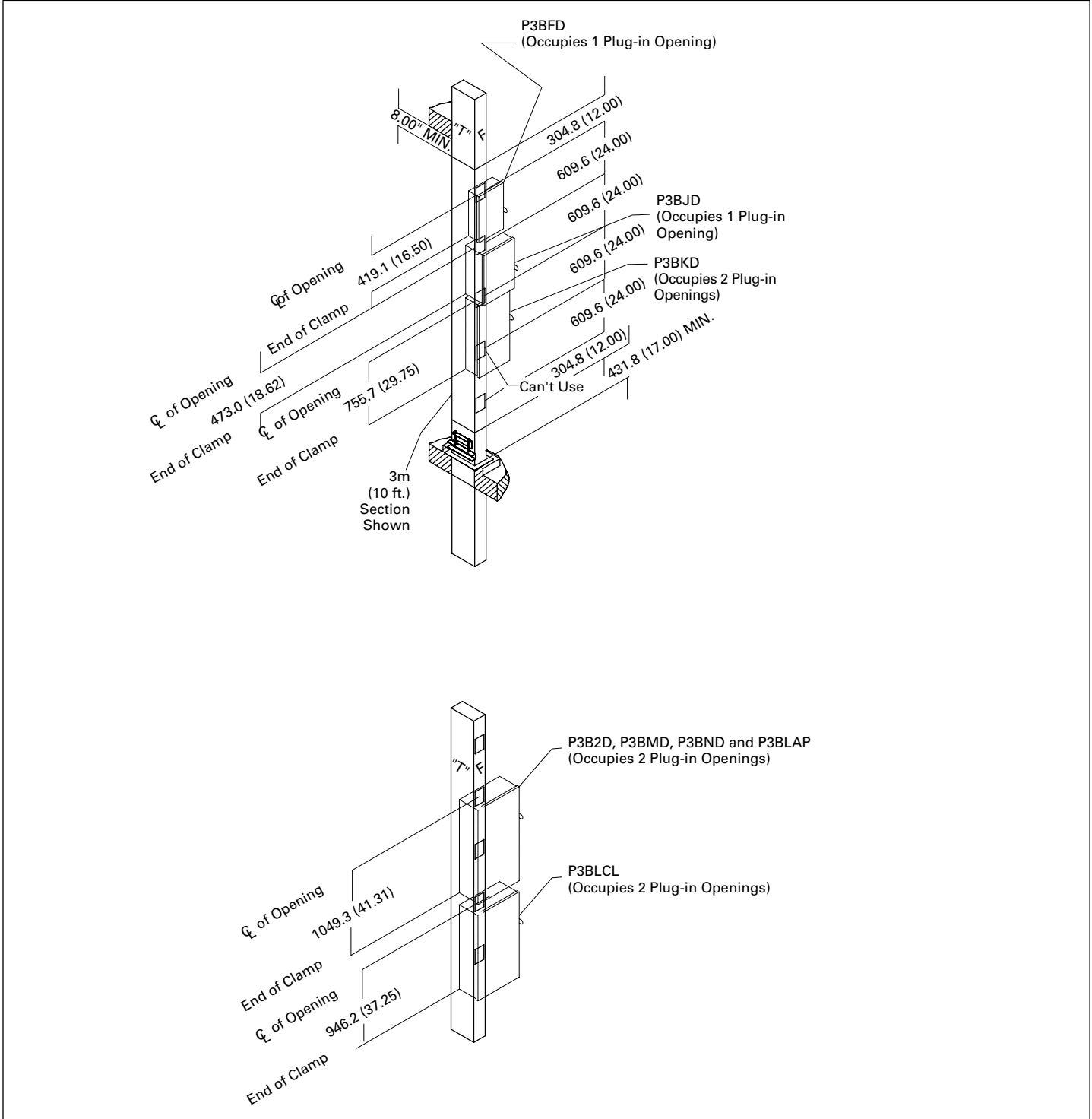


**Figure 52. Plug-in device mounting**

**Plug-in device mounting (continued)**

Plug-in openings are spaced every 609.9 mm (24.00 inches) starting 304.8 mm (12.00 inches) in from the centerline of each bridge joint with a maximum of five openings per side of an individual section of busway. **Figure 53** illustrates the number of plug-in openings taken up by each style/size bus plug.

Each plug-in unit uses only one plug-in opening; however, may cover up additional plug-in openings preventing use.



**Figure 53. Breaker plug-in device mounting**

## SPD plug-in devices

### SPD Series (Figure 54)

The Pow-R-Way III plug-in device product offering includes a surge protective device (SPD), which is ideal for busway fed distribution systems. A transient voltage is a random, high energy, short duration electrical anomaly. These high energy surges can disrupt, damage, or destroy sensitive microprocessor-based equipment. Eaton has developed the SPD family of products to ensure that quality power is supplied to commercial, industrial, medical, and institutional facilities.

The SPD not only protects against externally created impulse transients such as lightning, utility capacitor switching, and disturbances emitted by adjacent facilities, but it also provides needed protection against internal transients. This type of transient is generated within a facility's own distribution system. Sources of internally generated, or ringwave, transients are imaging, equipment, variable frequency drives, lighting dimmers, arc welders, and the switching on and off of electrical distribution equipment. It is estimated that over 80% of surge disturbances are actually caused by internal transients.

The SPD also filters repetitive electrical line noise (EMI/RFI), which is defined as any unwanted electrical signal that produces undesirable effects in the circuits of sensitive electronic equipment or disturbances that are two times peak voltage. The suppression of AC transients is accomplished through the use of metal oxide varistors (MOVs) that provide a low impedance path to divert surges away from loads. Electrical line noise and ringing transients are eliminated by adding filtering capacitors to the suppression device.

Not all SPD units on the market have filtering capabilities. The benefits of combining SPD and filtering are reduced MOV stress, resulting in a longer life cycle, lower let-through voltage, better noise attenuation levels, and increased reliability.

Without protection devices, electronic-based loads and microprocessors are not provided with the noise- and disturbance-free power that they require. Because microprocessors are now common in that facilities, specifiers must ensure that the AC power supply is properly filtered. Significant performance advantages are achieved by integrating SPD filters into busway systems.

Because the SPD unit is directly connected to the busway it is able to minimize let-through voltage and to isolate critical loads that are fed from a protected busway run. Due to the integrated design, the SPD bus plug saves the user-needed wall space and greatly reduces the installed project cost. The SPD bus plug is furnished with a breaker disconnect. For catalog numbers and selection criteria, see **Table 53** below.

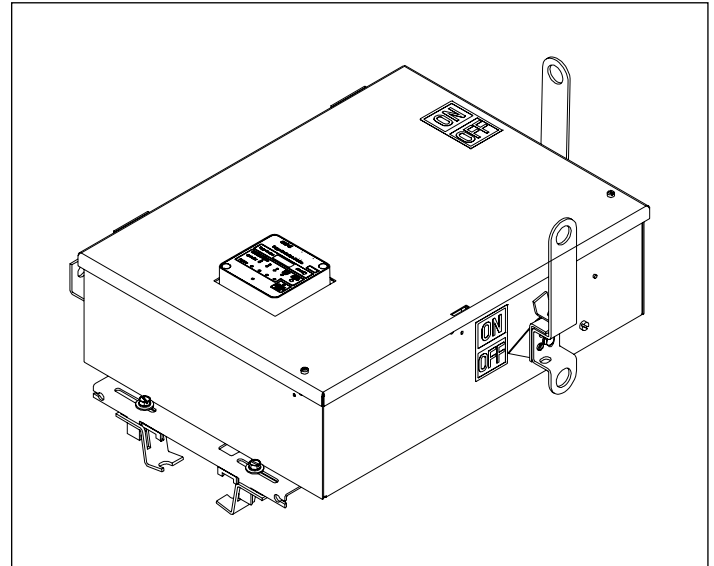


Figure 54. Surge protective device (SPD series) bus plug

Table 53. SPD bus plugs catalog numbering system

Fixed—do not change		P3BSPD 250 480Y 2 C		Fixed—do not change	
Surge rating (kA/phase)		Voltage code		Option code	
50	208Y = 208Y/120 V (four-wire + ground)	1 = Basic—Dual-colored LED per phase to indicate protection status of the N-G mode on units with a neutral wire, single-colored LED to indicate the lack of a neutral wire connection on systems with a neutral wire. 2 = Standard—Dual-colored LED per phase to indicate protection status of the N-G mode on units with a neutral wire, single-colored LED to indicate the lack of a neutral wire connection on systems with a neutral wire, audible alarm with silence button and form 'C' relay contact. 3 = Standard + Surge Counter—Dual-colored LED per phase to indicate protection status of the N-G mode on units with a neutral wire, single-colored LED to indicate the lack of a neutral wire connection on systems with a neutral wire, audible alarm with silence button, form 'C' relay contact, EMI/RFI filtering providing up to 50 dB of noise attenuation from 10 kHz to 100 MHz and surge counter with reset button.			
80	400Y = 400Y/230 V (four-wire + ground)				
100	480Y = 480Y/277 V (four-wire + ground)				
120	600Y = 600Y/347 V (four-wire + ground)				
160	240D = 240 delta (three-wire + ground)				
200	480D = 240 delta (three-wire + ground)				
250	600D = 240 delta (four-wire + ground)				
300					
400					

**Note:** Available for Pow-R-Way III plugs. This information is required for all quotations. This information should also be included at order entry to ensure prompt processing of the order.

## Special plug-in devices

### IQ Energy Sentinel bus plugs (Figure 55)

The IQ Energy Sentinel™ is a microprocessor-based metering module capable of communicating energy usage and demand values over the Eaton PowerNet™ power monitoring network. These innovative submetering devices are designed to mount directly to Series C® molded-case breakers through 400 A and are available for universal mounting through 250 A.

It offers a centralized alternative to individually mounted wattmeters, watt-hour meters, and watt-demand meters. Key advantages include unmatched savings in space, lower installation costs, and the capability to communicate data readings in a variety of ways. IQ Energy Sentinels with built-in CTs and communication capability have the added benefit of overall system accuracy. The Energy Sentinel mounts on the load side of Eaton F, J, and K frame breakers within the bus plug enclosure. The Energy Sentinel is also available for fusible plug-in units, which use external CTs within the plug-in enclosure.

Submetering application examples for the Energy Sentinel include energy monitoring and demand management, energy cost analysis/allocation, and tenant or interdepartmental billing.

To accomplish the communication system, the customer must provide a twisted pair communication cable in 12.7 mm (0.50 inch) conduit connecting the IQ Energy Sentinel to an Eaton Central Energy Display (CED) or a customer PC to display and collect the information.

The IQ Energy Sentinel offers the user full energy monitoring capability in a compact, cost-effective module ideally suited to busway application.

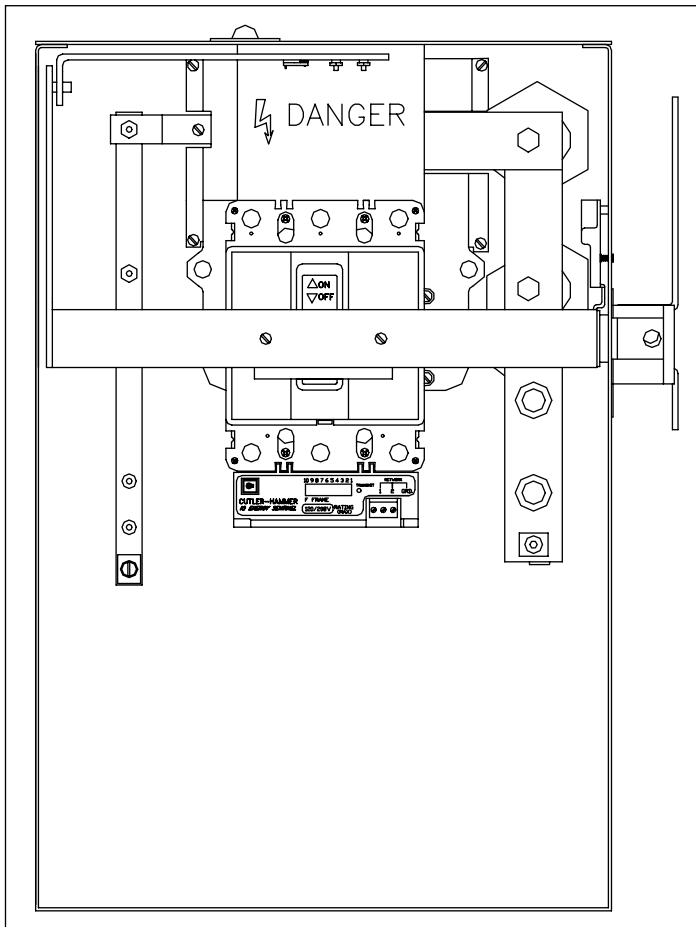


Figure 55. IQ Energy Sentinel bus plug

### Ground detector/neutralizer bus plug (Figure 56)

In rare cases, busbars in a busway system pick up static electricity. In order to discharge this potential, a neutralizer and ground detector bus plug is available. The unit has three 18,000 ohm resistors connected between the busbars and the ground. Static electricity is discharged through these resistors. A neon lamp is wired in series with the busbar and part of the resistor and burns continuously. If there is a ground anywhere on the system of a lower resistance than the path through the lamp, the lamp will go out, indicating that there is a short in the system.

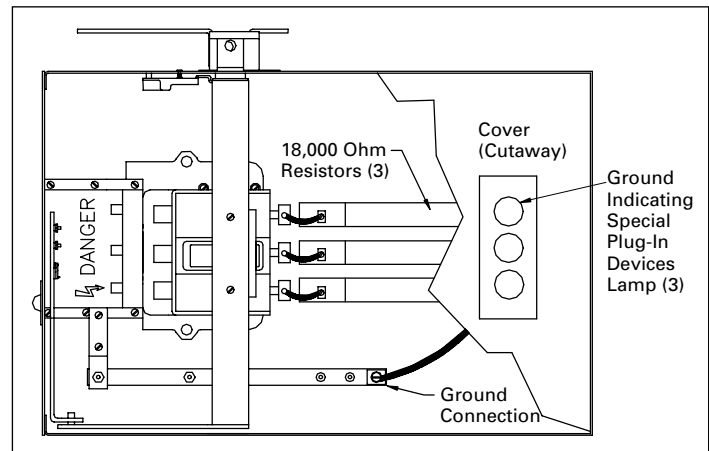


Figure 56. Ground detector/neutralizer bus plug

### Combination starter bus plugs (see Figure 57)

Eaton Freedom™ and Advantage™ motor starters are included in the Pow-R-Way III bus plug product offering. Freedom motor starters offer state-of-the-art features that ensure greater value, flexibility, and performance in the toughest commercial and industrial applications.

Advantage motor starters have features including a solid-state, heaterless overload relay with built-in ground fault protection. Advantage also features communication capabilities and an on-board microprocessor that controls the contactor magnet to eliminate burnout in low voltage or varying control circuit conditions.

Plug-in combination starters or contactors are mounted in enclosures identical to the circuit breaker and fusible switch type bus plugs including the clamp and guides, safety interlocks, and guide pin. They are available from size 0 through 5 with a circuit breaker, motor circuit protector, or fusible disconnect. Contact Eaton for specific application and outline dimensions.

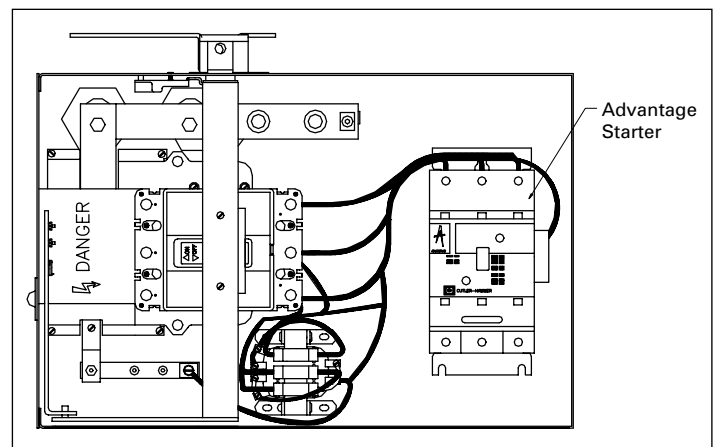


Figure 57. Freedom/Advantage bus plug

## OPTIM plug-in devices

### Digitrip™ OPTIM™ bus plugs (Figure 58)

Digitrip OPTIM is a programmable, communicating, microprocessor-based electronic trip unit system for Eaton Series C circuit breakers. OPTIM is available for Pow-R-Way III bus plugs on K-Frame (125–400 A), L-Frame (70–600 A), and N-Frame (400–1200 A) circuit breakers. Digitrip OPTIM provides an electrical distribution system with superior programmable protection, coordination, and a state-of-the-art advanced warning capability along with system diagnostics, monitoring, and communications. Digitrip OPTIM is available in two trip unit types: OPTIM 550 and OPTIM 1050.

Unique Digitrip OPTIM features can provide time current settings with more increments that permit the user to OPTIMIZE system protection and coordination; improved accuracy to give more selectivity and closer sensitivity in providing coordination; programmable short delay and/or instantaneous curve tripping options; and selectable thermal memory, as well as selectable sure start discriminator protection features. Increased system security is provided by the addition of a programmable password protection. For improved system coordination, 1<sup>st</sup> long delay time slope has been added to the traditional nine LSIG curve shaping options. Short delay and ground delay zone selective interlocking have also been added, down to a 70 A circuit breaker.

The following Advance Warning options are also available:

- A programmable high load phase and neutral alarm, adjustable between 50% and 100% of  $I_r$  (LDPU setting), will signal an impending trip condition
- An adjustable ground fault alarm that will alert the user of a ground fault condition without the breaker
- Energy alarming can be performed (such as peak demand exceeded) to reduce energy costs with OPTIM 1050 via PowerNet
- Total Harmonic Distortion (THD) alarming detects changes in power quality with OPTIM 1050 via PowerNet

Digitrip OPTIM provides a complete selection of system diagnostic capabilities including four cause-of-trip LEDs mounted on the front of the trip unit to improve troubleshooting capabilities. They are complemented by trip event information that is stored in memory after a trip condition. Remote breaker status indication is provided by auxiliary and alarm switches. The Breaker Interface Module (BIM) provides trip indication information on the front of the unit or via relay contacts to a remote location.

Digitrip OPTIM has an extensive menu of monitoring capabilities including load monitoring, power factor (OPTIM 1050), power and energy (OPTIM 1050) power quality-current harmonics.

OPTIM trip units are PowerNet compatible and can be included in the unique Eaton tripping PowerNet communications system. Contact Eaton for specific applications and outline dimensions.

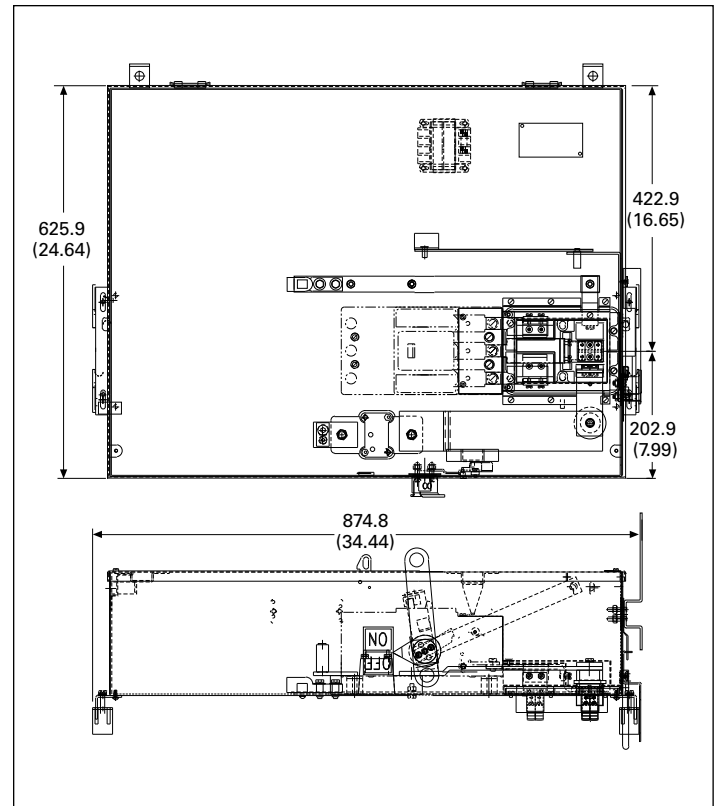


Figure 58. OPTIM bus plug

### Power takeoff sections

Power takeoff sections are used to tap up to 1200 A of power off of the busway. A power takeoff section must be used when power in excess of the current-carrying capabilities of the plug-in stabs (800 A) is required. A bolt-on fusible switch or circuit breaker unit can then be bolted to the power takeoff.

#### Bridge joint power takeoff (Figure 59)

A bridge joint power takeoff is a special connection that allows for the attachment of a bolt-on unit at the bridge joint. The bridge joint power takeoff and a bolt-on unit can be used to tap off power where plug-in busway is not available.

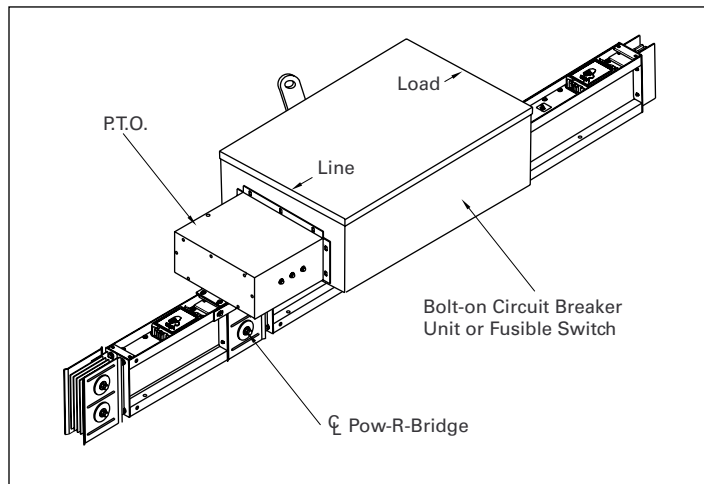


Figure 59. Bridge power takeoff

#### Built-in power takeoff (Figure 60)

A built-in power takeoff is a special piece of feeder busway that allows for the attachment of a bolt-on unit. Built-in power takeoffs are used where space restrictions dictate that the wide dimensions of the busway be flat against the wall, ceiling, or other obstruction. In this application, power takeoffs and bolt-on units are used instead of plug-in units.

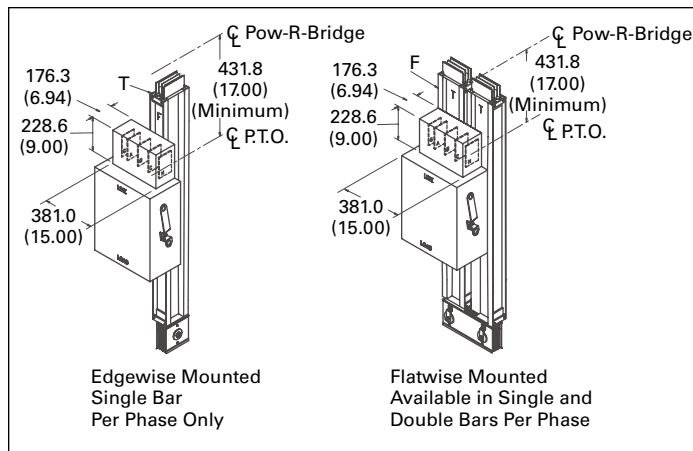


Figure 60. Built-in power takeoff

#### Plug-in cable tap boxes (Figure 61)

Plug-in cable tap boxes are used to feed the busway run, or where equipment served by the busway is connected without overcurrent protection. Plug-in cable tap boxes plug into any Pow-R-Way III busway (225–5000 A) plug in opening.

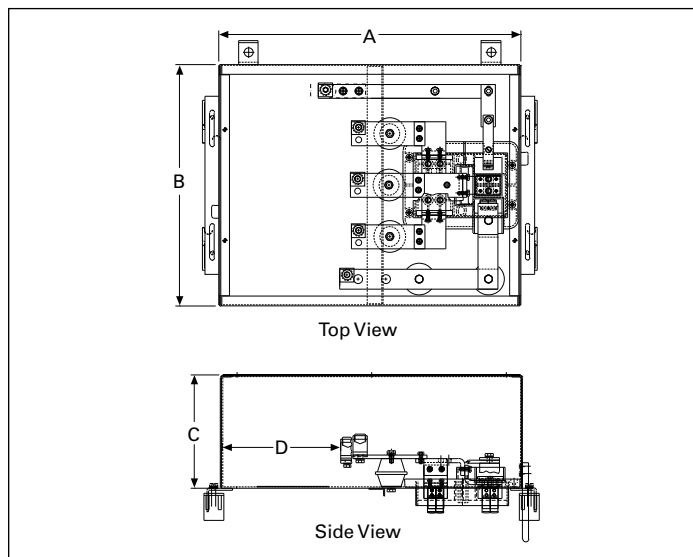


Figure 61. Plug-in cable tap box

Table 54. Plug-in cable tap box details

Ampere rating	Dimensions in mm				Compression conn./ phase and N		Mechanical lugs/phase and N		Catalog number
	A	B	C	D	English	Metric	English	Metric	
200	495.3	393.7	180.8	190.5	(1)	(1)	—	—	P3PTB200C
200	495.3	393.7	180.8	190.5	—	—	(1) #4–350 kcmil	(1) 21.2–177 mm <sup>2</sup>	P3PTB200M
400	666.7	533.4	254.0	190.5	(1)	(1)	—	—	P3PTB400C
400	666.7	533.4	254.0	190.5	—	—	(1) 250–750 kcmil or (2) 3/0–250 kcmil	(1) 127–380 mm <sup>2</sup> or (2) 85.0–127 mm <sup>2</sup>	P3PTB400M
600	762.0	628.6	266.7	325.1	(2)	(2)	—	—	P3PTB600C
600	762.0	628.6	266.7	325.1	—	—	(2) 250–750 kcmil or (4) 3/0–250 kcmil	(1) 127–380 mm <sup>2</sup> or (4) 85.0–127 mm <sup>2</sup>	P3PTB600M
800	762.0	628.6	266.7	325.1	(3)	(3)	—	—	P3PTB800C
800	762.0	628.6	266.7	325.1	—	—	(3) 250–750 kcmil or (6) 3/0–250 kcmil	(3) 127–380 mm <sup>2</sup> or (6) 85.0–127 mm <sup>2</sup>	P3PTB800M



**Plug-in device electrical data**

**Table 55. Circuit breakers**

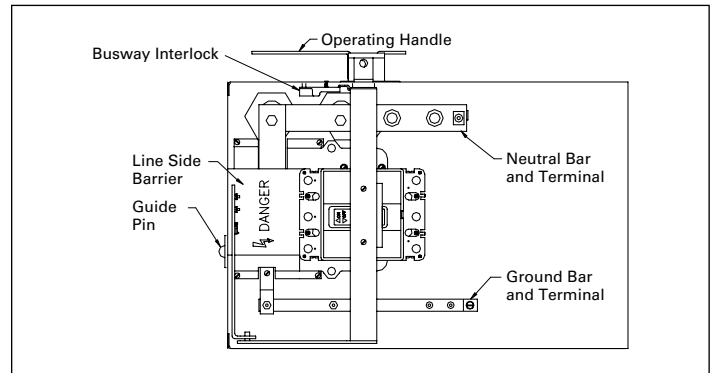
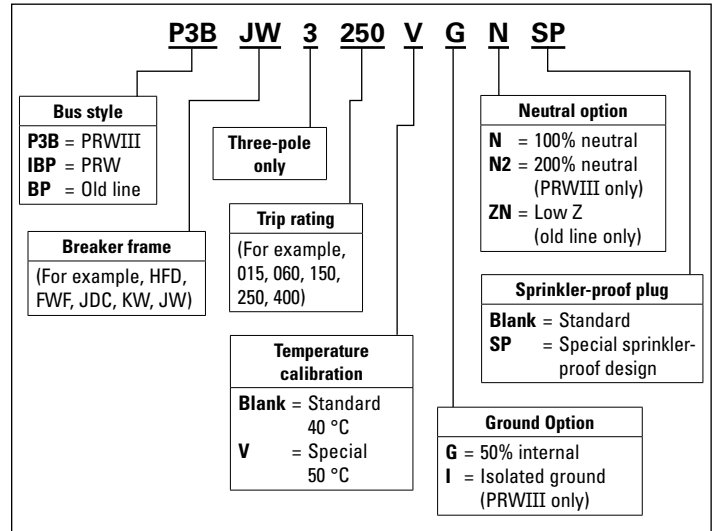
100% rated breakers are not available for use in bus plugs. Contact Product Line for guidance.

Ampere rating	Interrupting rating (kA symmetrical)			Breaker type
	240 Vac	480 Vac	600 Vac	
15-60	18	14	—	EHD
70-100	18	14	—	EHD
15-60	18	14	14	FDB
70-100	18	14	14	FDB
110-150	18	14	14	FDB
15-60	65	25	18	FD
70-100	65	25	18	FD
110-150	65	25	18	FD
175-225	65	25	18	FD
15-60	100	65	25	HFD
70-100	100	65	25	HFD
110-150	100	65	25	HFD
175-225	100	65	25	HFD
15-60	200	100	35	FDC
70-100	200	100	35	FDC
110-225	200	100	35	FDC
15-100	200	150	—	FCL
100-225	65	—	—	ED
100-225	100	—	—	EDH
100-225	200	—	—	EDC
70-225	65	35	18	JD, JDB
250	65	35	18	JD, JDB
70-225	100	65	25	HJD
250	100	65	25	HJD
70-225	200	100	35	JDC
250	200	100	35	JDC
125-250	200	200	—	LCL
250-400	65	—	—	DK
100-400	65	35	25	KD, KDB
100-400	100	65	35	HKD
100-400	200	100	50	KDC
200-400	200	200	—	LCL
300-600	65	35	25	LD, LDB
300-600	100	65	35	HLD
300-600	200	100	50	LDC
400-800	65	50	25	MDL
400-800	100	65	35	HMDL
400-800	65	50	25	ND
400-800	100	65	35	HND
400-800	200	100	50	NDC
600-1200	65	50	25	ND
600-1200	100	65	35	HND
600-1200	200	100	50	NDC

**Table 56. Integrally fused, current limiting circuit breaker**

Ampere rating	Interrupting rating (kA symmetrical)			Breaker type
	240 Vac	480 Vac	600 Vac	
15-100	200	200	200	FB-P
125-225	200	200	200	LA-P
250-400	200	200	200	LA-P
400-600	200	200	200	NB-P
700-800	200	200	200	NB-P

**Table 57. Breaker unit catalog numbering system**



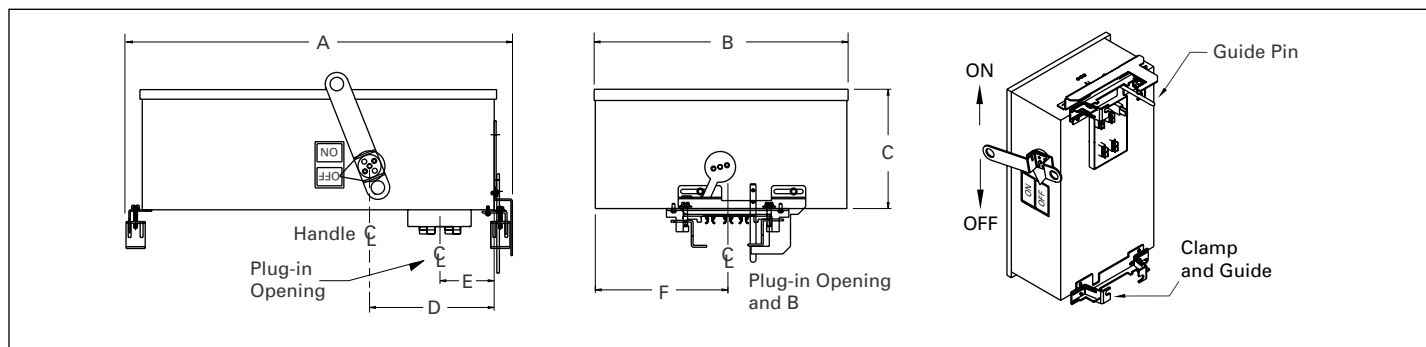
**Figure 62. Typical circuit breaker plug-in unit**

**Note:** Please call Greenwood Low Voltage Busway department for help in assigning a catalog number for a specific application.

**Note:** Do not leave spaces between characters. Example: P3BFD3225N; IBPKD3400N.

**Note:** All plug-in units come fully assembled.

**Plug-in device physical data**

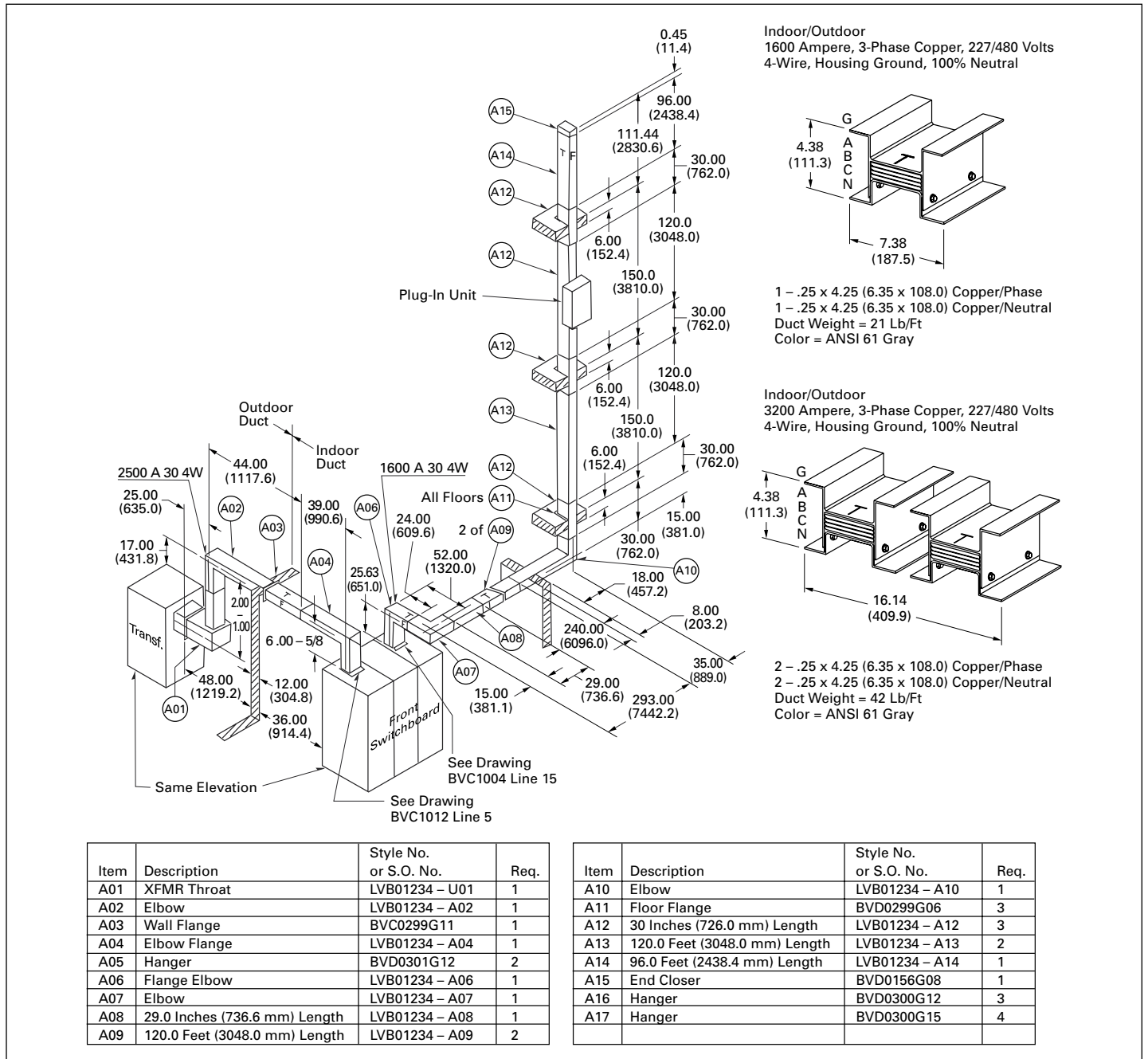


**Figure 63. Bus plugs**

**Table 58. Plug-in units**

Circuit breaker plug-in units	Maximum amperes	Maximum Vac	Dimensions in mm						Mechanical terminal Wire range per phase (mm <sup>2</sup> )	Approx. weight (kg)
			A	B	C	D	E	F		
P3BFD (E- and F-frame breakers)	225	600	538.5	314.0	138.0	158.8	101.6	153.7	100 A-(1) #14-1/0 (2.5-50) 150 A-(1) #4-4/0 (25-95)	11.3
P3BKD (K-frame breakers)	400	600	874.0	337.6	197.9	319.0	101.6	168.7	350 A-(1) 250-500 kcmil (120-240) 400 A-(2) 3/0-250 kcmil (45-120)	24.0
P3BLD (L-frame breakers)	600	600	1064.5	499.1	257.8	441.5	101.6	249.7	400 A-(1) 4/0-600 kcmil (120-300) 600 A-(2) 400-500 kcmil (185-240)	34.0
P3BMDL (MDL-frame breakers)	800	600	1165.6	499.1	257.8	441.5	101.6	249.7	600 A-(2) #1-500 kcmil (50-240) 800 A-(2) 500-750 kcmil (300-400)	61.7
P3BND (N-frame breakers)	800	600	1167.9	499.1	257.8	441.5	101.6	249.7	700 A-(2) # 1-500 kcmil (50-240) (800 A-(3) 3/0-400 kcmil (95-185)	62.6
P3BLAP (TRI-PAC)	400	600	1165.6	499.1	257.8	350.5	101.6	249.7	225 A-(1) #6-350 kcmil (16-185) 400 A-(1) #4-250 kcmil and (1) 3/0-600 kcmil (25-120 and 95-300)	43.5
P3BLCL	400	600	1063.2	499.1	257.8	350.5	101.6	249.7	(1) #4-250 kcmil (25-120) and (1) 3/0-600 kcmil (95-300)	39.9

**Construction drawing**



**Figure 64. Sample installation drawing**

After the approval process and prior to shipment of the busway from the factory, the installer will receive a set of construction drawings. A sample is illustrated in **Figure 64** above. The drawings will contain a complete layout of the entire installation and a bill of material that includes:

1. The item number of each section that can be correlated with the drawing.
2. A description of each section.
3. The style number or shop order number of each section.
4. The quantity of each section or style number required.
5. The height, width, and weight (per ft) of each ampere rating.

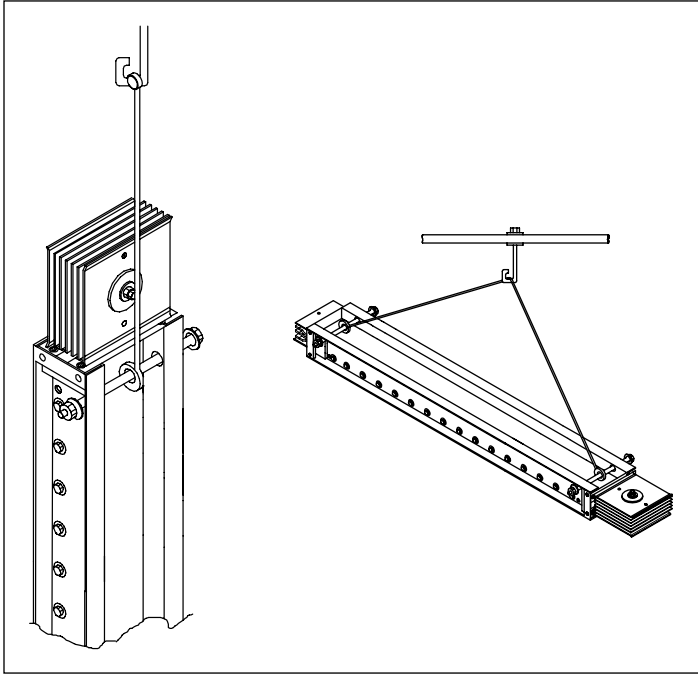
6. Location of the "T" and "F" markings on the busway.
7. Flange reference drawings.
8. Switchgear locations and orientation.
9. Wall and floor locations.
10. The length of each section.
11. The location of any sections that have been designated as "Field Fit" pieces (see **Page 45**).

The installer should review this drawing prior to and during the installation process. Please note that plug-in units are generally not shown on a construction drawing. The installer will also receive installation instruction leaflets, and operation and maintenance manuals with the drawings.

## Installation data

### Hoisting and positioning busway

Pow-R-Way III is manufactured with two sets of lifting eyes at the ends of each piece to facilitate the hoisting and positioning of the busway during installation. Refer to **Figure 65** for location of lifting eyes.



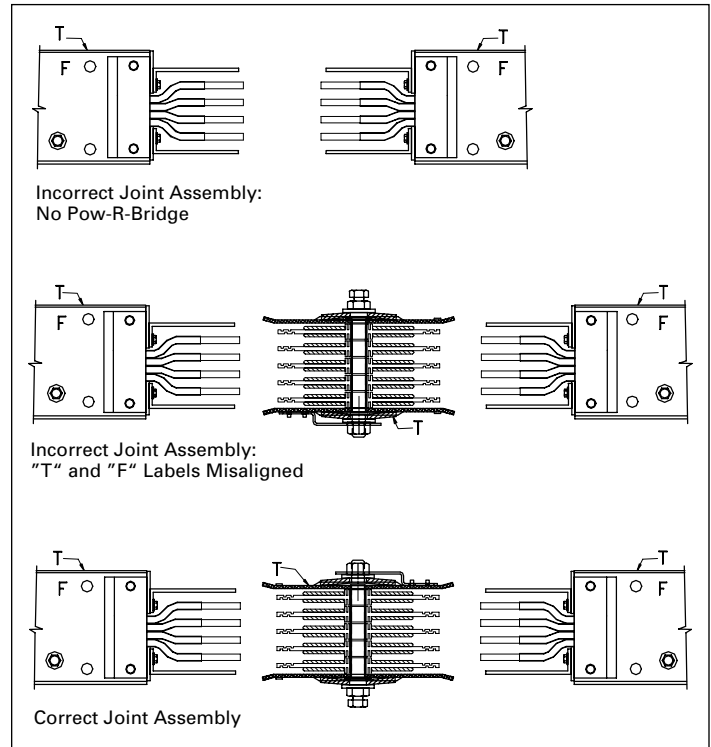
**Figure 65. Hoisting riser and horizontal busway**

### Busway joint assembly

When connecting sections of busway, the following guidelines must be followed:

1. Carefully read NEMA publication BUI.1 and Eaton publication IB01701001E provided with the busway before installing equipment.
2. Contact surfaces must be kept clean and free of all contaminants.
3. Align the (factory installed) Pow-R-Bridge end of the piece being positioned with the non-bridge joint end of the adjacent section. Confirm that the "T" and "F" labels of both sections are in the same plane. Failure to do so will result in an improper installation with the phase bars of the connected sections out of sequence. Then, slide the two sections together until the busbars of the non-bridge section contact the stopping lances of the bridge joint conductor bars of the section being positioned.

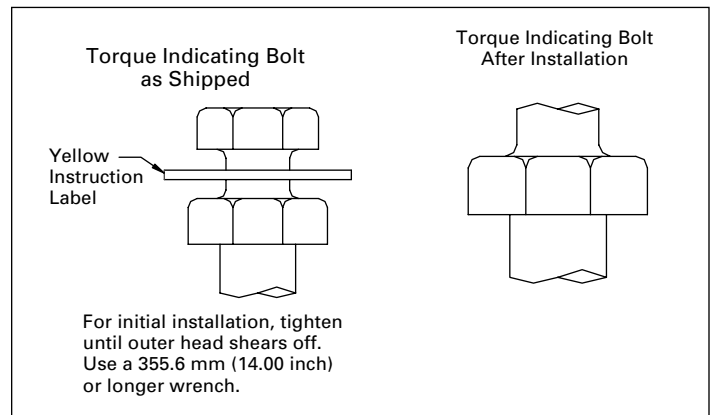
**Figure 66** illustrates examples of incorrect and correct connections. Obviously, the installation is incorrect if the bridge joint is missing, but the busway will also be improperly installed if the "T" label of the bridge joint is not in the same plane as the "T" label of the busway.



**Figure 66. Bridge joint installation**

### Torque indicating bolt (Figure 67)

The torque indicating bolt is a double-headed bolt designed to ensure that proper installation torque is achieved. Fall-away instruction labels are provided between the upper and lower bolt heads. A standard wrench with a (minimum) 355.6 mm (14.00 inch) handle should be used to complete the joint installation. Torque should be applied to the upper head only and as when the proper value is achieved. This bolt head will shear off allowing the tag to fall to the floor. Any joint that is improperly torqued will retain the highly visible tag and should be retightened. The lower bolt head remains intact for future maintenance and a label is provided on the bridge joint with the proper torque requirements.



**Figure 67. Torque indicating bolt**

**Note:** For maintenance or relocation, torque from 55 to 65 ft-lb using a torque wrench.

### Final field fit program

A field fit section of busway is typically an elbow or a short length of feeder that is intentionally left out of a run for later shipment. It is most often a mutually agreed upon section between the customer and the plant. The purpose of the program is to effectively manage the dimensional uncertainties that may be involved in a busway layout.

The example shown in **Figure 68** identifies the field fit piece as item F01, a straight length.

Upon release of the order, this item is kept on hold for field measurement. The contractor installs the busway (Items A01 through A04) and is then able to obtain an exact dimension for the final field fit piece, Item F01. The measurement should be made from the edge of the housing of A01 to the edge of the housing of A02.

The contractor can fax the dimensions directly to the factory on the Final Field Fit Fax Release form (see **Page 46**), which is packed with the original shipment. The field fit section will ship within 5 to 10 working days from the receipt of the release fax. Offset fittings or more than four field fits released at the same time will ship within 15 working days. This program has been successful for many years and it provides the assurance of an exact fit the first time. It allows for busway runs to be released when certain dimensions are not yet determined. It also eliminates the costly delays that can occur when sections have to be remade and shipped due to last-minute job site changes. In turn, this allows for installations to begin early and projects can be completed on time.

The Final Field Fit Fax Release form is customized to each order and is shipped to the job site with the busway. The field fit items shown on the form will match the "F" items shown on the as-built drawings provided. The sheet is faxed from the job site directly to the product engineer at the factory.

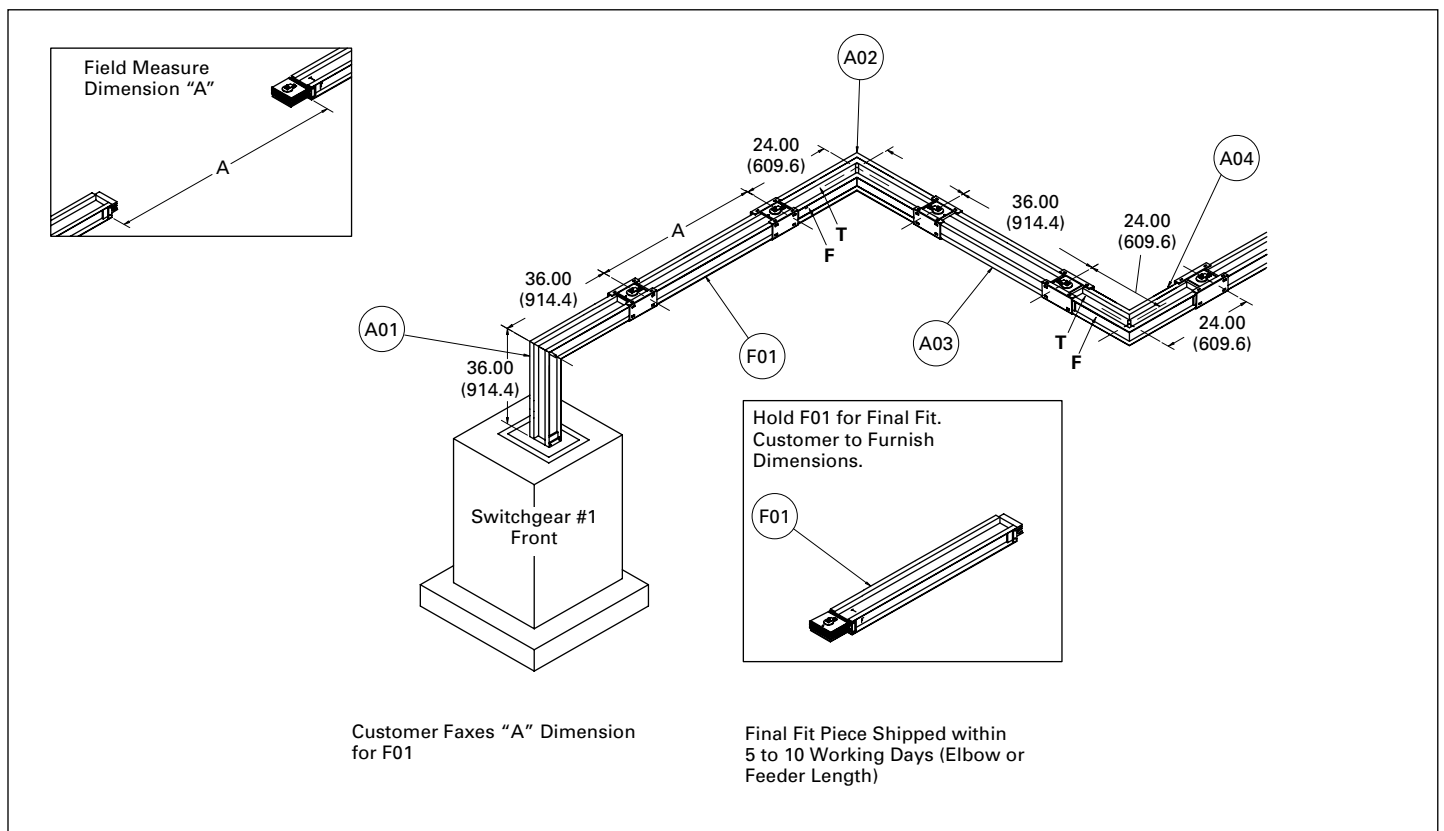


Figure 68. Final field fit program

**Final Field Fit Program**

**Item Release!**

Email Directly to Greenwood busway factory

Ref. Drawing:

G.O.#:

Item #:

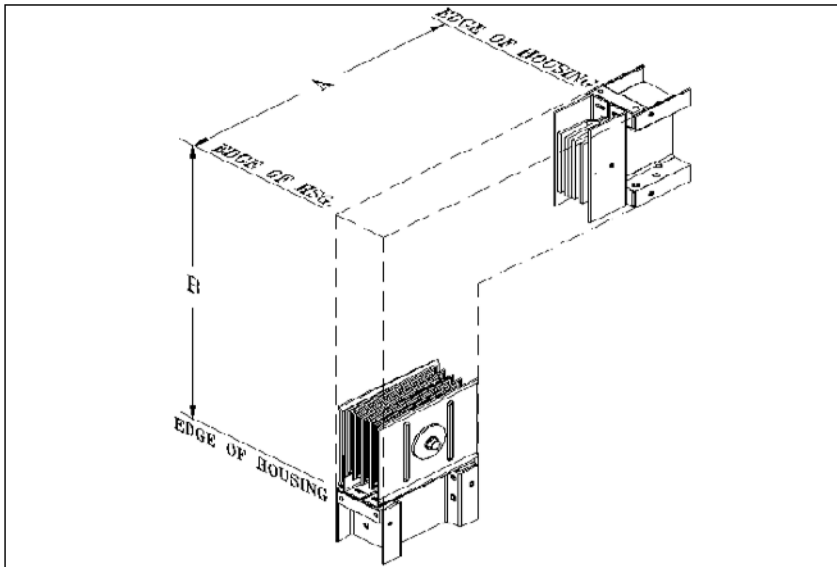
Phone #: **864-942-6310**

Email Address: [buswayfieldfit@eaton.com](mailto:buswayfieldfit@eaton.com)

Customer to provide dimensions indicated by letters on field fit section of busway. In order to help expedite your release please include the GO# and Item# listed above on this sheet in the subject line of your email message.

"A" Dimension = \_\_\_\_\_ (see chart for min.)

"B" Dimension = \_\_\_\_\_ (see chart for min.)



Minimum Dimensions		
Amp Rating	Hsg. to Hsg.	
CU.	AL.	(in.)
225	225	19.88
400	400	19.88
600	600	19.88
800	-	19.88
1000	-	20.19
1200	800	20.94
1350	1000	21.19
1600	1200	22.19
2000	1350	23.31
-	1600	24.19
2500	2000	26.12
3200	-	31.06
4000	2500	33.31
-	3200	35.12
5000	4000	38.88

Name: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Phone#: \_\_\_\_\_ Email: \_\_\_\_\_  
 Date: \_\_\_\_\_

Lead times shown below are in working days from receipt of complete information.

Piece Type	1-5 pieces*	6-10 pieces*	11 or more pieces*
Straight Sections	5-10 working days	10-15 working days	consult factory for lead times
Standard 90 Elbows	5-10 working days	10-15 working days	consult factory for lead times
Offsets	10-15 working days	consult factory for lead times	consult factory for lead times
Specials/Other	consult factory for lead times	consult factory for lead times	consult factory for lead times

The number of pieces is calculated by adding all field fit pieces being released to be made at the same time together. This is not necessarily a number of like pieces. For example 3 elbows and 4 straight sections would equal 7 total pieces. The lead time for each item in this case would be found under the 6-10 piece column.

\*Denotes number of pieces per project not per run, and could be included on multiple order numbers.

Revised 4/14

Figure 69. Release form

## Specifications

### Part 1—General

#### 1.01 Scope

- A. The contractor shall furnish and install the busway system including all necessary fittings, hangers, and accessories as specified herein and as shown on the contract drawings.

#### 1.02 Related sections

#### 1.03 References

- A. The low voltage busway and all components shall be designed, manufactured, and tested in accordance with the latest applicable standards of ANSI, CSA, NEMA, and IEC:

1. NEMA BU.1.
2. ANSI/UL 857.
3. CSA C22.2 No. 27.
4. IEC 60439-1 and 2.

#### 1.04 Submittals for review/approval

- A. The following information shall be submitted to the engineer:

1. Master drawing index.
2. Isometric drawing of each busway run.
3. Component list
4. Busway ratings including:
  - a. Short-circuit rating
  - b. Voltage
  - c. Continuous current
5. Major component ratings including:
  - a. Voltage
  - b. Continuous current
  - c. Interrupting ratings
6. Cable terminal sizes.
7. Product data sheets.

#### 1.05 Submittals for information

- A. When requested by the Engineer, the following product information shall be submitted:

1. Descriptive bulletins.
2. Product sheets.

#### 1.06 Submittals for close-out

- A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in Section 1.04.
2. Installation information.
3. Seismic certification and equipment anchorage details.

#### 1.07 Qualifications

- A. All components shall be of the same manufacturer as the busway.
- B. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001, or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a period of 10 years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. The busway and related accessories shall be suitable for and certified to meet all applicable seismic requirements of the Uniform Building Code and the California Building Code for Zone 4 application.

#### 1.08 Delivery, storage, and handling

- A. Equipment shall be handled and stored in accordance with the manufacturer's instructions. One copy of these instructions shall be included with the equipment at time of shipment.

#### 1.09 Operation and maintenance manuals

- A. Ten copies of the equipment operation and maintenance manuals shall be provided.
- B. Operation and maintenance manuals shall include the following information:
1. Instruction books or leaflets.
  2. Recommended renewal parts list.
  3. Drawings and information required by Section 1.06.

### Part 2—Products

#### 2.01 Manufacturers

- A. Eaton.

#### 2.02 Ratings

- A. The busway shall be Eaton type Pow-R-Way III and shall be:
1. Three-phase, three-wire with 50% integral housing ground.
  2. Three-phase, three-wire with 50% internal ground or 50% isolated, internal ground.
  3. Three-phase, three-wire with 100% ground.
  4. Three-phase, four-wire with 100% neutral.
  5. Three-phase, four-wire with 50% integral housing ground and 100% neutral.
  6. Three-phase, four-wire with 50% internal ground or 50% isolated, internal ground and 100% neutral.
  7. Three-phase, four-wire with 100% ground and 100% neutral.
  8. Three-phase, four-wire with 200% neutral.
  9. Three-phase, four-wire with 50% integral housing ground and 200% neutral.
  10. Three-phase, four-wire with 50% internal ground or 50% isolated, internal ground and 200% neutral.
  11. Three-phase, four-wire with 100% ground and 200% neutral as indicated on the Contract Drawings.

### 2.03 Construction

The busway and associated fittings shall consist of copper (or) aluminum conductors totally enclosed in a two-piece extruded aluminum housing. Outdoor feeder, indoor feeder, and indoor plug-in shall be interchangeable at the same rating without the use of special adapters or splice plates. Where indicated on the contract drawings, provide indoor, sprinkler-proof, plug-in busway. Fittings shall be identical for use with both the plug-in and feeder types of busway. The busway shall be capable of being mounted in the flatwise, edgewise, or vertical positions without derating. The busway shall consist of standard 3 m (10 ft) sections with special sections and fittings manufactured to suit the installation. Horizontal runs shall be suitable for hanging on 3 m (10 ft) maximum centers. Vertical runs shall be suitable for mounting on 5 m (16 ft) maximum centers. Provide one hanger for every 3 m (10 ft) of horizontally mounted busway. On vertical runs, provide one spring, suspension type hanger per floor and at the end of the bus run on the last floor.

### 2.04 Conductor busbars

- A. Busbars shall be fabricated from high strength, 57% conductivity aluminum or 99% conductivity copper and shall be suitably plated with silver- (or) tin-plating at all electrical contact surfaces.
- B. Busbars shall be insulated over their entire length, except at joint and contact surfaces, with Class B, 130 °C, epoxy insulation applied by the fluidized bed process. The epoxy insulation shall extend fully to the joint contact surface.
- C. The busway shall be capable of carrying rated current continuously without exceeding a temperature rise of 55 °C based on a 40 °C ambient.

### 2.05 Bus joints

- A. Each busway section shall be furnished complete with joint hardware and covers. The busway joints shall be a single-bolt, non-rotating, removable bridge design. All bridge joints shall be furnished with [standard torque-indicating double-head joint bolts and Belleville washers. The bridge joint shall utilize a captive nut retainer on the opposite side of the torque-indicating bolt. The bridge joint design shall ensure proper installation without the use of a torque wrench and provide visual indication that the joint has been tightened to the proper torque value.] –OR– [an optional tension indicating SmartBolt and Belleville washer. The bridge joint shall utilize a captive nut retainer on the opposite side of the tension-indicating bolt. The bridge joint design shall ensure proper installation without the use of a torque wrench and provide visual indication through a color changing window on the bolt head that the joint has been tightened to the proper internal tension value.] Each indoor busway joint shall allow for a minimum length adjustment of ±12.7 mm (0.50 inches). De-energization of busway shall not be required for safe testing of joint tightness. The bridge joint shall be the Eaton Pow-R-Bridge.

### 2.06 Housing

- A. The busway housing shall be an all-aluminum construction. The housing shall be manufactured as a two-piece design only, and shall be fabricated from extruded aluminum. The two-piece housing shall be bolted along the bottom flange only, using grade 5, 1/4 x 20 zinc-plated hardware on 76.22 mm (3.00 inch) centers for maximum mechanical strength. The busway enclosure finish shall be ANSI 61 gray baked epoxy powder paint applied by an electrostatic process.
- B. Outdoor feeder busway housing shall be identical to indoor feeder busway housings, and shall be UL listed for outdoor use. Busway shall be completely weatherized at the factory, and designed with a two-piece metal joint cover so that no caulking is required by the installer to achieve an IP66 rating suitable for outdoor use.
- C. The busway shall have a minimum short-circuit withstand rating of 85 kA rms symmetrical for ampere ratings through 800 A, 100 kA rms symmetrical through 1350 A, 125 kA rms symmetrical through 1600 A, 150 kA rms symmetrical through 2500 A, and 200 kA rms symmetrical for ratings through 5000 A.

### 2.07 Plug-in busway

- A. Where required, busway shall be of the plug-in type. Plug-in busway shall be available in standard 609.6 mm (24.00 inch) incremental lengths not to exceed a maximum length of 3 m (10 ft). Plug-in outlets shall be provided on both sides of the busway on 609.6 mm (24.00 inch) centerlines. The design shall allow for 10 cover outlets per 3 m (10 ft) section. Covers for plug-in openings shall have a positive screw close feature and shall require the use of a tool to open. Plug-in outlet covers shall prohibit dirt and debris from entering the plug-in contact openings in the busway and shall have provisions for the installation of power company seals.
- B. The plug-in contact surfaces of the busbars shall be constructed of conductor tabs, welded to the side edges of the bars. The tabs shall be of the same (full) thickness, rating, and material as the busbars. The contact surfaces shall receive the same plating process as the joint contact surfaces.
- C. Plug-in and feeder busway of the same ampere rating shall have identical short-circuit withstand ratings.
- D. Positive mechanical guides for plug-in nits shall be provided at each plug-in outlet to facilitate unit alignment and to prevent improper installation.
- E. The plug-in busway shall maintain the same sandwich bus design as the feeder busway. Plug-in busway with busbars that are separated or flared at the plug-in opening shall be unacceptable.
- F. Plug-in outlets shall be furnished with barriers across the plug-in openings to prevent accidental contact with a live part by an operator or installer.
- G. Where required, indoor sprinkler proof plug-in busway shall be provided with housing identical to the standard plug-in bus. Sprinkler-proof busway shall carry an ingress protection rating of IP55 with the plug-in openings closed.



- H. Where required, plug-in units of the types and ratings indicated on the contract drawings shall be supplied. Plug-in units shall be mechanically interlocked with the busway housing to prevent their installation or removal while the switch is in the ON position. The ground stab of any plug-in unit shall make a positive connection with a busway ground (housing or internal) contact, inside the plug-in outlet, before the phase and neutral stabs make contact with the contact surfaces of the busbars. All plug-in units shall be equipped with a defeatable interlock to prevent the cover from being opened while the switch is in the ON position and to prevent the accidental closing of the switch while the cover is open. The operating mechanism and handle shall remain in control of the disconnect device at all times, permitting easy operation from the floor by means of a hookstick or chain. For safety reasons, no projections shall extend into the busway housing other than the plug-in stabs. All plug-in units shall be interchangeable without alteration or modification to the busway.
- I. Fusible-type bus-plugs shall have a quick-make, quick-break disconnect switch and positive pressure fuse clips.
- J. Circuit breaker type bus plugs shall have an interrupting rating as indicated on the contract drawings. It shall be possible to increase the interrupting rating of a breaker plug-in device having ampere ratings through 400 A up to 100 kAIC at 480 Vac and 200 kAIC at 240 Vac by changing out the circuit breaker only and leaving the enclosure intact. All circuit breaker plug-in devices shall be Eaton type Series C.
- K. Current limiting circuit breaker type plug-in devices shall be units that provide integral time delay/thermal trip protection and current-limiting protection in one assembly.
- L. Where indicated on the contract drawings, provide bus plugs with Surge Protective Device (SPD). SPD units shall incorporate Metal Oxide Varistors (MOVs) for suppression of AC transients and filtering capacitors to eliminate electrical line noise and ringing transients. Ratings of SPD bus plugs shall be as indicated on the contract drawings. SPD units shall be Eaton's SPD Series.
- M. Where indicated on the contract drawings, furnish bus plugs with metering and communication capabilities to monitor power consumption in watts, watthours, and demand. The energy monitoring device shall be Eaton's IQ Energy Sentinel.
- N. Where indicated on the contract drawings, provide circuit breaker bus plugs with programmable microprocessor-based trip units that have coordination, communication, monitoring, and advanced warning capabilities. Programmable breaker bus plugs shall be Eaton's Digitrip OPTIM.





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