



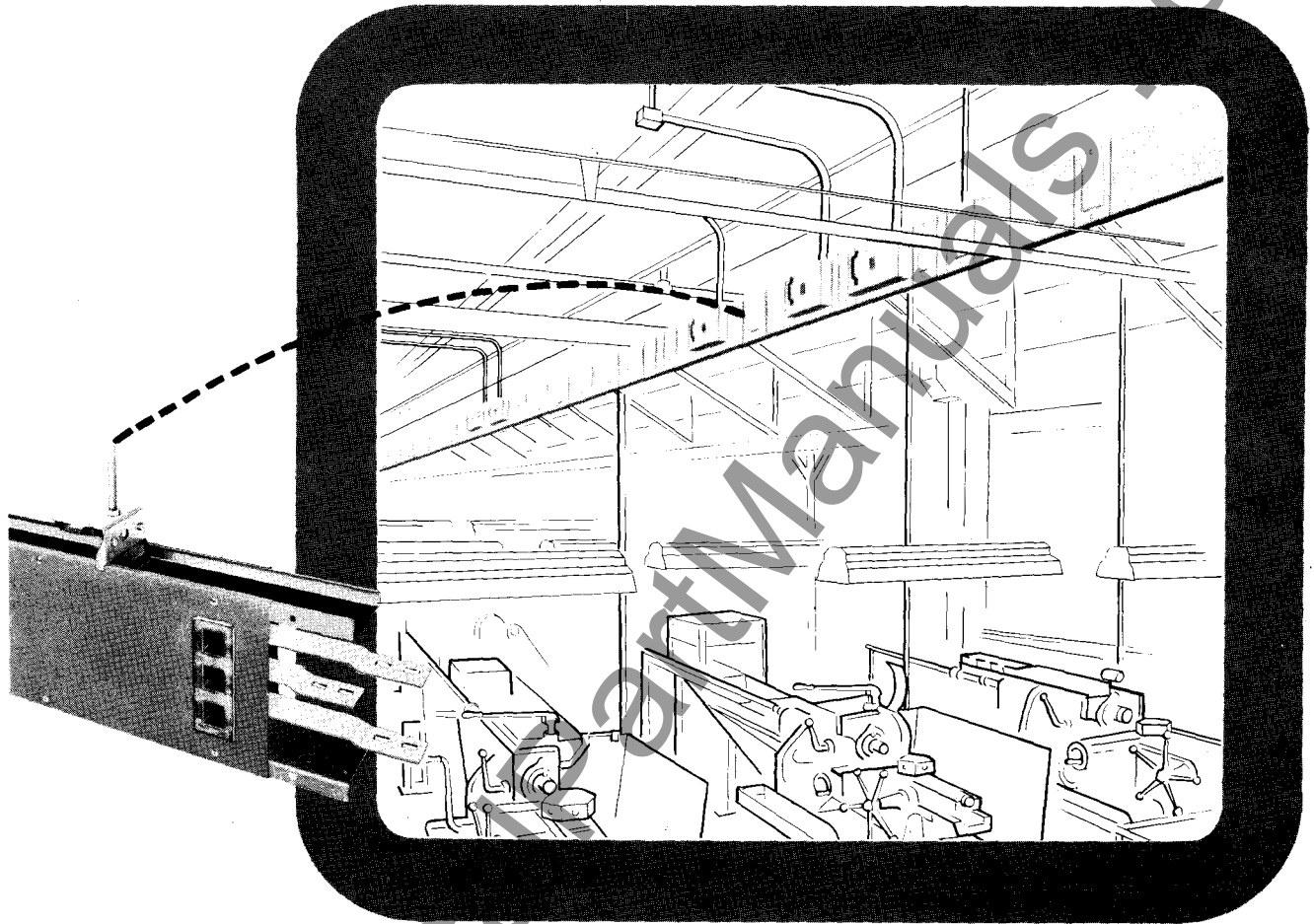
**plug-in bus duct**

application data

**30-561**

page 1

straight lengths, fittings, plug-in protective devices, hangers



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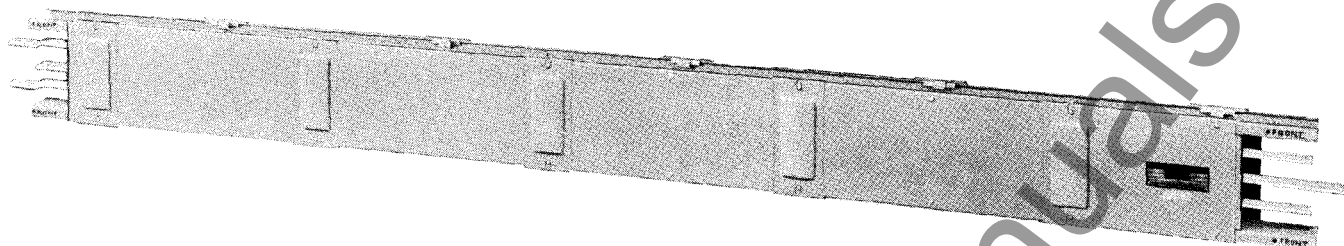
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**March, 1965**

supersedes application data 30-661, pages 1-28, dated January, 1960  
 mailed to: E/1136/DB; D/808/DB; C/315/AD



## general information



### application

Plug-in bus duct consists of uninsulated bus bars supported by high strength molded insulators and enclosed in a steel housing. It is far superior to other types of power distribution systems where frequent tap-off locations are necessary . . . places such as manufacturing areas with heavy concentrations of electrical machinery and lighting.

This is because the insulators also serve as plug-in receptacles. They are spaced at  $11\frac{5}{8}$  inch intervals, staggered so that adjacent receptacles fall on opposite sides of the duct. Therefore, power can be taken off close to its utilization point no matter where it is needed.

### construction

Plug-in bus duct is furnished with either uninsulated copper or aluminum bus bars. The maximum ratings are 1500 amps for copper and 1000 amps for aluminum. Two and 3-conductor duct is designed for 600 volts maximum and three-phase, 4-wire duct for 277/480 volts.

Housing is manufactured of 16-gauge steel with channel construction on all four sides. These channels are interlocked to provide an extremely rigid housing which assures proper mating of bus bars with those of the adjacent sections. Top, bottom, channels and rear cover are spot-welded together while the front cover is fastened with Phillips-head, self-tapping screws.

### assembly

Assembled sections of duct are plainly marked TOP and FRONT to ease installation. Facing the "FRONT" of the duct with the marking "TOP" upward, bus bars at the left end of a section are offset downward and those at the right end are straight. *When assembling the system, "TOP" and "FRONT" markings of adjacent sections must match.*

Front and back covers are identical and measure  $9\frac{5}{8}$  inches. This dimension remains constant for all sizes of duct from the 225-ampere to the 1500-ampere rating in 2-wire; 3-wire; and 3-phase, 4-wire duct. Width of the duct varies with the size of bus bars and the dimensions for available ratings in both copper and aluminum are tabulated on the following page.

### standards

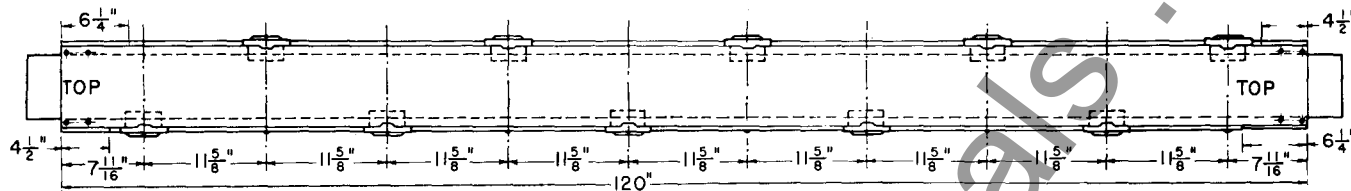
All Westinghouse plug-in duct in ratings from 225 amperes up to and including 1000 amperes is listed by Underwriters and CSA approved. Sections used for vertical installation are so marked. Plug-in duct is manufactured in accordance with NEMA standards for bus duct short circuit withstanding strength which is 15,000 amperes for 225 ampere duct and 25,000 amperes for 400, 600, 800 and 1000 ampere duct. Duct can be braced to withstand higher short circuit currents by substituting high strength poly-glass supports for the standard molded supports.

225 ampere duct can be braced for a maximum of 18,000 amperes. 400 ampere through 1500 ampere duct can be braced for a maximum of 50,000 amperes.

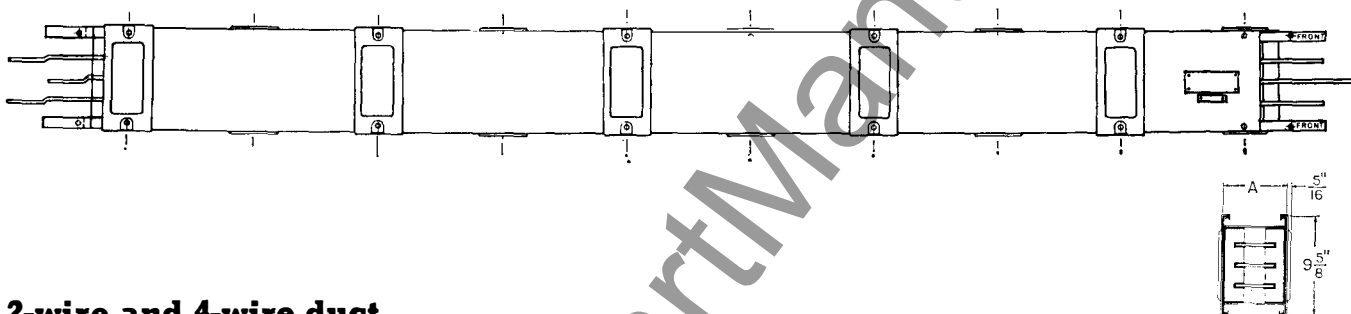
straight lengths, fittings, plug-in protective devices, hangers

**straight lengths**

top view—ten foot section—all straight lengths



**3-wire duct**



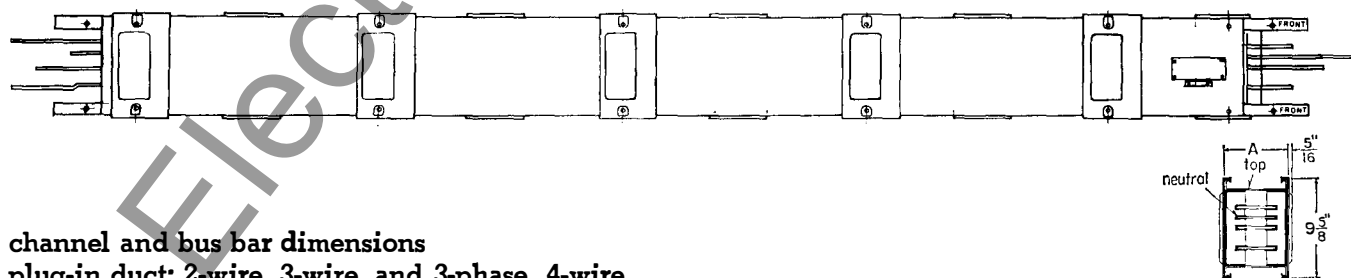
**2-wire and 4-wire duct**

All dimensions and construction features of plug-in duct are applicable to 2 and 4-wire duct as well as 3-wire. Four-wire duct has either a half or full-size neutral bus bar inserted between the top and middle bus bars. In addition, an opening to accept the neutral stab is located at the right-hand side of the plug-in insulator. In order to cover this opening when not in use, an outlet cover slightly wider than that for 2-wire and 3-wire duct is employed. To accommodate the neutral in 3-phase, 4-wire bus duct, the offset in the bus bars differs from the 2- and 3-wire duct as indicated in the following drawing.

For 3-phase, 4-wire plug-in bus duct systems serving a combination power and lighting load, a half-size neutral is normally sufficient. However, when the load is completely lighting or a major portion of the total, a full-size neutral is recommended.

The 2-wire duct is, in all respects, identical with the 3-conductor, except that the middle bus bar is omitted.

Standard straight lengths of duct are available in lengths from 2 through 10 feet in increments of one foot. Special lengths can be fabricated from 20 3/4" minimum to 10 ft. maximum.



**channel and bus bar dimensions  
plug-in duct: 2-wire, 3-wire, and 3-phase, 4-wire**

rating of duct (in amperes)	bus bar size (in inches)		neutral bar (in inches)		housing dimension "A" (in inches)	
	copper	aluminum	copper	aluminum	copper	aluminum
225	1/8 x 7/8	3/16 x 1	1/8 x 7/8	3/16 x 1	3 3/8	3 3/8
400	15/64 x 1 1/2	1/4 x 2	1/8 x 1 1/2	1/8 x 2	3 7/8	4 3/8
600	1/4 x 2	1/4 x 3 1/2	1/8 x 2	1/8 x 3 1/2	4 3/8	5 7/8
800	1/4 x 3	1/4 x 5	1/8 x 3	1/8 x 5	5 3/8	7 3/8
1000	1/4 x 4	1/4 x 6	1/8 x 4	9/64 x 6	6 3/8	8 3/8
1250	1/4 x 5		1/8 x 5		7 3/8	
1500	1/4 x 6		1/8 x 6		8 3/8	



**straight lengths**

**duct joint and bus slots**

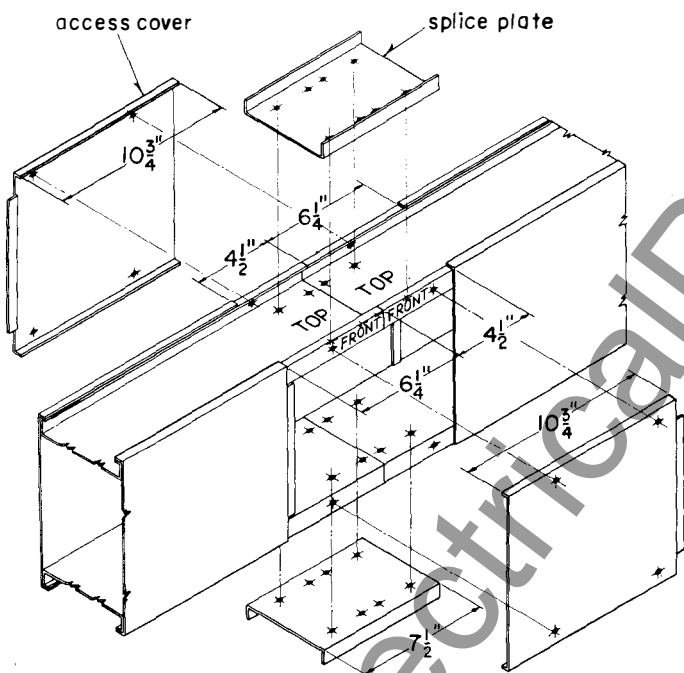
To facilitate installation and inspection of bus duct, an opening  $10\frac{3}{4}$  inches wide is provided in the front and rear covers at each splice. This affords ample room for bolting of bus bars. After they are bolted, an access cover  $9\frac{5}{8}$  inches by  $10\frac{3}{4}$  inches covers this opening and is held in place by Sems fasteners.

Bus bars on the left of each section are offset slightly so that proper electrical clearances are maintained and bars of mating sections are in the same relative plane. In joining bus bars of any two sections, heat-treated, zinc-chromate plated bolts having a tensile strength of 100,000 pounds per square inch are used.

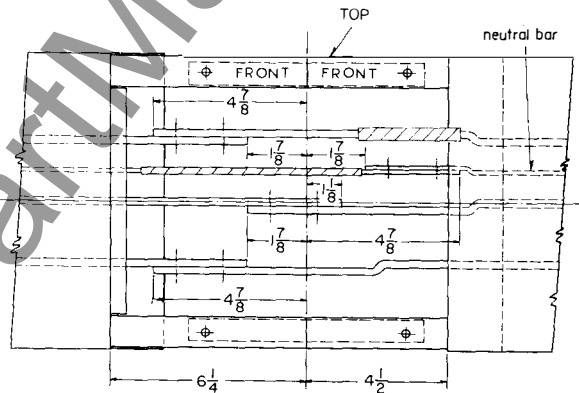
Rectangular slots in the bus bars simplify installation since they do not have to match perfectly when inserting bolts. The same slots are furnished in extensions for flange sections. Since they are silver-plated, a non-oxidizing contact surface is assured between the two joining ends of the bus bars.

Heavy 14-gauge steel splice plates telescope inside the top and bottom channels. They are attached by means of fasteners—zinc-chromate plated bolts with shakeproof washers permanently attached.

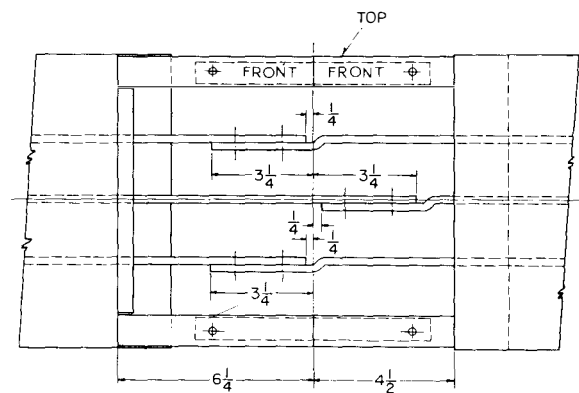
typical plug-in duct joint



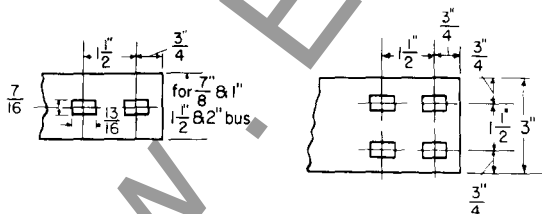
typical joint—4-wire splice



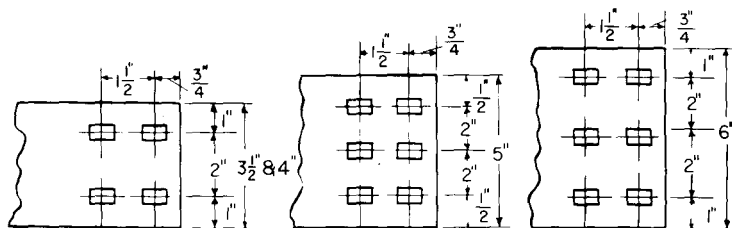
typical joint—3-wire splice



bus slots for  
bolting bus bars  
together

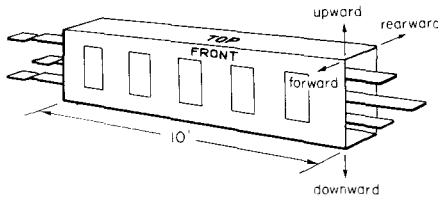


note: all slotted holes  $\frac{7}{16} \times \frac{13}{16}$   
except  $\frac{7}{8}$  & 1" bus they have  $\frac{11}{32} \times \frac{11}{16}$  holes



**fittings**

key to relationship of fittings to straight lengths



There are ten basic fittings available to meet every construction or application need. These include:

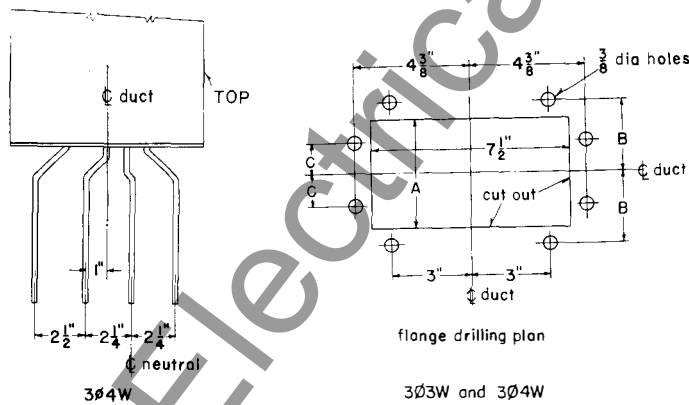
**flange sections**

When the bus duct system connects to switchgear structure or a pullbox, it is necessary to provide means for mechanical and electrical connection of the busway to the other apparatus. For such applications a flange for joining the duct housing to the steel pullbox or switchgear is used and specially fabricated bus bars are furnished. For proper coordination between bus duct and switchgear, detailed drawings must accompany the order.

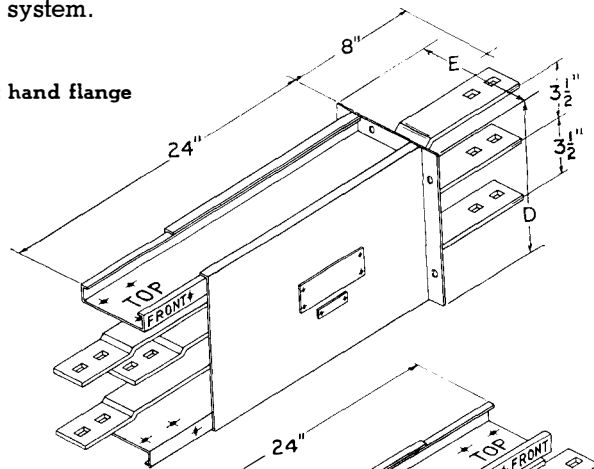
When bus duct extends out of switchgear, opening and flange drillings must be provided by the switch-

gear builder. In this case, the cutout dimensions and drilling plan shown must be followed. Standard bus extensions are 8 inches long. For 3-wire duct the middle bar is straight with the two outside bars flared to 3 1/2 inches on center from the middle bar. They cannot be spread to more than 7 1/2 inches overall.

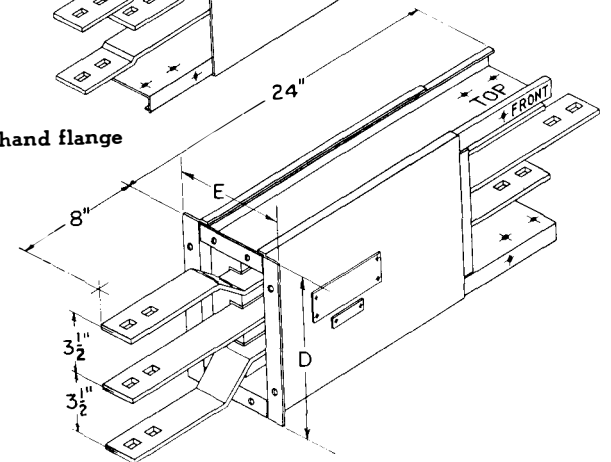
Flange and bus extensions are fabricated for either right or left connections to the duct system. The two sections are similar except for the straight and offset bus bars which are necessary to connect them to the system.



right hand flange



left hand flange



amp rating copper	amp rating aluminum	bus bar size (in inches)	dimensions (in inches)				
			A	B	C	D	E
225	225 <sup>①</sup>	1/8 x 7/8	3 1/4	2 1/4	5/8	9 5/8	5 3/8
400		7/32 x 1 1/2	3 3/4	2 1/2	7/8	9 5/8	5 7/8
600	400	1/4 x 2	4 1/4	2 3/4	1 1/8	9 5/8	6 3/8
800		1/4 x 3	5 1/4	3 1/4	1 5/8	9 5/8	7 3/8
	600	1/4 x 3 1/2	5 3/4	3 1/2	1 7/8	9 5/8	7 7/8
1000		1/4 x 4	6 1/4	3 3/4	2 1/8	9 5/8	8 3/8
1250	800	1/4 x 5	7 1/4	4 1/4	2 5/8	9 5/8	9 3/8
1500	1000	1/4 x 6	8 1/4	4 3/4	3 1/8	9 5/8	10 3/8

① 225 amp rating in aluminum uses 3/16 x 1" bar.



**fittings**

**forward and rearward elbows**

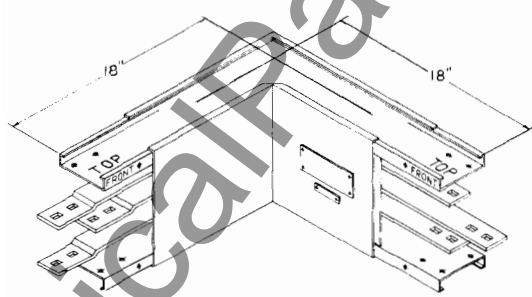
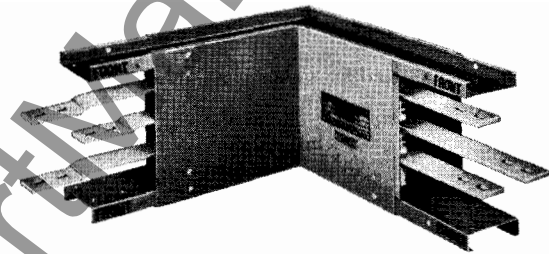
When bus duct is hung in the conventional edgewise mounting position with the marking "TOP" up and "FRONT" toward the viewer, the bus bars are flat, one over the other. If the duct is to be extended forward, a forward elbow must be used. The marking "FRONT" on this elbow is always on the inside of the right angle. When using the elbow at the right end of the run, the straight bus in the elbow extends forward. When used at the left end of the run, the offset bus extends forward.

If bus duct is mounted in the conventional edgewise position and it is desired to extend the busway rearward, a rearward elbow is used. The marking "FRONT" on the elbow falls on the outer side of the right angle. When used on the right end of a run of duct, the leg with the straight bus extends rearward. On the left end of a run, the leg with the offset bus extends rearward.

**forward elbow**

**minimum leg dimensions  
2-wire, 3-wire, and 3-phase,  
4-wire duct**

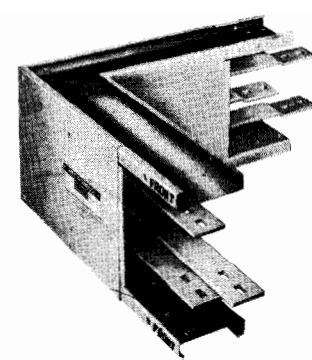
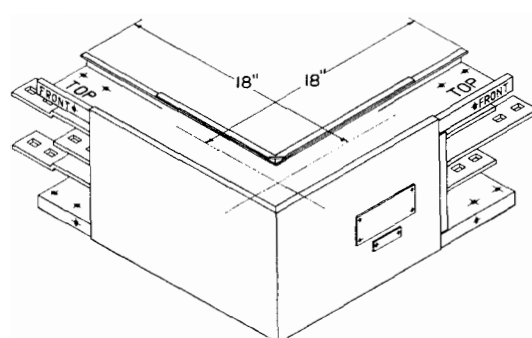
bus bar size (in inches)	left leg (in inches)	right leg (in inches)
3/16 x 1	11	11
1/8 x 7/8	11	14
1/4 x 7/8	11	14
1/4 x 1 1/2	11	14
1/4 x 2	11	14
1/4 x 3	11 1/2	14 1/2
1/4 x 3 1/2	11 3/4	14 3/4
1/4 x 4	12	15
1/4 x 5	12 1/2	15 1/2
1/4 x 6	13	16



**rearward elbow**

**minimum leg dimensions  
2-wire, 3-wire, and 3-phase,  
4-wire duct**

bus bar size (in inches)	left leg (in inches)	right leg (in inches)
3/16 x 1	11	11
1/8 x 7/8	14	11
1/4 x 7/8	14	11
1/4 x 1 1/2	14	11
1/4 x 2	14	11
1/4 x 3	14 1/2	11 1/2
1/4 x 3 1/2	14 3/4	11 3/4
1/4 x 4	15	12
1/4 x 5	15 1/2	12 1/2
1/4 x 6	16	13



## plug-in bus duct

application  
data

**30-561**

straight lengths, fittings, plug-in  
protective devices, hangers

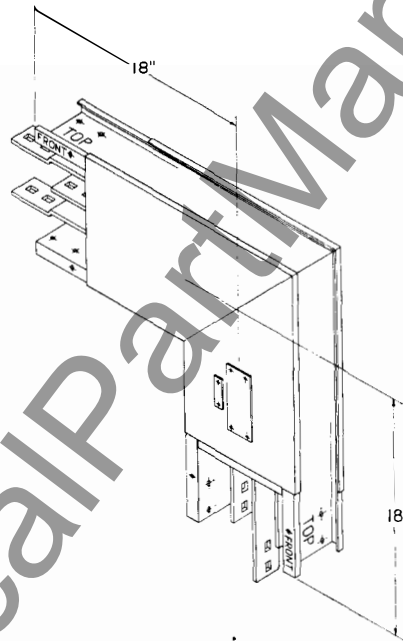
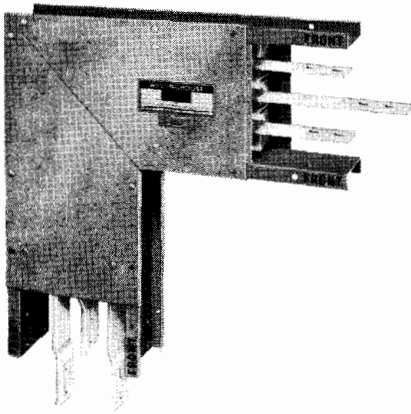
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### upward and downward elbows

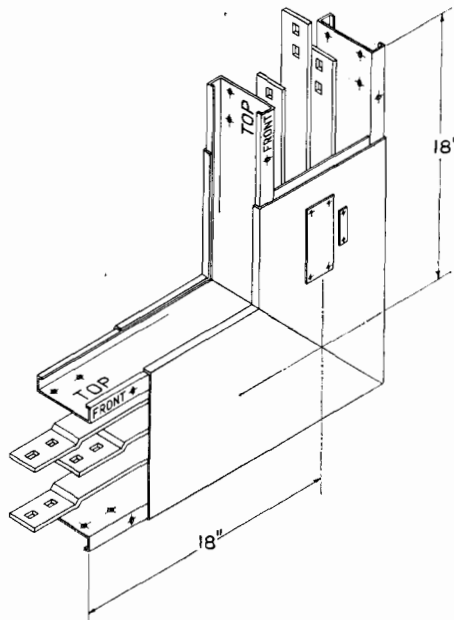
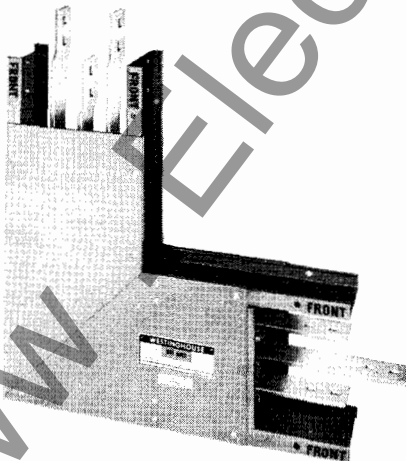
If bus duct is hung in the conventional edgewise manner with the marking "TOP" up, an upward elbow is used to direct the busway upward. The marking "TOP" on the elbow will always be on the inside of the right angle and when used on the right end of a run, the leg with the straight bus extends upward. When used on the left end of a run, the leg with the offset bus extends upward.

A downward elbow is used to direct the busway downward when it is hung in the conventional manner. The marking "TOP" on the duct will always be on the outer side of the right angle. The leg with the straight bus extends downward when used on the right end of a run of duct and the leg with the offset bus extends downward when used on the left end.

#### downward elbow



#### upward elbow



minimum leg dimensions  
2-wire, 3-wire, and 3-phase,  
4-wire duct

bus bar size (in inches)	left leg (in inches)	right leg (in inches)
$\frac{3}{16} \times 1$	14½	14½
$\frac{1}{8} \times \frac{7}{8}$	↓	↓
$\frac{1}{4} \times \frac{7}{8}$	↓	↓
$\frac{1}{4} \times 1\frac{1}{2}$	↓	↓
$\frac{1}{4} \times 2$	↓	↓
$\frac{1}{4} \times 3$	↓	↓
$\frac{1}{4} \times 3\frac{1}{2}$	↓	↓
$\frac{1}{4} \times 4$	↓	↓
$\frac{1}{4} \times 5$	↓	↓
$\frac{1}{4} \times 6$	↓	↓



**fittings**

**offsets**

Offsets are used to avoid obstacles and to conform with building structure. Essentially, an offset is composed of two elbows fabricated into one unit. They are also used to lower or raise the level of a bus duct

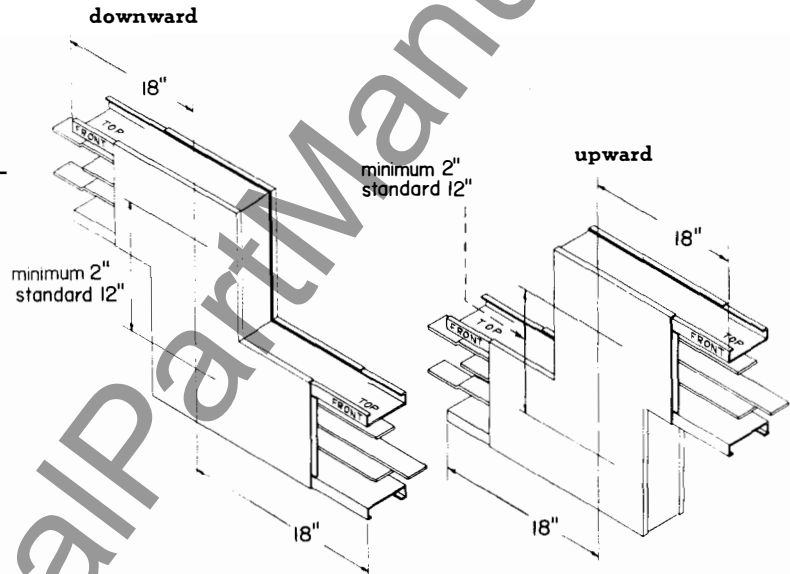
when it is impossible to use elbows because of space restrictions. Installation is simplified because offsets bolt onto other sections of duct in the same manner as standard lengths.

**upward and downward offset**

**minimum leg dimensions**

**2-wire, 3-wire, and 3-phase, 4-wire duct**

bus bar size (in inches)	left leg (in inches)	right leg (in inches)
3/16 x 1	14 1/2	14 1/2
1/8 x 7/8		
1/4 x 7/8		
1/4 x 1 1/2		
1/4 x 2		
1/4 x 3		
1/4 x 3 1/2		
1/4 x 4		
1/4 x 5		
1/4 x 6		

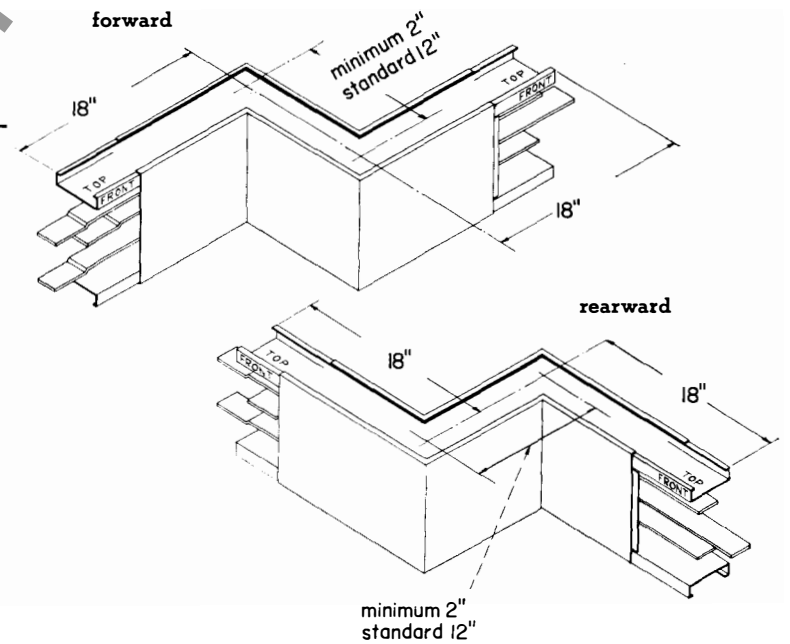


**forward and rearward offset**

**minimum leg dimensions**

**2-wire, 3-wire, and 3-phase, 4-wire duct**

bus bar size (in inches)	left leg (in inches)	right leg (in inches)
3/16 x 1	14	14
1/8 x 7/8	14	14
1/4 x 7/8	14	14
1/4 x 1 1/2	14	14
1/4 x 2	14	14
1/4 x 3	14 1/2	14 1/2
1/4 x 3 1/2	14 3/4	14 3/4
1/4 x 4	15	15
1/4 x 5	15 1/2	15 1/2
1/4 x 6	16	16



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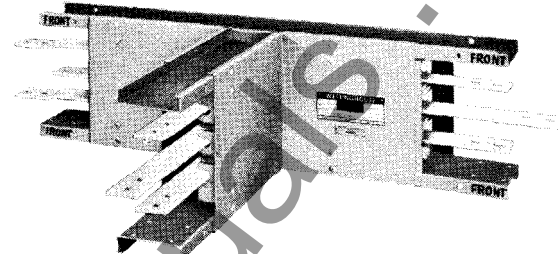


**tees**

A tee is a busway fitting suitable for connection in three directions. There are four types of tees available; forward, rearward, upward, and downward.

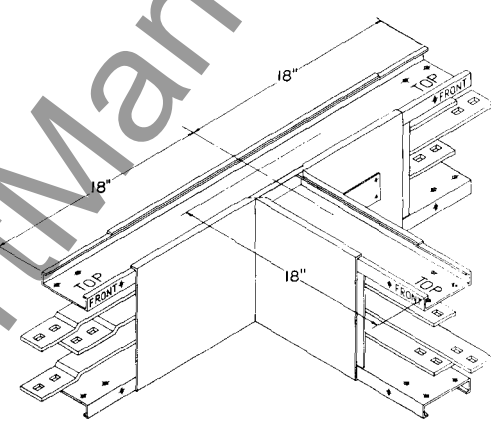
Legs of all standard tees are 18 inches long, measured from the center line of the duct to the end of the top or bottom channels.

**forward tee** Facing the "FRONT" of a forward tee with the marking "TOP" upward, an 18-in. leg extends forward from the center of a 3-ft. section of duct. This leg has straight bus bars.

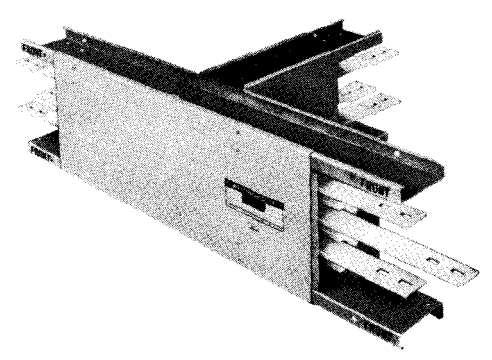


**minimum leg dimensions**  
2-wire, 3-wire, and 3-phase,  
4-wire duct

bus bar size (in inches)	left leg (in inches)	middle leg (in inches)	right leg (in inches)
3/16 x 1	11	14	14
1/8 x 7/8	11	14	14
1/4 x 7/8	11	14	14
1/4 x 1 1/2	11	14	14
1/4 x 2	11	14	14
1/4 x 3	11 1/2	14 1/2	14 1/2
1/4 x 3 1/2	11 3/4	14 3/4	14 3/4
1/4 x 4	12	15	15
1/4 x 5	12 1/2	15 1/2	15 1/2
1/4 x 6	13	16	16

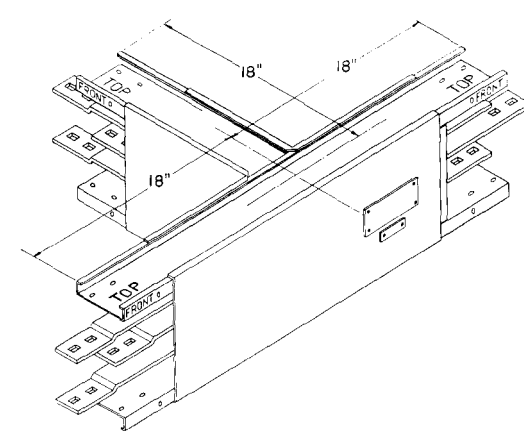


**rearward tee** Facing the "FRONT" of a rearward tee with the marking "TOP" upward, an 18-in. leg with offset bus bars extends rearward from the center of a 3-ft. section of duct.



**minimum leg dimensions**  
2-wire, 3-wire, and 3-phase,  
4-wire duct

bus bar size (in inches)	left leg (in inches)	middle leg (in inches)	right leg (in inches)
3/16 x 1	11	11	14
1/8 x 7/8	11	11	14
1/4 x 7/8	11	11	14
1/4 x 1 1/2	11	11	14
1/4 x 2	11	11	14
1/4 x 3	11 1/2	11 1/2	14 1/2
1/4 x 3 1/2	11 3/4	11 3/4	14 3/4
1/4 x 4	12	12	15
1/4 x 5	12 1/2	12 1/2	15 1/2
1/4 x 6	13	13	16

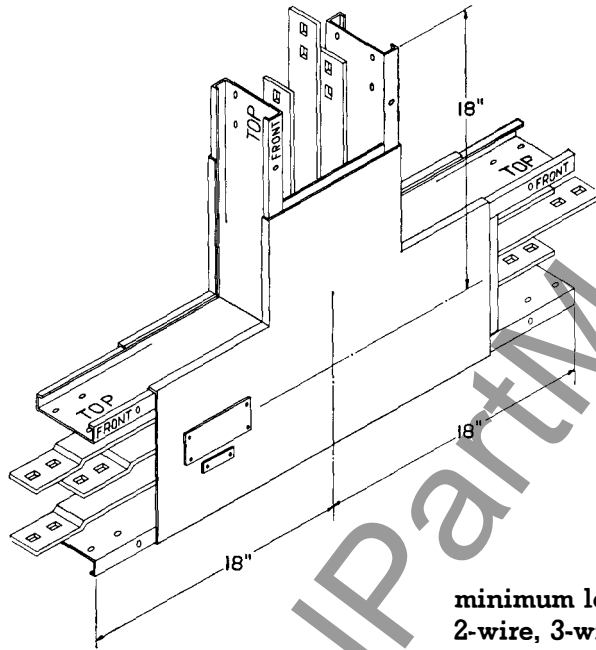




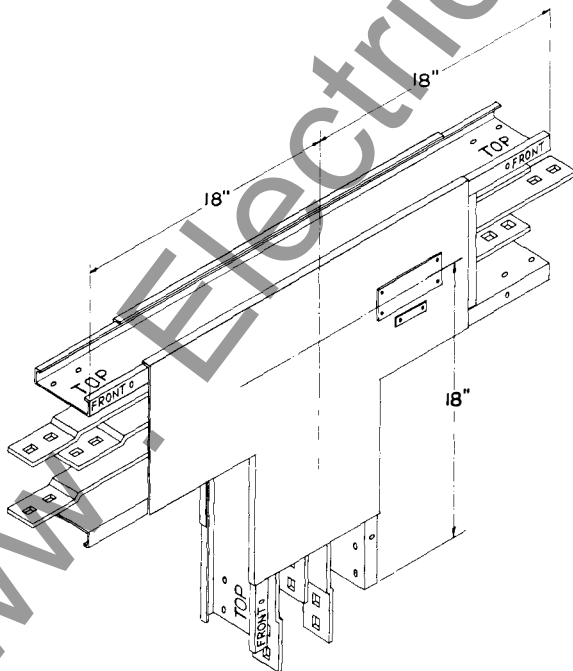
**fittings**

**tees cont'd**

**upward tee** With the "TOP" marking upward, the upward tee has an 18-in. leg extending upward from the center of a 3-ft. section. This leg has straight bus bars.



**downward tee** With the "TOP" marking upward, the downward tee has an 18-in. leg with offset bus bars extending downward from the center of a 3-ft. section of duct.



**minimum leg dimensions  
2-wire, 3-wire, and 3-phase, 4-wire duct**

bus bar size (in inches)	left, middle and right leg (in inches)
3/16 x 1	14
1/8 x 7/8	14
1/4 x 7/8	14
1/4 x 1 1/2	14
1/4 x 2	14
1/4 x 3	14
1/4 x 3 1/2	14
1/4 x 4	15
1/4 x 5	16
1/4 x 6	18

**crossovers**

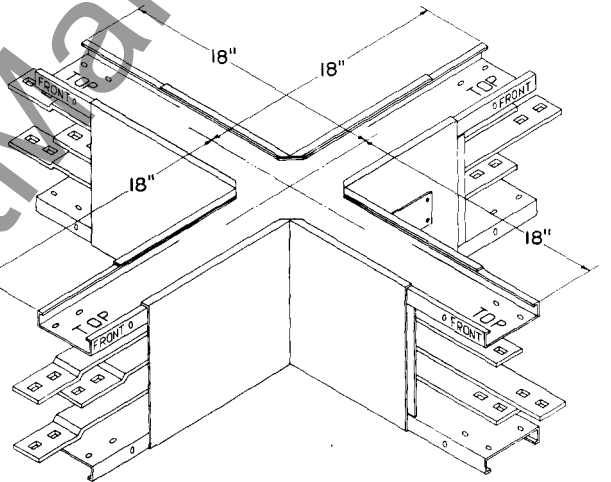
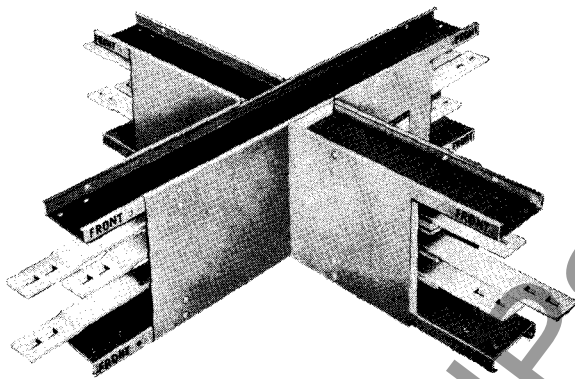
Crossovers are needed where two runs of duct cross each other in the same plane. Since bus duct can be installed in only two positions, only two types of

crossover are needed. Two adjacent legs have straight bus bars, the other two have offset.

**forward-rearward**

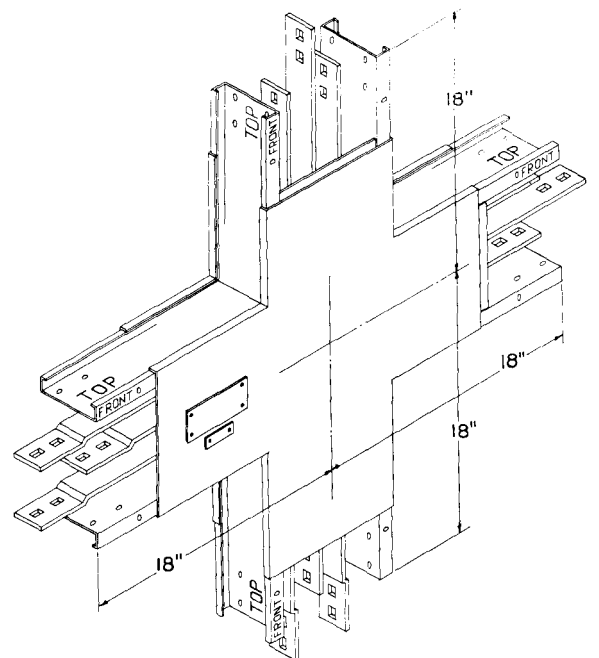
When two runs of duct must cross each other so that the sides marked "TOP" are to be in the same plane, a forward-rearward crossover is used. It has two 18-inch legs extending at right

angles from the center of a three foot section of duct, one leg extending forward and one rearward.



**upward-downward**

When two runs of duct must cross each other so that the sides marked "FRONT" are to be in the same plane an upward-downward crossover is used. It also has two 18-inch legs extending at right angles from the center of a three foot section, one extending upward and one downward.





**fittings**

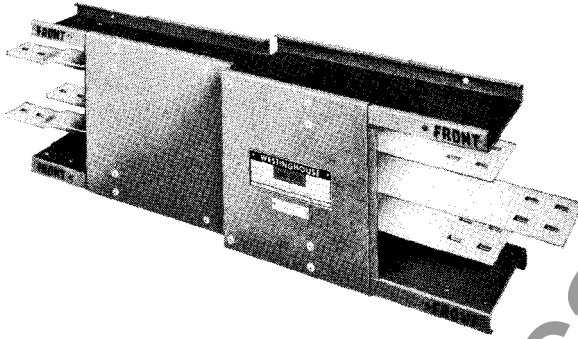
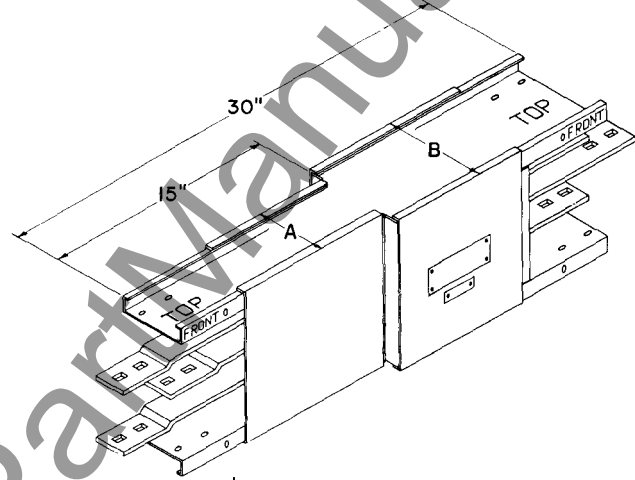
**reducers**

Reducers are used to reduce the capacity of bus duct without overcurrent protective devices. They are built into a 30-inch section of duct with the straight and offset bus bars the same as in straight sections of duct.

No overcurrent protection is required where bus duct is reduced in size, provided the length of the smaller duct does not extend more than 50 feet and has a current rating of at least 1/3 of the breaker next back on the line. (See NEC section 364.10.)

**left reducer**

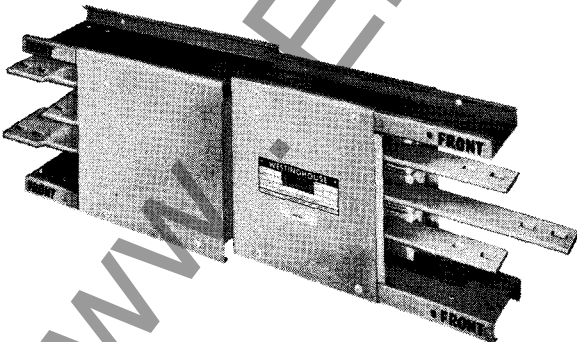
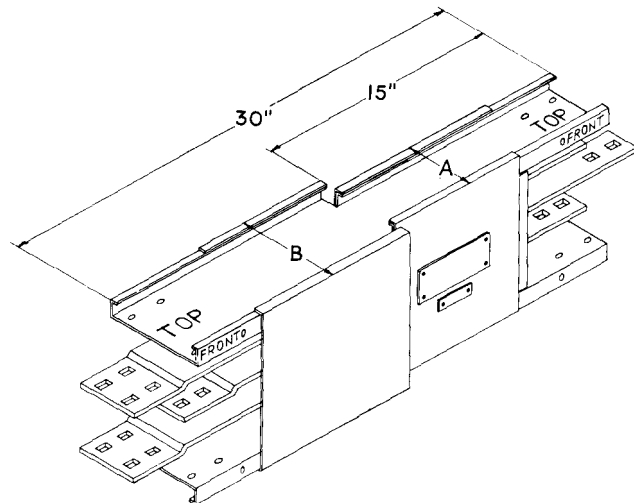
To reduce the capacity of a run at its left end when facing the "FRONT" with marking "TOP" up a left reducer is used. Looking at the "FRONT" of a left reducer, the larger size bus bars are on the right and the smaller size bars on the left.



reduction		dimensions (in inches)			
from (amperes)	to (amperes)	copper		aluminum	
		A	B	A	B
400	225	3 3/8	3 7/8	3 3/8	4 3/8
600	400	3 7/8	4 3/8	4 3/8	5 7/8
600	225	3 3/8	4 3/8	3 3/8	5 7/8
800	600	4 3/8	5 3/8	5 7/8	7 3/8
800	400	3 7/8	5 3/8	4 3/8	7 3/8
1000	800	5 3/8	6 3/8	7 3/8	8 3/8
1000	600	4 3/8	6 3/8	5 7/8	8 3/8
1000	400	3 7/8	6 3/8	4 3/8	8 3/8
1250	1000	6 3/8	7 3/8		
1250	800	5 3/8	7 3/8		
1250	600	4 3/8	7 3/8		
1250	400	3 7/8	7 3/8		
1500	1250	7 3/8	8 3/8		
1500	1000	6 3/8	8 3/8		
1500	800	5 3/8	8 3/8		
1500	600	4 3/8	8 3/8		

**right reducer**

For reducing the capacity of a run at its right end, when facing the "FRONT" with marking "TOP" up a right reducer is used. Viewing the "FRONT" of a right reducer, the bus bars are reduced from left to right.



**adapter cubicles**

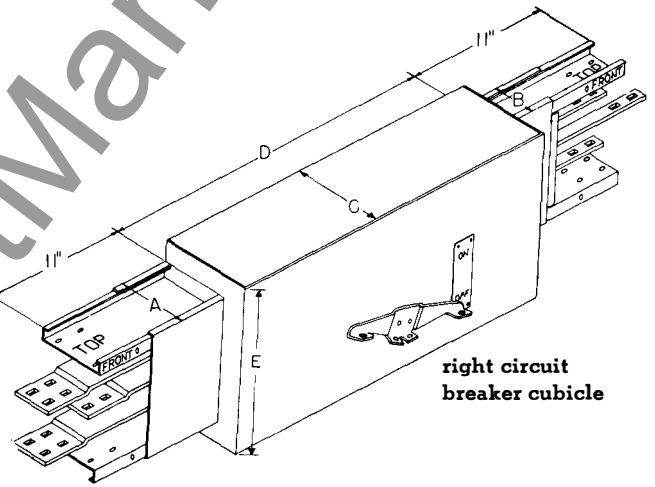
In many instances, it is economical to reduce the ampere rating of the duct as the load drops off. In these cases, whenever the rating is reduced more than two-thirds of the rating of the overcurrent protection next back on the line or the length of the reduced run is over 50 feet, an overcurrent protective device must be used to meet N.E.C. requirements.

These adapter cubicles are available with either a

circuit breaker or fused non-automatic circuit breaker to furnish overcurrent protection and serve as a disconnecting means. Reduction in bus capacity is made within the cubicle. The line side of the cubicle is connected to the large rating duct and the load side to the reduced rating duct. Adapter cubicles connect to bus duct like any other section of duct.

**circuit breaker adapter cubicles**

When the reduced run does not exceed 1000 amperes in capacity, type JA, LA, or MA circuit breakers are ideally suited for the overcurrent protective devices. Unique handle construction permits the breaker to be operated from the floor by either hookstick or chain.



**circuit breaker adapter cubicle  
2, 3 and 4-wire**

type breakers	dimensions (in inches)		
	C	D	E
JA	7 1/4 ③	20	12
LA	7 1/4 ③	26	12
MA	9 1/32	32	9 5/8

③ This dimension 9 1/4" for 1/4 x 5" and 1/4 x 6" bus bars.

reduction		dimensions (in inches)			
from (amperes)	to (amperes)	copper		aluminum	
		A	B	A	B
225	225	3 3/8	3 3/8	3 3/8	3 3/8
400	225	3 7/8	3 3/8	4 3/8	3 3/8
400	400	3 7/8	3 7/8	4 3/8	4 3/8
600	225	4 3/8	3 3/8	5 7/8	3 3/8
600	400	4 3/8	3 7/8	5 7/8	4 3/8
600	600	4 3/8	4 3/8	5 7/8	5 7/8
800	225	5 3/8	3 3/8	7 3/8	3 3/8
800	400	5 3/8	3 7/8	7 3/8	4 3/8
800	600	5 3/8	4 3/8	7 3/8	5 7/8
800	800	5 3/8	5 3/8	7 3/8	7 3/8
1000	225	6 3/8	3 3/8	8 3/8	3 3/8
1000	400	6 3/8	3 7/8	8 3/8	4 3/8
1000	600	6 3/8	4 3/8	8 3/8	5 7/8
1000	800	6 3/8	5 3/8	8 3/8	7 3/8
1250	225	7 3/8	3 3/8		
1250	400	7 3/8	3 7/8		
1250	600	7 3/8	4 3/8		
1250	800	7 3/8	5 3/8		
1500	225	8 3/8	3 3/8		
1500	400	8 3/8	3 7/8		
1500	600	8 3/8	4 3/8		
1500	800	8 3/8	5 3/8		

**right circuit breaker cubicle** When facing the "FRONT" of a right cubicle with the marking "TOP" upward, the larger size duct is on the left end or line side of the cubicle and the smaller size on the right end or load side of the cubicle.

**left circuit breaker cubicle** From the "FRONT" of a left cubicle with the marking "TOP" upward, the larger size duct is on the right end or line side of the cubicle, and the smaller size on the left end or load side of the cubicle.

Fused disconnect cubicles consist of a non-auto circuit breaker with fuse clips built into a 5'-0" section.

These units are similar in appearance to circuit breaker adapter cubicles shown on this page. For complete information refer to Westinghouse.



**fittings**

**expansion section**

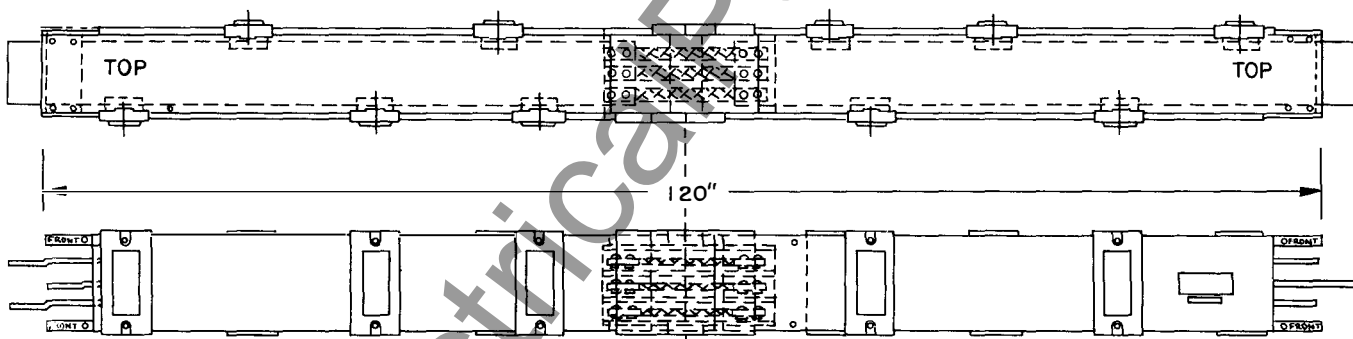
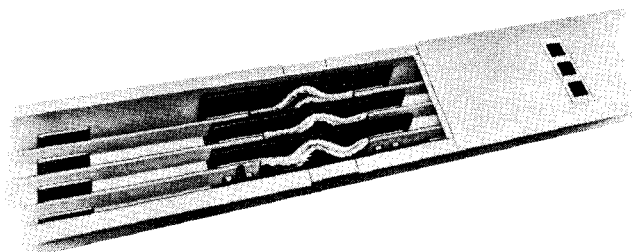
An expansion section is a busway section which accommodates the expansion and contraction of the bus bars with respect to the enclosure. They are necessary only in long, straight runs to compensate for the difference in the coefficient of expansion\* for steel and copper or aluminum.

They consist of a 10-foot section of duct in which the steel housing contains a sliding telescopic joint to allow movement of the housings. A length of rigid bus bars inside the telescope joint is replaced by flexible braid completely surrounded by ebony asbestos.

There should be an expansion section installed in the center of any run of 150 feet or more of copper duct, 100 feet or more of aluminum. This is especially true if the bus bars are anchored at each end of the run, such as an elbow. If a 150-foot run of copper duct or a 100-foot run of aluminum duct has an end closer at one end so that the bus bars are free to move, it may be omitted. Also if runs of the above length are fed in the center so that the bus bars are free to move in either direction, an expansion section is unnecessary. They must be used wherever a run of duct crosses an expansion joint in the building. The use of expansion joints should be engineered for individual installations.

**\*NOTE—**

- Coefficient of expansion for copper . . . .0000091 per degree F.
- Coefficient of expansion for steel . . . . .0000064 per degree F.
- Coefficient of expansion for aluminum . .0000133 per degree F.



**transposition section**

On long runs of plug-in duct, especially where the load is concentrated at the end of the run, the voltage sometimes becomes unbalanced between phase bars. This is due to unequal impedances in the three bars of the duct.

To correct such a situation, the use of two transposition sections in the run is recommended. These transposition sections are built into a 10-foot section of duct and are otherwise identical to a standard 10-foot length.

The use of transposition sections is best described by the following quote from the A.I.E.E. publication

"Electrical Power Distribution for Industrial Plants."

"If the load end voltages are badly unbalanced, due to unequal impedances in the three legs of the busway, this condition can be minimized by the use of two transpositions. For a load concentrated at the end of the run, the transpositions should be placed at the  $\frac{1}{3}$  and  $\frac{2}{3}$  points in the run. For an evenly distributed loading, the transpositions would be placed at the 20 percent and 40 percent points. Transpositions are generally not necessary except in the long runs. Transpositions are never required in the low impedance feeder busways of the interlaced or paired-phase designs."

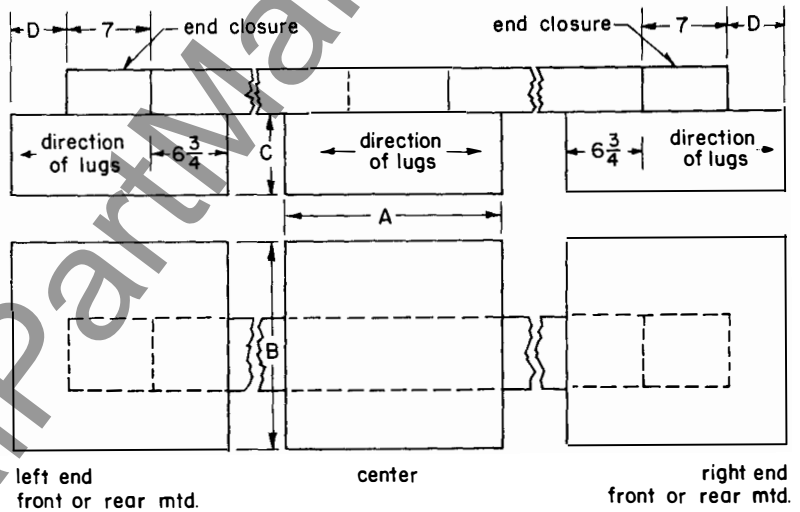
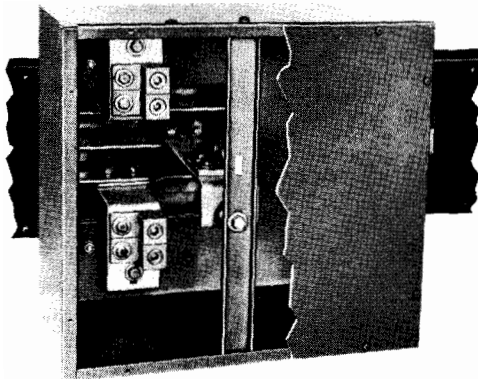
**cable tap boxes**

Cable tap boxes are used where a run of duct is fed by cable or where equipment served by the duct is connected without over-current protection. The cable tap box is designed to bolt to either end or at a joint between any two sections of duct.

Solderless lugs are furnished with each tap box. Since it is easier for electrical contractors to work

with 500 MCM cable and smaller, and it is more economical to use multiple cables for large capacities per phase, multiple lugs are furnished in the numbers shown in the following table.

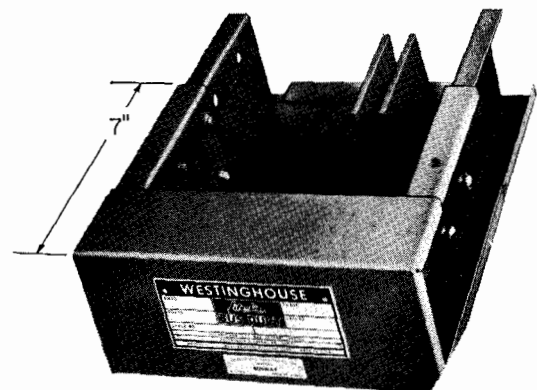
When the cable tap box is mounted at the end of a run, a special end closer must be used.



ampere rating of box	3 wire				4 wire				lugs per phase and neutral
	A	B	C	D	A	B	C	D	
225	16 1/8	16 3/4	10 1/8	2 3/8	17 3/4	16 3/4	10 1/8	4	1 # 6 or 250 MCM 2 # 4 to 600 MCM or 4 250 MCM or 4 # 1/0
400	16 1/8	16 3/4	10 1/8	2 3/8	17 3/4	16 3/4	10 1/8	4	
600	18 1/8	16 3/4	10 1/8	4 3/8	19 3/4	16 3/4	10 1/8	6	2 # 4 to 600 MCM or 4 250 MCM or 4 # 1/0 3 # 4 to 600 MCM
800	22 3/8	21 1/32	11 3/8	8 5/8	21 3/4	21 1/32	11 3/8	8	
1000	22 3/8	21 1/32	11 3/8	8 5/8	24	21 1/32	11 3/8	10 1/4	4 # 2 to 600 MCM

**end closers**

An end closer is a fitting which terminates the busway run and closes the end. It comes complete with two splice plates and two access covers and is designed to be used on either end of duct. A mica barrier is provided to maintain isolation of neutral bar on 4-wire duct. The effective length of an end closer is 7" and the width is the same as the rating of duct involved.





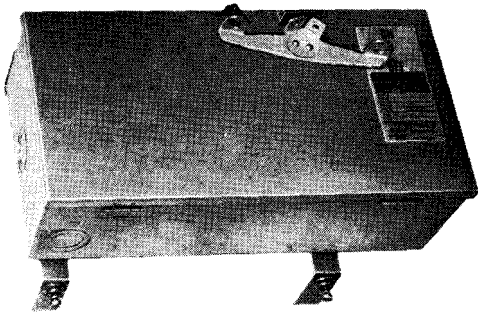
## **plug-in protective devices**

A primary advantage of plug-in bus duct is that power can be taken off close to its utilization point. To accomplish this, easily installed plug-in devices are available which plug-in through the insulators onto the bare bus bars of the duct. These devices provide overcurrent protection to the conductors and also serve as a disconnecting means.

Three types of overload protective units are available: the AB circuit breaker (type BP), the type HD safety switch (type TAP), and the cover-operated fusible

switch (type COP). These units are equipped with insulated plug-in stabs. The stabs are made from cadmium copper alloy. The use of this material makes possible the elimination of reinforcing springs, while maintaining better contact pressure through a wider range of temperatures.

### **circuit breaker plug-in • type BP**

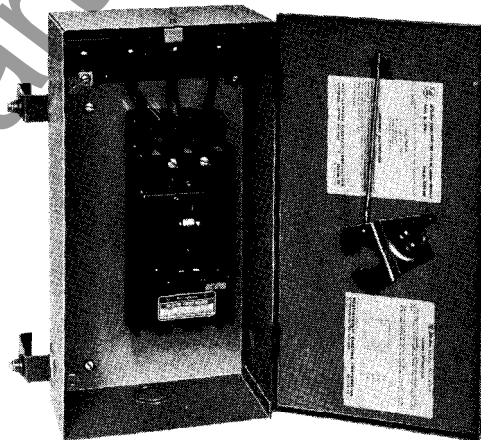
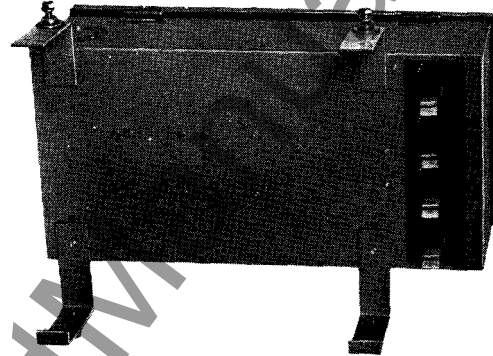


The AB De-ion<sup>®</sup> circuit breakers provide the highest type of automatic branch circuit protection. They incorporate the exclusive Westinghouse "De-ion" principle of arc quenching and combine thermal and magnetic overload protection on all ratings.

In the event of a dangerous overload or shortcircuit, the breaker opens the circuit and the handle indicates this by moving to the "TRIPPED" position. The circuit is restored, after the fault is cleared, simply by moving the handle to the "RESET" position and then back to "ON."

The slam-proof cover is locked into place as soon as it is closed and cannot be opened until the operating handle is pulled to the "OPEN COVER" beyond the "OFF" position. The operating handle can be locked in either "OFF" or "ON" position and is constructed so that the unit can be hookstick, chain, or hand operated. In case of an emergency, a means has been provided for an authorized person to open the cover with the breaker in the "ON" position. All BP enclosures with plug-in stabs are designed so that, if necessary, a neutral stab assembly can be added in the field.

Type E, EH, F, JA, KA and LA breaker plug-ins are furnished with plug-in stabs, and Type LM<sup>Ⓢ</sup> breaker



plug-ins are built with copper extensions that bolt onto the bus bars between any two sections of duct.

The 4-pole solid neutral type E, EH and F plug-ins through 50 ampere rating have lugs designed to accommodate a full-size neutral conductor. However, in all other ratings of type E, EH and F plug-ins and all other circuit breaker plug-ins, when a full-size neutral stab and lug is required, it must be specified in the order write-up.

The same enclosure is used for 2-pole, 3-pole, and 3-phase, 4-wire applications.

Normally, all 2-pole units plug into the two outside bars of the duct and combinations other than this should be specified in the order write-up.

<sup>Ⓢ</sup> For complete information on breaker types refer to price list 29-120, general catalog.



straight lengths, fittings, plug-in protective devices, hangers

**circuit breaker plug-in • type BP—cont'd**

**E breaker plug-in:** 100 amp, 240 volts a-c, non-interchangeable trip. Available in 15, 20, 30, 40, 50, 70, 90 and 100 ampere trip ratings, the Type E plug-in is the standard unit for 240 volt, 2 and 3 pole, and 3-phase, 4-wire systems up to 100 amperes. Connections between the plug-in stabs and the line side of the breaker are made with heavy stranded wire.

**EH breaker plug-in:** 100 amp, 480 volts a-c, non-interchangeable trip. Same as E except single pole rating is 277 volts a-c with 10,000 amperes interrupting capacity, and 125 volts d-c with 5000 amperes interrupting capacity. Two and three pole 480 volts a-c, 250 volts d-c with 10,000 amperes interrupting capacity.

**F breaker plug-in:** 100 amp, 600 volts a-c, non-interchangeable trip. Type F breaker plug-in is used up to and including 100 amperes, 600 volts, and is available with 15, 20, 30, 40, 50, 70, 90 and 100 ampere trip ratings. Connections between the line side of the breaker and the plug-in stabs are made with heavy stranded wire.

**JA breaker plug-in:** 225 amp, 600 volts a-c, non-interchangeable trip. When a larger breaker is needed the Type J breaker plug-in is used to and including 225 amperes, 600 volts. It is available with 70, 90, 100, 125, 150, 200 and 225 ampere trip ratings. Plug-in stabs are connected directly to the line terminals of the breaker.

**KA breaker plug-in:** 225 amp, 600 volts a-c, interchangeable trip. Wherever a larger breaker with an interchangeable trip is

needed, the KA breaker plug-in is used up to and including 225 ampere, 600 volts. It is available with 70, 90, 100, 125, 150, 175, 200 and 225 ampere trip ratings. The plug-in stabs are connected directly to the line terminals of the breaker.

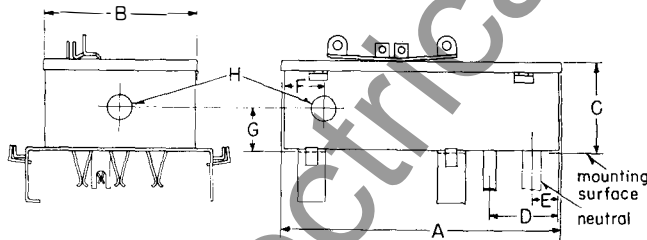
③ **LA breaker plug-in:** 400 amp, 600 volts a-c, interchangeable trip. These units provide a maximum of 400 ampere, 600 volt protection in minimum space. The LA breaker plug-in has an interchangeable trip with ratings of 125, 150, 175, 200, 225, 250, 300, 350 and 400 amperes.

● **MA breaker bolt-on:** 800 amp, 600 volts a-c, interchangeable trip. When the load requires larger units than the type LA breaker will accommodate, the MA breaker bolt-on with an interchangeable trip is available up to and including 800 amperes, 600 volts. Trip ratings available are 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 400, 450, 500, 550, 600, 700, and 800 amperes. These units are also designed to be bolted on to any size plug-in duct between any two sections. *It is absolutely necessary to specify front or rear mounting on the order write-up.*

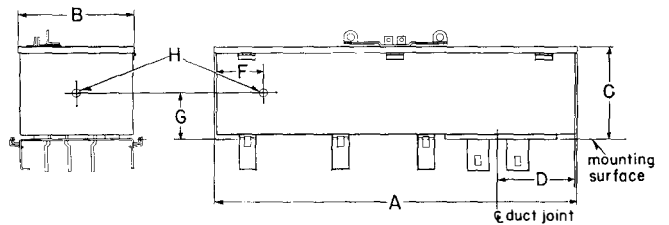
① **MARK 75**①: Available in F, KA, LA and MA frame sizes. Ideally suited for network systems where unusually high fault currents are available. (See price list 29-120 for additional information).

② **TRI-PAC**②: The TRI-PAC breaker provides triple protection in a single compact device; thermal, magnetic and current limiting. Available in 100, 225, 400 and 600 ampere frame sizes.

E, EH, F, JA, KA, LA breaker cubicle



MA breaker enclosure



circuit breaker	dimensions (in inches)								net weight lbs		
	A	B	C	D	E③	F	G	H	2-pole	3-pole	3Ø4w
E	16 1/8	8 11/16	4 9/16	3 11/16	1 7/16	1 15/16	1 3/8	3/4-1-1/4	13	15	16
EH	16 1/8	8 11/16	4 9/16	3 11/16	1 7/16	1 15/16	1 3/8	3/4-1-1/4	15	16	17
F	18 7/8	8 11/16	5 3/8	3 11/16	1 7/16	1 15/16	1 3/8	3/4-1-1/4	18	20	21
JA	20 7/16	9 1/4	5 11/16	3 3/4	1 7/16	2 9/16	2 3/8	2-2 1/2-3	32	34	35
KA	20 7/16	9 1/4	5 11/16	3 3/4	1 7/16	2 9/16	2 3/8	2-2 1/2-3	32	34	35
LA	24 1/16	10 1/2	6 7/8	3 3/4	1 7/16	4 7/16	2 11/16	2-2 1/2-3	50	53	54
MA 3 pole①	31	12 1/2	11 1/2	9 11/16	.....	.....	.....	.....	..	118	..
MA 4 pole③	40 1/16	12 1/2	11 1/2	6 11/16	.....	.....	.....	.....	..	...	..
TRI-PAC②	Refer to Westinghouse										
MARK 75①	Refer to Westinghouse										

① Above 225 amp bolt-on at joint.

② 4 wire only.

③ Bolts on at joint.



**plug-in protective devices**

**safety switch plug-in • type TAP**

For use on motor circuits and heavy-duty industrial circuits, type TAP fusible plug-in is available in 30, 60, 100, 200, 400 and 600 ampere ratings in 2-pole, 3-pole, and 3-phase, 4-wire types for 240 and 600 volt circuits.

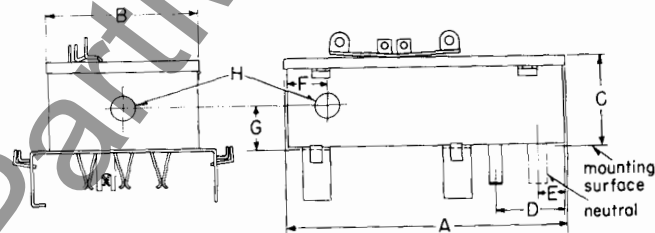
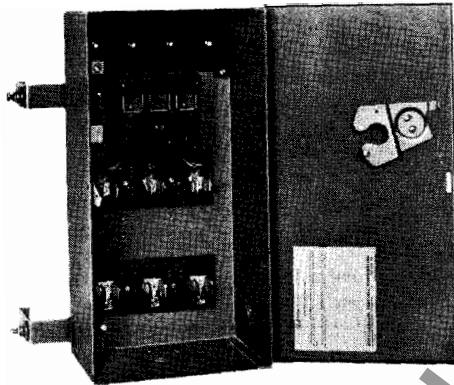
The 30, 60 and 100 ampere units utilize the visible blade de-ion switch, the 200 ampere unit uses the visi-flex switch.

These units have a front-operated device similar to the circuit breaker plug-in and can be hookstick, chain or hand operated. Cover is interlocked to prevent opening while the switch is "ON". A second

interlock is provided to prevent accidental closing of switch when cover is open. All 30 and 60 ampere units are so designed that a neutral stab assembly can be added in the field, if necessary. Four-pole solid neutral units in the 60 and 30 ampere ratings have proper lugs to accommodate a full-size neutral conductor. **However, in all other ratings, a full-size neutral stab and lug must be specified in the order write-up, if needed.**

The 400 and 600 ampere units use a non-auto circuit breaker with fuse clips for NEC fuses. The 400 ampere unit is furnished with plug-in stabs, but the 600 ampere unit must be bolted to the duct at any splice joint. **Specify whether the 600 ampere unit is front or rear mounted.** The covers are interlocked to prevent opening when the switch is "ON" and the operating handle has to be pulled beyond the "OFF" position to open the cover.

Front operated 30, 60, 100 and 200 amp type TAP safety switch plug-in



ampere rating	voltage	poles	horsepower rating		dimensions (in inches)								net wt lbs
			NEC stand.	time delay	A	B	C	D <sup>①</sup>	E	F	G	H	
30	240	2	1 1/2	3	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	15
	240	3	3	7 1/2	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	240	3ph 4W	3	7 1/2	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	600	2	3	10	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	15
	600	3	7 1/2	20	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	277/480	3ph 4W	5	15	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
60	240	2	3	10	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	15
	240	3	7 1/2	15	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	240	3ph 4W	7 1/2	15	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	600	2	10	25	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	15
	600	3	15	50	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
	277/480	3ph 4W	15	30	18 7/8	8 1/16	5 3/8	3 9/16	1 1/4	1 9/16	1 3/8	3/4-1-1/4-1 1/2	16
100	240	2	7 1/2	15	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	22
	240	3	15	30	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	22
	240	3ph 4W	15	30	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	23
	600	2	15	40	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	23
	600	3	30	50	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	23
	277/480	3ph 4W	25	50	22 3/4	8 1/16	5 1/16	3 1/16	1 1/4	1 7/8	2 3/4	3/4-1-1/4	25
200	240	2	15	...	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	56
	240	3	25	50	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	57
	240	3ph 4W	25	50	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	58
	600	2	30	50	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	56
	600	3	50	...	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	57
	277/480	3ph 4W	50	...	19 7/8	15 1/8	8 3/16	3 9/16	1 5/16	2 9/16	2 3/8	2-2 1/2-3	58
400 <sup>②</sup>	240	2	...	...	19 15/16	16 1/4	13 9/16	6 1/32	3 3/4	16 3/4	9 1/8	2-2 1/2-3	79
	240	3	...	...	19 15/16	16 1/4	13 9/16	6 1/32	3 3/4	16 3/4	9 1/8	2-2 1/2-3	80
	240	3ph 4W	...	...	19 15/16	16 1/4	13 9/16	6 1/32	3 3/4	16 3/4	9 1/8	2-2 1/2-3	81
	600	3	...	...	19 15/16	16 1/4	13 9/16	6 1/32	3 3/4	16 3/4	9 1/8	2-2 1/2-3	80
	277/480	3ph 4W	...	...	19 15/16	16 1/4	13 9/16	6 1/32	3 3/4	16 3/4	9 1/8	2-2 1/2-3	81
600 <sup>②</sup>	240	3	...	...	30 3/4	15 1/2	16	6 3/16					
	600	3	...	...	30 3/4	15 1/2	16	6 3/16					
	240	3ph 4W	...	...	40 1/16	15 1/2	16	6 3/16					
	600	3ph 4W	...	...	40 1/16	15 1/2	16	6 3/16					

① Duct joint for 600 amp unit.

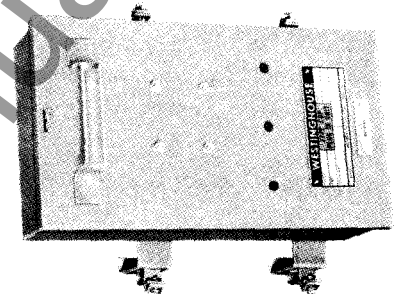
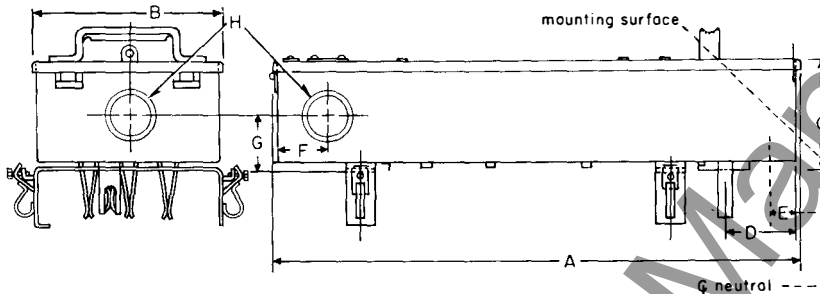
② Bolts on at joint.

③ Line and load same end.

**cover-operated switch plug-in • type COP**

Cover-operated fusible take-off devices are available in 30, 60, 100 and 200 ampere ratings in 2-pole, 3-pole, and 3-phase, 4-wire types for 240 and 600-volt a-c circuits. Switch blades are mounted on cover so switch and cover are always opened together. These units are horsepower-rated up to and including the 100 ampere device. All 30 and 60 ampere units

are so designed that a neutral stab assembly can be added in the field, if necessary. On 4-pole solid neutral devices, the 30 and 60 ampere ratings have proper lugs to accommodate a full-size neutral conductor. *However, on the 100 and 200 ampere devices, a full-size neutral stab and lug, if needed, must be specified on the order write-up.*



ampere rating	voltage	poles	dimensions (in inches)								net wt lbs	lug sizes
			A	B	C	D	E	F	G	H		
30 & 60	240	2 & 3	14 1/4	8 3/8	3 7/8	3 1/16	...	1 1/4	1 15/32	3/4-1-1/4	14	30 amp-# 8 max. 60 amp-# 4 max.
	120/208	3ph 4W	14 1/4	8 3/8	3 7/8	3 1/16	1 9/32	1 1/4	1 15/32	3/4-1-1/4	15	
	600	2 & 3	14 1/4	8 3/8	3 7/8	3 1/16	...	1 1/4	1 15/32	3/4-1-1/4	14	
	277/480	3ph 4W	14 1/4	8 3/8	3 7/8	3 1/16	1 9/32	1 1/4	1 15/32	3/4-1-1/4	15	
100	240	2 & 3	16 31/32	8	4 13/16	3 9/16	...	1 1/2	1 5/8	3/4-1-1/4	21	# 8-# 2/0
	120/208	3ph 4W	16 31/32	8	4 13/16	3 9/16	1 9/32	1 1/2	1 5/8	3/4-1-1/4	22	
	600	2 & 3	18 31/32	8	4 13/16	3 9/16	...	1 1/2	1 5/8	3/4-1-1/4	22	
	277/480	3ph 4W	18 31/32	8	4 13/16	3 9/16	1 9/32	1 1/2	1 5/8	3/4-1-1/4	23	
200	240	2 & 3	26 15/32	9 9/16	5 11/16	3 9/16	...	2 9/16	2 21/32	2-2 1/2	41	# 2/0-# 4/0
	120/208	3ph 4W	26 15/32	9 9/16	5 11/16	3 9/16	1 9/32	2 9/16	2 21/32	2-2 1/2	42	
	600	2 & 3	26 15/32	9 9/16	5 11/16	2 17/32	...	2 9/16	2 21/32	2-2 1/2	42	
	277/480	3ph 4W	27 1/2	9 9/16	5 11/16	3 9/16	1 9/32	2 9/16	2 21/32	2-2 1/2	43	

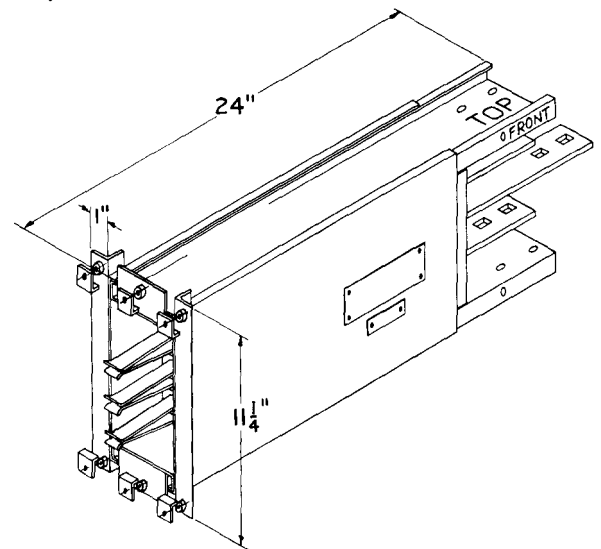
**combination Life-Line® starter plug-ins**

For motor circuits the ultimate in motor overload and branch conductor protection is furnished by combination Life-Line starter plug-ins. The unit consists of a Linestarter for motor overload protection and a circuit breaker or a De-ion® Switch with fuses for protection of the conductors. Additional safety for operating personnel can be obtained by using a step-down control transformer to provide a low-voltage control circuit. These units are available for motors up to 100 horsepower, 440 volts, which use a size 4 starter and type JA breaker. A remote control pushbutton can be located at any convenient place. *When ordering a combination plug-in Life-Line starter, include all information necessary for any other combination starter.*

to locate the branch run anywhere along the run of plug-in duct. This unit is available in 225 and 400 amp ratings only, for 2, 3-pole 3Ø 4W H/N and 3Ø 4W F/N duct.

**straight length plug-in**

To provide additional branch circuits from a run of plug-in bus duct, a 2-foot straight length with stabs on one end can be used. These stabs make it possible



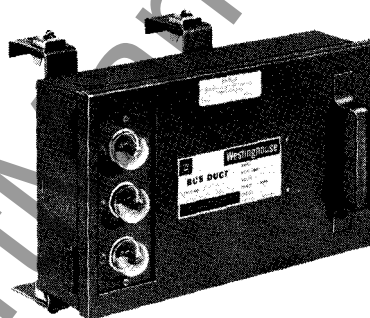
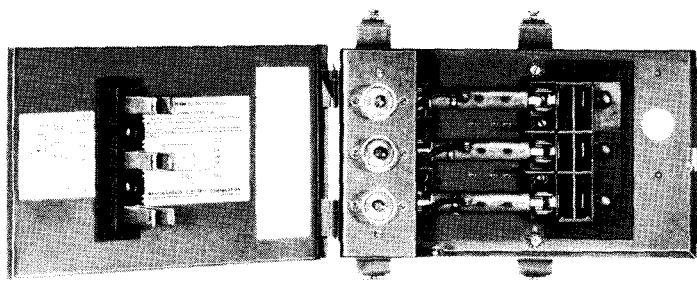


**plug-in protective devices**

**ground detector and neutralizer plug-in**

In rare cases, bus bars in a bus duct system pick up static electricity. In order to discharge this potential, a neutralizer plug is available which also serves as a ground detector. The unit has an 18,000 ohm resistor connected between the bus bars and the ground. Static electricity is discharged through this resistor. A neon lamp is placed in series with the bus bar and part of the resistor and burns continuously. If there

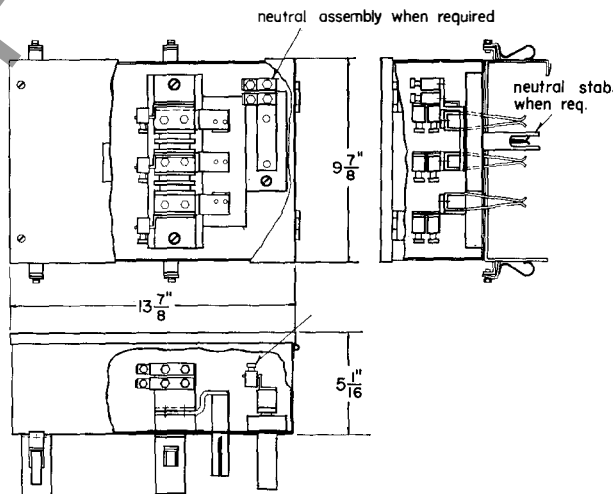
is a ground anywhere on the system which is of lower resistance than the path through the lamp, the lamp will go out, indicating that there is a short in the system. *When ordering specify system voltage —240, 480 or 575.*



**tap box plug-in**

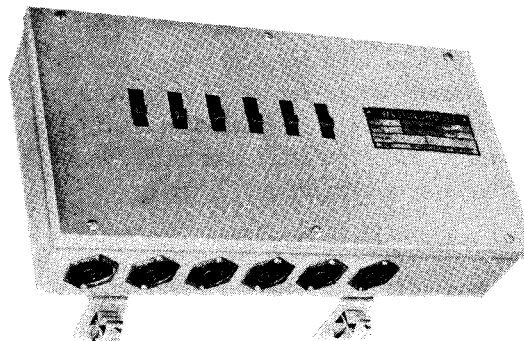
Flexibility is extended by using a tap box plug-in for cable connection. They are available in ratings of 100, 225 and 400 amperes.

ampere rating	lug range
<b>3 wire</b>	
100	1—1/0 lug per Ø
225	1—4/0 lug per Ø
400	2—4/0 lug per Ø
<b>4 wire</b>	
100	1—1/0 lug per Ø and neutral
225	1—4/0 lug per Ø and neutral
400	2—4/0 lug per Ø and 1—4/0 lug per neutral



**load center plug-in unit**

Shown here are 6 single-pole E frames. These units are also available in combinations of 1, 2 and 3-pole units up to a total of 12 poles, or a maximum total current of 400 amperes. Each unit is completely wired at the factory making it unnecessary to open the enclosure to put them in service. Convenient twist-lock receptacle simplifies power take-off. Units are available with or without twist-lock receptacle.



straight lengths, fittings, plug-in protective devices, hangers

**hangers** for plug-in duct

**cantilever hangers**

The cantilever type hanger can be used to support 225 to 1500 ampere plug-in duct. The most popular hanger in the industry by far, it is easy to install, saves material, and contributes to neat appearance. Drop rods, with "Z" shaped plates on them, can be suspended before duct is ready for installation. Then the duct is raised to the proper place, the "Z" shaped plate twisted onto the duct, and the flat plate bolted to the "Z" shaped piece. Installation is completed by tightening a nut on the drop rod. (See illustrated step-by-step assembly of cantilever hanger below.)

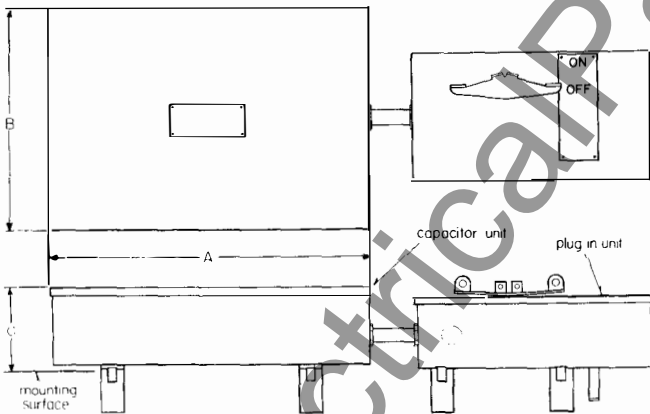
One hanger is furnished with every 10 feet of duct, *but drop rods and nuts are not supplied by Westinghouse.* If the installation requires long drop rods, it may be necessary to place braces at occasional intervals to prevent sidesway. *When ordering, specify what size duct the hangers are to carry.*

**transformer plug-in units**

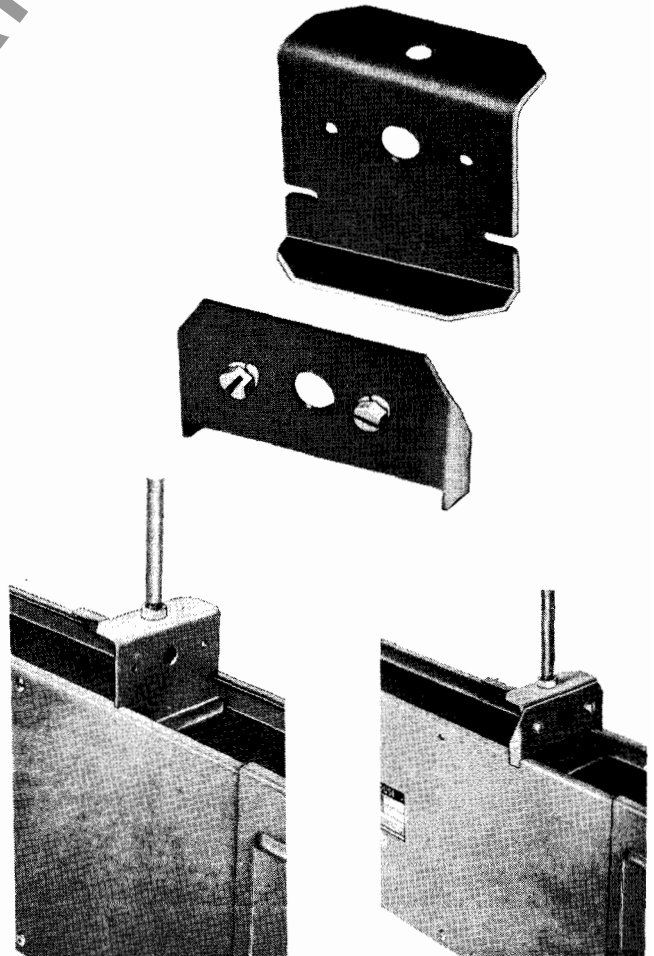
Whenever power for small loads is needed at a lower voltage than that of the bus duct system, they are conveniently served by the use of a transformer plug-in unit. The transformer and plug-in device is built into one unit, reducing voltage from 480, 440 to 240, 220 or 120/208, etc.

**capacitor plug-in units**

When bus duct systems serve an inductive load, it is sometimes necessary and economical to use capacitors for improving the power factor. On large installations it may be best to bank capacitors, however on individual units they are built into one enclosure in capacities of 5 and 7½ KVAR, 230-volt, and 5, 10 and 15 KVAR, 460 and 575-volt. For overcurrent protection either type BP, type TAP, or type COP plug-in devices may be used.



KVAR	voltage	dimensions (in inches)		
		A	B	C
5.0	240	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	5 <sup>9</sup> / <sub>16</sub>
7.5	240	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	6 <sup>9</sup> / <sub>16</sub>
5.0	460, 575	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	5 <sup>9</sup> / <sub>16</sub>
10.0	460, 575	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	5 <sup>9</sup> / <sub>16</sub>
15.0	460	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	6 <sup>9</sup> / <sub>16</sub>
15.0	575	24 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	5 <sup>9</sup> / <sub>16</sub>



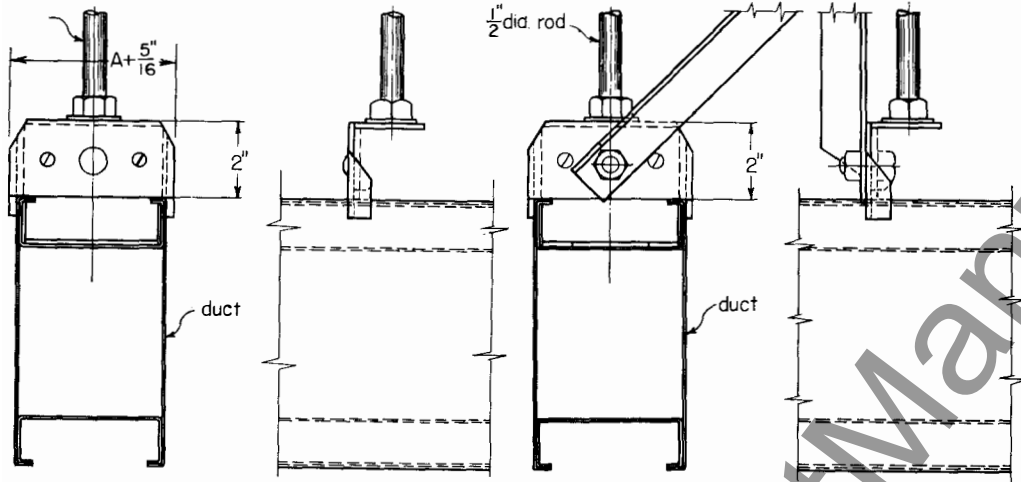
WWW.ElectricalPart.com



**hangers** for plug-in duct—cont'd

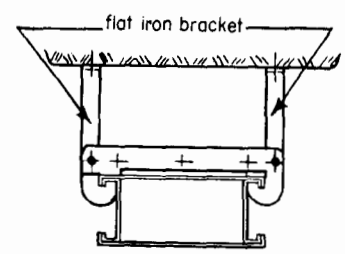
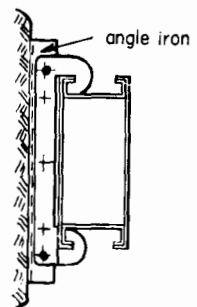
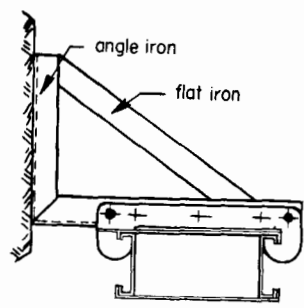
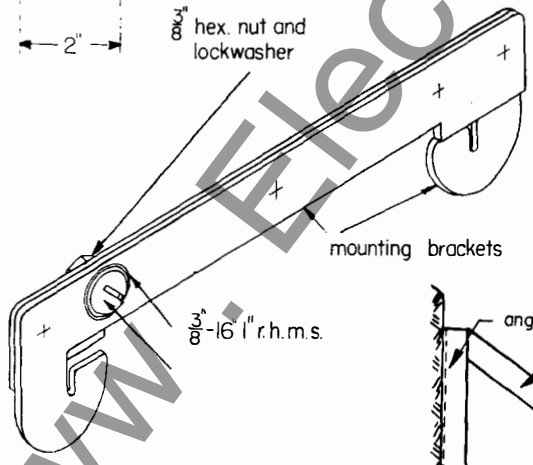
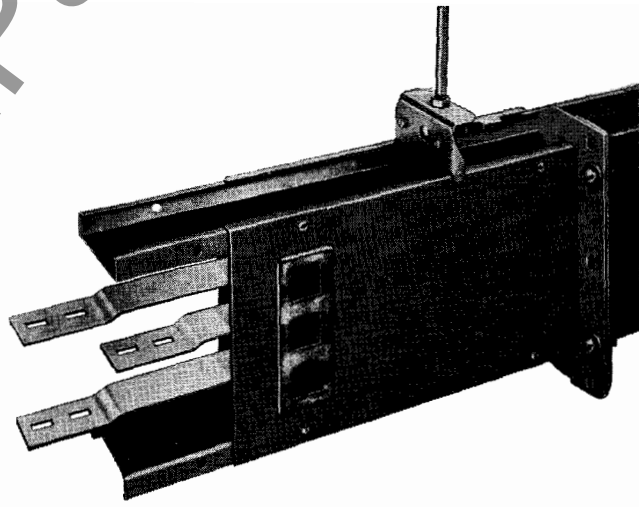
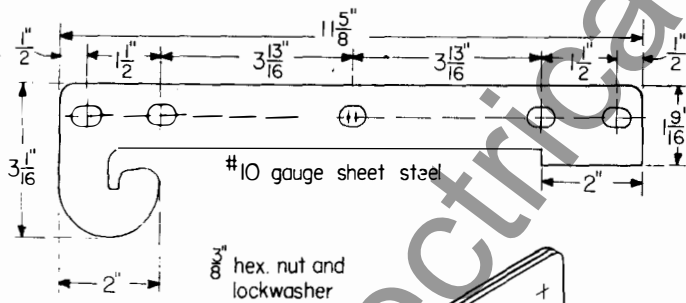
**cantilever hangers cont'd**

rods with nuts "not" supplied by w.e.c.



**"C" type hangers**

If duct is to be mounted flatwise or close to a wall, "C" type hangers can be used. These consist of a 2-piece mounting bracket which fits on either the "FRONT" or "REAR" side of the duct. The same bracket fits all sizes of plug-in duct from 225 to 1500 amperes and one hanger is furnished for every 10-feet of duct.



**typical specifications for plug-in bus duct****general**

The bus duct shall consist of { aluminum  
copper bus conductors  
totally enclosed by and supported in a sheet steel housing. The complete installation shall be coordinated throughout, rigid in construction, of uniform size, and neat and symmetrical in appearance. As many sections as possible shall be ten-foot lengths. Special sections and/or fittings shall be provided only where necessary to suit the installation. Access openings to the bolted joints of conductors shall be provided in two opposite sides of the housing. Conductor joints shall be made in such a manner that no increase of enclosure size is required at the splice between adjoining sections. One hanger shall be provided for every 10' 0" of horizontally mounted duct. For vertically mounted duct, one adjustable vertical hanger shall be provided per 15' 0" of riser or per span between floors. The bus duct shall be listed by Underwriters' Laboratories including approval for mounting in the horizontal or vertical position. The bus duct shall be as manufactured by Westinghouse or approved equal.

**enclosure**

The duct housing, which shall be made from 16-gauge steel, shall be of the four-channel interlocking type of construction. It shall be bonderized both inside and outside and given one coat of gray, baked-on enamel. Except for fittings, at least one plug-in opening per foot shall be provided in the housing of standard sections. Spring retained, sliding-plate type outlet covers shall be provided to cover each plug-in opening in the housing. Two removable access covers shall be provided at each splice to insure ease of inspection of bus bar joints and to facilitate the bolting-on of current take-off devices. Two splice plates shall also be provided at each splice to insure a strong, positive, mechanical connection being made between the housing of adjoining sections.

**conductors**

The conductors shall be fabricated from the best grade 98% conductivity pure copper bus bars. Bars shall be of the rectangular type having full round edges. Bars shall be silver-plated their entire length.

(Alternate: The conductors shall be fabricated from high strength, 55% minimum conductivity, extruded aluminum bus bars. Bars shall be of the rectangular type with full rounded edges. The entire length of the bars shall be plated electrolytically with a minimum thickness of .0002" of silver.)

Bus bars shall be offset at one end for ease in making neat lap splices. However, to further simplify installation, bars shall be pierced on both lap ends with rectangular slots. Joints shall be made with not less than two bolts which shall be of heat-treated, zinc-chromate plated steel and of a tensile strength of 100,000 lbs. per square inch.

**supports**

Bus bars shall be firmly supported by high strength molded insulators, spaced equally, on alternate sides of the duct, and on not greater than  $11\frac{5}{8}$ " centers. Insulators shall be of the type through which it is possible to insert the stabs of a plug-in device in order to fully isolate stabs as well as to afford extra protection in the event of stresses due to a fault. Insulator construction shall be such that the only requirement for the securing of the insulator to the housing is an extension of a portion of insulator through either the front or back cover of housing.

**plug-in devices**

Plug-in devices shall be of the circuit breaker type, fusible (De-ion switch, visible blade), load-break type or fusible (cover-operated) non-load break type. Plug-in units shall be equipped with safety interlocks and insulated stabs so that live parts are not readily exposed to personnel. A universal clamping device shall be used to securely fasten both plug-in units and bolt-on units to the duct. The plug-in units shall be interchangeable without alteration or modification on all ratings of plug-in duct. Plug-in units shall also be equipped with operating mechanisms that will permit easy operation from the floor by means of hookstick or chain. Plug-in units shall bear the label of Underwriters' Laboratories, Inc.

**operating characteristics**

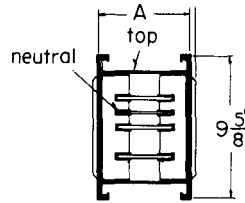
The current carrying capacity of bus duct and plug-in units shall be according to NEMA Standards. Likewise, the bus duct structure shall withstand short circuit stresses in accordance with NEMA short circuit ratings for busways.



**engineering and test data**

**dimensions and weights**

ampere rating	bus size	lbs./ft. 1/2 neutral bus size	lbs./ft. full neutral bus size	lbs./ft. dim. A
<b>copper</b>				
225	5/8 x 7/8	12	12	3 3/8
325	3/4 x 1	13	14	3 3/8
400	7/8 x 1 1/2	15	16	3 3/8
600	1/4 x 2	17	18	4 3/8
800	1/4 x 3	20	22	5 3/8
1000	1/4 x 4	24	26	6 3/8
1250	1/4 x 5	28	30	7 3/8
1500	1/4 x 6	31	34	8 3/8



ampere rating	bus size	lbs./ft. 1/2 neutral bus size	lbs./ft. full neutral bus size	lbs./ft. dim. A
<b>aluminum</b>				
225	3/16 x 1	11	12	3 3/8
325	1/4 x 1 1/2	12	13	3 3/8
400	1/4 x 2	13	13	4 3/8
600	1/4 x 3 1/2	16	16	5 3/8
800	1/4 x 5	18	18	7 3/8
1000	1/4 x 6	19	20	8 3/8

**line to line voltage drop per 100 ft—distributed loading**

ampere rating	percent power factor											
	0	10	20	30	40	50	60	70	80	90	95	100
<b>plug-in aluminum</b>												
225	1.34	1.51	1.67	1.82	1.93	2.06	2.15	2.21	2.23	2.19	2.11	1.78
400	1.84	1.95	2.06	2.18	2.20	2.21	2.25	2.25	2.14	1.97	1.80	1.31
600	1.84	1.95	2.03	2.09	2.14	2.15	2.14	2.10	2.01	1.82	1.65	1.13
800	1.94	2.09	2.11	2.18	2.21	2.22	2.20	2.14	2.02	1.82	1.62	1.07
1000	2.30	2.41	2.49	2.54	2.56	2.56	2.53	2.44	2.30	2.03	1.79	1.13
<b>plug-in copper</b>												
225	1.39	1.56	1.70	1.83	1.99	2.03	2.11	2.16	2.16	2.10	2.03	1.66
400	2.03	2.12	2.19	2.23	2.28	2.24	2.21	2.13	1.99	1.75	1.55	0.96
600	2.49	2.60	2.68	2.74	2.76	2.76	2.71	2.61	2.45	2.16	1.91	1.19
800	2.63	2.72	2.83	2.82	2.82	2.80	2.73	2.60	2.41	2.09	1.82	1.09
1000	2.90	2.97	3.01	3.03	3.00	2.94	2.89	2.68	2.43	2.04	1.73	0.87

The table above gives the average line to line voltage drop at rated current at a varying power factor. The line to neutral voltage drop is obtained by multiplying the line to line value by .577.