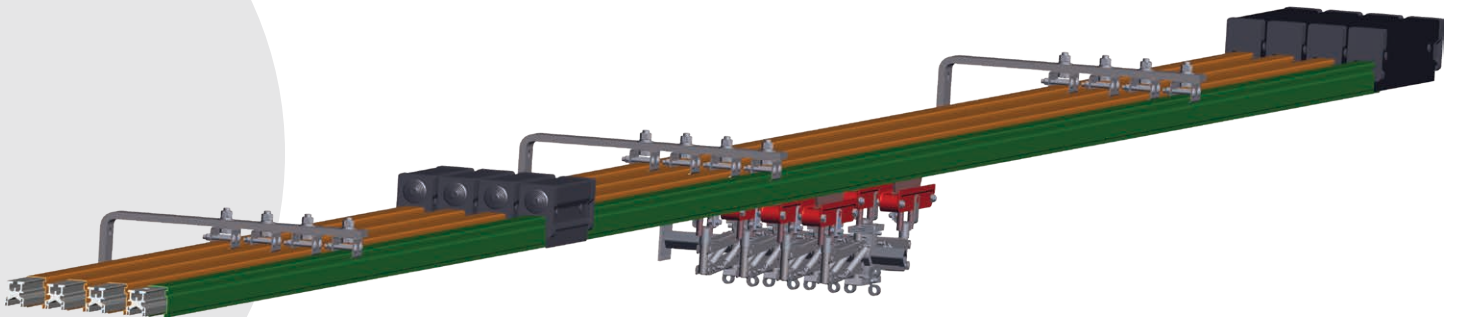


# Conductor Bar

## Hevi-Bar II



**CONDUCTIX**  
wampfler

# Table of Contents

<b>Overview</b> .....	<b>4</b>
Hevi-Bar II Features.....	4
DURA-COAT Option for Hevi-Bar II.....	4
<b>Conductor Bar Summary Chart</b> .....	<b>5</b>
<b>Conductor Bar Specification Data Sheet</b> .....	<b>6-7</b>
Sizing systems for multiple hoist, motors, and/or multiple cranes.....	7
<b>Typical 4-Bar System</b> .....	<b>8</b>
<b>500 Amp</b> .....	<b>9-12</b>
Conductor Bar.....	9
Splice.....	9
End Cover.....	10
Power Feed.....	10
Expansion Section.....	11
Power Interrupting Section.....	11
Hangers.....	12
Anchor Pin.....	12
500 Amp Installed Dimensions.....	12
<b>700 Amp</b> .....	<b>13-16</b>
Conductor Bar.....	13
Splice.....	13
End Cover.....	14
Power Feed.....	14
Expansion Section.....	15
Power Interrupting Section.....	15
Hangers.....	16
Anchor Pin.....	16
700 Amp Installed Dimensions.....	16
<b>1000 Amp</b> .....	<b>17-20</b>
Conductor Bar.....	17
Splice.....	17
End Cover.....	18
Power Feed.....	18
Expansion Section.....	19
Power Interrupting Section.....	19
Hangers.....	20
Anchor Pin.....	20
1000 Amp Installed Dimensions.....	20
<b>1500 Amp</b> .....	<b>21-24</b>
Conductor Bar.....	21
Splice.....	21
End Cover.....	22
Power Feed.....	22
Expansion Section.....	23
Power Interrupting Section.....	23
Hangers.....	24
Anchor Pin.....	24
1500 Amp Installed Dimensions.....	24

# Table of Contents - Continued

<b>Collectors &amp; Replacement Shoes</b> .....	<b>25-28</b>
125 Amp Single Collector .....	25
250 Amp Tandem Collector .....	26
200 Amp Single Collector .....	27
400 Amp Tandem Collector .....	28
<b>500 Amp - 700 Amp Support Brackets</b> .....	<b>29-30</b>
Web Bracket .....	29
Flange Bracket .....	30
<b>1000 Amp - 1500 Amp Support Brackets</b> .....	<b>31-33</b>
Web Bracket .....	31
Flange Bracket .....	32
Braced Web Bracket .....	33
<b>Lateral Bracket</b> .....	<b>34</b>
Braced Web Bracket .....	34
<b>Specifications</b> .....	<b>35</b>
Conductor Bar Cover .....	35
Conductor Bar .....	35
Corrosion Protection .....	35
<b>Appendix I - Selection of Systems</b> .....	<b>36-38</b>
Environmental Conditions .....	36
Mounting and Installation .....	36
Number of Power Bonding Conductors Required .....	36
Moving Versus Stationary Applications .....	36
Current and Voltage Requirements .....	36
Voltage Drop and Power Locations .....	37
Thermal Expansion/Contraction and Other Effects of Heat .....	38
Conductor Bar Current Rating and Duty Cycle .....	38
<b>CMAA Crane Classifications</b> .....	<b>39</b>
<b>Appendix II - Volage Drop Calculations</b> .....	<b>40</b>
Full-Load Current (Three Phase Alternating-Current Motors) .....	40
Full-Load Current in Amperes, Direct Current Motors Armature Voltage Rating (Direct-Current) .....	40
Voltage Drop .....	40
<b>Appendix III - Electrical Formulas &amp; Conversions</b> .....	<b>41</b>
Ohms Law .....	41
Power .....	41
Speed .....	41
Metric Conversion Formulas .....	41
<b>Appendix IV - Power Interrupting Sections</b> .....	<b>42-43</b>
End Power Interrupting Sections .....	42
Middle Power Interrupting Sections .....	43

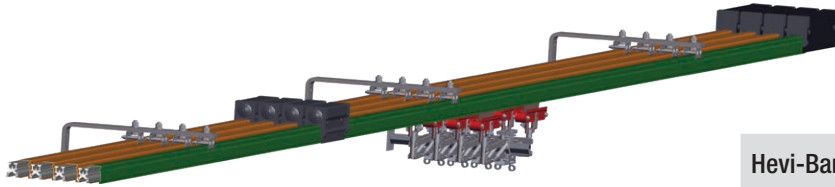


# Overview

The rugged Hevi-Bar II Conductor Bar System delivers reliable, high-capacity electrical performance. It is ideal for tough environments and demanding, heavy-use applications found in mills, heavy industry, storage yards, and transit systems. It is truly a “put it up once and forget it” system that will last for the life of your equipment.

**Ampacity Selections:** 500A, 700A, 1000A, and 1500A, at 600 volts.

**Maximum Speed:** 2000 feet per minute  
(Contact the factory if higher speeds are needed)



## Hevi-Bar II is ideal for:

- Medium to large cranes
- Bulk Handling Systems
- Mills and heavy industry
- Transit Systems
- Material Handling Equipment
- Other mobile power applications

---

## Hevi-Bar II Features

---

- Uses surface area rather than mass to dissipate heat generated by high current conditions
- Can be mounted horizontally or vertically (“side entry”)
- V-grooved for positive and accurate collector shoe tracking
- Has hardened, long-wearing and corrosion resistant stainless steel contact surface.
- Offers a choice of insulating covers:
  - Standard orange for indoor use
  - Green for the ground (bonding) conductor
  - Black UV-resistant for outdoor use
  - Medium or high heat versions to withstand higher ambient temperatures



Hevi Bar II is easy to install and maintain. For further information, please download the Hevi Bar II manual from our web site.

---

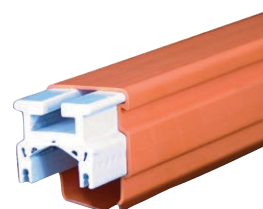
## DURA-COAT Option - for Hevi-Bar II

---

Hevi-Bar II is available with our optional DURA-COAT finish, specially formulated for extremely corrosive environments. This coating combines a ceramic compound with an epoxy binder to provide superior corrosion resistance and adhesion to the base materials. The entire bar is coated, with the exception of the stainless steel running surface. The insulating cover is applied over the coating. All metal parts of the collector arm are coated.

DURA-COAT is ideal for galvanizing and electro-plating lines, chemical plants, smelters, foundries and cast houses, coke and ore handling cranes, and oxidizing/electro-winning facilities.

Contact Conductix-Wampfler for further information about DURA-COAT.



# Conductor Bar Summary Chart

The below chart is only showing Conductor Bar lines manufactured in the USA.

For Conductor Rails manufactured in Germany but available in the USA, please refer to KAT0800-0001 | Conductor Rail Overview

	Safe-Lec 2 CAT1003	Hevi-Bar II CAT1006	Hevi-Bar MD CAT1011	8-Bar CAT1004	Side Contact CAT1004
<b>Common Applications</b>	Small to medium overhead cranes, moderate curves	Medium to large overhead cranes, higher speeds	Very large cranes, mill handling systems, and transit	Small to medium overhead cranes, tighter curves	Contained spaces, slip ring applications, curves
<b>Bar Ampacity Selections</b>	100 125 160 200 250 315 400	500 700 1000 1500	2200 3800 4500 6000	40 90 110 250 350 500	40 90 110 250 350
<b>Maximum Voltage</b>	600	600	600	600	600
<b>Maximum Speed<sup>1</sup> ft./min (m/min)</b>	1200 (365.78)	2000 (609.6)	2000 (609.6)	900 (274.3)	600 (182.8)
<b>Bar Spacing in. (mm)</b>	1.69 (43)	3.0 (76.2)	7.0 (177.8)	3.0 (76.2)	1.375 (34.9)
<b>Cover Temps</b> Low 160 °F (71 °C) Med 250 °F (121 °C) High 400 °F (204 °C)	Low Med	Low Med High (700 & 100 Amp Only)	n/a	Low Med High	Led Med
<b>Outdoor Rated</b>	Yes	Yes	Yes	Yes	No
<b>Dura-Coat Available?</b>	No	Yes	No	No	No
<b>Orientation (collector entry)</b>	Bottom/Side	Bottom/Side	Bottom/Side/Top	Bottom/Side	Side Only
<b>Minimum Bend Radius with Low Temp Cover - in. (mm)</b>	60.0 (1542)	Consult Factory	n/a	180.0 (457)	9.0 (228)
<b>Minimum Bend Radius Med Temp Cover - in (mm)</b>	60.0 (1542)	96.0 (2438.4)	n/a	57.0 (1447)	57.0 (1447)
<b>Heater Wire Available</b>	Yes	500Amp Only	n/a	No	No

<sup>1</sup>For faster speeds - contact factory.

# Conductor Bar Specification Data Sheet

E-mail to: sales.us@conductix.com

The following data form must be filled out in order for the system to be designed and perform properly.

Request Date

Sales Person

Company

Contact

Title

Tel

Fax

Company Type

E-mail

## Application

Application Type:  Runway  Bridge  Monorail  Other

New Approved Installation?  Extended Existing?  Replacement?

System Length: \_\_\_\_\_  Feet  Meters

Total Number of Conductors: \_\_\_\_\_ Will one conductor be designated as a ground:  Yes  No

Does your application require Data Transmission as well as Power Transmission  Yes  No

If yes, describe your requirements: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Environmental Data

Indoors  Outdoors  Both Indoors & Outdoors  Outdoor & Ice

Ambient Temperature Range - Min. \_\_\_\_\_ Max. \_\_\_\_\_  °F  °C

Radiant Heat Temperature Range - Min. \_\_\_\_\_ Max. \_\_\_\_\_  °F  °C

Will a heater wire need to be included:  Yes  No (if yes, consult factory)

Will there be corrosive materials present  Yes  No If yes, what type (salt, chlorine, steam, acids, etc.) \_\_\_\_\_

Are there any other environmental considerations for this application? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Mechanical Data

Vehicle Speed: \_\_\_\_\_  feet/min  meters/min

Duty Cycle: \_\_\_\_\_ cycles per: \_\_\_\_\_ (hour, day, minute, etc.)

Number of vehicles or trolleys: \_\_\_\_\_ Crane Class (if applicable) \_\_\_\_\_

Will Conductix be supplying mounting brackets:  Yes  No

Does the system have any curves:  Yes  No if yes, Radius \_\_\_\_\_  Feet  Meters Angle \_\_\_\_\_°

Mounting position with regards to monorail:  Inside  Outside  Both

Other mechanical Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Conductor Bar Specification Data Sheet

## Electrical Specifications

Number of power feeds: \_\_\_\_\_

Location of power feeds (check all that apply):  Center  End  Multiple

Advanced: Distance power feeds will be from end of system: \_\_\_\_\_ (or attach diagram)

Number of power phases: \_\_\_\_\_ Operating Voltage: \_\_\_\_\_ (volts)  AC  DC

Total current draw: (sum of all vehicles) \_\_\_\_\_ (Amps) Demand factor \_\_\_\_\_ (typically .9)

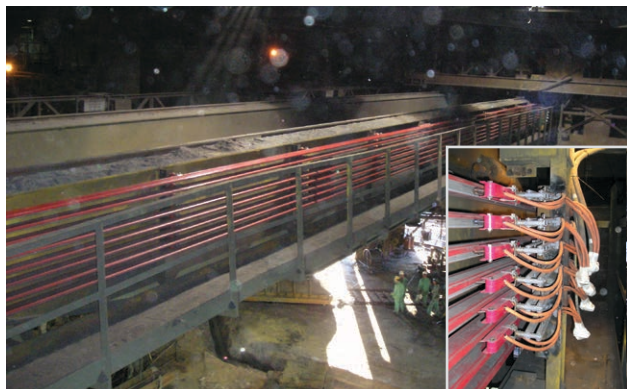
Operating Frequency: \_\_\_\_\_ (Hz - USA is 60 Hz)

### Sizing systems for multiple hoists, motors, and/or multiple cranes

For a single crane: Size the conductor bar to handle 100% of the current draw of the largest motor or group of motors, plus 50% of the combined current draw of the other motors on the vehicle.

For multiple cranes or vehicles: Determine the current draw for each crane/vehicle, using the method above. Sum all the current draws for each crane/vehicle, then multiply the sum by the appropriate demand factor:

# of Cranes/vehicles	Demand Factor
2	.95
3	.91
4	.87
5	.84
6	.81
7	.78



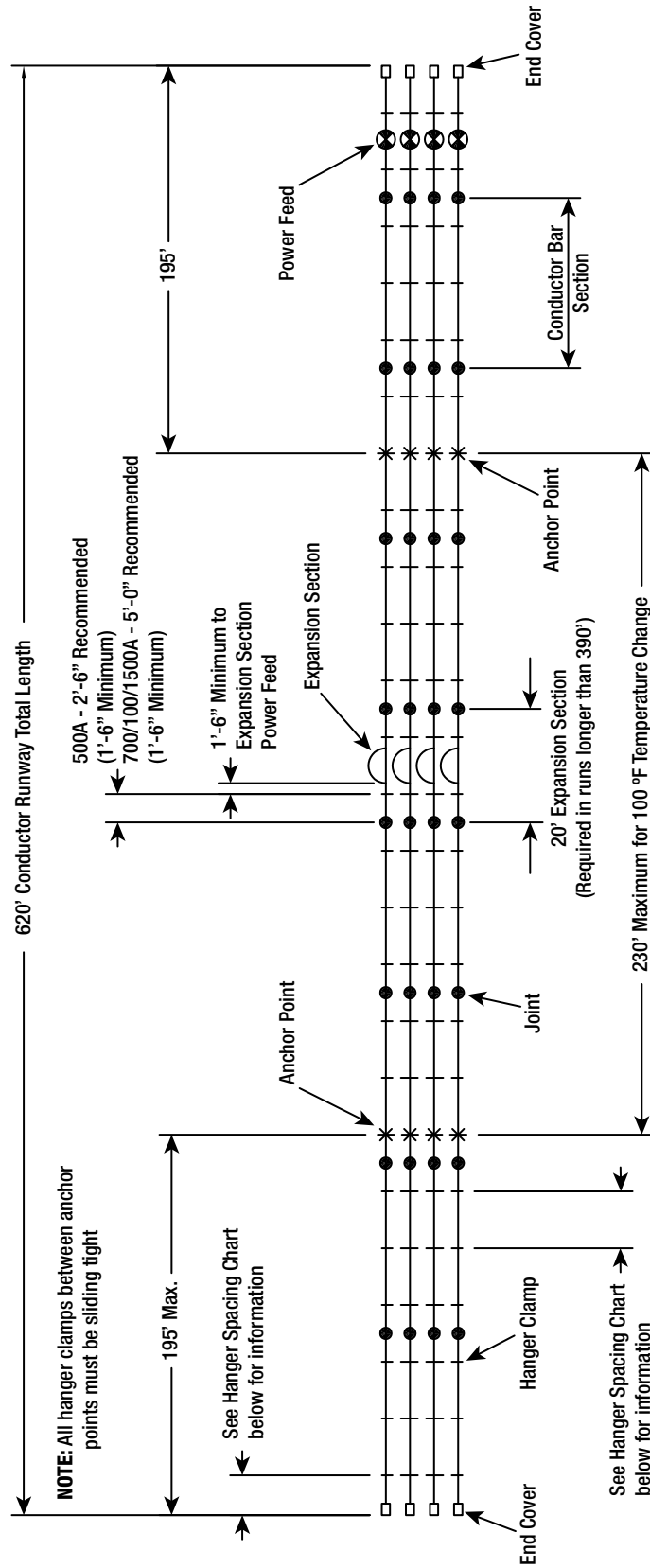
Hevi-Bar II - Foundry Crane



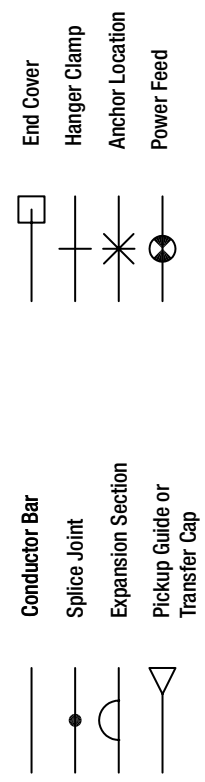
Hevi-Bar II - Curved System

# Typical 4-Bar System

Example of 4 Conductor Runway  
Hevi-Bar II  
(3 Phase + 1 Ground)



**Legend**



**Hanger Spacing Chart**

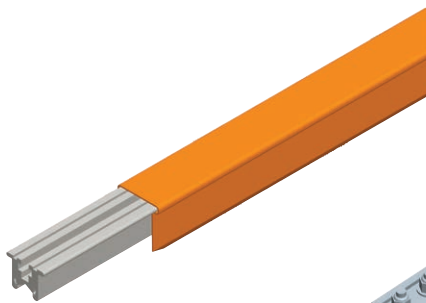
System	First Hanger	Maximum Hanger Spacing
500 Amp	2'-6"	5'-0"
700 Amp	3'-9"	7'-6"
1000 Amp	5'-0"	10'-0"
1500 Amp	5'-0"	10'-0"



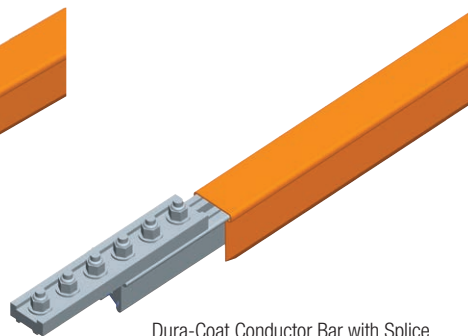
# 500 Amp

## Conductor Bar

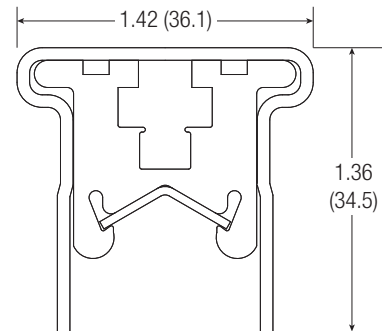
Type / Max Temp	Use (Color)	Standard	DURA-COAT with splice installed
		Conductor Bar	Conductor Bar
PVC 160° F	Phase / Indoors (Orange)	XA-27582	XA-39745-J
	Ground / Indoors (Green)	XA-50258	XA-39745G-J
	Phase / Outdoors UV Stable (Black)	XA-38925	XA-39745B-J
	Ground / Outdoors UV Stable (Green)	XA-574123	XA-39745C-J
Polycarbonate 250° F	Phase / Indoors & Outdoors (Red)	XA-32496	XA-50731-J
	Ground / Indoors & Outdoors (Green)	XA- 574041	XA-50731G-J
Weight: lb. (kg)		26.0 (11.79)	27.0 (12.24)
Length: ft. (m)		30.0 (9.144)	30.0 (9.144)



Conductor Bar



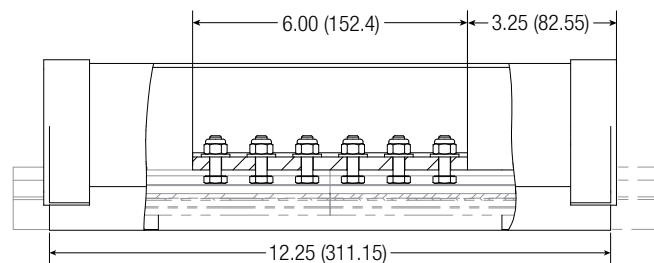
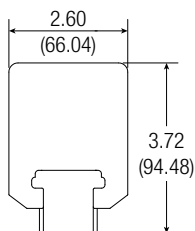
Dura-Coat Conductor Bar with Splice



## Splice

Type / Temperature Rating	Standard	DURA-COAT
	Splice	*Splice Cover
PVC / Indoors 160° F	XA-37676	XA-51304
PVC / Outdoors UV Stable 160°F	XA-37676	XA-51304
Polycarbonate / Indoors & Outdoors 250° F	XA-32499	XA-51305
Weight: lb. (kg)	1.2 (0.681)	0.73 (0.33)

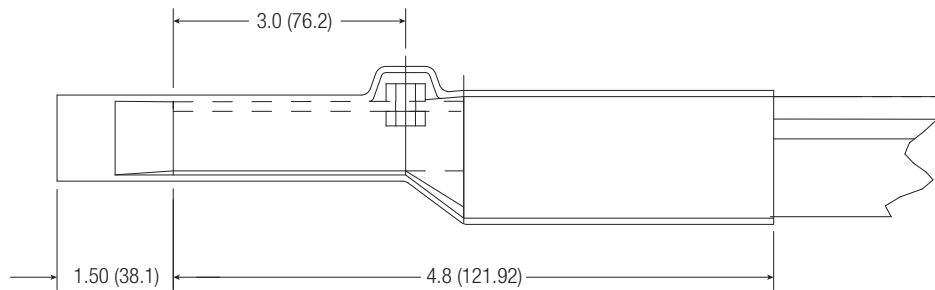
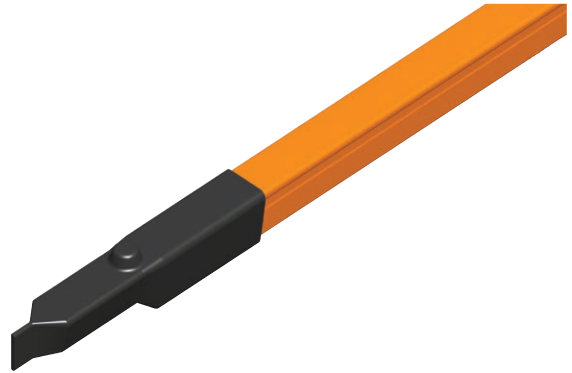
\* DURA-COAT bar comes with splices installed. The above part number represents only the Splice Cover.



# 500 Amp

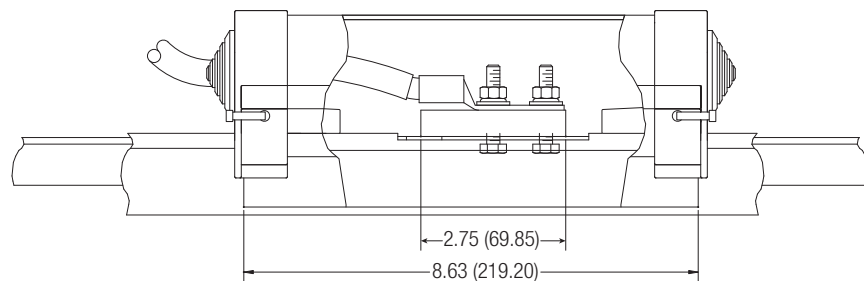
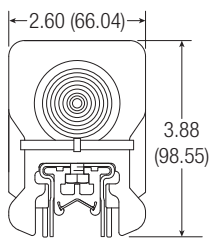
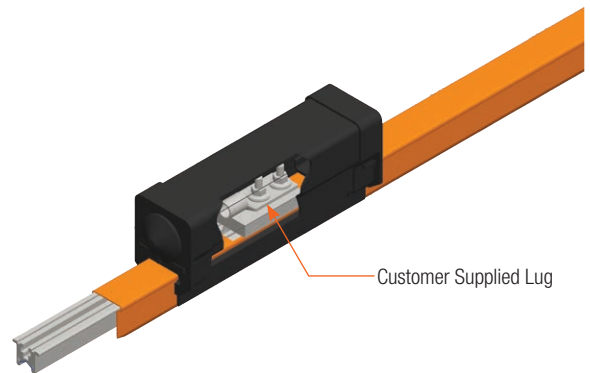
## End Cover

Type / Temperature Rating	Part No.
Phase & Ground for both Standard & DURA-COAT / all temperature ranges	XA-27588
Weight: lb. (kg)	0.1 (0.045)



## Power Feed

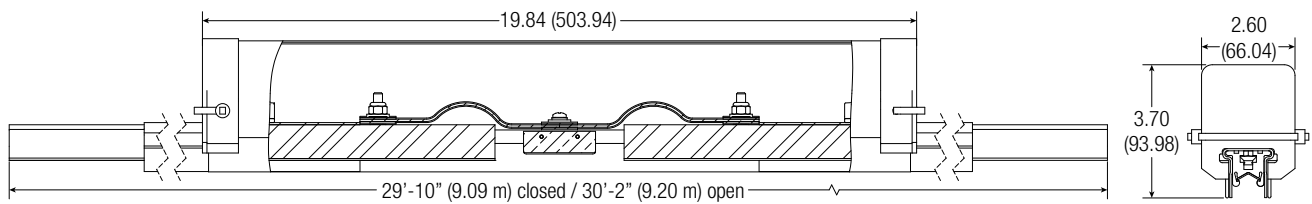
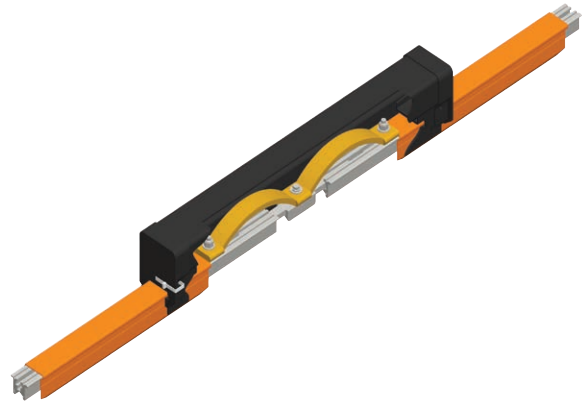
Type / Temperature Rating	Standard	DURA-COAT
PVC 160° F	XA-37674	XA-27588
Polycarbonate 250° F	XA-32500	XA-27588
Weight: lb. (kg)	0.1 (0.045)	1.0 (0.45)



# 500 Amp

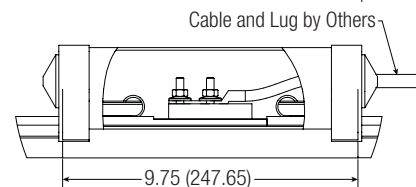
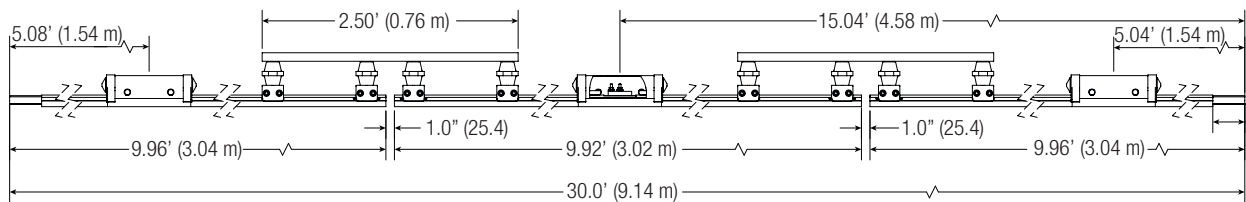
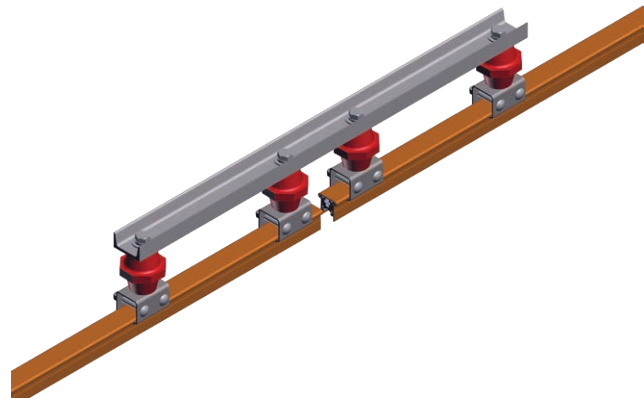
## Expansion Section

Use (Color)	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-37677	XA-39741-J
Ground / Indoors (Green) 160° F	XA-37677E	XA-39741G-J
Phase / Outdoors UV Stable (Black) 160° F	XA-38946	XA-39741B-J
Ground / Outdoors UV Stable (Green) 160° F	XA-38946B	XA-39741C-J
Phase / Indoors & Outdoors (Red) 250° F	XA-32498	XA-50741-J
Ground / Indoors & Outdoors (Green) 250° F	XA-32498B	XA-50714G-J
Weight: lb. (kg)	30.0 (13.61)	30.0 (13.61)
Length: ft. (m)	30.0 (9.144)	30.0 (9.144)



## Power Interrupting Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-50746	XA-50749-J
Phase / Outdoors UV Stable (Black) 160° F	XA-50746B	XA-50749B-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50747	XA-50750-J
Weight: lb. (kg)	50.0 (22.67)	50.0 (22.67)
Length: ft. (m)	30.0 (9.144)	30.0 (9.144)



# 500 Amp

## Hangers

Hangers can be installed on brackets up to 3/8" thick (9.5mm).

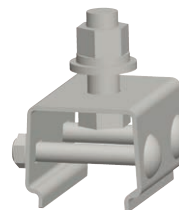
For 500 Amp Bar Only	Plated Hardware	Stainless Steel Hardware	Weight - lb. (kg)
Polycarbonate Snap-In	XA-26591	XA-28368	0.29 (0.14)
Polycarbonate Snap-In with Insulator	XA-27483	XA-27780	0.89 (0.40)
Stainless Steel Cross Bolt	XA-27481	XA-27788	0.60 (0.27)
Stainless Steel Cross Bolt with Insulator	XA-27482	XA-32807	1.14 (0.50)



Polycarbonate Snap-In



Polycarbonate Snap-in w/Insulator



Stainless Steel Cross Bolt



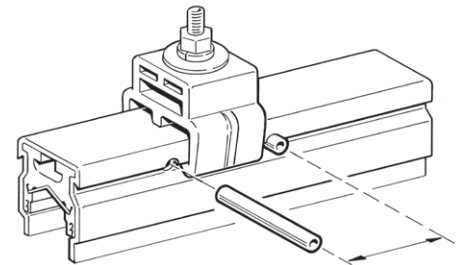
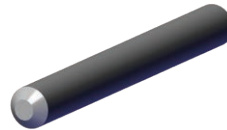
Stainless Steel Cross Bolt w/Insulator

## Anchor Pin

Anchor Pins turn a hanger into an anchor. (2) required per Hanger.

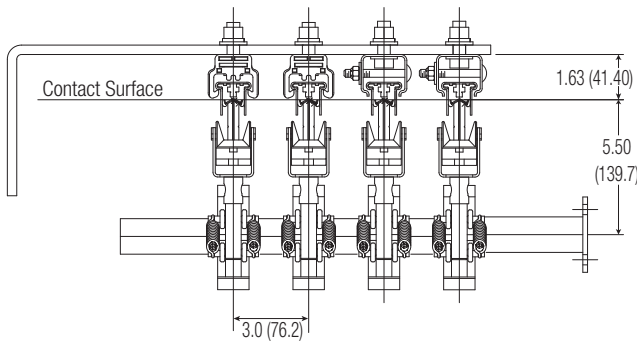
**NOTE:** Only for use with Plastic Hangers.

Part Number	Weight - lb. (kg)
XA-23946	0.1 (0.05)

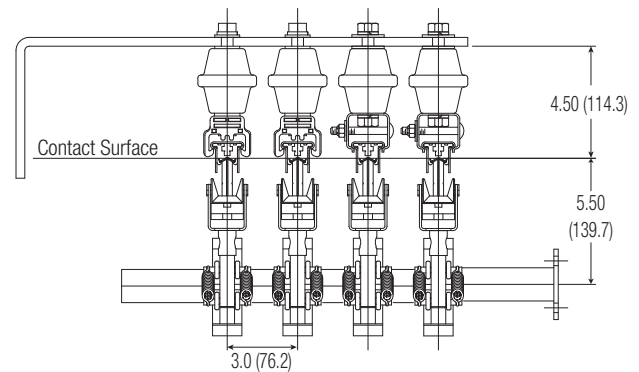


## 500 Amp Installed Dimensions

### Standard Hanger



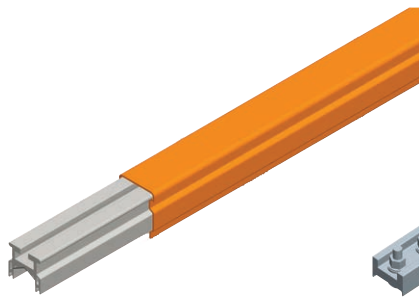
### With Insulators



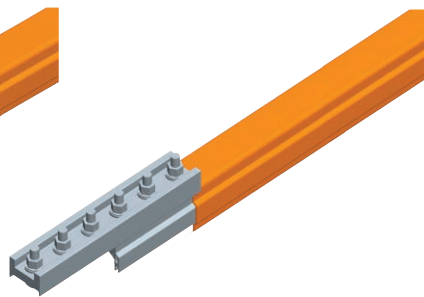
# 700 Amp

## Conductor Bar

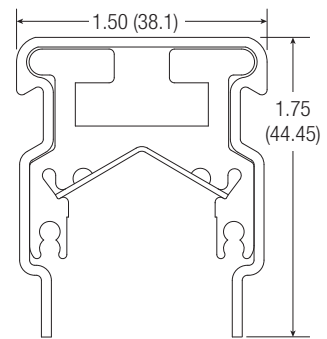
Type / Max Temp	Use (Color)	Standard	DURA-COAT with splice installed
		Conductor Bar	Conductor Bar
PVC 160° F	Phase / Indoors (Orange)	XA-24528	XA-39847-J
	Ground / Indoors (Green)	XA-24528B	XA-39847G-J
	Phase / Outdoors UV Stable (Black)	XA-38934	XA-51376-J
	Ground / Outdoors UV Stable (Green)	XA-574535	XA-39847C-J
Polycarbonate 250° F	Phase / Indoors & Outdoors (Red)	XA-50733	XA-50062-J
	Ground / Indoors & Outdoors (Green)	XA-574095	XA-50062G-J
Fiberglass Reinforced Polyester 400° F	Phase & Ground / Indoors (Orange)	XA-24554	N/A
Weight: lb. (kg)		40.0 (18.14)	40.0 (18.14)
Length: ft. (m)		30.0 (9.144)	30.0 (9.144)



Conductor Bar



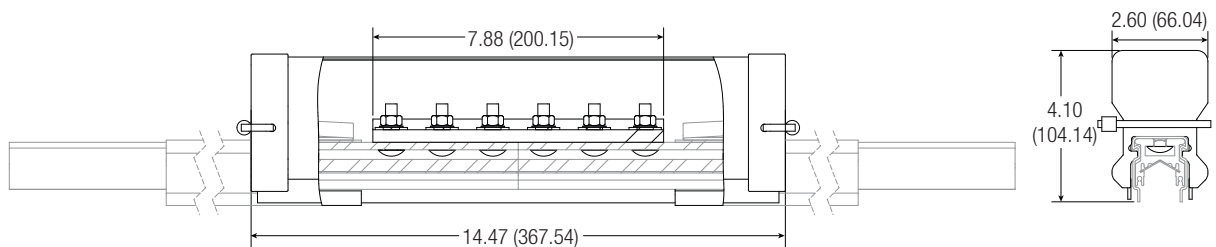
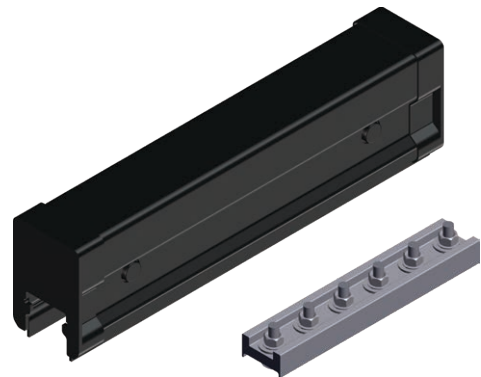
Dura-Coat Conductor Bar with Splice



## Splice

Type / Temperature Rating	Standard	DURA-COAT
	Splice	*Splice Cover
PVC / Indoors 160° F	XA-38115	XA-51320
PVC / Outdoors UV Stable 160°F	XA-38115	XA-51320
Polycarbonate / Indoors & Outdoors 250° F	XA-38115C	XA-51321
Fiberglass Reinforced Polyester 400° F	XA-24558	N/A
Weight: lb (kg)	1.9 (0.86)	1.5 (0.457)

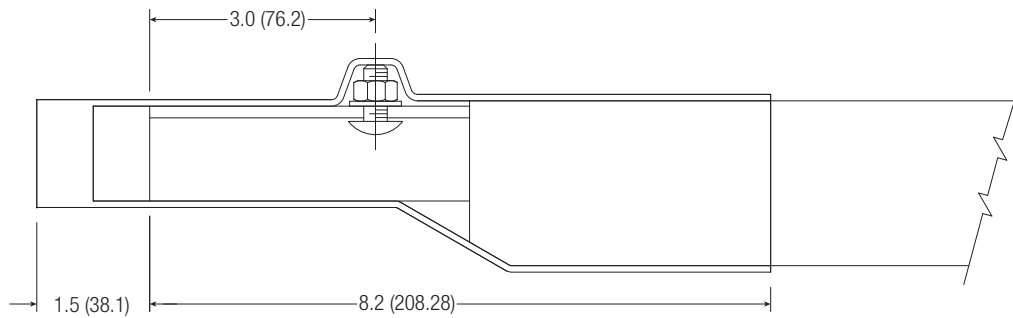
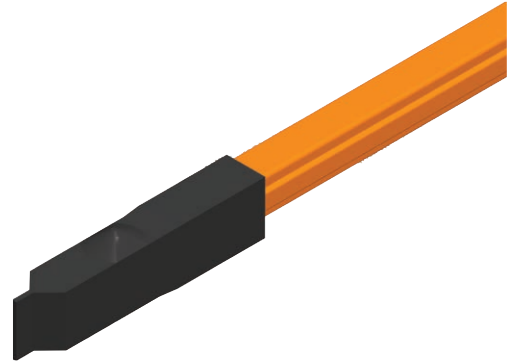
\* DURA-COAT bar comes with splices installed. The above part number represents only the Splice Cover.



# 700 Amp

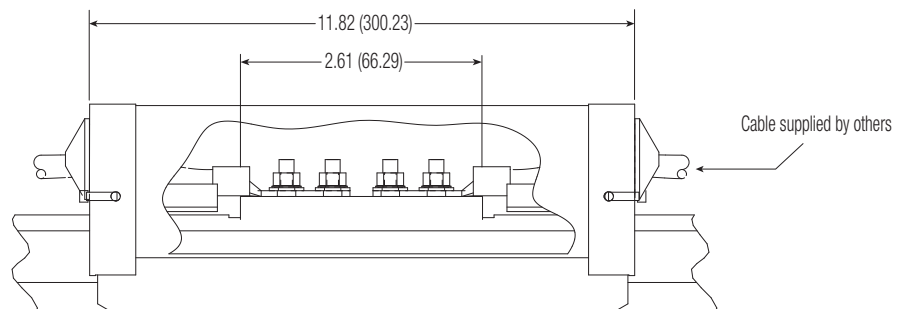
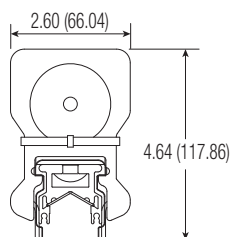
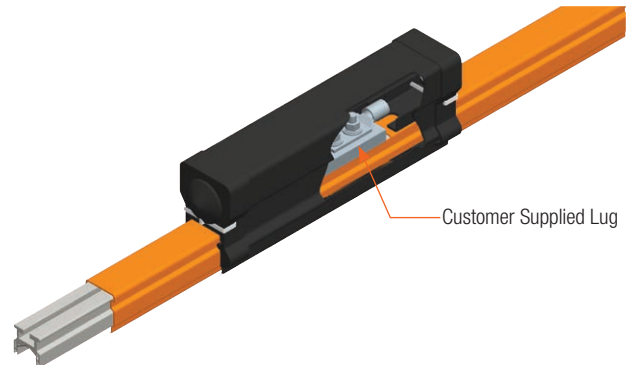
## End Cover

Type / Temperature Rating	Part No.
Phase & Ground for both Standard & DURA-COAT / 160° F & 250° F	XA-50859
Fiberglass Reinforced Polyester 400° F	XA-24585
Weight: lb (kg)	1.8 (0.82)



## Power Feed

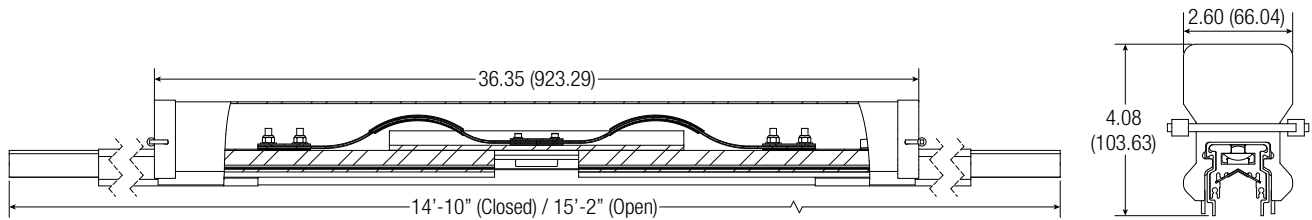
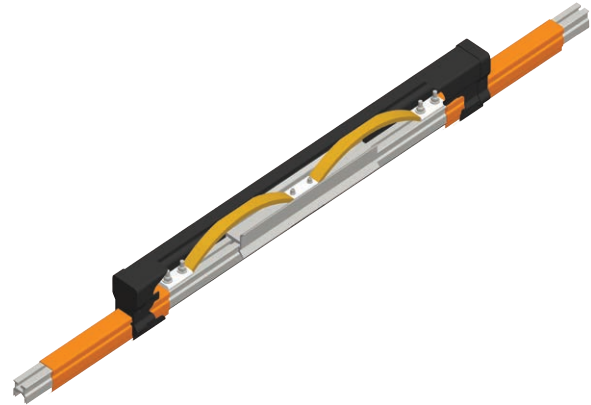
Type / Temperature Rating	Standard	DURA-COAT
PVC 160° F	XA-38117	XA-38117
Polycarbonate 250° F	XA-50067	XA-50067
Fiberglass Reinforced Polyester 400° F	XA-24594	N/A
Weight: lb (kg)	1.8 (0.82)	2.0 (0.907)



# 700 Amp

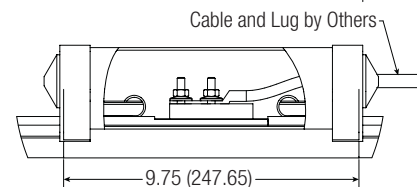
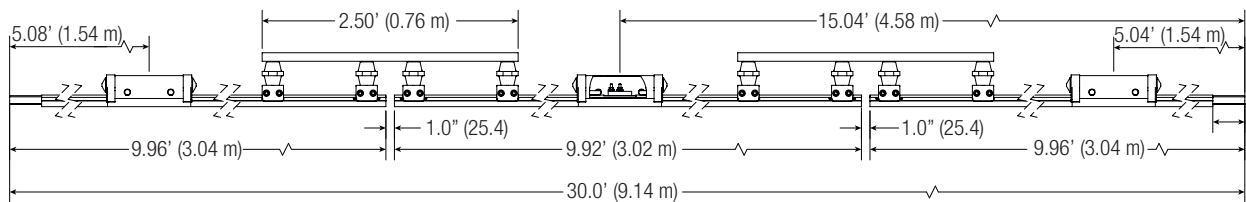
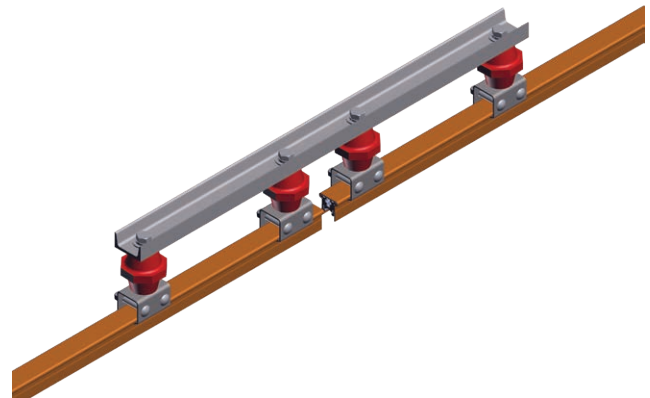
## Expansion Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-24566	XA-50739-J
Ground / Indoors (Green) 160° F	XA-24566B	XA-50739B-J
Phase / Outdoors UV Stable (Black) 160° F	XA-38949	XA-50740-J
Ground / Outdoors UV Stable (Green) 160° F	XA-38949G	XA-50740G-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50738	XA-50063-J
Ground / Indoors & Outdoors (Green) 250° F	XA-50738G	XA-50063G-J
Fiberglass Reinforced Polyester 400° F	XA-24567D	N/A
Weight: lb. (kg)	24.0 (10.68)	25.0 (11.33)



## Power Interrupting Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-50748	XA-50751-J
Phase / Outdoors UV Stable (Black) 160° F	XA-50748B	XA-50751B-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50752	XA-50753-J
Fiberglass Reinforced Polyester 400° F	XA-50754	N/A
Weight: lb (kg)	63.0 (28.58)	65.0 (29.48)
Length: ft (m)	30.0 (9.144)	30.0 (9.144)

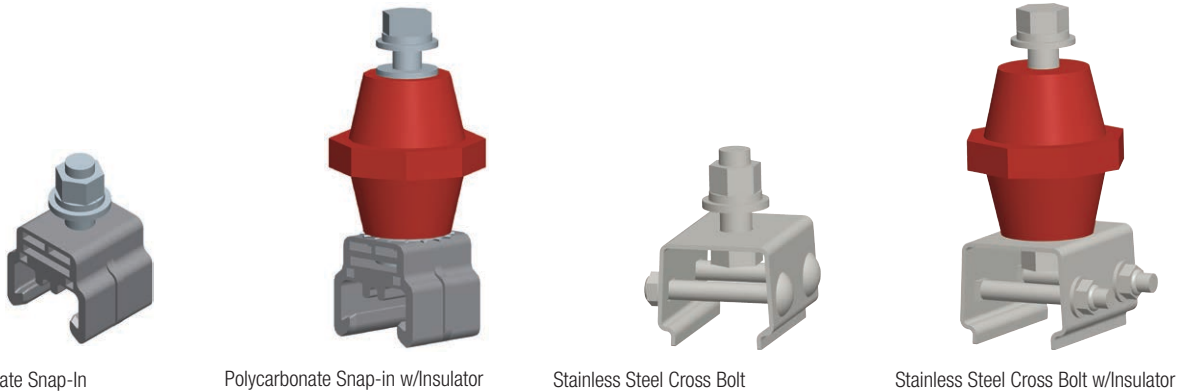


# 700 Amp

## Hangers

Should be installed on brackets with a minimum thickness of 3/8" (9.5mm).

For 700 Amp to 1500 Amp Bar	Plated Hardware	Stainless Steel Hardware	Weight - lb. (kg)
Polycarbonate Snap-In	XA-23223	XA-28220	0.27 (0.13)
Polycarbonate Snap-In with Insulator	XA-24902	XA-24902B	0.83 (0.40)
Stainless Steel Cross Bolt	XA-27481	XA-27788	0.58 (0.28)
Stainless Steel Cross Bolt with Insulator	XA-27482	XA-32807	1.11 (0.53)

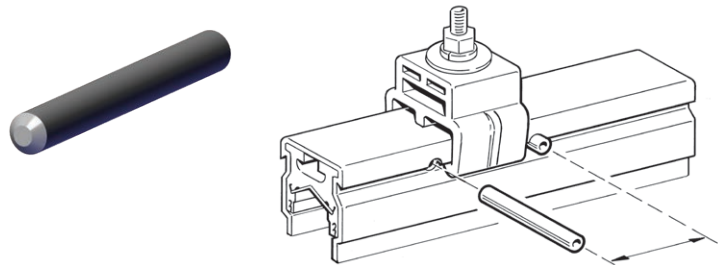


## Anchor Pin

Anchor Pins turn a hanger into an anchor. (2) required per Hanger.

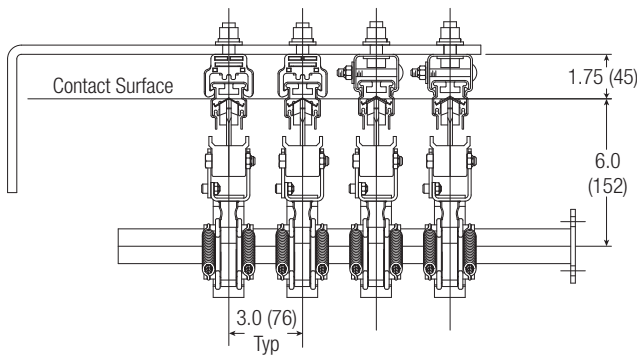
**NOTE:** Only for use with Plastic Hangers.

Part Number	Weight - lb. (kg)
XA-23946	0.1 (0.05)

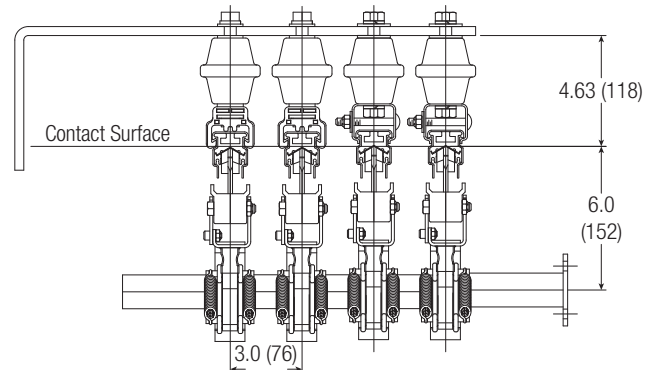


## 700 Amp Installed Dimensions

### Standard Hanger



### With Insulators

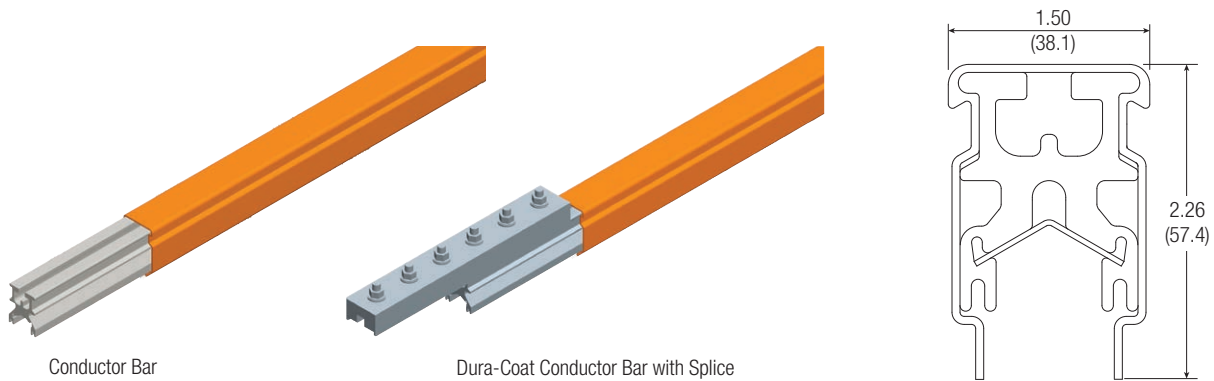




# 1000 Amp

## Conductor Bar

Type / Max Temp	Use (Color)	Standard	DURA-COAT with splice installed
		Conductor Bar	Conductor Bar
PVC 160° F	Phase / Indoors (Orange)	XA-23500	XA-50736-J
	Phase / Outdoors UV Stable (Black)	XA-23500D	XA-50736B-J
	Ground / Outdoors UV Stable (Green)	XA-571682	XA-50736C-J
Polycarbonate 250° F	Phase / Indoors & Outdoors (Red)	XA-31991	XA-50735-J
	Ground / Indoors & Outdoors (Green)	XA-574094	XA-50735G-J
Fiberglass Reinforced Polyester 400° F	Phase / Indoors (Orange)	XA-23508	N/A
Weight: lb. (kg)		48.0 (21.77)	49.0 (22.22)
Length: ft. (m)		30.0 (9.144)	30.0 (9.144)



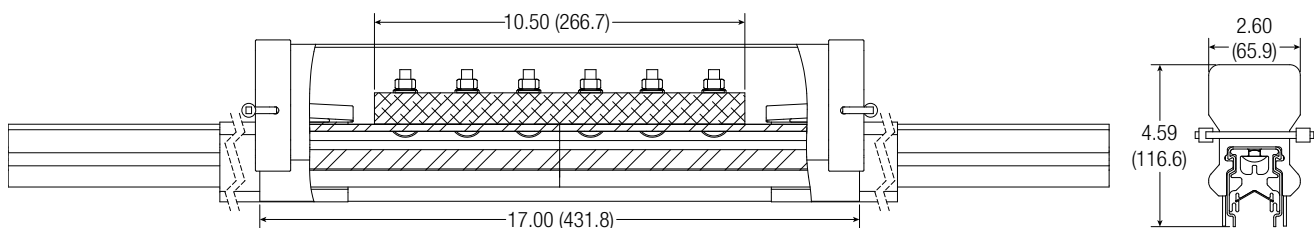
Conductor Bar

Dura-Coat Conductor Bar with Splice

## Splice

Type / Temperature Rating	Standard	DURA-COAT
	Splice	*Splice Cover
PVC / Indoors 160° F	XA-37746	XA-51322
PVC / Outdoors UV Stable 160°F	XA-37746	XA-51322
Polycarbonate / Indoors & Outdoors 250° F	XA-31964	XA-534845
Fiberglass Reinforced Polyester 400° F	XA-23520	N/A
Weight: lb (kg)	3.0 (1.36)	1.2 (0.54)

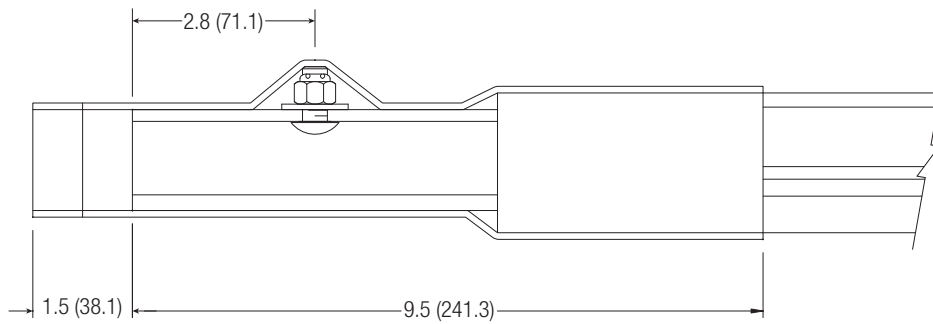
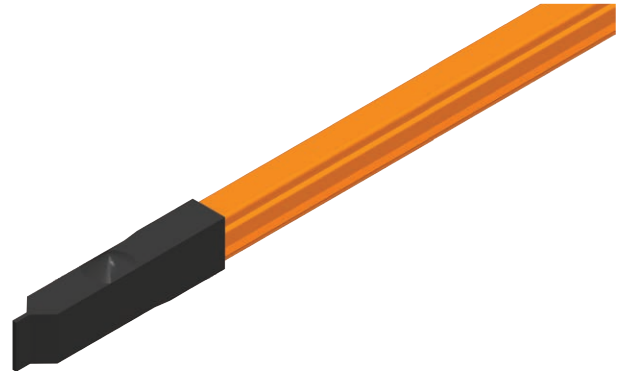
\* DURA-COAT bar comes with splices installed. The above part number represents only the Splice Cover.



# 1000 Amp

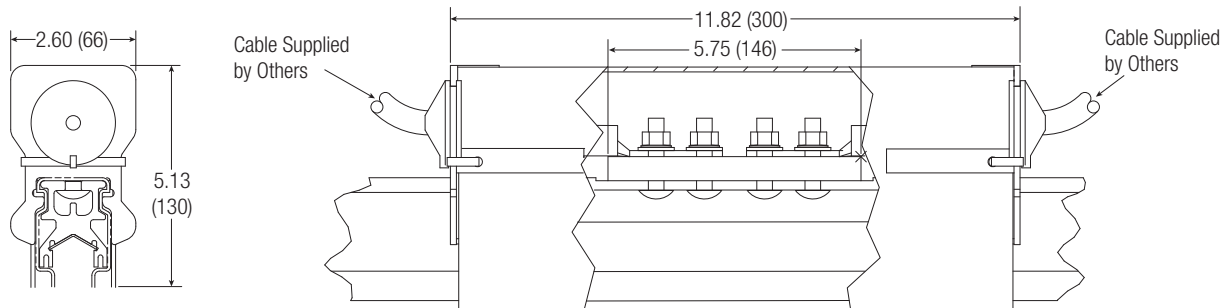
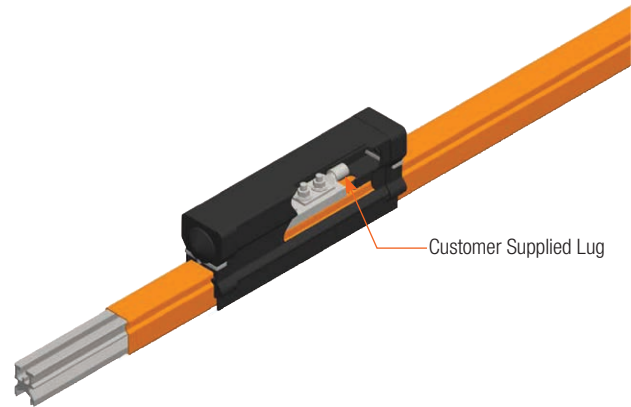
## End Cover

Type / Temperature Rating	Part No.
Phase & Ground for both Standard & DURA-COAT / 160° F & 250° F	XA-33796B
Fiberglass Reinforced Polyester 400° F	XA-23523
Weight: lb (kg)	1.72 (0.78)



## Power Feed

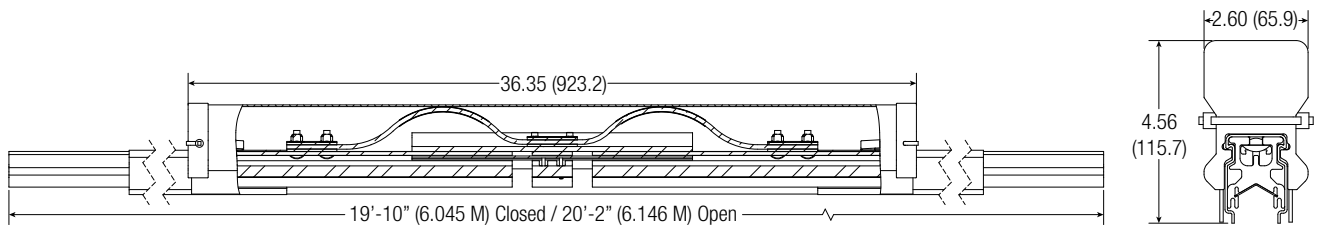
Type / Temperature Rating	Standard	DURA-COAT
PVC 160° F	XA-38184	XA-38184
Polycarbonate 250° F	XA-38184D	XA-38184D
Fiberglass Reinforced Polyester 400° F	XA-23530	N/A
Weight: lb (kg)	1.69 (0.77)	1.69 (0.77)



# 1000 Amp

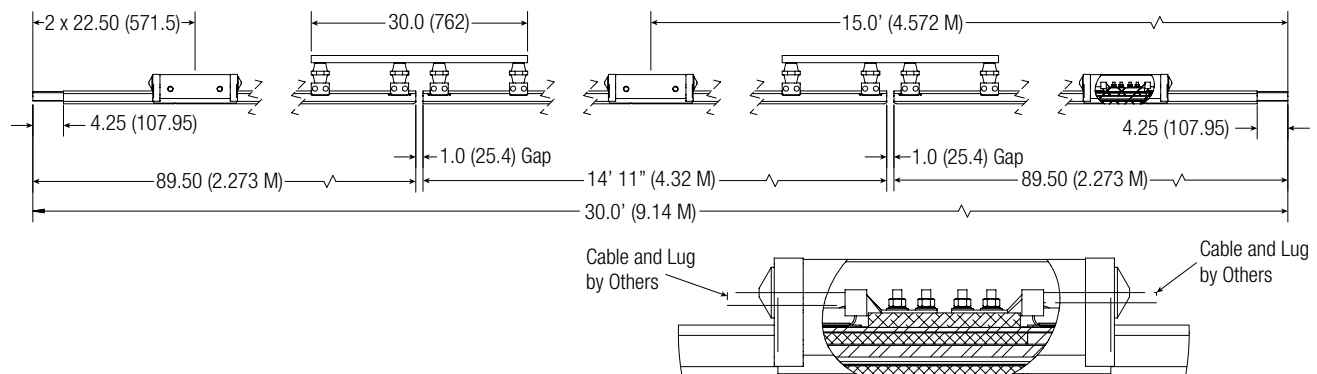
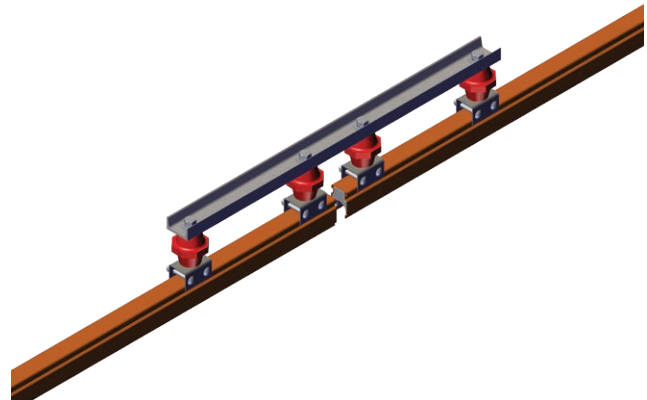
## Expansion Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-23512	XA-50743-J
Phase / Indoors (Green) 160° F	XA-23512G	XA-50743G-J
Phase / Outdoors UV Stable (Black) 160° F	XA-23512C	XA-50743B-J
Ground / Outdoors UV Stable (Green) 160° F	XA-23512E	XA-50743C-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50941	XA-50817-J
Ground / Indoors & Outdoors (Green) 250° F	XA-50941G	XA-501817G-J
Fiberglass Reinforced Polyester 400° F	XA-23514	N/A
Weight: lb. (kg)	40.0 (18.14)	40.0 (18.14)



## Power Interrupting Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-50755	XA-50758-J
Phase / Outdoors UV Stable (Black) 160° F	XA-50755B	XA-50755B-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50756	XA-50759-J
Fiberglass Reinforced Polyester 400° F	XA-50757	N/A
Weight: lb (kg)	79.0 (35.83)	77.0 (34.92)
Length: ft (m)	30.0 (9.144)	30.0 (9.144)

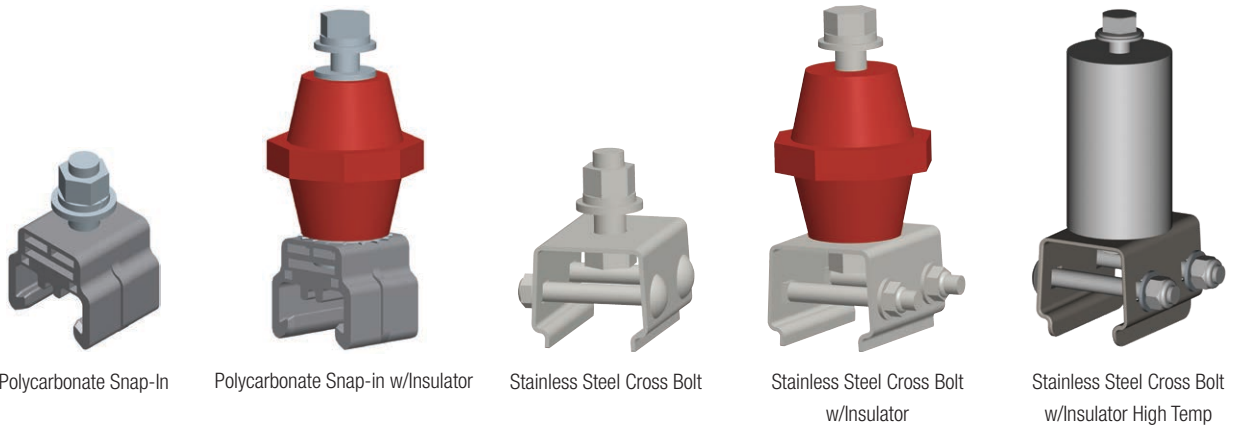


# 1000 Amp

## Hangers

Should be installed on brackets with a minimum thickness of 1/2" (12.7 mm).

For 700 Amp to 1500 Amp Bar	Plated Hardware	Stainless Steel Hardware	High Temp	Weight - lb. (kg)
Polycarbonate Snap-In	XA-23223	XA-28220	N/A	0.27 (0.13)
Polycarbonate Snap-In with Insulator	XA-24902	XA-24902B	N/A	0.83 (0.40)
Stainless Steel Cross Bolt	XA-27481	XA-27788	XA-51972	0.58 (0.28)
Stainless Steel Cross Bolt with Insulator	XA-27482	XA-32807	XA-588232	1.11 (0.53)

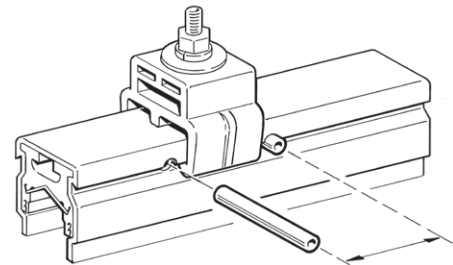
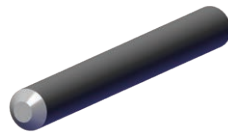


## Anchor Pin

Anchor Pins turn a hanger into an anchor. (2) required per Hanger.

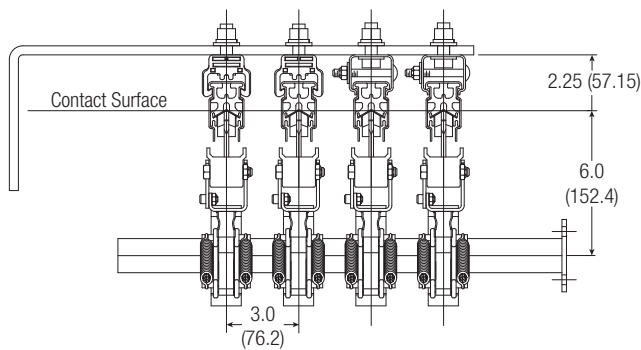
**NOTE:** Only for use with Plastic Hangers.

Part Number	Weight - lb. (kg)
XA-23946	0.1 (0.05)

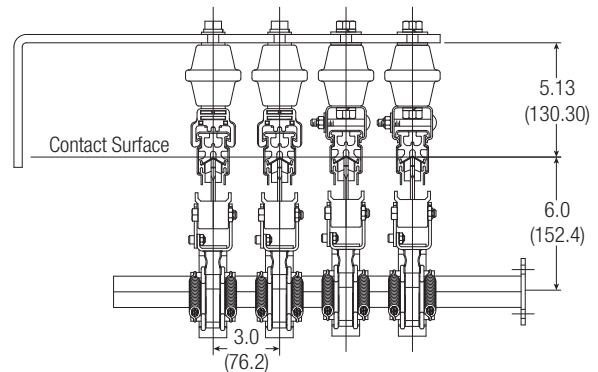


## 1000 Amp Installed Dimensions

### Standard Hanger



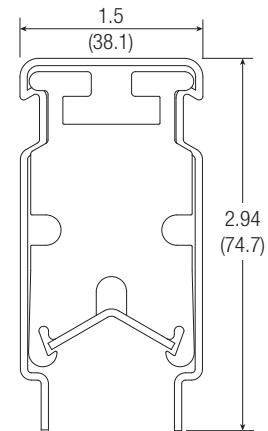
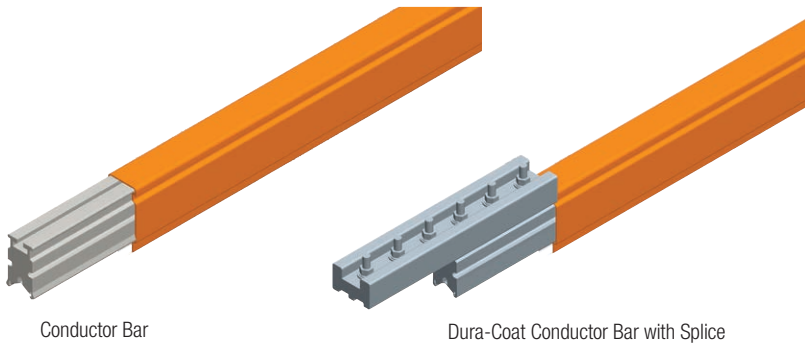
### With Insulators



# 1500 Amp

## Conductor Bar

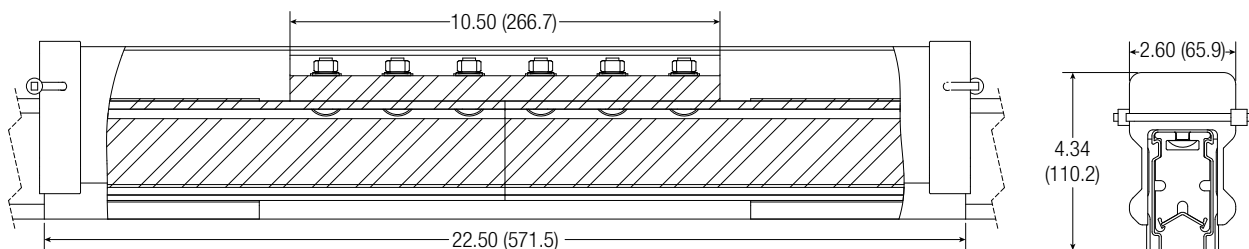
Type / Max Temp	Use (Color)	Standard	DURA-COAT with splice installed
		Conductor Bar	Conductor Bar
PVC 160° F	Phase / Indoors (Orange)	XA-24000	XA-50734-J
	Phase / Outdoors UV Stable (Black)	XA-24000C	XA-50734B-J
	Ground / Outdoors UV Stable (Green)	XA-24000D	XA-50734C-J
Polycarbonate 250° F	Phase / Indoors & Outdoors (Red)	XA-39296	XA-39430-J
	Ground / Indoors & Outdoors (Green)	XA-574096	XA-577244-J
Weight: lb. (kg)		96.0 (43.54)	97.0 (44)
Length: ft. (m)		30.0 (9.144)	30.0 (9.144)



## Splice

Type / Temperature Rating	Standard	DURA-COAT
	Splice	*Splice Cover
PVC / Indoors 160° F	XA-38968	XA-51297
PVC / Outdoors UV Stable 160°F	XA-38968	XA-51297
Polycarbonate / Indoors & Outdoors 250° F	XA-34802	XA-51297B
Weight: lb (kg)	3.8 (1.72)	1.4 (0.64)

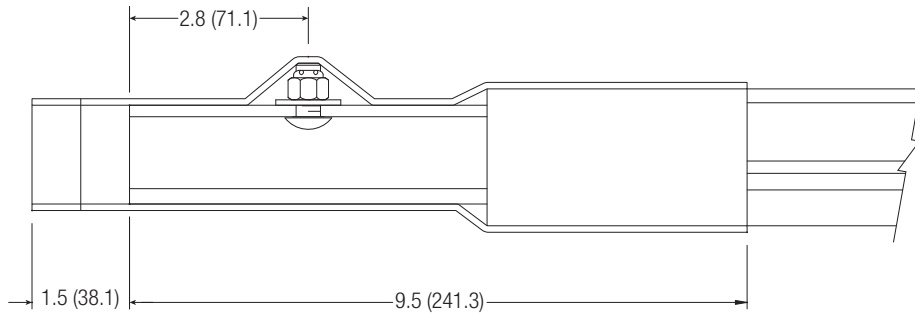
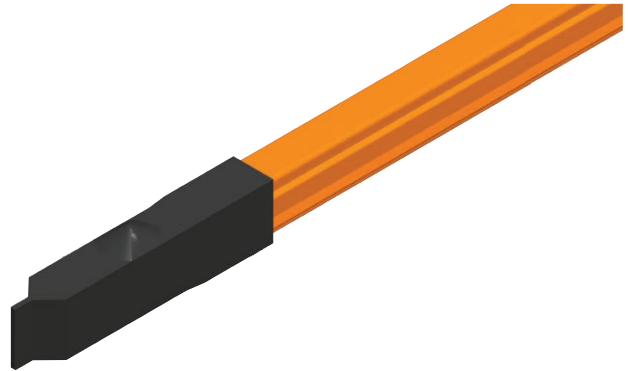
\* DURA-COAT bar comes with splices installed. The above part number represents only the Splice Cover.



# 1500 Amp

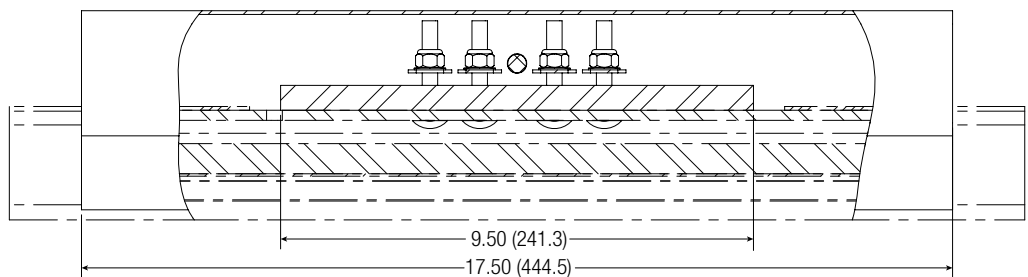
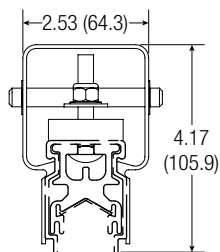
## End Cover

Type / Temperature Rating	Part No.
Phase & Ground for both Standard & DURA-COAT / all temperatures	XA-33796B
Weight: lb (kg)	1.72 (0.78)



## Power Feed

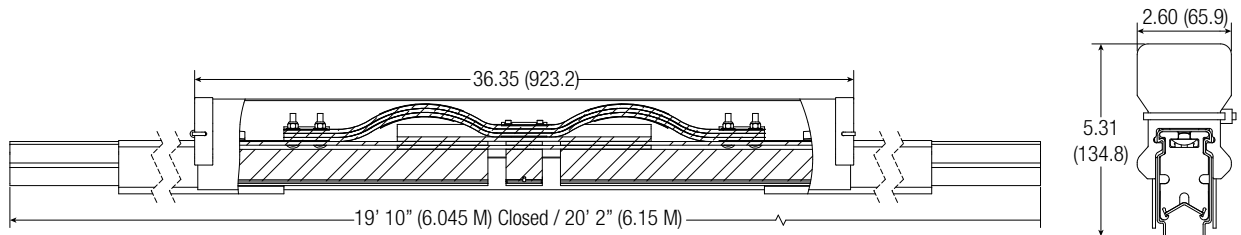
Type / Temperature Rating	Standard	DURA-COAT
PVC 160° F	XA-50227	XA-50227
Polycarbonate 250° F	XA-50227C	XA-50227C
Reinforced Polyester 400° F	XA-23530	N/A
Weight: lb (kg)	2.3 (1.04)	2.3 (1.04)



# 1500 Amp

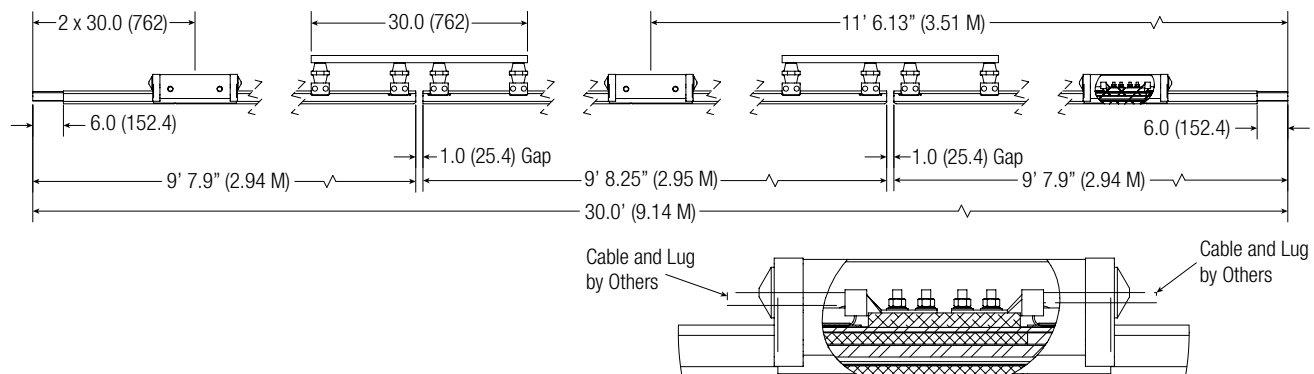
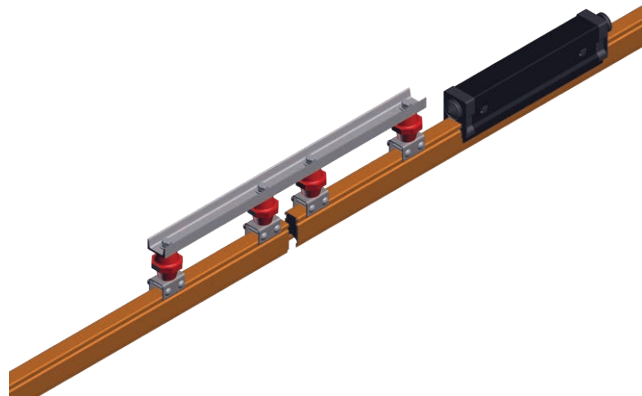
## Expansion Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-32820	XA-50742-J
Phase / Indoors (Green) 160° F	XA-32820G	XA-50742G-J
Phase / Outdoors UV Stable (Black) 160° F	XA-38952	XA-50742B-J
Ground / Outdoors UV Stable (Green) 160° F	XA-38952G	XA-50742D-J
Phase / Indoors & Outdoors (Red) 250° F	XA-39287	XA-50060-J
Ground / Indoors & Outdoors (Green) 250° F	XA-39287G	XA-50060G-J
Weight: lb. (kg)	71.0 (32.21)	72.0 (32.66)



## Power Interrupting Section

Use (Color) / Temperature Rating	Standard	DURA-COAT
Phase / Indoors (Orange) 160° F	XA-50760	XA-50762-J
Phase / Outdoors UV Stable (Black) 160° F	XA-50760B	XA-50762B-J
Phase / Indoors & Outdoors (Red) 250° F	XA-50761	XA-50763-J
Weight: lb (kg)	123.0 (55.80)	126 (57.15)
Length: ft (m)	30.0 (9.144)	30.0 (9.144)



# 1500 Amp

## Hangers

Should be installed on brackets with a minimum thickness of 1/2" (12.7 mm).

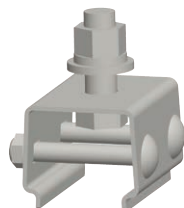
For 700 Amp to 1500 Amp Bar	Plated Hardware	Stainless Steel Hardware	High Temp	Weight - lb. (kg)
Polycarbonate Snap-In	XA-23223	XA-28220	N/A	0.27 (0.13)
Polycarbonate Snap-In with Insulator	XA-24902	XA-24902B	N/A	0.83 (0.40)
Stainless Steel Cross Bolt	XA-27481	XA-27788	XA-51972	0.58 (0.28)
Stainless Steel Cross Bolt with Insulator	XA-27482	XA-32807	XA-588232	1.11 (0.53)



Polycarbonate Snap-In



Polycarbonate Snap-in w/Insulator



Stainless Steel Cross Bolt



Stainless Steel Cross Bolt w/Insulator



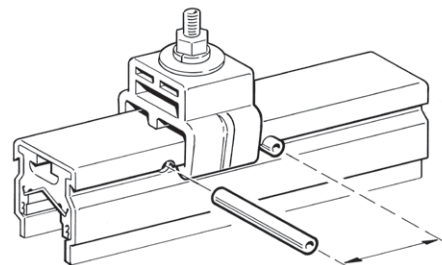
Stainless Steel Cross Bolt w/Insulator High Temp

## Anchor Pin

Anchor Pins turn a hanger into an anchor. (2) required per Hanger.

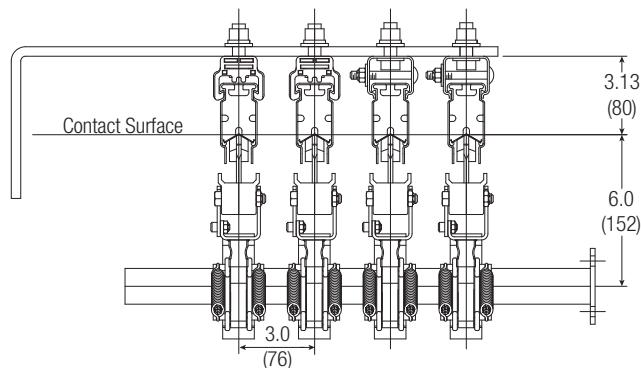
**NOTE:** Only for use with Plastic Hangers.

Part Number	Weight - lb. (kg)
XA-23946	0.1 (0.05)

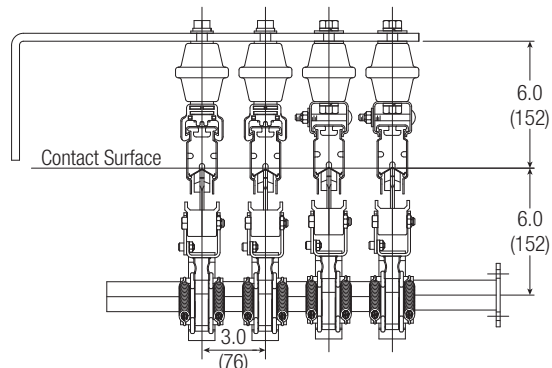


## 1500 Amp Installed Dimensions

### Standard Hanger



### With Insulators





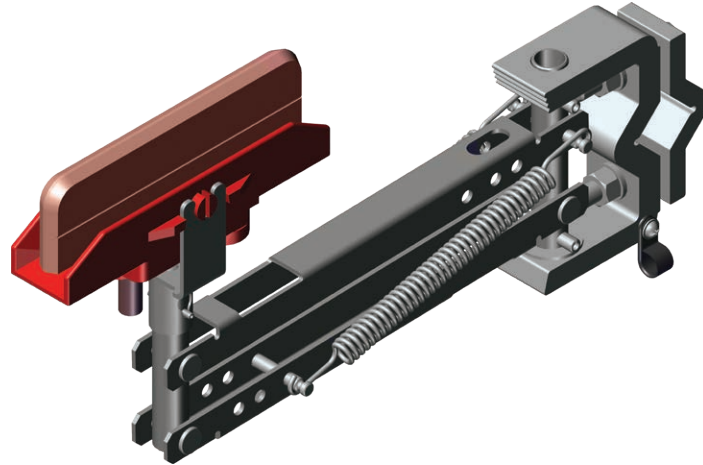
# Collectors & Replacement Shoes

All collectors include long-wearing copper graphite shoes (in holders) and "pigtail" wiring as noted below. For recommendations about choosing collectors, see Appendix I Pgs. 36-38.

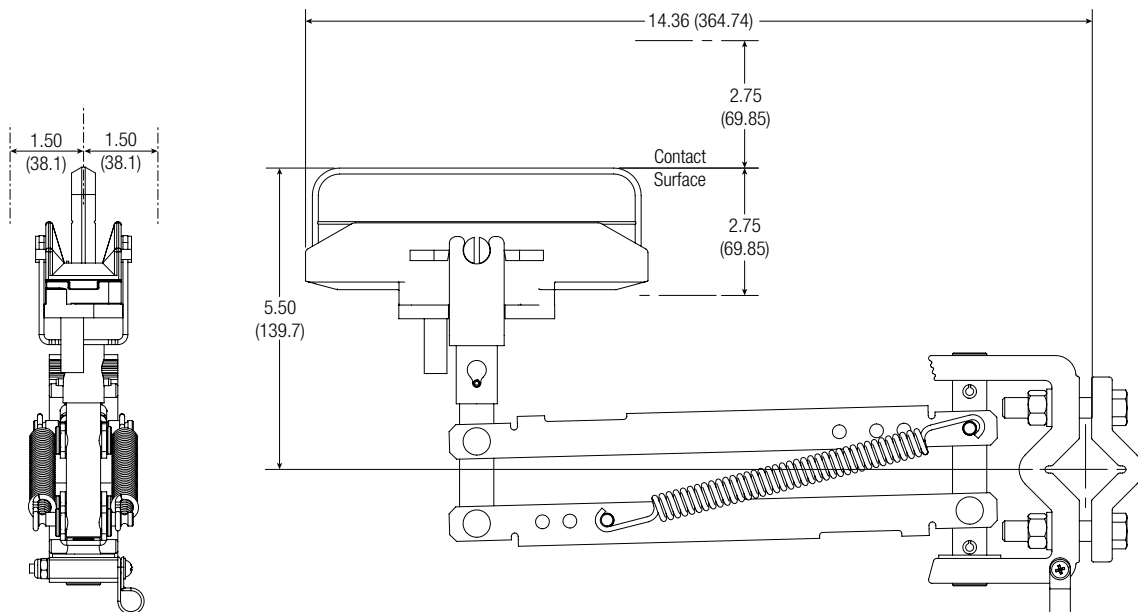
## 125 Amp Single Collector

21" long pigtails, 4 AWG, are supplied on the collector. Customer supplied wiring connects to the collector pigtail with in-line connectors.

**Used on 500A conductor bar only.**



Type	Part No.	Weight - lb (kg)
Standard Collector with Shoes	XA-30388	3.50 (1.58)
Stainless Steel Collector with Shoes	XA-50205	3.58 (1.76)
Lateral Mount Collector with Shoes	XA-532272	3.99 (1.81)
Corrosive Environment Collector with Shoes	XA-588351	6.54 (2.96)
Replacement Shoe (2 required per collector)	XA-30516	6.32 (2.87)
Cast Iron Cleaning Shoe (2 required per collector)	XA-39166	1.38 (0.63)



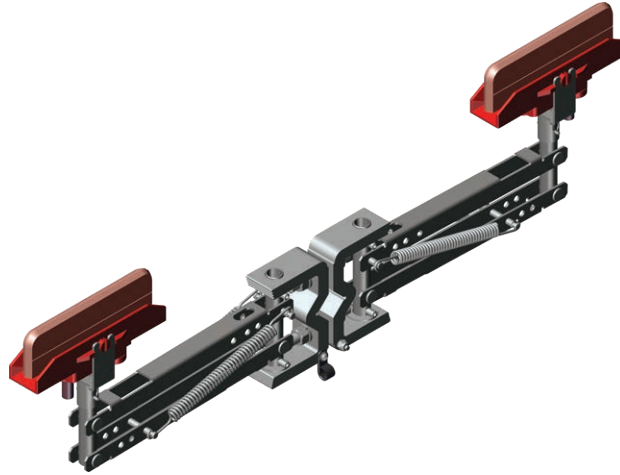
# Collectors & Replacement Shoes

All collectors include long-wearing copper graphite shoes (in holders) and "pigtail" wiring as noted below. For recommendations about choosing collectors, see Appendix I Pgs. 36-38.

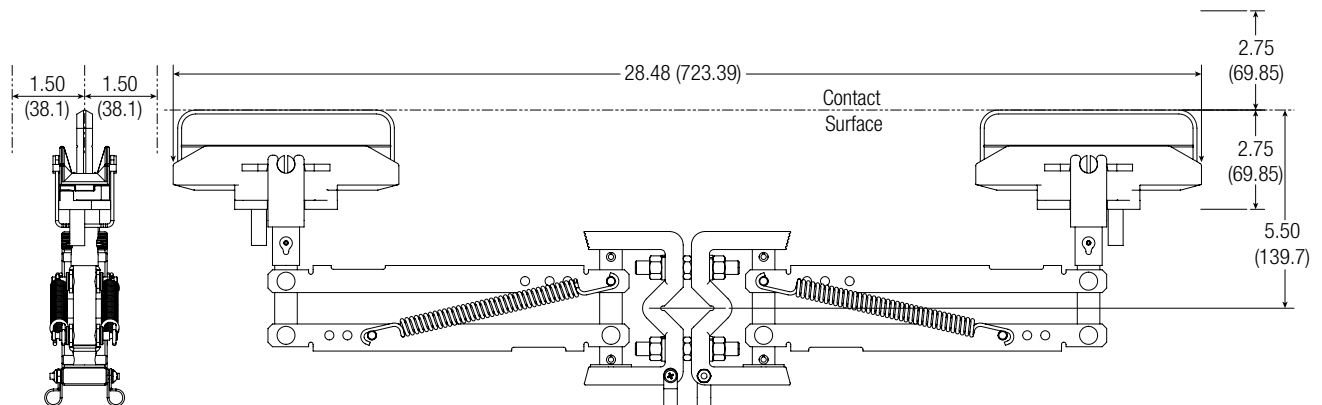
## 250 Amp Tandem Collector

21" long pigtails, 4 AWG, are supplied on the collector. Customer supplied wiring connects to the collector pigtail with in-line connectors.

**Used on 500A conductor bar only.**



Type	Part No.	Weight - lb. (kg)
Standard Collector with Shoes	XA-30389	6.54 (2.96)
Stainless Steel Collector with Shoes	XA-39752	6.76 (3.06)
Lateral Mount Collector with Shoes	XA-532273	6.39 (2.90)
Corrosive Environment Collector with Shoes	XA-583623	6.54 (2.96)
Replacement Shoe (2 required per collector)	XA-30516	1.0 (0.45)
Cast Iron Cleaning Shoe (2 required per collector)	XA-39166	1.38 (0.63)

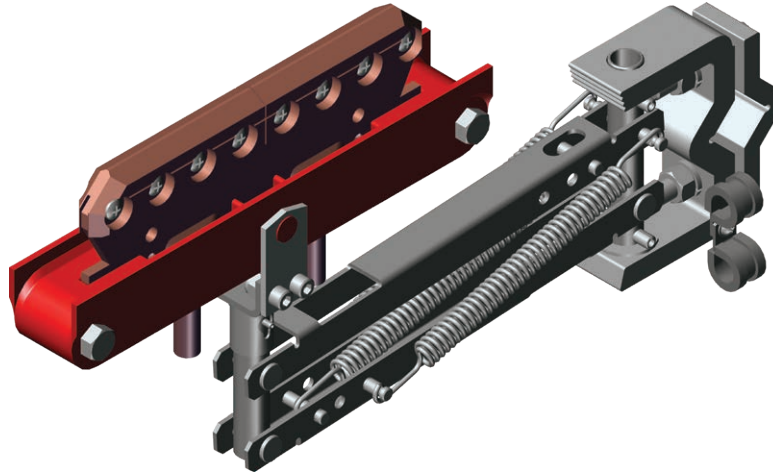


# Collectors & Replacement Shoes

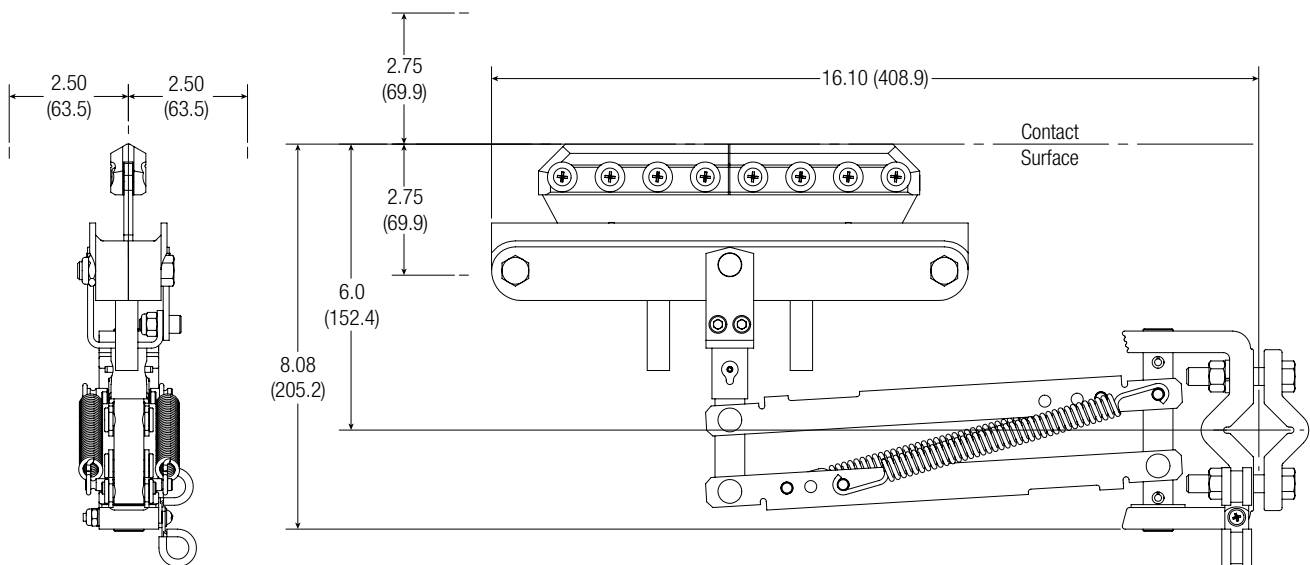
All collectors include long-wearing copper graphite shoes (in holders) and "pigtail" wiring as noted below. For recommendations about choosing collectors, see Appendix I Pgs. 36-38.

## 200 Amp Single Collector

42" long pigtails, 2 AWG, are supplied on the collector. Customer supplied wiring connects to the collector pigtail with in-line connectors. **Used on 700A - 1500A conductor bar only.** Note that the 300A version is the same as the 200A, except with an extra tension spring on the arm.



Type	Part No.	Weight - lb. (kg)
Standard Collector with Shoe	XA-24060	6.79 (3.08)
Stainless Steel Collector with Shoe	XA-51522	6.87 (3.11)
300 Amp Standard Collector with Shoe.	XA-24060Q	6.89 (3.12)
Replacement Shoe for Standard or Stainless	XA-11417X	0.76 (0.34)

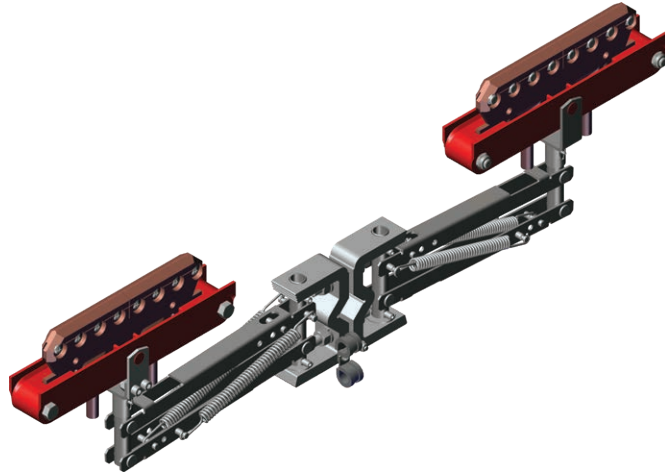


# Collectors & Replacement Shoes

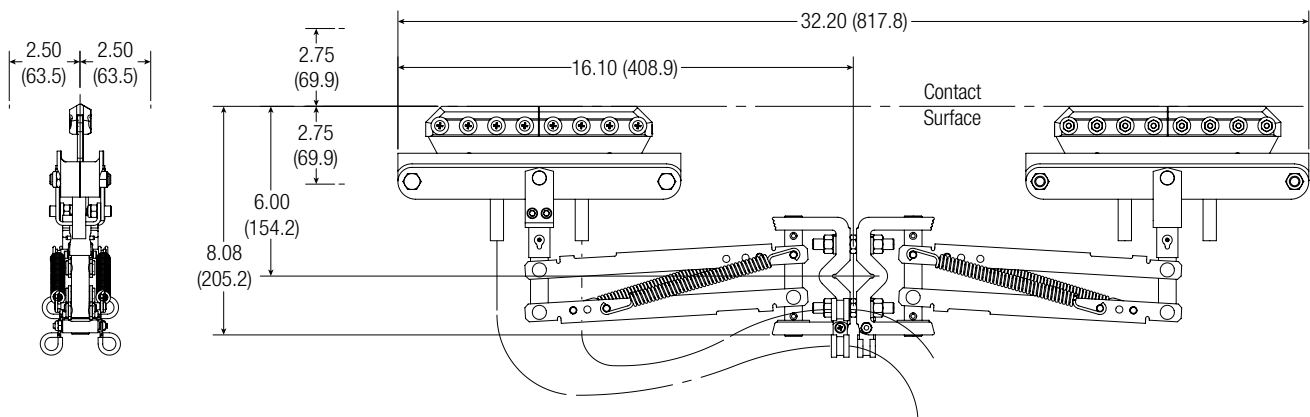
All collectors include long-wearing copper graphite shoes (in holders) and "pigtail" wiring as noted below. For recommendations about choosing collectors, see Appendix I Pgs. 36-38.

## 400 Amp Tandem Collector

42" long pigtails, 2 AWG, are supplied on the collector. Customer supplied wiring connects to the collector pigtail with in-line connectors. **Used on 700A - 1500A conductor bar only.** Note that the 600A version is the same as the 400A, except with one extra tension spring on each arm.



Type	Part No.	Weight - lb. (kg)
Standard Collector with Shoes	XA-24061	13.05 (6.04)
Stainless Steel Collector with Shoes	XA-39848	13.25 (6.01)
600 Amp Standard Collector with Shoes	XA-24061B	13.05 (6.04)
Replacement Shoe (2 required per collector)	XA-11417X	1.0 (0.45)



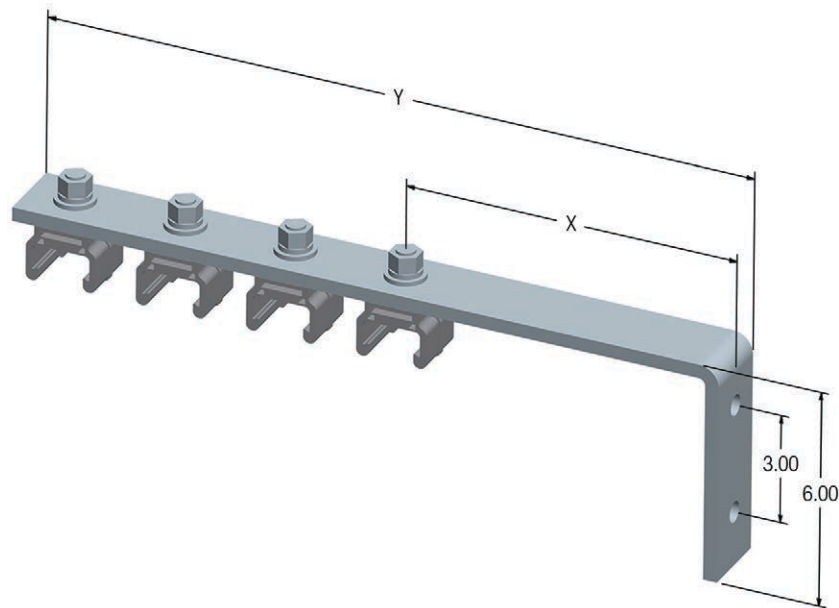
# 500 Amp - 700 Amp Support Brackets

The Hevi-Bar II Support Brackets listed below are for 500A - 700A conductors. They are available in three types as listed below and can be ordered in five different configurations:

- Bracket only (no hangers included)
- Bracket with four pre-installed hangers - standard Polycarbonate
- Bracket with four pre-installed hangers - standard Polycarbonate w/insulators
- Bracket with four pre-installed hangers - stainless steel cross-bolt
- Bracket with four pre-installed hangers - stainless steel cross-bolt w/insulators

All holes to accept hangers are 3" on-center and .56" diameter.

## Web Bracket

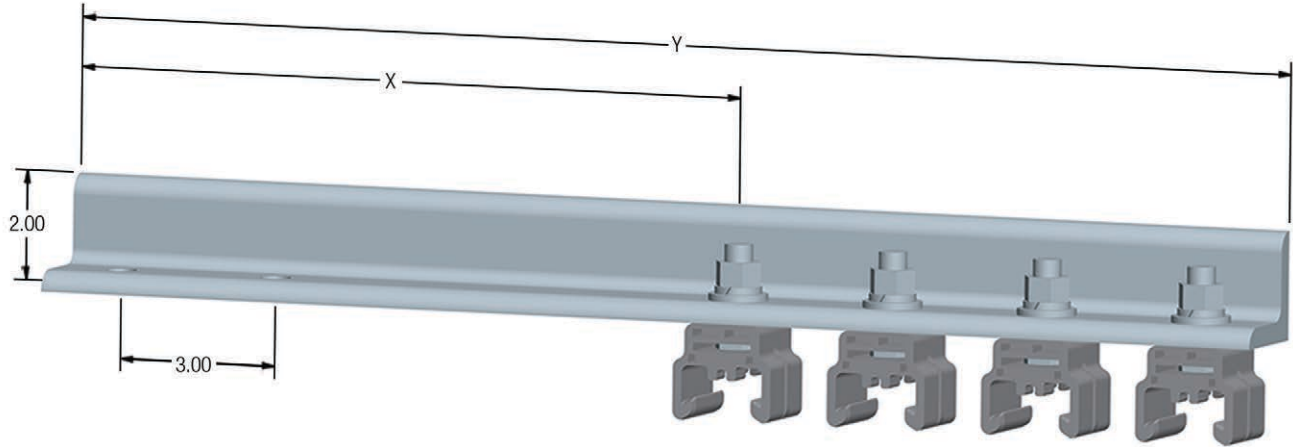


Ampacity	Bracket Finish	Dim X Inches (mm)	Dim Y Inches (mm)	Part No. Bracket Only	Wt. lb. (kg)	Part Numbers - With Four Hangers Pre-Installed			
						Standard Polycarbonate	Standard Polycarbonate with Insulator	Stainless Steel Crossbolt	Stainless Steel Crossbolt with Insulator
500	Plated Steel	6.0 (152)	16.25 (413)	XA-29441	4.4 (2.00)	XA-29440	XA-29440B	XA-29440C	XA-29440D
	Plated Steel	9.0 (229)	19.25 (489)	XA-30503	5.2 (2.36)	XA-51785	XA-51785B	XA-51785C	XA-51785D
	Plated Steel	11.0 (279)	21.25 (540)	XA-33655	7.3 (3.31)	XA-38268	XA-38268B	XA-38268C	XA-38268D
	Stainless Steel	9.0 (229)	19.0 (483)	XA-35337	6.7 (3.04)	XA-51786	XA-51786B	XA-51786C	XA-51786D
	Hot Dip Galvanized	9.0 (229)	19.25 (489)	XA-30697	5.0 (2.27)	XA-34814	XA-34814B	XA-34814C	XA-34814D
700	Plated Steel	6.0 (152)	16.25 (413)	XA-29441	4.4 (2.0)	XA-537794	XA-537794B	XA-537794C	XA-537794D
	Plated Steel	9.0 (229)	19.25 (489)	XA-30503	5.2 (2.36)	XA-537796	XA-537796B	XA-537796C	XA-537796D
	Plated Steel	11.0 (279)	21.25 (540)	XA-33655	7.3 (3.31)	XA-537795	XA-537795B	XA-537795C	XA-537795D
	Plated Steel	9.0 (229)	19.25 (489)	XA-30697	5.0 (2.27)	XA-537797	XA-537797B	XA-537797C	XA-537797D

# 500 Amp - 700 Amp Support Brackets

## Flange Bracket

Mounts to top flange of beam. Bracket is a 2"x 2" angle, by 3/8" thick. The first hole is 1 1/4" from the end.



Part Numbers - With Four Hangers Pre-Installed

Ampacity	Bracket Finish	Dim X Inches (mm)	Dim Y Inches (mm)	Part No. Bracket Only	Wt. lb. (kg)	Part Numbers - With Four Hangers Pre-Installed			
						Standard Polycarbonate	Standard Polycarbonate with Insulator	Stainless Steel Crossbolt	Stainless Steel Crossbolt with Insulator
500	Plated Steel	13.25 (337)	23.50 (597)	XA-30529	8.8 (4.0)	XA-30493	XA-30493B	XA-51878C	XA-51878D
700	Plated Steel	13.25 (337)	23.50 (597)	XA-30529	8.8 (4.0)	XA-51878	XA-51878B	XA-51878C	XA-51878D

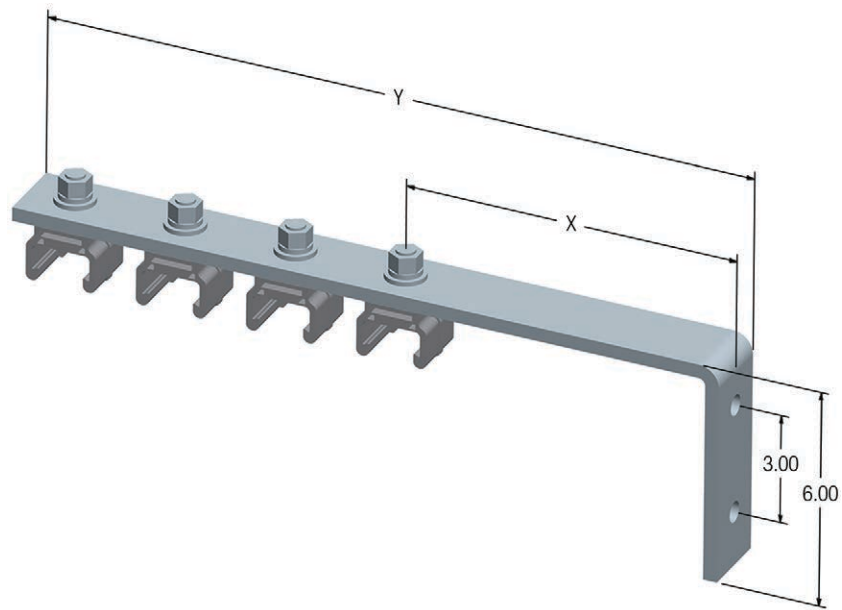
# 1000 Amp - 1500 Amp Support Brackets

The Hevi-Bar II Support Brackets listed below are for 1000A or 1500A conductors. They are available in three types as listed below, and can be ordered in five different configurations:

- Bracket only (no hangers included)
- Bracket with four pre-installed hangers - standard Polycarbonate
- Bracket with four pre-installed hangers - standard Polycarbonate w/insulators
- Bracket with four pre-installed hangers - stainless steel cross-bolt
- Bracket with four pre-installed hangers - stainless steel cross-bolt w/insulators

All holes to accept hangers are 3" on-center and .56" diameter.

## Web Bracket

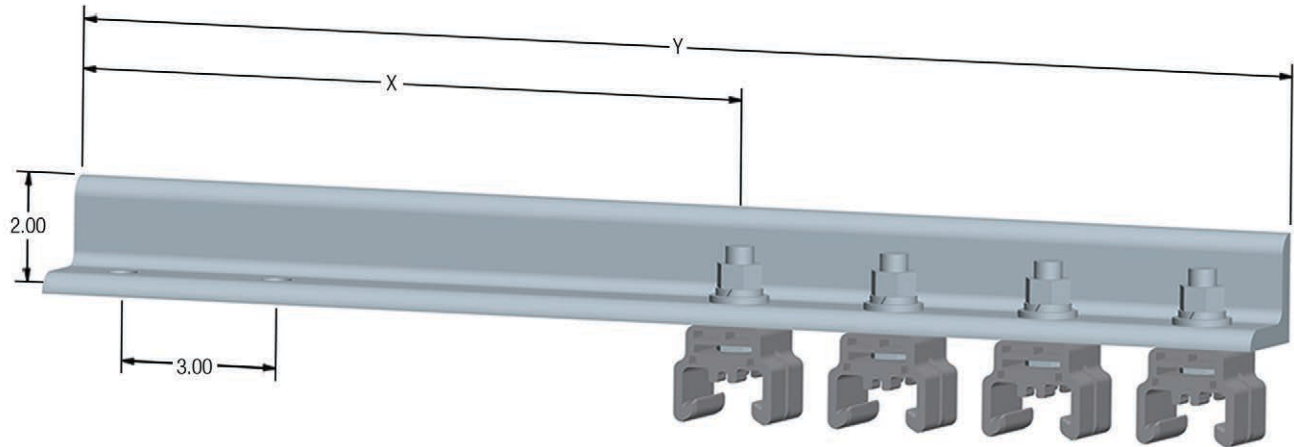


Bracket Finish	Dim X Inches (mm)	Dim Y Inches (mm)	Part No. Bracket Only	Wt. lb. (kg)	Part Numbers - With Four Hangers Pre-Installed			
					Standard Polycarbonate	Standard Polycarbonate with Insulator	Stainless Steel Crossbolt	Stainless Steel Crossbolt with Insulator
Plated Steel	6.0 (152)	16.25 (413)	XA-537552	5.9 (2.68)	XA-32893	XA-32893B	XA-32893C	XA-32893D
Plated Steel	9.0 (229)	19.25 (489)	XA-537554	6.7 (3.04)	XA-39923	XA-39923B	XA-39923C	XA-39923D
Hot Dip Galvanized	9.0 (229)	19.25 (489)	XA-537555	6.7 (3.04)	XA-32932	XA-32932B	XA-32932C	XA-32932D

# 1000 Amp - 1500 Amp Support Brackets

## Flange Bracket

Mounts to top flange of beam. Bracket is a 2"x 2" angle, by 3/8" thick. The first hole is 1 1/4" from the end.



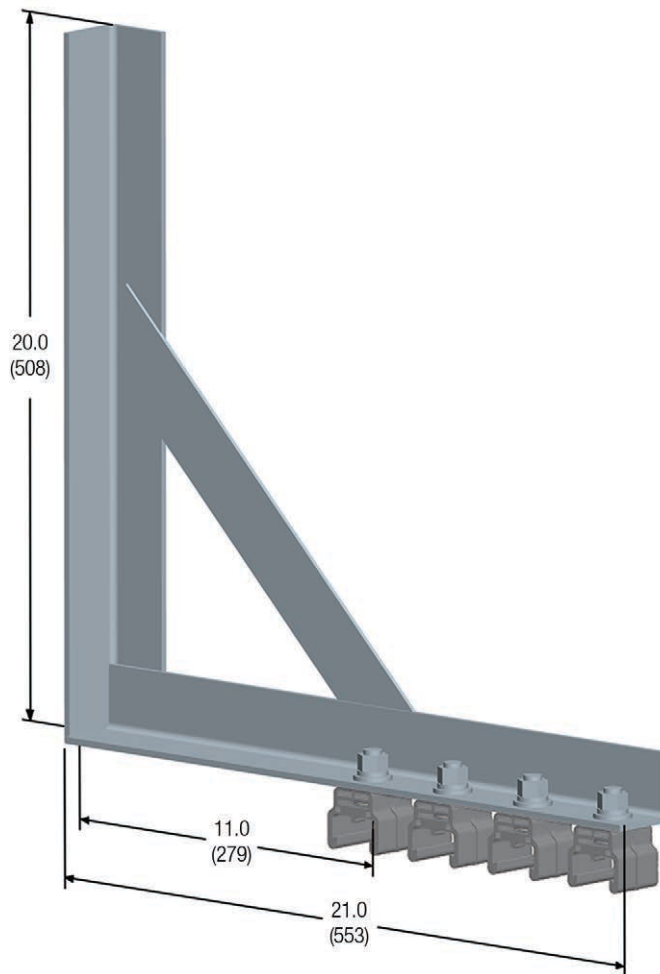
Bracket Finish	Dim X Inches (mm)	Dim Y Inches (mm)	Part No. Bracket Only	Wt. lb. (kg)	Part Numbers - With Four Hangers Pre-Installed			
					Standard Polycarbonate	Standard Polycarbonate with Insulator	Stainless Steel Crossbolt	Stainless Steel Crossbolt with Insulator
Plated Steel	13.25 (337)	23.50 (597)	XA-30529	8.5 (3.8)	XA-51878	XA-51878B	XA-51878C	XA-51878D



# 1000 Amp - 1500 Amp Support Brackets

## Braced Web Bracket

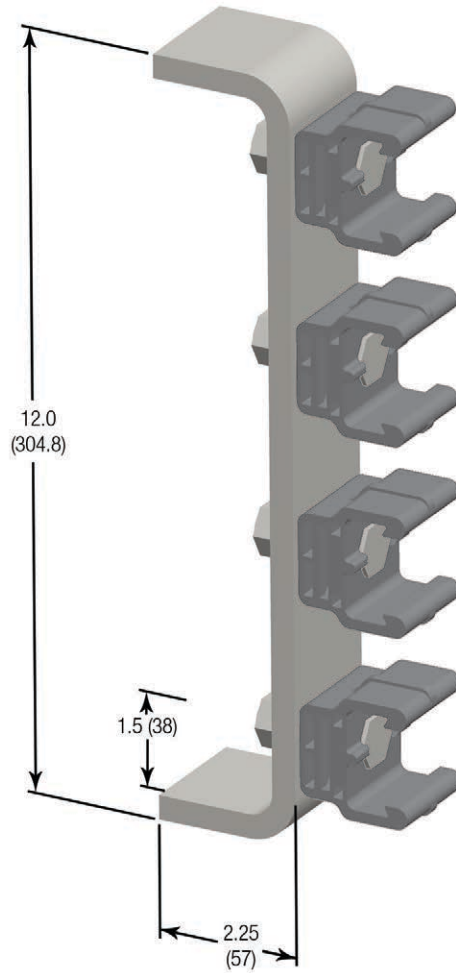
Plated steel weldment with brace, used for heavier conductor bar (e.g. 1500A).



Description	Hanger Type	Part Number	Weight - lb. (kg)
Bracket Only	n/a	XA-25720	9.5 (4.30)
Bracket with 4 Hangers Installed	Polycarbonate	XA-25691	10.5 (4.76)
Bracket with 4 Hangers Installed	Polycarbonate with Insulators	XA-25691B	14.2 (6.44)
Bracket with 4 Hangers Installed	Stainless Steel Cross Bolt	XA-25691C	11.9 (5.40)
Bracket with 4 Hangers Installed	Stainless Steel Cross Bolt with Insulators	XA-25691D	14.1 (4.39)

# Lateral Bracket

## Braced Web Bracket



Description	Hanger Type	Amperage	Part Number	Weight - lb. (kg)
Bracket Only	n/a	All	XA-50498	3.1 (1.41)
Bracket with 4 Hangers Installed	Polycarbonate	700, 1000, 1500	XA-51876	4.3 (1.95)
Bracket with 4 Hangers Installed	Polycarbonate with Insulators	700, 1000, 1500	XA-51876B	7.5 (3.40)
Bracket with 4 Hangers Installed	Stainless Steel Cross Bolt	All	XA-51876C	5.8 (2.63)
Bracket with 4 Hangers Installed	Stainless Steel Cross Bolt with Insulators	All	XA-51876D	8.8 (3.99)

# Specifications

## Conductor Bar Cover

	Cover Type:				
	Standard (Ground)	UV Resistant	Medium Heat	High Heat*	Bare Bar
Material	PVC	PVC	Polycarbonate	Fiberglass Reinforced	N/A
Color	Orange (Green)	Black / Green	Red / Green	Orange / Green	No Color
Temperature Rating	-10° F to 160° F -23° C to 71° C	-10° F to 160° F -23° C to 71° C	-25° F to 250° F -31° C to 121° C	-60° F to 400° F -51° C to 204.4° C	-40° F to 690° F -40° C to 365.5° C
Dielectric Strength	450 volts/mil	450 volts/mil	600 volts/mil	200 volts/mil	N/A
Volume Resistivity	>10 <sup>12</sup> (Ω/mil)	>10 <sup>12</sup> (Ω/mil)	>10 <sup>13</sup> (Ω/mil)	>10 <sup>11</sup> (Ω/mil)	N/A
Flame Test	Self Extinguishing	Self Extinguishing	Self Extinguishing	Self Extinguishing	N/A
Specific Density	1.5 g/cm <sup>3</sup>	1.5 g/cm <sup>3</sup>	1.15 g/cm <sup>3</sup>	1.24 g/cm <sup>3</sup>	N/A

\* 700 Amp and 1000 Amp only

## Conductor Bar

	Nominal Current of Bar:			
	500 Amp	700 Amp	1000 Amp	1500 Amp
Cross Sectional Area, in. (mm)	0.45 (11.4)	0.70 (17.8)	1.05 (26.7)	2.29 (58.2)
AC & DC Voltage	600	600/4160	600/4160	600/4160
DC Resistance at 20° C (Ω/ft.)	3.27 x 10 <sup>-5</sup>	2.11 x 10 <sup>-5</sup>	1.41 x 10 <sup>-5</sup>	0.64 x 10 <sup>-5</sup>
Phase Corrected Impedance Z at 20° C (Ω/ft.)	5.40 x 10 <sup>-5</sup>	4.21 x 10 <sup>-5</sup>	3.39 x 10 <sup>-5</sup>	2.28 x 10 <sup>-5</sup>
Conductor Length - ft. (m)	30.0 (9.1)	30.0 (9.1)	30.0 (9.1)	30.0 (9.1)
Support Spacing - ft. (m)	5 (1.52)	7.5 (2.28)	10 (3.05)	10 (3.05)
Spacing Between Conductors - in. (mm)	3.0 (76.2)	3.0 (76.2)	3.0 (76.2)	3.0 (76.2)
Expansion Sections not required for runs less than - ft. (m)	390 (11.9)	390 (11.9)	390 (11.9)	390 (11.9)
Minimum Bending Radius - ft. (m)	8.0 (2.4)	10.0 (3.05)	12.0 (3.7)	15.0 (4.6)

## Corrosion Protection

Hardware Type	Duty
Zinc Plated	Moderate
Stainless Steel	Severe
DURA-COAT	Extreme Duty

### Available Accessories (Contact Conductix-Wampfler)

- Thermostatically controlled heater wire system, for ice and snow environments (500A only)
- Transfer Caps for switches
- Pick-up Guides for discontinuous systems
- Vertical and horizontal curves

The appropriate conductor bar can be chosen only when all the relevant factors are known. Please refer to the Specification Data Sheet on Pg. 6, and to Appendices I through IV at the back of this catalog. Also, please consult Conductix-Wampfler Sales if you have any questions about the suitability of this product to your application.

# Appendix I - Selection of Systems

Carefully review your equipment and application to choose the correct system and reduce the risk of system failures, equipment downtime, and maintenance time and expense. There are eight interrelated factors that should be considered when selecting the correct system.

---

## Environmental Conditions

---

Have all aspects of the operating environment been accounted for?

- **Freezing Conditions** - Might require a **heater wire** to keep the conductor contact surface free from ice.
- **Water and/or Dust** - Might adversely affect components and might require the use of insulated hangers to better isolate the “live” conductors from ground.
- **Chemicals** - Can adversely affect system components. Acidic or basic fumes may require stainless steel hardware and components. With the Hevi-Bar II system, you may want to consider the optional “**Dura-Coat**” treatment to reduce component corrosion.
- **Cutting Oils** - May negatively affect polycarbonate components
- **Radiation** - May require the use of non-PVC components and non-galvanized plated components.

---

## Mounting and Installation

---

How will your system be mounted?

- **Bottom Entry** – Puts the running surface on the bottom side of the conductor, which keeps dust, water, or debris away.
- **Lateral (or side) Entry** – Can be used if space is limited. Lateral mounting is not recommended for dusty, outdoor, or wet conditions. You may be able to stagger the collectors to decrease the space required for the system.
- **Installation** – Collector Arms are designed to accommodate a certain amount of movement or misalignments between the crane/vehicle and the conductor. However, if misalignments are excessive the collector could disengage from the bar. **Poor collector installation is the single greatest cause of new system problems.** Installation Instructions should be strictly followed to optimize system performance and prevent problems. Manuals are available at [www.conductix.us](http://www.conductix.us).

---

## Number of Power and Bonding Conductors Required

---

Have you ordered enough conductor runs?

- **Power Legs** - Each “power leg” requires one run of bar
- **Bonding (Ground) Bar** - Per article 610.61 (National Electrical Code): “The trolley frame and bridge frame shall not be considered as electrically grounded through the bridge and trolley wheels and its respective tracks. A separate bonding conductor shall be provided”. A bonding bar is required for all overhead cranes built after 2004.

---

## Moving Versus Stationary Applications

---

Is the equipment moving or stationary when operating?

- **Moving Machine** - Draws maximum power as it moves. Current-induced heat is dissipated over a wider area of the conductor.
- **Stationary Machine** - Draws maximum power while stationary for extended periods (e.g.: weld stations, testing equipment, or cranes that repeatedly lift in the same location). Current-induced heat is not easily dissipated when collectors are stationary. In these cases, verify that the collectors and conductors are adequate for the application.

---

## Current and Voltage Requirements

---

The purchase of a new conductor system affords the opportunity to size the system for additional cranes or larger cranes that may be added in the future. A small investment now could avoid major investments in the future.

- **Conductor Bar Rating** – Per NEC Article 610-14, the bar must accommodate 100% of the current of all the largest motors involved in a single movement, plus 50% of the next largest motors. The auxiliary hoist motor must be included if it works in conjunction with the main hoist. The system also must accommodate 100% the current draw of auxiliary equipment such as magnets, lighting, air conditioners, etc. that operate when the largest motors are energized.
- **Multiple Cranes on a Single Runway** – Sum the amperage requirements of each crane, then apply the appropriate “diversity factor” (NEC Table 610-14e). All cranes do not pull the maximum load all the time or pull the load at the same time.
- **Two Cranes Working in Tandem** - Do not apply the diversity factor, since both run at the same time. See Specification Data Sheet, Pg. 4-5 for further “total load” calculation details.

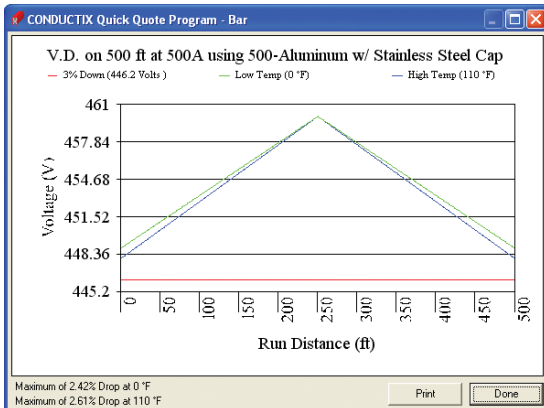
# Appendix I - Selection of Systems

- **Voltage Rating** - 600 volt rated insulators are standard. Higher voltages require insulators designed for that voltage. Conductor separation may also be affected for medium voltage (e.g. 4160 volts) and higher. The conductor system may need to meet the fault force requirements as determined by a qualified engineer.

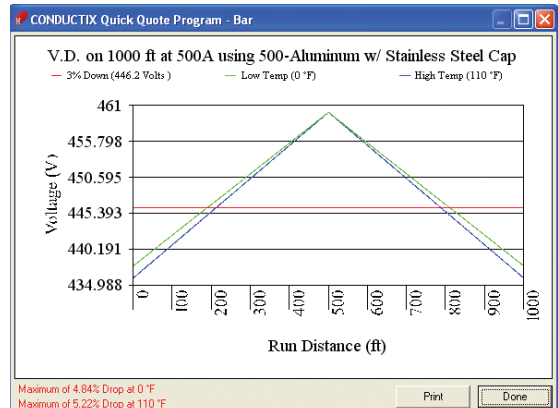
## Voltage Drop and Power Feed Locations

Voltage drop along a conductor increases as system length increases and as ambient temperature increases.

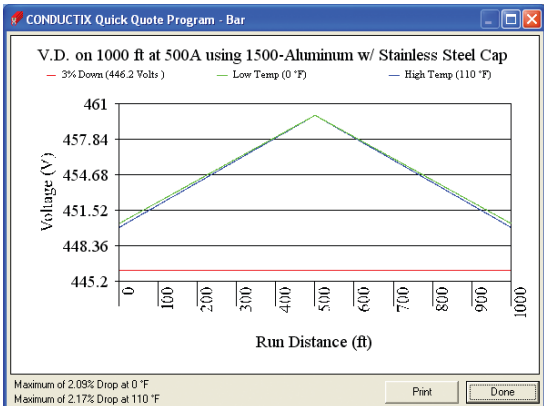
- **Maximum Voltage Drop** - The CMAA (Crane Manufacturers Association of America) recommends a maximum voltage drop of 3% on runways and 2% on bridges. The voltage drop in volts will vary according to voltage available. For example, a 3% voltage drop on a 480 volt system is 14.40 volts; a 3% voltage drop at 115 volts is 3.45 volts.
- **Center Power Feed** - Is the optimal location for most systems. Longer runs may require multiple power feed locations to compensate for voltage drop and to minimize the total cost of the system.
- **Multiple Power Feeds** - Can reduce total system cost if the savings of a lower capacity bar offset the cost to install the multiple power feed locations.
- **Calculating Voltage Drop** - Can also be manually calculated – see Appendix II, Pg. 39.



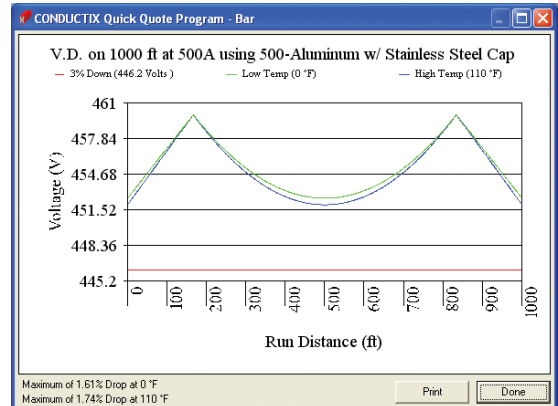
**Figure 1:** Center Feed Example - Voltage drop along a 500 foot long runway with one crane drawing 500 amps at 460 volts on a 500 amp rated bar. The green line shows the voltage drop along the run at 00 F. The blue line shows the voltage drop at 1100 F. The red line indicates the 3% maximum voltage drop. The voltage drop increases linearly as you move away from the center feed point.



**Figure 2:** Same parameters as Fig. 1, except with a 1000 foot system. Note that the voltage drop is now greater than the recommended 3%.



**Figure 3:** Center Power Example: With higher capacity 1500 amp bar to lower the voltage drop below 3%.



**Figure 4:** Two power feeds optimally located. The voltage drop remains under 3% , without the need to increase conductor capacity. A load positioned between the two feed points is supplied by both power feeds.

# Appendix I - Selection of Systems

---

## Thermal Expansion/Contraction and Other Effects of Heat

---

The effects of thermal expansion and contraction become more pronounced as the length of the run increases. The combination of ambient heat plus current-induced heat affects the size of conductor bar needed, the power feed arrangement, and the type of insulating cover required.

- **“Snaking”** – Occurs when the conductors heat up, and due to cumulative hanger friction, start to bow to the side. This can be observed by sighting down the runway. Each bar will bow alternately left and right between hangers, which puts strain on the collectors and hangers. Eventually, the collectors can disengage and damage the system.
- **“Snaking” - Older Systems** - May begin after a year or two in operation. This is because accumulated dirt increases friction between bar and hangers. This possibility should be considered when determining the number of expansions. Precautions taken at the time of installation could avoid costly repairs later.
- **Shorter Systems** - Can be anchored in the center. As the temperature of the conductor rises, the expansion simply pushes the bar outward. The longest system that can be successfully “center-anchored” depends on the friction of the hangers and the rigidity of the conductor.
- **Longer Systems** - Require the installation of one or more “Expansion Sections” - i.e. lengths of conductors designed to slide in and out to absorb bar expansion/contraction between anchor points. The slider is bridged by a jumper cable to maintain electrical continuity and acts as the running surface for the collector. Expansion sections effectively break the run into smaller lengths defined by the anchor points. The length of run an expansion section can accommodate is based on expansion/contraction parameters, including temperature range, conductor material, and the length of the slider. The high end of the temperature range is the sum of current-induced heat of the bar (at maximum load) plus the highest ambient temperature. The low end is the lowest ambient temperature, which may occur during a January system shutdown. Conductor sections need to be anchored properly between each expansion and between the last expansion and the end of the run.
- **Ambient Heat** – All heat sources must be considered and evaluated for their effect on the conductor and cover. Typical heat sources are furnaces, billets, slag, etc. Ambient heat is easy to measure and the effects are consistent with measured values.
- **Radiant Heat** - Can be difficult to measure and its effects hard to anticipate. It will directly affect cover, and the cover might withstand it. However, the effect on metal components might be even more pronounced. For example, metal hangers may heat to such a degree that they will melt the cover. Heat shields provide a good way of minimizing the effects of radiant heat. If heat shields are not practical, higher temperature rated covers might be required.
- **Total Operating Temperature** – The sum of the ambient temperature, radiant heat, and current-induced temperature rise. This is the total heat the conductor and its cover material must withstand. For example, if your machine is working in an ambient temperature of 120° F (49° C), and the current-induced temperature rise of the conductor adds another 50° F, the total 170° F (76.7° C) exceeds the PVC cover rating of 70° C (156° F). The cover will deform or melt, and interfere with collector tracking and/or interrupt power. In this scenario, the cover must be made from a heat-resistant material. Conductix-Wampfler offers “Medium Heat” or “High Heat” covers for most systems – see Pg. 4.

---

## Conductor Bar Current Rating and Duty Cycle

---

- **Conductor Electrical Capacity** – A wide variety of capacities are offered, since conductors often power multiple vehicles. Ratings are based on the electrical load the conductor can handle before the operating temperature of the bar exceeds the temperature rating of its cover. The rating assumes a certain ambient temperature (e.g.: 49° C or 120° F) and a specific duty cycle.
- **Duty Cycle** - One manufacturer may rate their conductors for continuous duty; others for intermittent duty based on a given duty cycle. It is important to know which was used to establish the ratings.
- **Continuous Duty** - A conductor is put under a continuous load at some “normal” ambient, usually 30° C. Once the bar temperature has stabilized at the target load rating, the bar temperature cannot exceed the temperature rating of the cover. Most PVC covers can handle approximately 70° C, which is a 40° C rise over 30° C ambient.
- **Intermittent Duty** - Assumes that the current is “on” for a period of time and “off” for a period of time; i.e.: one “duty cycle”. The conductor is allowed to cool between “on” phases. A 50% duty cycle is most common – i.e.: one minute on and one minute off. Since a crane cannot lift continuously, nor is current flowing at maximum for long periods of time, most operate at a 40% duty cycle or less. So a 50% duty cycle is sufficient. However, cranes that see heavy duty, especially Class D and E cranes (see end of this Appendix), may push the conductor beyond a 50% intermittent duty rating.
- **Collector Electrical Capacity** – A limited selection of collector capacities is available, since collectors only power the crane/vehicle they service. Additional collectors can be used if the crane/vehicle load exceeds the collector rating. Note that the load will not be shared equally among multiple collectors. The collector closest to the power feed will carry a larger load than those farther down the line. So when using multiple sets of collectors, make sure the collector capacities are adequate for this scenario

# CMAA Crane Classifications

Provided for general information only. Refer to CMAA Section 78-6 for full definitions.

**Class A (Standby or Infrequent Service)** Performs precise lifts at slow speed, with long idle period between lifts. Performs lifts at full or near rated capacity. Power houses, public utilities, turbine rooms.

**Class B (Light Service)** Light service requirements at slow speed. Performs 2 to 5 lifts/hour, light to occasional full loads, at 10 ft. average height. Repair shops, light assembly, service buildings, light warehousing.

**Class C (Moderate Service)** Moderate service requirement with loads averaging 50% of capacity. 5 to 10 lifts per hour at 15 ft. average lift height. Not more than 50% of lifts at rated capacity. Machine shops, paper mill machine rooms, etc.

**Class D (Heavy Service)** Bucket/magnet duty, where heavy duty production is required. Loads of 50% capacity handled constantly. 10 to 20 lifts per hour averaging 15 ft. lift height. Not over 65% of the lifts at rated capacity. Heavy machine shops, foundries, fabricating plants, steel warehouses, container yards, lumber mills, etc.

**Class E (Severe Service)** Loads approaching capacity throughout the life of the crane. 20 or more lifts per hour at or near rated capacity. Magnet/bucket cranes for scrap yards, cement mills, lumber mills, fertilizer plants, container handling.

**Class F (Continuous Severe Service)** Handles loads approaching capacity continuously under severe service conditions throughout the life of the crane. Includes custom designed specialty cranes performing work critical to the total production facility. Needs to have the highest reliability and ease of maintenance.

**For system recommendations based on Crane Class, contact Conductix-Wampfler Sales.**

# Appendix II - Voltage Drop Calculations

Proper selection of conductor and covers for Conductix-Wampfler conductor systems is simple, requiring only the ampacity, voltage and ambient conditions.

The method for determining the rating for cranes and hoists is completely outlined in NEC 640-14(e). Further reference to the Code is made where applicable.

- I. For a single crane, simply use the nameplate full load ampere rating of the largest motor or group of motors for any one function plus half the rating of the next largest motor or motor groups.

$$\begin{aligned} \text{Hoist} &= 65\text{A} \times 1 = 65.0 \\ \text{Bridge} &= 27\text{A} \times .5 = 13.5 \\ \text{Total} &= \underline{78.5\text{A}} \end{aligned}$$

For multiple cranes, use the same method for each crane, add the results and multiply by the demand factor shown in table 610-14(e) NEC Book. Examples with data taken from motor nameplates - all are 460V, 3-phase, 60 Hz.

$$\begin{aligned} \text{Crane \#1} \\ \text{Hoist} &= 65\text{A} \times 1 = 65.0 \\ \text{Bridge} &= 27\text{A} \times .5 = 13.5 \\ \text{Total} &= \underline{78.5\text{A}} \end{aligned}$$

$$\begin{aligned} \text{Crane \#2} \\ \text{Hoist} &= 52\text{A} \times 1 = 52.0 \\ \text{Bridge} &= 14\text{A} \times .5 = 7.0 \\ \text{Total} &= \underline{59.0\text{A}} \end{aligned}$$

$$\text{Total of \#1 + \#2} = 137.5 \times .195 = 130.0\text{A}$$

- II. When the motor ampere ratings are unknown, a good approximation may be made using the nominal horse power ratings of the motors, converting them to full load amperes per NEC table 430-150; then proceeding as above. If the motors are not three-phase, applicable tables 430-137 through 430-149 must be used.

A few examples from the tables are:

## Full-Load Current (Three-Phase Alternating-Current Motors)

HP	230V	460V	575V
10	28	14	11
15	42	21	17
20	54	27	22
25	68	34	27
30	80	40	32
40	104	52	41
50	130	65	52
60	154	77	62
75	192	96	77
100	248	124	99
125	312	156	125
150	360	180	144
200	480	240	192

## Full-Load Current in Amperes, Direct Current Motors Armature Voltage Rating (Direct-Current)

HP	240V	HP	240V
10	38	60	206
15	55	75	255
20	72	100	341
25	89	125	425
30	106	150	506
40	140	200	675
50	173		

## Voltage Drop

Voltage drop is the difference between the voltage at the feed point and the voltage at the extreme end. It is usually expressed as a percentage of the supply voltage and can be calculated as shown below.

Voltage drop increases in direct proportion to the length of the conductors. The CMAA specifications limit total voltage drops to 3% on runways and 2% on bridge conductors. Since power feeds are usually located at the mid-point of a system, the effective length is the distance from power feed to the end of the runway. On longer systems it may be necessary to provide additional feed points.

## Voltage Drop per 100 Ft. of run, per 100 Amps of Current

Conductor	3-Phase 60 Hz	D.C.	Example
Stainless Steel 40 Amp	35.2	44.6	Rolled Copper 3-phase 350' long, 250 Amp load.  VD = 1.39 x 3.5 x 2.5 = 12.1 volts  Assume load pF is 90
Galvanized Steel 90 Amp	16.2	15.0	
Galvanized Steel 110 Amp	10.1	7.1	
Stainless Clad Copper 250 Amp	2.01	2.0	
Copper Steel Laminate 250 Amp	2.01	2.0	
Rolled Copper 350 Amp	1.39	1.2	
Solid Copper 500 Amp	1.08	0.8	

## 3% at Max Amps and Length from Power Feed

Bar	Amps	480V	240V
SS	40	102'	51'
Galv	90	99'	49'
Galv	110	130'	65'
SS/CU	250	287'	144'
CU/Galv	250	287'	144'
Rolled Cu	350	296'	148'
Solid CU	500	381'	191'

3% of 480V = 14.4  
3% of 240V = 7.2  
3% of 180V = 9.6  
3% of 120V = 4.8



# Appendix III Electrical Formulas & Conversions

## Electrical Formulas

### Ohms Law

$$\text{Ohms} = \frac{\text{volts}}{\text{amperes}}$$

$$\text{Amperes} = \frac{\text{volts}}{\text{ohms}}$$

$$\text{Volts} = \text{amperes} \times \text{ohms}$$

### Power

$$\text{Watts} = \text{amperes} \times \text{volts}$$

$$\text{Amperes} = \frac{\text{watts}}{\text{volts}}$$

(not 3-Phase)

$$\text{HP} = \frac{\text{volts} \times \text{amps} \times \text{efficiency}}{746}$$

$$\text{Power Factor} = \frac{\text{watts}}{\text{amperes} \times \text{volts}}$$

$$\text{3-phase Kilowatts} = \frac{\text{volts} \times \text{amperes} \times \text{power factor} \times 1.732}{1000}$$

$$\text{3-phase Amperes} = \frac{746 \times \text{HP (Horsepower)}}{1.732 \times \text{volts} \times \text{efficiency} \times \text{power factor}}$$

$$\text{3-phase Volt-Amperes} = \text{volts} \times \text{amperes} \times 1.732$$

$$\text{Single-phase Kilowatts} = \frac{\text{volts} \times \text{amperes} \times \text{power factor}}{1000}$$

$$\text{Single-phase Amperes} = \frac{746 \times \text{HP (Horsepower)}}{\text{volts} \times \text{efficiency} \times \text{power factor}}$$

### Speed

$$\text{Synchronous RPM} = \frac{\text{Hertz} \times 120}{\text{poles}}$$

$$\text{Percent Slip} = \frac{\text{Synchronous RPM} - \text{Full Load RPM}}{\text{Synchronous RPM}} \times 100$$

### Metric Conversion Formulas

To Obtain	Calculate
Millimeters	Inches x 25.4
Inches	Millimeters x 0.0394
Meters	Feet x .3048
Feet	Meters x 3.281
Square Centimeters	Square Inches x 6.45
Square Inches	Square Centimeters x 0.155
Kilograms	Pounds x 0.4536
Pounds	Kilograms x 2.205
Kilograms per Meter	lb./ft. (divided by) 0.6719
Pounds per Foot	Kg/m x .6719
Degrees Celsius	(Degrees F-32) x 5/9
Degrees Fahrenheit	(Degrees C x 9/5) + 32

# Appendix IV - Power Interrupting Sections

Power can be shut off in a designated area along a bar system, either to safely maintain vehicles, or for some other purpose, while leaving the rest of the system powered. The shut off zone can be configured at the end of or in the middle of the system using a "Power Interrupting Section". The following diagrams show how this is set up. Note that Tandem Collectors can bridge across the "isolation joint" of an isolation section, so enough Power Feeds and Isolation Sections must be used to ensure correct power switching.

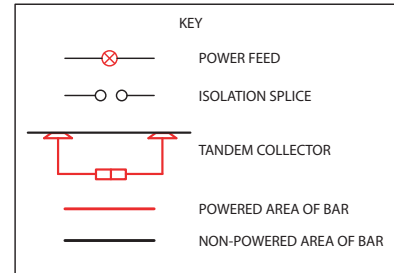
## End Power Interrupting Sections

### Safe-Lec 2: For each power phase order:

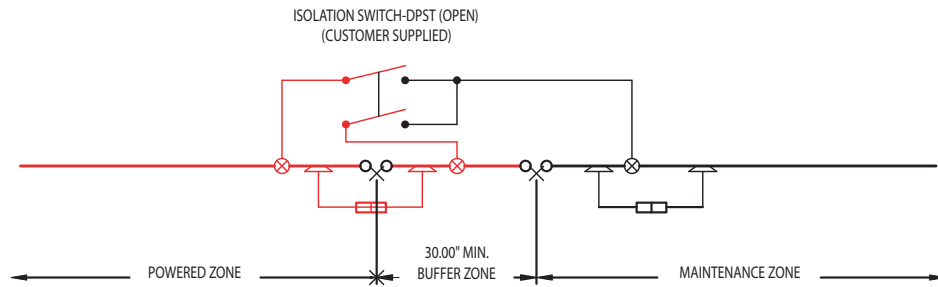
- Qty. 1 - "Power Interrupting Section" of the desired current rating. With this "kit" you get the required isolations and power feeds. Safe-Lec 2 interrupts are meant for use only in dry, clean environments.
- Qty. 1 - "Customer supplied" DPST switch per phase and necessary power wiring (ordered from others)

### Hevi-Bar II: For each power phase order:

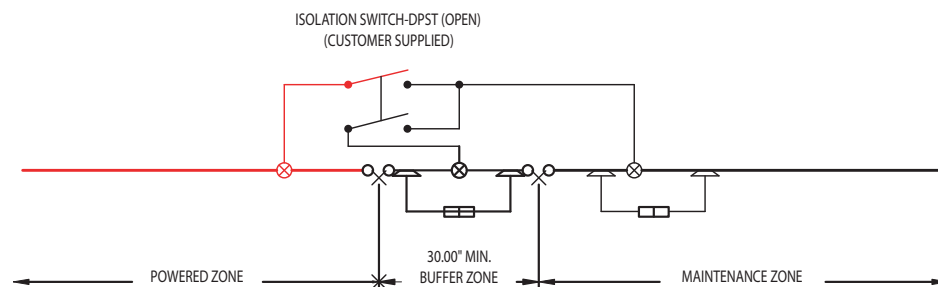
- Qty. 1 - "Power Interrupting Section" of the desired current rating. With this "kit" you get the required isolations and power feeds. The HB-II power interrupts can be used indoors or out and can withstand dirty/dusty environments common in mills.
- Qty. 1 - "Customer supplied" DPST switch per phase and necessary power wiring (ordered from others)



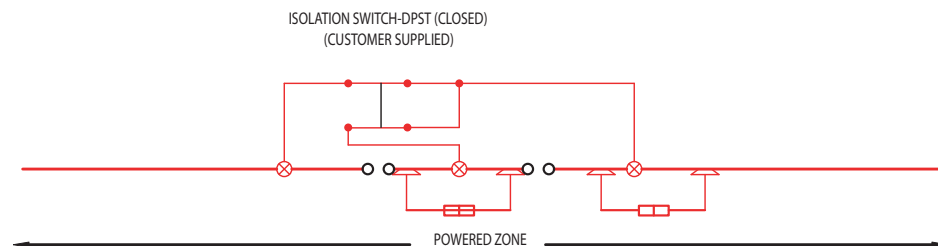
I: System with power off to the maintenance section (DPST switch open), but with tandem collector bridging the first (left-most) isolation joint.



II: System with power off to the maintenance section (DPST switch open), but with tandem collector fully to the right of the first (left-most) isolation joint.



III: System with power on to the maintenance section (DPST switch closed).



# Appendix IV - Power Interrupting Sections

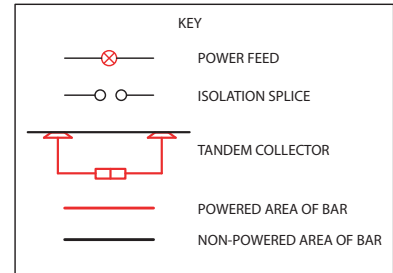
## Middle Power Interrupting Sections

**Safe-Lec 2: For each power phase order:**

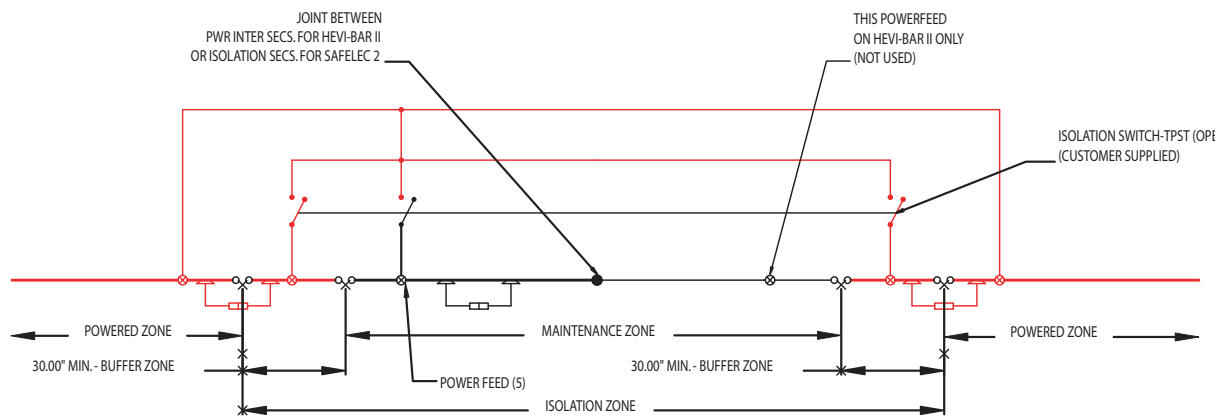
- Qty. 2 - "Power Interrupting Section" of the desired current rating. With this "kit" you get the required isolations and power feeds.
- Qty. 1 - "Customer supplied" TPST switch per phase and necessary power wiring (ordered from others)

**Hevi-Bar II: For each power phase order:**

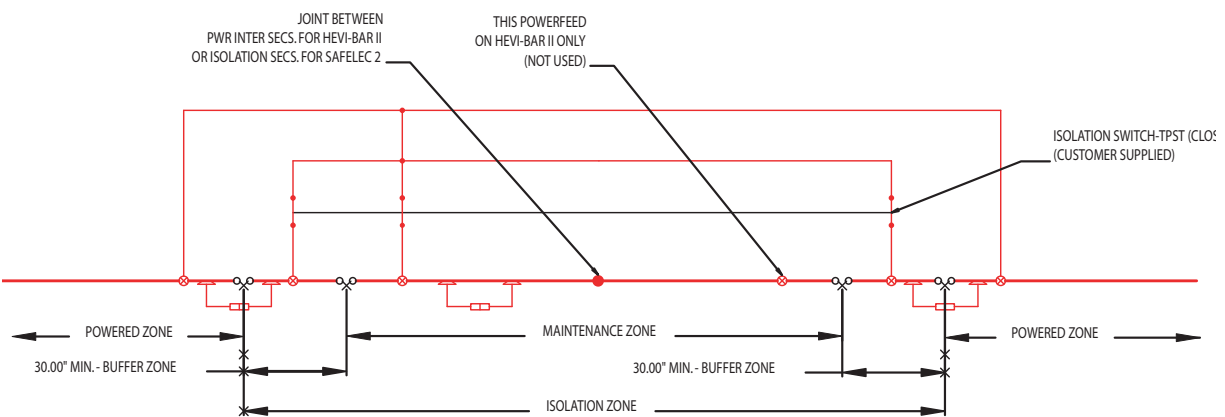
- Qty. 2 - "Power Interrupting Section" of the desired current rating. With this "kit" you get the required isolations and power feeds.
- Qty. 1 - "Customer supplied" TPST switch per phase and necessary power wiring (ordered from others).



**I: System with power off** to the maintenance section (TPST switches open), power will not feed into the maintenance zone.



**II: System with power on** (TPST switches closed), normal crane operation resumes with power to all zones.



# Notes

# Notes

# Notes

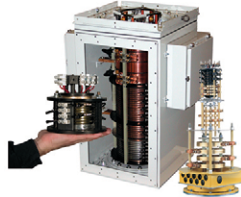
# Other Products from Conductix-Wampfler

The products described in this catalog represent a few of the products from the broad spectrum of Conductix-Wampfler components and systems for the transfer of energy, data, gases, and fluids. The solutions we deliver for your applications are based on your specific requirements. In many cases, a combination of several different Conductix-Wampfler products are needed to fill the application. You can count on all of Conductix-Wampfler's business units for hands-on engineering support - coupled with the perfect solution to meet your energy management and control needs.



### Motor driven cable reels

Motor driven reels by Conductix-Wampfler are the perfect solution for managing long lengths of heavy cable and hoses in very demanding industrial applications. Monospiral, level wind, and random wind spools.



### Slip ring assemblies

Whenever powered machinery needs to rotate 360°, field proven slip ring assemblies by Conductix-Wampfler can flawlessly transfer energy and data. Here, everything revolves around flexibility and reliability.



### Conductor bar

Whether they are enclosed conductor rails, expandable single-pole bar systems, or high amperage bar for demanding steel mill use up to 6000 amps. Conductix-Wampfler's conductor bar is the proven solution to reliably move people and material.



### Spring driven cable reels

We have 60 years experience and trusted brands such as Insul-8, Wampfler, and IER. We offer small cord reels all the way to large multi-motor units, a wide range of accessories, and hazardous location reels.



### Cable Festoon systems

It's hard to imagine Conductix-Wampfler cable trolleys not being used in virtually every industrial application. They are reliable and robust and available in an enormous variety of sizes and models.



### Push Button Pendants

Our ergonomic pendants are ideally suited for industrial control applications. They are available in a wide range of configurations for overhead cranes and other machinery.



### Radio remote controls

Safe, secure, and reliable radios use the latest in microprocessor technology. Available in several models for overhead crane control and other types of machinery.



### Inductive Power Transfer IPT®

The contact-less system for transferring energy and data. For all tasks that depend on high speeds and absolute resistance to wear.



### Data Transfer: ProfidAT® | Nexus

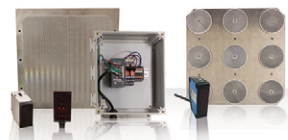
Safe & reliable wireless communication using slotted waveguide technology that's PROFI-safe compatible.

Nexus NB for narrow band signal transfer over power conductors



### LJU Automation EMS Controller

Specialized controllers Programmable by parameters, Ideal for Electrified Monorails at automotive plants, with over 1500 in service worldwide. Adaptable for other applications



### BridgeGuard™

Prevents crane to crane and crane to end collisions. IP69K rated for indoor and outdoor use, with a 3 ft to 150 ft range. Compliant with IEC 60068-2-6:2007



### Air & Spring balancers | Air hoists

Conductix-Wampfler offers the full line of ENDO positioning devices. Rugged, reliable steel construction increasing safety and decreasing fatigue and body stress.

# www.conductix.us

## USA / LATIN AMERICA

10102 F Street  
Omaha, NE 68127

Customer Support  
Phone +1-800-521-4888

Phone +1-402-339-9300  
Fax +1-402-339-9627

info.us@conductix.com  
latinamerica@conductix.com

## CANADA

1435 Norjohn Court  
Unit 5  
Burlington, ON L7L 0E6

Customer Support  
Phone +1-800-667-2487

Phone +1-450-565-9900  
Fax +1-450-951-8591

info.ca@conductix.com

## MÉXICO

Calle Treviño 983-C  
Zona Centro  
Apodaca, NL México 66600

Customer Support  
Phone (+52 81) 1090 9519  
(+52 81) 1090 9025  
(+52 81) 1090 9013

Fax (+52 81) 1090 9014

info.mx@conductix.com

## BRAZIL

Rua Luiz Pionti, 110  
Vila Progresso  
Itu, São Paulo, Brasil  
CEP: 13313-534

Customer Support  
Phone (+55 11) 4813 7330

Fax (+55 11) 4813 7357

info.br@conductix.com

Contact us for our Global Sales Offices

