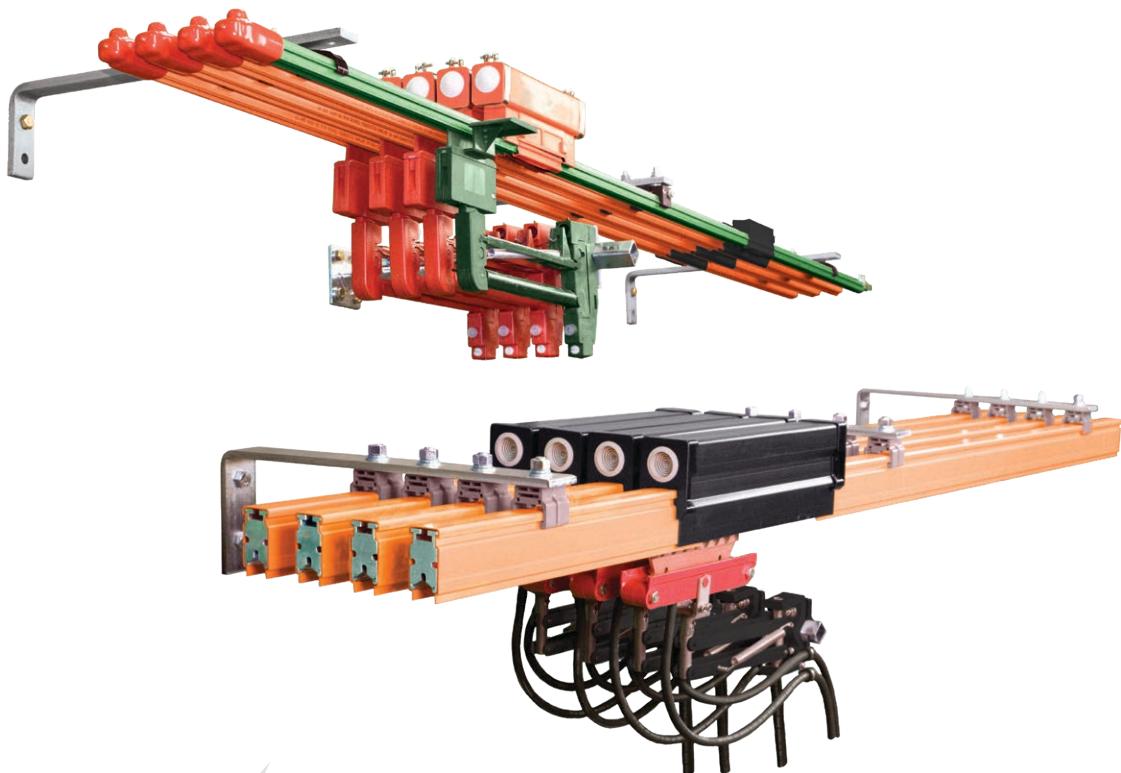


Conductor Bar

Safe-Lec 2 | Hevi-Bar II



CONDUCTIX
wampfler
◊ DELACHAUX GROUP

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Safe-Lec 2 and Hevi-Bar II Overview

Conductix-Wampfler has designed and built state-of-the-art conductor bar systems for over 60 years. Our experienced engineering and sales people are recognized experts in the application of conductor bar in the most demanding applications.

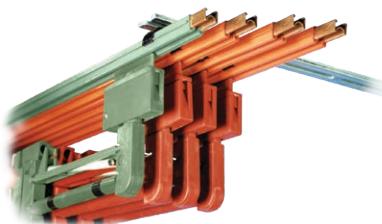
Conductix-Wampfler USA was founded in 1944 as Insul-8 Corporation (San Carlos, CA). Insul-8 developed the first "Figure 8" conductor bar system, which became the standard method for electrifying overhead cranes. In 1991 the company moved its manufacturing facility to Harlan, Iowa.

With the merger of Conductix and Wampfler in 2007, **Conductix-Wampfler** is now the world leader in the design and manufacture of high-performance conductor bar systems for industry.

Our innovations include the "finger-safe", V-contact Safe-Lec 2 system, Hevi-Bar II with optional Dura-Coat corrosion protection, and Hevi-Bar MD for high-current mill applications.

Conductix-Wampfler 8 Bar and Side Contact systems are manufactured in the USA to provide unsurpassed service and quick delivery. Our plants are ISO9001-2008 certified and adhere to stringent quality standards.

We offer a full complement of other mobile electrification products to include Cable Festoon Systems, Cable Reels (spring and motor driven), Push-Button Pendants, Radio Remote Controls, and Crane Bumpers - see page 67 for details.



Safe-Lec 2

The **new industry standard** for crane, monorail, and material handling electrification. Easy to install and maintain. Collector shoes track accurately on V-contact bar. Requires fewer joints and expansion sections than other systems. "Finger-safe" (IP2 rated). Can be mounted for bottom or lateral entry. Heater wire system available for cold climates; black UV resistant cover for outdoor applications.

Most components are UL Listed: Contact Factory



Hevi-Bar II

The ideal conductor bar system for large process cranes and material handling equipment used in mills and other heavy industrial applications. Aluminum body efficiently dissipates heat; stainless steel V-contact surface for accurate shoe tracking and long wear. Can be mounted for bottom or lateral entry. Heater wire system available for cold climates; black UV resistant cover for outdoor applications.

UL / CSA Listed



8-Bar and Side Contact

For details on the original "Insul-8" conductor bar products, please refer to catalog CAT1004.

Series 811, 812, 813, 815, 831, 842

For details on our German-made conductor rail lines, please refer to catalog KATO***-0001-US (*** = series no.)



Omaha Plant



Harlan Plant



Conductor Bar Summary Chart

Conductor Bar Lines Manufactured in the USA

8-Bar and Side Contact are shown in catalog CAT1004. Hevi-Bar MD is shown in CAT1011.

| | Safe-Lec 2 | Hevi-Bar II | Hevi-Bar MD | 8-Bar | Side Contact |
|--|--|--|---|---|--|
| Common Applications | 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 | Constrained spaces, slip ring applications, curves |
| Bar Ampacity Selections | 100 | 500 | 2200 | 40 | 40 |
| | 125 | 700 | 3800 | 90 | 90 |
| | 160 | 1000 | 4500 | 110 | 110 |
| | 200 | 1500 | 6000 | 250 | 250 |
| | 250 | | | 350 | 350 |
| | 315 | | | 500 | |
| | 400 | | | | |
| Max. Voltage | 600 | 600 ¹ | 600 ¹ | 600 | 600 |
| Max. Speed ² ft/min (m/min.) | 1200 (365.7) | 2000 (609.6) | 2000 (609.6) | 900 (274.3) | 600 (182.8) |
| Bar Spacing in. (mm) | 1.69 (43) | 3.0 (76.2) | 7.0 (177.8) | 3.0 (76.2) | 1.375 (34.9) |
| Cover Temps Low 160°F (71°C) Med 250°F (121°C) High 400°F (204°C) | Low Med | Low Med. High (700A & 1000A only) | n/a | Low Med. High | Low Med. |
| Outdoor Rated? | Yes | Yes | Yes | Yes | No |
| Dura-Coat Available? | No | Yes | No | No | No |
| Orientation (Collector Entry) | Bottom/Side | Bottom/Side | Bottom/Side/Top | Bottom/Side | Side Only |
| Min Bend Rad Low-Temp Cover in. (mm) | 60.0 (1524) | Consult Factory | n/a | 18.0 (457) ³ 45.0 (1143) ⁴ | 9.0 (228) |
| Med-Temp. Cover in. (mm) | 60.0 (1524) | See Page 48 | n/a | 57.0 (1447) | 57.0 (1447) |
| Heater Wire Available? | Yes | 500A only | n/a | No | No |

¹ Can be configured for 5000 volts and more - contact Factory. ² For faster speeds - contact Factory. ³ The "easy way" (bar profile vertical) ⁴ The "hard way" (horizontal)

Conductix-Wampfler Germany - Conductor Rail Lines

Conductix-Wampfler Germany's high-performance conductor rails are stocked and available in the USA. Please contact our office at (+1) 800-521-4888 for more information. See Pg. 66 of this catalog for a brief overview of available series

Don't see what you need? Give us a call. We offer hundreds of special designs and options!

“Quick Quote Web” Online System Quoting Program

Do you specify or purchase Conductor Bar Systems, Festoon Systems, or Push Button Pendants on a regular basis? If so, we recommend that you use our innovative **Quick Quote Web** online configuration tool. To access the program, all you need is a **Partners Site** login - see below.

The screenshot shows the 'Bar Configuration' section of the software. On the left, under 'Bar Selection', there are dropdown menus for 'Bar Type' (Safe-Lec 2), 'Cover' (PVC (-22°F to 187°F)), and 'Amperage' (125 - Galvanized Steel). Below these are sections for 'Voltage Drop Analysis' showing a graph of voltage drop versus distance at 0°F and 110°F, and a 'Show Chart' button. On the right, under 'Bar Mounting and Collectors', there are dropdown menus for 'Collector Orientation' (Standard (Vertical)), 'Max. Hanger Spacing' (59 in), 'Bracket Selection' (XA-36197 - Web Bracket Long), 'Hanger Selection' (XA-310821 - 4 Conductor Standard...), 'Anchors' (XA-310832 - Standard Anchor Clia...), 'Collector Type' (XA-310990 - 100 Amp DI Collector), 'Deflector (Ground Only)' (None), 'Mounting Staff' (Kit Crane Collector Mount), and 'Tandem Collectors' (checked). There is also an unchecked checkbox for 'Include Sealing Lips'. A small pop-up window titled 'Voltage Drop on 350 at 60A Using 125-Galvanized Steel' shows a graph with a maximum drop of 2.79% at 0°F and 2.84% at 110°F.

Quick Quote Web:

- Configures systems based on your needs and generates a bill of material
- Allows you to create and save customized quotes for your customers
- Enables you to transmit your quote to Conductix-Wampfler as an order, at the click of a button.

Quick Quote Web specifies our most popular Conductor Bar Systems:

- Calculates crane amp draw with one or more vehicles
- Automatically calculates and graphs voltage drop with single or multiple power feed locations
- Handles advanced bar and collector mounting configurations
- Provides conductor bar system schematic



Also handles advanced features for C-track and Square Bar Festoon Systems:

- Handles most common festoon mounting configurations
- Lets you set-up cable package arrangements and trolley selection
- Handles factory prewiring and preassembly options for festoon systems



Quick Quote Web allows you to add the appropriate Push Button Pendant:

- Determines the type of pendant required based on your cable festoon system parameters
- Allows you to choose pre-configured pendants and related accessories, including pendant cable

Our **Quick Quote Web** program is available on our **Partners Site** at

www.conductix.us

To access the program, you will need a Partners Site Login. Contact our Customer Service Team for details:

(+1) 800 521 4888 or (+1) 402 339 9300), Press 1.

Or by e-mail at customerservice@conductix.com

Conductor Bar Specification Data Sheet

Fax to: 800-780-8329 or 402-339-9627 E-mail to: info.us@conductix.com

| | |
|--------------|--------------|
| Request Date | Sales Person |
| Company | Name |
| | Title |
| | Phone |
| | Fax |
| Company Type | E-mail |

APPLICATION

1. Application Type: Runway Bridge Monorail Other
2. New Approved Installation? Extended Existing? Replacement?
3. System Length: _____ Feet Meters
4. Total # of Conductors: _____ Will one conductor be designated as a ground? Yes No

ENVIRONMENTAL DATA

Describe the environment where the conductor system will be located:

1. Indoors Outdoors Both Indoors and Outdoors Outdoor & Ice
2. Ambient temperature range: Min. _____ Max. _____ Degrees Fahrenheit Celcius
3. Radiant Heat Temperature Range: Min. _____ Max. _____ Fahrenheit Celcius
4. Will a heater wire need to be included? Yes No (If yes, consult factory)
5. Is there a source of corrosion present? Yes No Refer to Appendix I Pg. 57

If yes, describe the corrosive: _____

6. Other environmental considerations (dust, etc.)? _____

MECHANICAL DATA

1. Vehicle Speed _____ feet/min M/min Duty Cycle: _____
2. Number of vehicles or trolleys: _____ Crane Class (if applicable) _____
Refer to Appendix I Pg. 60.
3. Will Conductix-Wampfler be supplying mounting brackets? Yes No
4. Does the system include any curves? Yes No
If Yes; Radius _____ Feet Meters Angle _____ degree
5. Mounting Position (w/regards to the monorail): Inside Outside Both
6. Other mechanical notes: _____

ELECTRICAL SPECIFICATIONS

1. Number of power feeds: _____
2. Location of power feeds (check all that apply): Center Multiple End Refer to Appendix I Pg. 58
 Advanced: Distance power feeds will be from end of system: _____ (or attach diagram)
3. Number of power phases: _____ Operating voltage: _____ (volts) AC DC
4. Total current draw: (sum of all vehicles) _____ (Amps) Demand factor _____ (typically .9)
5. Operating Frequency _____ (Hz - USA is 60 Hz) (Refer to chart on Pg. 7 for multiple cranes)

Contact Conductix-Wampfler today to discuss your Conductor Bar application.

Conductor Bar Specification Data Sheet

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 |



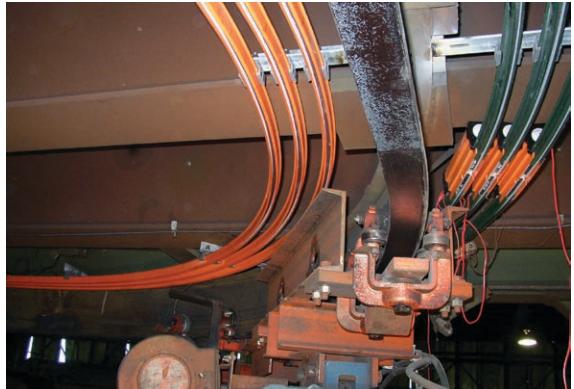
Hevi-Bar II - Process Crane



Hevi-Bar II - Mill Application



Hevi-Bar II - Foundry Crane



Hevi-Bar II - Curved System

Safe-Lec 2 Overview & Design Features

Safe-Lec 2™ - The “next generation” in electrification for overhead cranes and other moving equipment. This modern system delivers safe, reliable power in a rugged, easy-to-install package. Most components are **UL Listed** - contact Factory for details.



Safe-Lec 2 is ideal for:

- Small to medium cranes
- Monorails
- Conveyor systems
- Material Handling Equipment
- Moderately curved systems
- Amusement rides

Ampacity range:

100A, 125A, 160A, 200A, 250A, 315A, & 400A capacities up to 600 volts maximum.

Maximum Speed:

1200 ft/min

Options:

Heater wire systems (Pg. 26), stainless steel hardware, green bonding (ground) conductor covers, black “UV resistant” outdoor covers, curved systems to a minimum of 60” radius (curved at our factory).

Safe-Lec 2 Features:

- Positive shoe tracking and superior conductivity. Long-wearing shoe is guided by the V-contact in the rail.
- Robust collector arm articulates to help maintain contact.
- IP2 “finger safe” operation; no live parts exposed.
- Secure, bolted splice joints pre-installed on conductors for superior electrical connection. Won’t pull apart over time. Includes one-piece snap-on cover.
- Integrated collector cables; won’t snag on moving equipment.
- Peaked insulating covers to shed dust and water. The same cover profile fits all bar styles; fewer parts to stock.

Safe-Lec 2 Installs Quickly:

- Less expense and shorter crane downtime.
- Requires fewer splice joints; 14' 9" (4.5m) rail lengths versus 10' for most other systems.
- Includes pre-installed splice joints on one end of bar.
- Uses multi-pole hanger; multiple bars snap into the same hanger and hanger mounts with a single bolt.
- Requires fewer expansion joints; up to 492' (150m) without an expansion section.
- Is easy to install and align with slotted hanger brackets.
- Is easy to wire; power wires connect to lug at base of collector. Requires no in-line splices or connectors.

Automate your quotations with our advanced “Quick Quote” software - See Pg. 5.

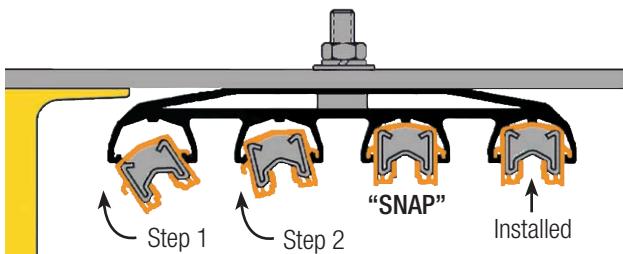
Safe-Lec 2 Overview & Design Features

Here are several specific reasons why Safe-Lec 2 is superior to a traditional (and now outmoded) 8-Bar system. And we should know . . . we invented 8-Bar over 50 years ago!

Safe-Lec 2

Quicker and less costly Installation

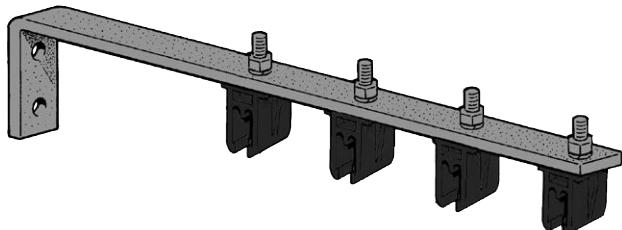
- 14.76 ft (4.50m) bar lengths; fewer joints
- Multiple pole hangers; a “snap” to install



- Wires connect into lug integrated in the collector arm

8-Bar

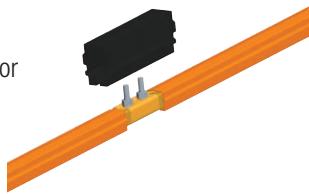
- 10 ft (3.05m) bar lengths; more splices required
- Hangers hold only one bar each



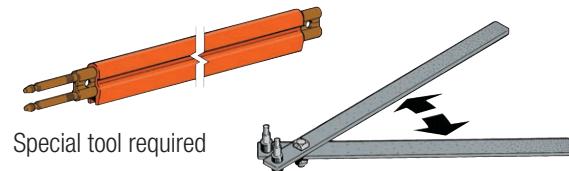
- Wires must be spliced to collector pigtails

More secure splice joint

- Bolted joints
- No special tools required
- No need for “joint keepers” or “joint repair kits”, etc



- Pinned joint can pull apart; requires special parts



- Special tool required

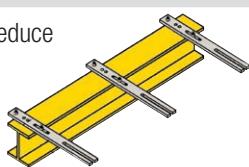
Fewer expansion sections required

- Safe-Lec 2 can go 492 ft (150m) before an expansion is required

- 8-Bar can only go 300 ft before an expansion section is required (or 200 ft for copper bar)

Easier system alignment

- Slotted brackets are available to reduce hole alignment problems
- System alignments are easy!



- Brackets have round holes, so alignment must be perfect
- Harder to make system alignment adjustments



Superior Collector Shoe Tracking

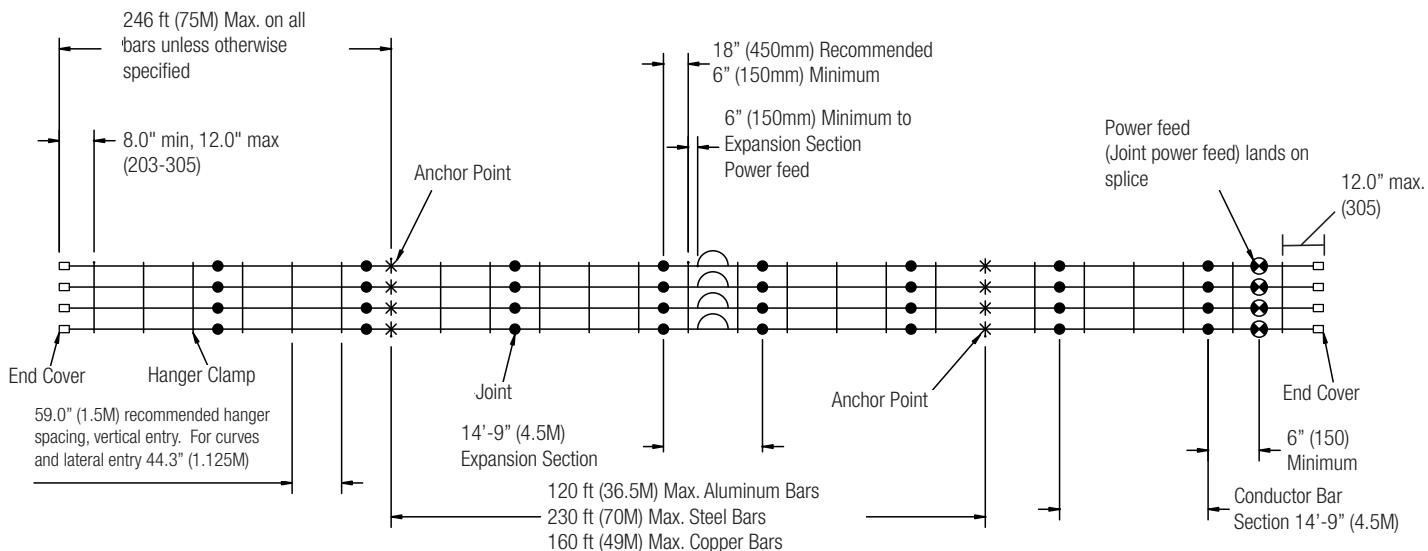
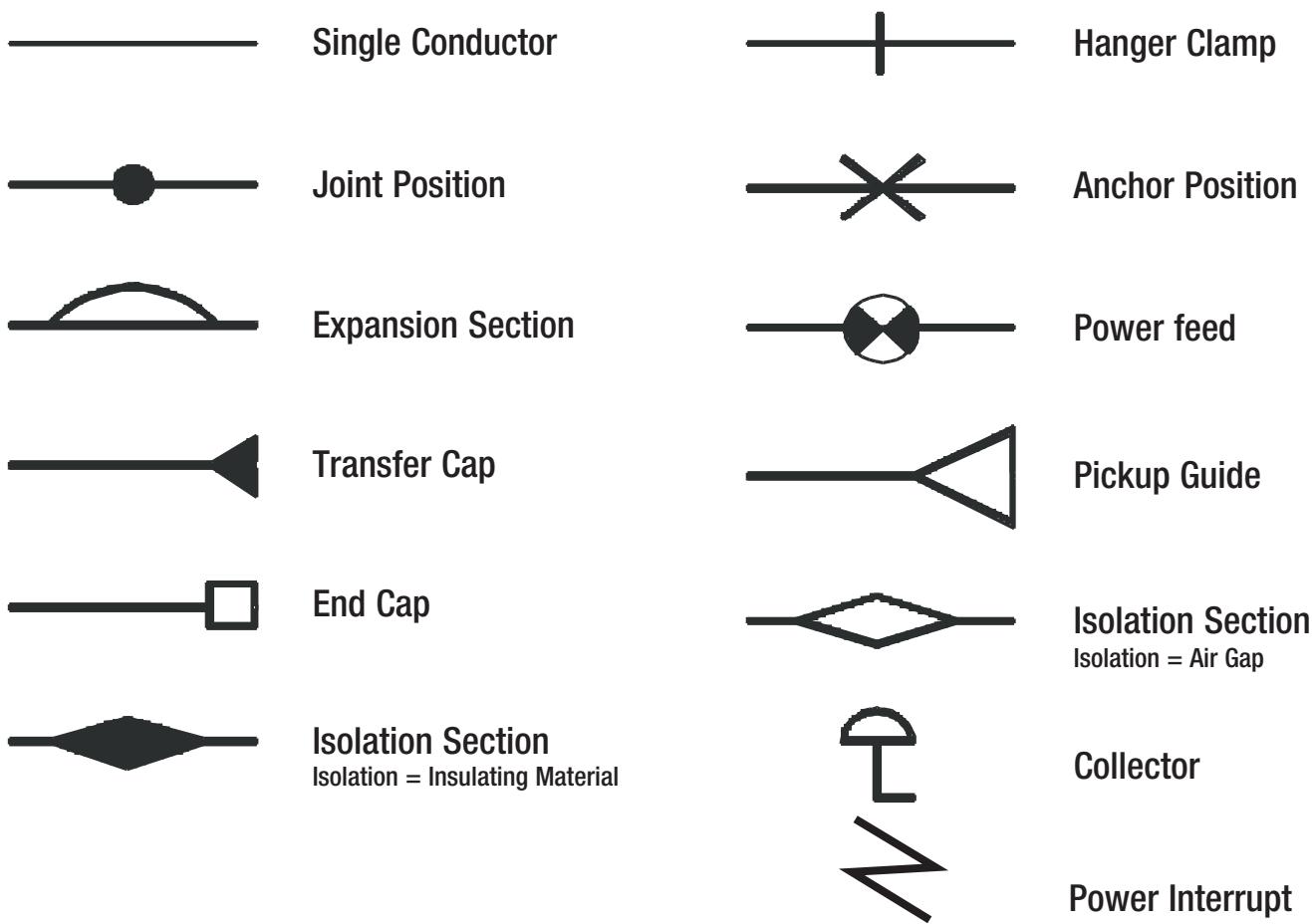
- Shoe is guided by the V-contact in the metal bar
- Collector arm articulates to accommodate mild system misalignments



- Shoe is guided by the plastic cover
- Accurate system alignment is much more critical



Typical 4-Bar Safe-Lec 2 System



Maximum Runway Without Expansions = 492'

**ATTENTION: CURVED BAR TO BE
FACTORY BENT ONLY!**

Dimensions are in Inches (mm)

NOTE: Maximum Recommended Hanger Spacing:
1.125 Meters (44")
On all Lateral Mount Systems
Curved Systems (curved section only)

Electrical Ratings for Safe-Lec 2

Voltage Drop Calculations

Volt drop calculation 3U :

3-Phase AC

$$\Delta U = \sqrt{3} \times I \times D \times Z$$

Single Phase AC

$$\Delta U = 2 \times I \times D \times Z$$

Continuous current DC

$$\Delta U = 2 \times I \times D \times R$$

$$\Delta U\% = (^3U \times 100) / U$$

Where:

ΔU : voltage drop in Volts

U : Nominal voltage

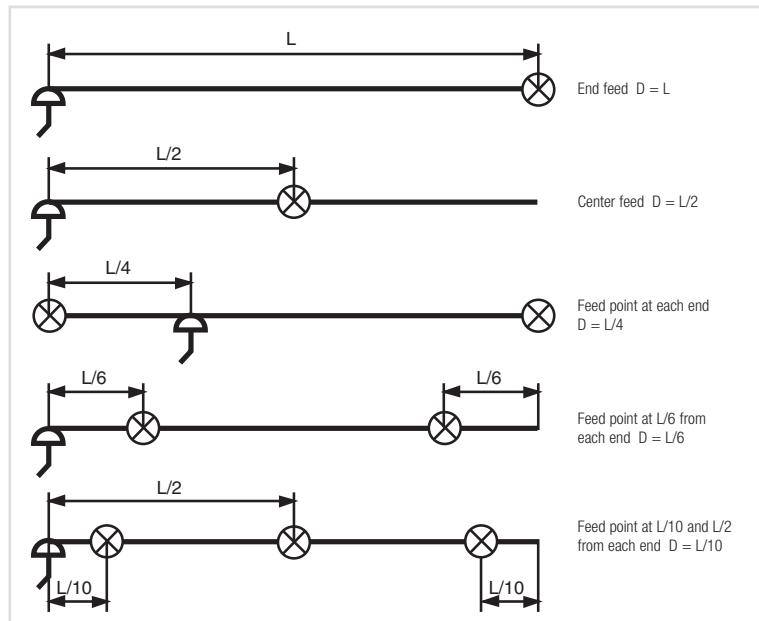
I : Maximum current in amps

D : Distance between the feed and pick-up points in meters.

R : Resistance of conductor in ohms per meter (see Pg. 13)

Z : Impedance of conductor in ohms per meter (see Pg. 13)

See Appendix I and Appendix II for more information about voltage drop.



Current Rating

The maximum allowable continuous current rating of the conductor bar depends on the Duty Factor "K" of the cranes and the maximum ambient temperature T_a . Allowable current (I) is calculated using the following formula:

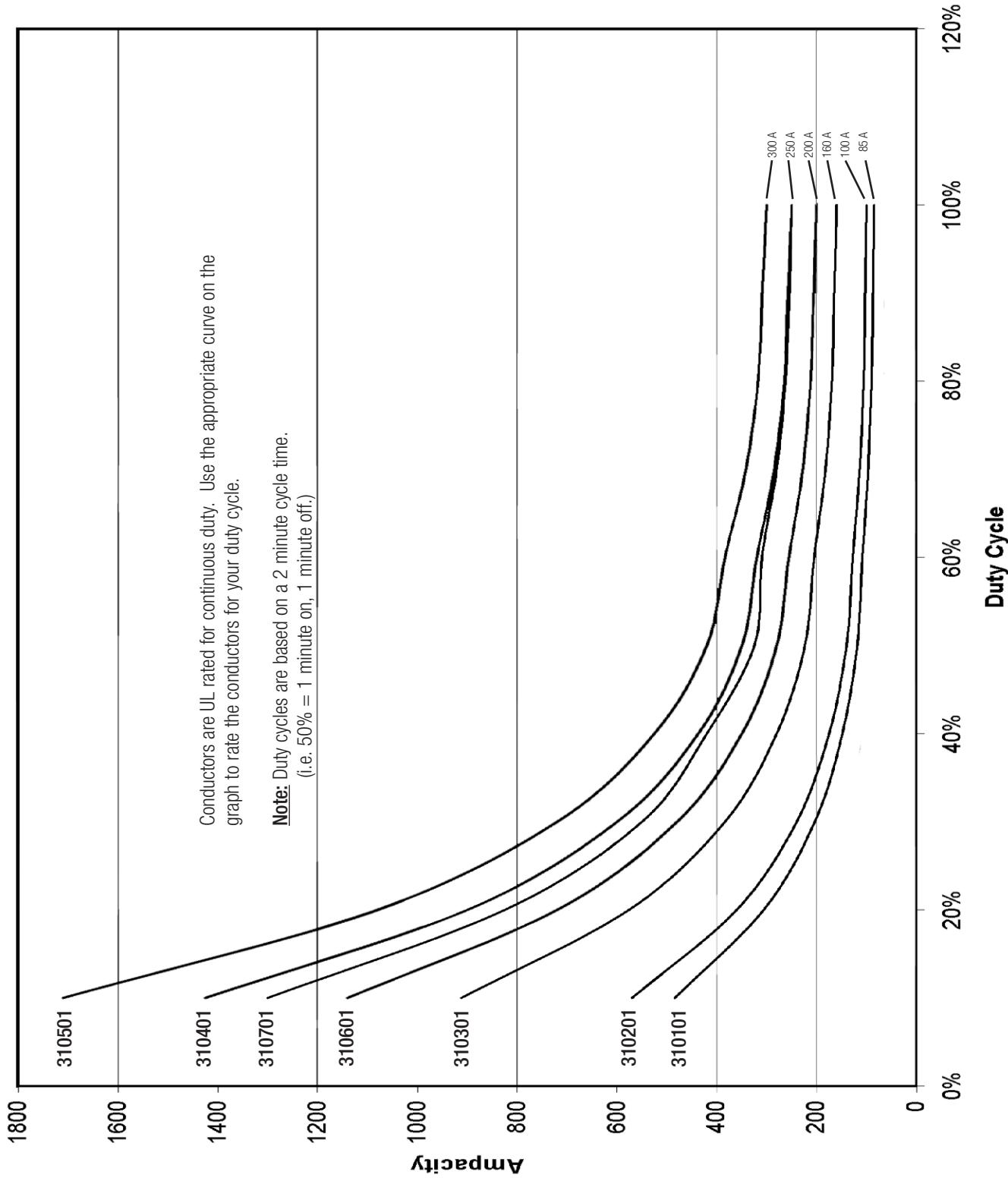
$$I_{\text{allowable}} = \text{Nominal Current} \times K$$

| | | Factor "K" | | | | |
|-------------------|--------------|------------|-------|-------|-------|-------|
| | | 100% | 80% | 60% | 40% | 20% |
| Ta | Duty | | | | | |
| | 77°F (25°C) | 1.000 | 1.118 | 1.291 | 1.581 | 2.236 |
| Standard Cover | 95°F (35°C) | 0.905 | 1.011 | 1.168 | 1.430 | 2.023 |
| | 113°F (45°C) | 0.798 | 0.892 | 1.030 | 1.261 | 1.784 |
| | 130°F (55°C) | 0.674 | 0.754 | 0.870 | 1.066 | 1.508 |
| Medium Heat Cover | 150°F (65°C) | 0.775 | 0.866 | 1.000 | 1.225 | 1.732 |
| | 167°F (75°C) | 0.707 | 0.791 | 0.913 | 1.118 | 1.581 |
| | 185°F (85°C) | 0.632 | 0.707 | 0.816 | 1.000 | 1.414 |

For UL rated capacities, see graph on Pg. 12

Safe-Lec 2 Electrical Ratings

Conductor De-rating



Safe-Lec 2 Specifications

The appropriate conductor bar can be chosen only when all the relevant factors are known. Please refer to the 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.

Safe-Lec 2 Conductor Bar

| | Galvanized Steel | | Copper | | | Aluminum / Stainless Steel | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------------|--------------------|--------------------|
| Nominal Current | 100A | 125A | 160A | 250A | 400A | 200A | 315A | 400A |
| Cross Sectional Area | 63mm ² | 93mm ² | 50mm ² | 63mm ² | 93mm ² | 104mm ² | 120mm ² | 156mm ² |
| Maximum System Voltage AC or DC (Per UL listing) * | 600V | 600V | 600V | 600V | 600V | 600V | 600V | 600V |
| Resistance R (for DC) at 20° C (Ω/m) | 0.002867 | 0.001933 | 0.000342 | 0.000274 | 0.000184 | 0.000301 | 0.000261 | 0.000199 |
| Impedance Z (for AC) at 20° C (Ω/m) | 0.002891 | 0.001968 | 0.000364 | 0.000300 | 0.000221 | 0.000325 | 0.000288 | 0.000234 |
| Maximum Allowable Ambient Temperature for 100% Duty Cycle | 25°C | 25°C | 25°C | 25°C | 25°C | 25°C | 25°C | 25°C |
| Bar Length | 4.5m | 4.5m | 4.5m | 4.5m | 4.5m | 4.5m | 4.5m | 4.5m |
| Support Pitch Standard Lateral | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm | 1500mm 1125mm |
| Minimum Pitch Centers Standard | 43mm | 43mm | 43mm | 43mm | 43mm | 43mm | 43mm | 43mm |
| Expansion Sections (Not required for runs less than) | 150m | 150m | 150m | 150m | 150m | 150m | 150m | 150m |
| Minimum Bending Radius (Horizontal only, bent at factory) | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m |

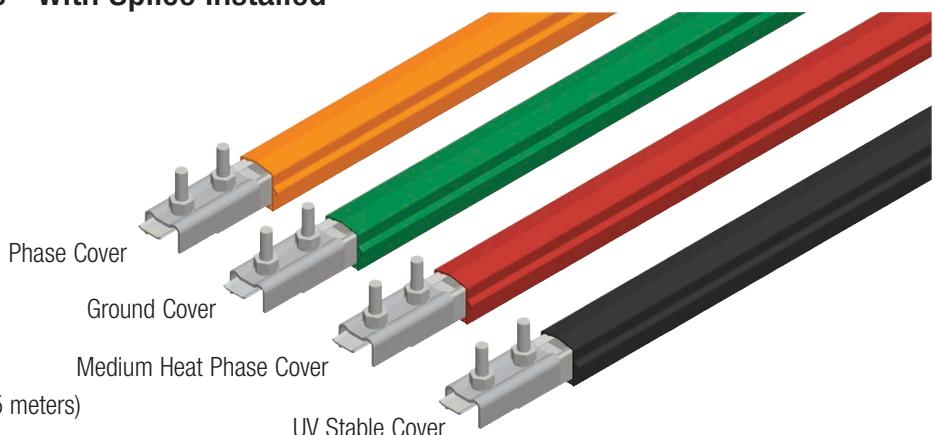
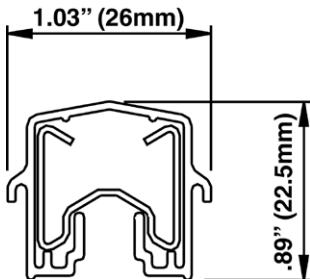
* Contact Conductix-Wampfler for other voltages

Safe-Lec 2 Conductor Bar Covers

| | Standard (Orange or Green) | UV Stable (Black) | Medium Heat (Red) |
|--|-------------------------------|------------------------|-----------------------------|
| Material | PVC | PVC | Polycarbonate |
| Dielectric Strength | 271 kv/cm | 271 kv/cm | 165 kv/cm |
| Surface Resistivity | 10 ¹¹ Ω | 10 ¹¹ Ω | >10 ¹⁴ Ω |
| Volume Resistivity | >10 ¹⁵ Ω/cm | >10 ¹⁵ Ω/cm | > 2 x 10 ¹⁷ Ω/cm |
| Vicat Softening Temperature Never expose PVC cover to temperatures in excess of 176° F (80° C) | 160°F (71.1°C) | 160°F (71.1°C) | 304°F (121.1°C) |
| Flame Test | Self extinguishing | Self extinguishing | Self extinguishing |
| Oxygen Index | 54% | 54% | 24% |
| Specific Density | 1.38 g/cm ³ | 1.38 g/cm ³ | 1.2 g/cm ³ |

Safe-Lec 2 Galvanized Steel Bar

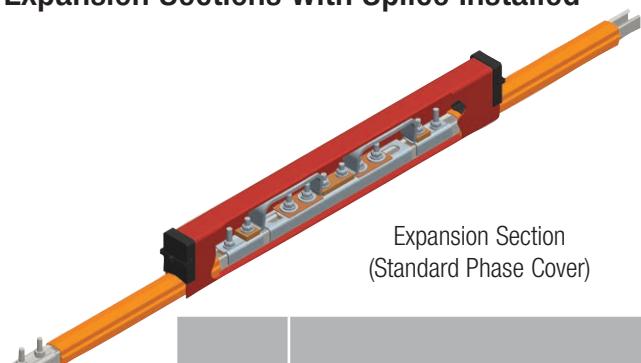
Galvanized Steel Conductor Bars - with Splice Installed



All Bar and Expansion Lengths: 14.76 ft (4.5 meters)

| Bar Type | Insulating Cover | | | Nominal Current Rating | |
|----------|------------------|----------------|------------------|------------------------|-----------|
| | Color | Type | Max Temp °F (°C) | 100 Amps | 125 Amps |
| | | | | Part No. | Part No. |
| Phase | Orange | PVC | 160 (71.1) | 310101-J | 310201-J |
| Ground | Green | PVC | 160 (71.1) | 310102-J | 310202-J |
| Phase | Red | Polycarbonate | 250 (121.1) | 310103-J | 310203-J |
| Outdoor | Black | PVC, UV Stable | 160 (71.1) | 310101B-J | 310201B-J |

Expansion Sections with Splice Installed

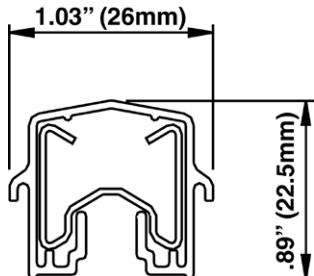


Expansion Sections are used at all structural expansion joints and for systems longer than 492 ft (150m) to allow for thermal expansion / contraction of the bar. The maximum gap of the Expansion Section is 2.0" (50 mm). The Expansion Section is installed in place of one length of conductor bar.

| Bar Type | Insulating Cover | | | Nominal Current Rating | |
|----------|------------------|----------------|------------------|------------------------|----------|
| | Color | Type | Max Temp °F (°C) | 100 Amps | 125 Amps |
| | | | | Part No. | Part No. |
| Phase | Orange | PVC | 160 (71.1) | 310107-J | 310207-J |
| Ground | Green | PVC | 160 (71.1) | 310108-J | 310208-J |
| Phase | Red | Polycarbonate | 250 (121.1) | 310109-J | 310209-J |
| Outdoor | Black | PVC, UV Stable | 160 (71.1) | 39130-J | 39131-J |

Safe-Lec 2 Copper Bar

Copper Conductor Bars with Splice Installed



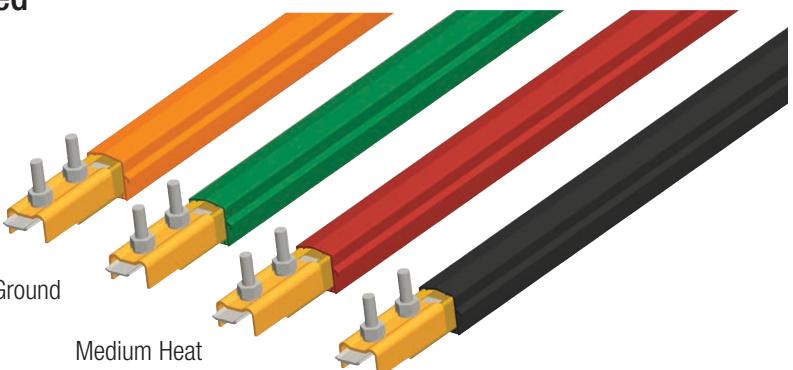
Standard Phase Cover

Standard Ground Cover

Medium Heat Cover

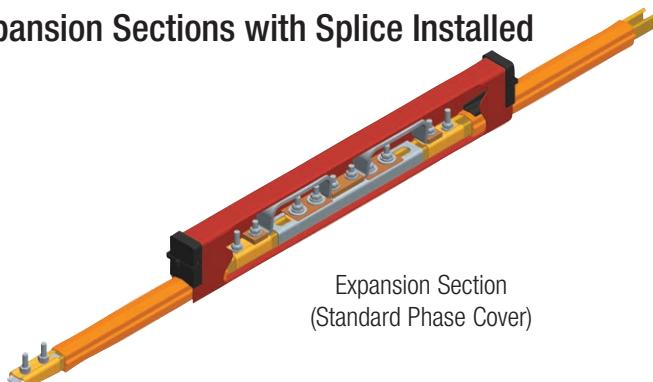
UV Stable Cover

All Bar and Expansion Lengths: 14.76 ft (4.5 meters)



| Bar Type | Insulating Cover | | | Nominal Current Rating | | |
|----------|------------------|----------------|------------------|------------------------|-----------|-----------|
| | | | | 160 Amps | 250 Amps | 400 amps |
| | Color | Type | Max Temp °F (°C) | Part No. | Part No. | Part No. |
| Phase | Orange | PVC | 160 (71.1) | 310301-J | 310401-J | 310501-J |
| Ground | Green | PVC | 160 (71.1) | 310302-J | 310402-J | 310502-J |
| Phase | Red | Polycarbonate | 250 (121.1) | 310303-J | 310403-J | 310503-J |
| Outdoor | Black | PVC, UV Stable | 160 (71.1) | 310301B-J | 310401B-J | 310501B-J |

Expansion Sections with Splice Installed

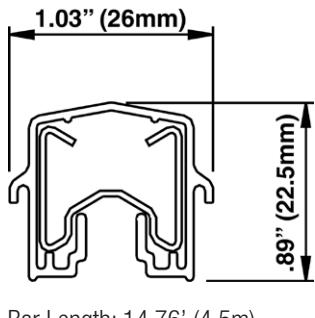


Expansion Sections are used at all structural expansion joints and for systems longer than 492 ft. (150m) to allow for thermal expansion / contraction of the bar. The maximum gap of the Expansion Section is 2.0" (50 mm). The Expansion Section is 14' 9" (4.5 m) long and is installed in place of one length of conductor bar.

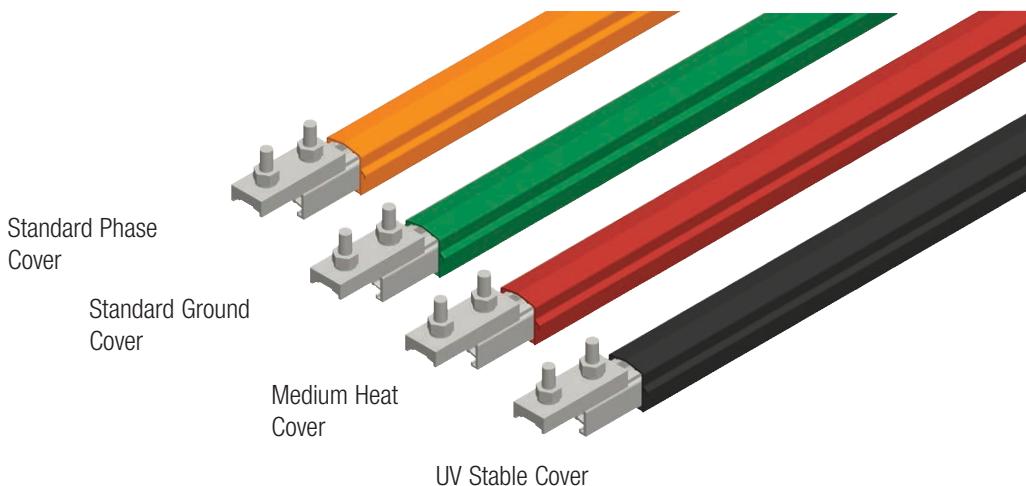
| Bar Type | Insulating Cover | | | Nominal Current Rating | | |
|----------|------------------|----------------|------------------|------------------------|----------|----------|
| | | | | 160 Amps | 250 Amps | 400 amps |
| | Color | Type | Max Temp °F (°C) | Part No. | Part No. | Part No. |
| Phase | Orange | PVC | 160 (71.1) | 310307-J | 310407-J | 310507-J |
| Ground | Green | PVC | 160 (71.1) | 310308-J | 310408-J | 310508-J |
| Phase | Red | Polycarbonate | 250 (121.1) | 310309-J | 310409-J | 310509-J |
| Outdoor | Black | PVC, UV Stable | 160 (71.1) | 39132-J | 39133-J | 39134-J |

Safe-Lec 2 Aluminum / Stainless Bar

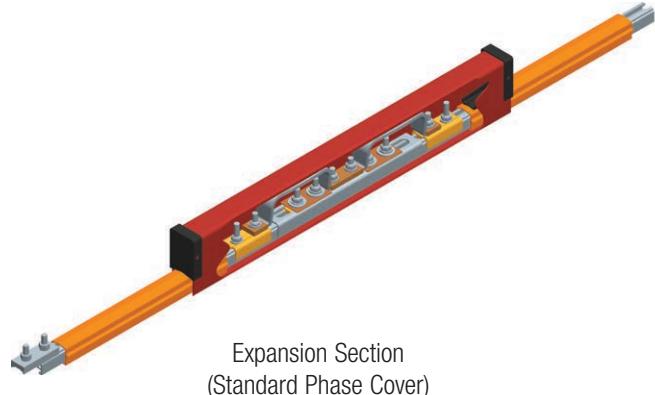
Aluminum / Stainless Steel Conductor Bars with Splice Installed



| COVER TYPE | CURRENT RATING | | |
|----------------------------------|----------------|-----------|-----------|
| | 200A | 315A | 400A |
| Standard Phase Cover (Orange) | 310601-J | 310701-J | 399101-J |
| Standard Ground Cover (Green) | 310602-J | 310702-J | 399102-J |
| Medium Heat Cover (Red) | 310603-J | 310703-J | 399103-J |
| UV Stable (Black) | 310601B-J | 310701B-J | 399101B-J |



Expansion Sections with Splice Installed

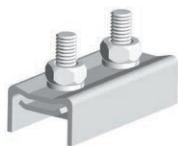


Expansion Sections are used at all structural expansion joints and for systems longer than 492 ft. (150m) to allow for thermal expansion / contraction of the bar. The maximum gap of the Expansion Section is 2.0" (50 mm). The Expansion Section is 14' 9" (4.5 m) long and is installed in place of one length of conductor bar.

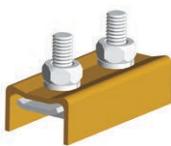
| COVER TYPE | CURRENT RATING | | |
|----------------------------------|----------------|----------|-----------|
| | 200A | 315A | 400A |
| Standard Phase Cover (Orange) | 310607-J | 310707-J | 399107-J |
| Standard Ground Cover (Green) | 310608-J | 310708-J | 399108-J |
| Medium Heat Cover (Red) | 310609-J | 310709-J | 399109-J |
| UV Stable (Black) | 39135-J | 39136-J | 399107B-J |

Safe-Lec 2 Joints & Power Feeds

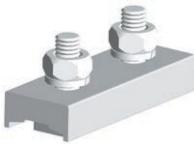
Splice Joints



Steel Joint 310872



Copper Joint 310873



Aluminum Joint 310874

One splice joint is included with bar part numbers ending with "-J" (see Pgs. 14-16)

| TYPE | Part No. |
|----------|---------------|
| Steel | 310872 |
| Copper | 310873 |
| Aluminum | 310874 |

Joint Covers



Standard Phase Joint Cover
310850B

Must be ordered separately - one per splice joint.

| TYPE | Part No. |
|---------------------------|----------------|
| Standard Cover (UV Black) | 310850B |
| Medium Heat Cover (Red) | 310855 |

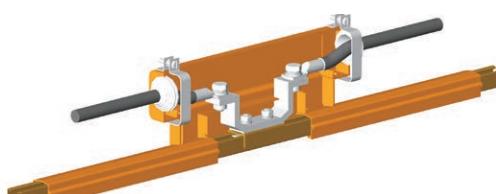
Joint Compound



Joint compound is applied to the contact surfaces at every joint on aluminum systems. One tube is included with every aluminum/stainless bar system at a nominal cost and is sufficient for over 300 connections (equal to a 1000 foot long system with four phases).

| Part No. |
|--------------|
| 15629 |

Joint Power Feeds



250A Joint Power Feed
310910B

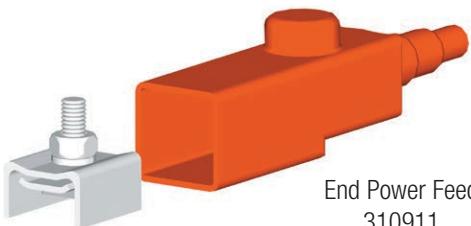
The Joint Power Feed is usually installed on top of a splice joint. Cable lugs are customer supplied.

CURRENT RATING

| TYPE | Up to 250A | Up to 400A |
|--------------------------|---------------------------|--------------------------------|
| Standard Cover (Black) | 310910B | 310912B |
| Medium Heat Cover (Red) | 310913 | 310915 |
| No. of Cable Connections | 2 | 2 |
| Max. Cable Size | #3/0 (95mm ²) | 300kcmil (150mm ²) |

Safe-Lec 2 Hanger Clamps

End Power Feed



End Power Feed
310911

The End Power Feed is installed in place of an end cover. Maximum cable connection size: 6 AWG (16mm²). These are suitable for 100A Galvanized Steel Bar only.

Part No.

310911

Hanger Clamps Standard

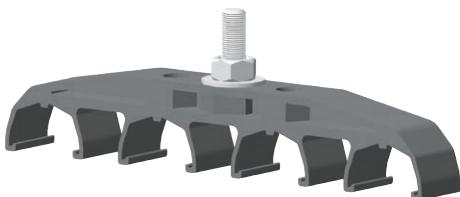


Single Pole Hanger 310824
310919 (stainless steel hardware)

| TYPE | Mounting Orientation | | Acetyl (Black) 160° Max. | Polycarbonate (Red) 250° Max. | Stainless Steel |
|-------------|----------------------|---------|-----------------------------|----------------------------------|-----------------|
| | Standard | Lateral | | | |
| Single Pole | X | X | 310824 | 310829 | 310919 |
| Two Pole | X | X | 310882 | 310899 | - |
| Three Pole | X | X | 310861 | 310871 | - |
| Four Pole | X | | 310821 | 310857 | 39768 |
| Four Pole | | X | 310835 | 310859 | 50120 |



Two Pole Hanger
310882



Four Pole Hanger, Standard Mount
310821 (plated hardware)
39768 (stainless steel hardware)



Three Pole Hanger
310861



Four Pole Hanger, Lateral Mount
310835 (plated hardware)
50120 (stainless steel hardware)

Safe-Lec 2 Hanger / Anchor Clamps

Hanger Clamps With Insulator



Single Pole Hanger
310918

| TYPE | Material | Max. Temp | Part No. |
|-----------------------|---------------------|-----------|----------|
| Single Pole | Acetyl (Black) | 160° F | 310918 |
| Single Pole | Polycarbonate (Red) | 250° F | 310834 |
| Single Pole | Stainless Steel | 250° F | 38779 |
| Single Pole, Two-Part | Acetyl (Black) | 160° F | 399544B |
| Two Pole, Two-Part | Acetyl (Black) | 160° F | 399647 |



Single Pole Hanger
310834



Stainless Steel Hanger
38779



Two-Part Single Pole
Hanger
399544B



Two-Part Two Pole
Hanger
399647

Anchor Clamps

Anchor points are usually situated in the middle of a conductor system. Additional anchor points are required for systems with expansion sections.



Anchor Clamp
310832 (plated hdwe)
310833 (stainless steel hdwe)

| TYPE | Max. Temp | Part No. Plated Steel Hdwe | Part No. Stainless Steel Hdwe |
|--|-----------|-------------------------------|----------------------------------|
| Standard | 250° F | 310832 | 310833 |
| With Insulator | 250° F | 310969 | 38780 |
| Without Top Bolt (Two req'd per anchor point) | 250° F | 310831 | 38220 |



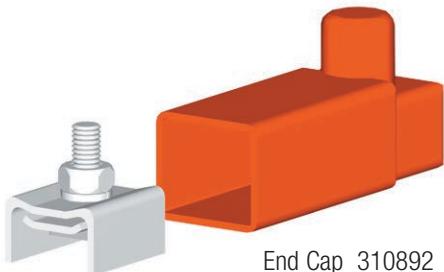
Anchor Clamp, with Insulator
310969 (plated hdwe)
38780 (stainless steel hdwe)



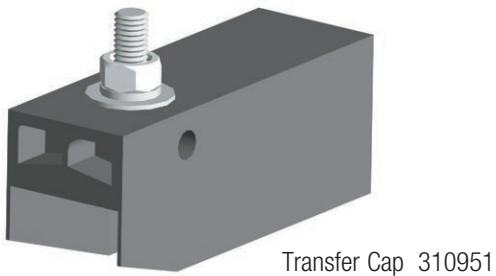
Anchor Clamp, without Top Bolt
310831 (plated hdwe)
38220 (stainless steel hdwe)

Safe-Lec 2 End Caps & Pick Up Guides

End Caps



End Cap 310892



Transfer Cap 310951

End Caps are insulated covers installed at the ends of the conductor system. Transfer Caps transfer the collectors across switch gaps up to 0.40" (10mm) wide.

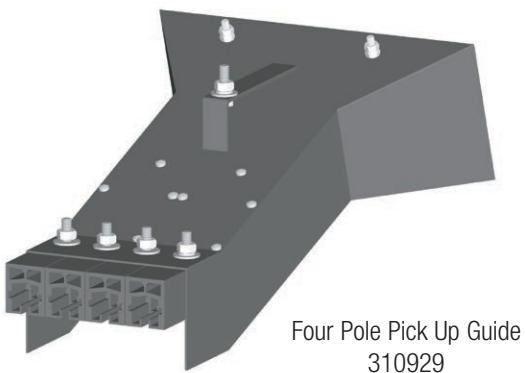
Transfer Cap Tolerances

Vertical tolerance $\pm 0.20"$ (5mm)

Horizontal tolerance $\pm 0.08"$ (2mm)

| TYPE | Material | Part No. |
|-------------------------------|---------------|----------|
| End Cap Steel / Copper Bar | PVC | 310892 |
| End Cap Aluminum Bar | PVC | 310893 |
| Transfer Cap | Polycarbonate | 310951 |

Pick Up Guides

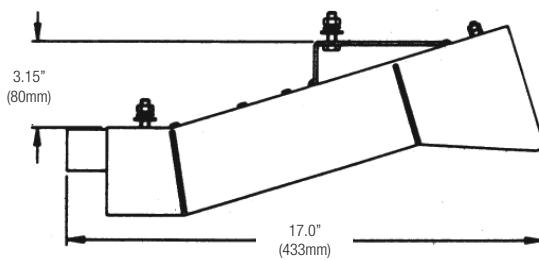


Four Pole Pick Up Guide
310929

Pick-up Guides are used on discontinuous systems to guide collectors on and off the conductors. Special collectors are required for systems where pick up guides are fitted - see Pg. 22. Guide housing is black painted steel. Guide surfaces are PVC. Molded guides are Polycarbonate.

Not recommended for lateral mounting

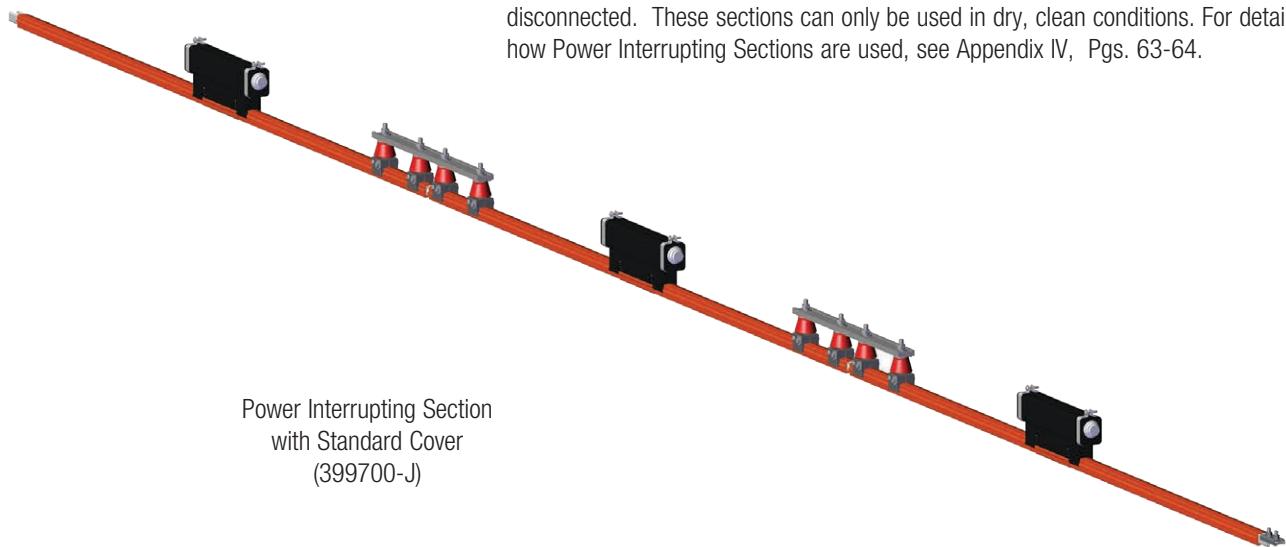
| TYPE | Part No. |
|-------------|----------|
| Single Pole | 310920 |
| Three Pole | 399502 |
| Four Pole | 310929 |



Safe-Lec 2 Power Interrupting Sections

Power Interrupting Sections with Splice Installed

Power Interrupting Sections provide a dead or safe zone between adjacent, separately powered zones of the system. Each section is 14' - 9" (4.5m) long and is installed in place of one length of conductor bar. It is recommended that Power Interrupting Sections are not mounted in ground conductors so that the ground is never disconnected. These sections can only be used in dry, clean conditions. For details on how Power Interrupting Sections are used, see Appendix IV, Pgs. 63-64.



Galvanized Steel Bar

CURRENT RATING

| COVER TYPE | 100A | 125A |
|-------------------------|----------|----------|
| Standard Phase (Orange) | 399700-J | 399700-J |
| Medium Heat (Red) | 399702-J | 399702-J |
| UV Stable (Black) | 399701-J | 399701-J |

Copper Bar

CURRENT RATING

| COVER TYPE | 160A | 250A | 400A |
|-------------------------|----------|----------|----------|
| Standard Phase (Orange) | 399703-J | 399703-J | 399706-J |
| Medium Heat (Red) | 399705-J | 399705-J | 399708-J |
| UV Stable (Black) | 399704-J | 399704-J | 399707-J |

Aluminum / Stainless Steel Bar

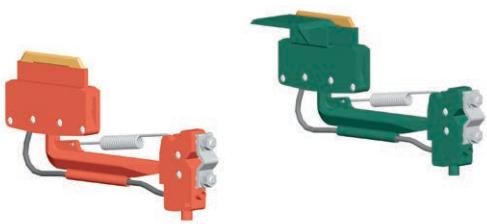
CURRENT RATING

| COVER TYPE | 200A | 315A | 400A |
|-------------------------|----------|----------|----------|
| Standard Phase (Orange) | 399709-J | 399712-J | 399715-J |
| Medium Heat (Red) | 399711-J | 399714-J | 399717-J |
| UV Stable (Black) | 399710-J | 399713-J | 399716-J |

Safe-Lec 2 Collectors & Shoes

Safe-Lec 2 "V-Contact" Collectors articulate to accurately track in the conductor bar groove for superior conductivity. Includes long-wearing copper graphite shoe (in holder) and shunt wires as noted below. The green "ground" (earth) collectors are available without "deflector", or with either right-hand or left-hand deflector. Deflectors prevent the ground collector from coming in contact with adjacent phase collectors. For recommendations about choosing collectors see Appendix I, Pg. 57.

50A Collectors



Collector shoe shunt wire is integrated into the arm. Incoming cable is connected to the terminal lug at the base of the collector (maximum 8 AWG).

| TYPE | Part No. |
|---------------------------|----------|
| Phase (Red) | 399360 |
| Ground, w/o Deflector | 399380 |
| Ground, with RH Deflector | 399373 |
| Ground, with LH Deflector | 399372 |

100A Collectors



Collector shoe shunt wire is integrated into the arm. Incoming cable is connected to the terminal lug at the base of the collector (maximum 2 AWG).

| TYPE | Part No. |
|---------------------------|----------|
| Phase (Red) | 310990 |
| Ground, w/o Deflector | 399355 |
| Ground, with RH Deflector | 399340 |
| Ground, with LH Deflector | 399352 |

Collectors used with Pick-up Guides Only, See Pg. 20.

| | |
|-------------|--------|
| Phase (Red) | 310988 |
| Ground | 399358 |

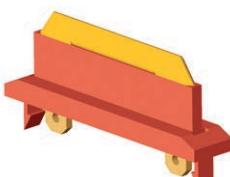
200A Collectors



Two 2 AWG cables, 42" long, are connected to the collector shoe. Incoming cables splice directly to the shunt wires.

| Type-Color | Part No. |
|-----------------|----------|
| Phase (Black) | 34956 |
| Stainless Steel | 531632 |
| Lateral Mount | 532146 |

Collector Shoe & Holder



50A / 100A Collector
Shoe and Holder
310993

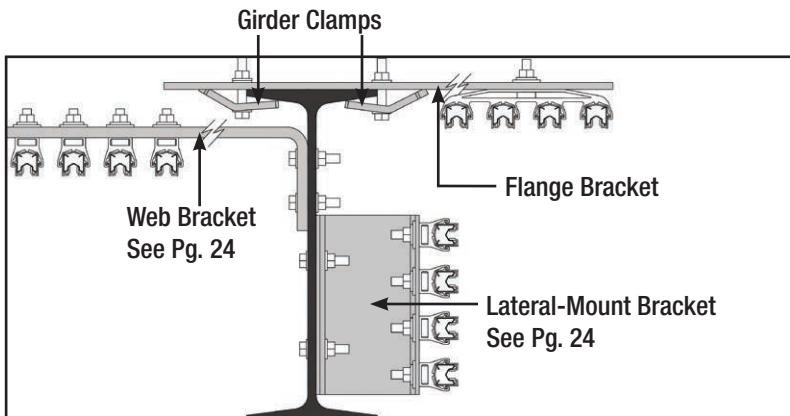


200A Collector Shoe
and Holder
35289

| Current Rating | 50A & 100A Phase (Red) | 50A & 100A Ground (Green) | 50A & 100A with Deflector (Green) | 200A |
|----------------|------------------------|---------------------------|-----------------------------------|-------|
| Part No. | 310993 | 399357 | 399356 | 35289 |

| Cleaning Shoe (Cast Iron) | 50A & 100A | 200A |
|---------------------------|------------|------|
| Part No. | 39157 | N/A |

Safe-Lec 2 Conductor Flange Brackets



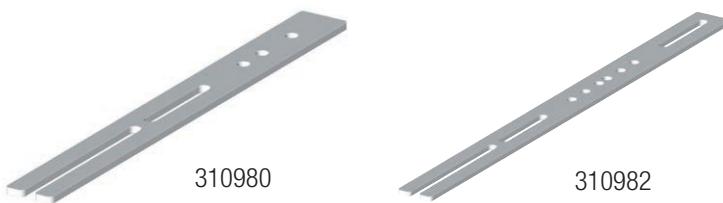
Example Bracket Installations

The various mounting brackets shown on this page and Pg. 24 are used to mount Safe-Lec 2 in many different configurations to suit the application. The diagram shown at the left illustrates how the various brackets are mounted to the I-beam. **All brackets are zinc plated unless noted otherwise.**

Recommended Max. Bracket Spacing

| Application | Collectors Coming Into | Spacing |
|----------------|------------------------|-----------------|
| Vertical Entry | Bottom of rail | 59.0" (1.500 M) |
| Lateral Entry | Side of rail | 44.3" (1.125 M) |
| Curves | Bottom of rail | 44.3" (1.125 M) |

Single-sided Flange Brackets



310980

310982

| Material | For Beam Flange: | Part No. |
|------------------|------------------------------------|----------|
| Galvanized Steel | 3.15" to 6.10" (80 to 155 mm) | 310980 |
| Galvanized Steel | 6.10" to 12.01" (155 to 305 mm) | 310982 |
| Stainless Steel | 6.10" to 12.01" (155 to 305 mm) | 530987 |

Double-sided Flange Brackets



310981

310983

| For Beam Flange: | Part No. | Wt lb (kg) |
|------------------------------------|----------|--------------|
| 3.15" to 7.28" (80 to 185 mm) | 310981 | 1.805 (0.82) |
| 7.28" to 12.01" (185 to 305 mm) | 310983 | 2.37 (1.08) |

Girder Clamp



Two required with each flange bracket.

| Material | Part No. |
|-----------------|----------|
| Plated Steel | 51142 |
| Stainless Steel | 537183 |

Safe-Lec 2 Conductor Web and Collector Brackets

Web Brackets



For mounting conductors horizontally, perpendicular to the web of the I-Beam - see illustration on page 23. For bracket dimensions and hole locations, see page 32.

| Length in. (mm) | Material | Part No. |
|-----------------|-----------------|---------------|
| 10.25 (260) | Plated steel | 310984 |
| 10.50 (267) | Plated steel | 36198 |
| 10.50 (267) | Stainless steel | 39948 |
| 15.75 (400) | Plated steel | 36197 |

Lateral Mount Bracket

For mounting conductors laterally to the web of the I-Beam. See drawing at the top of Pg. 23,



| Material | Part No. |
|--------------|---------------|
| Plated steel | 399517 |

Collector Brackets

For mounting collectors to the moving vehicle, which positions the collectors to slide along the bar.



| # of Posts | For Collector: | Material | Post Size in. (mm) | Length (in.) | Part No. |
|------------|----------------|-----------------|--------------------|--------------|---------------|
| Single | 50A | Plated steel | 0.50 (12.7) | 16.0 | 39618 |
| Single | 50A | Plated Steel | 0.50 (12.7) | 8.0 | 39618C |
| Double | 50A | Plated steel | 0.50 (12.7) | 16.0 | 39050 |
| Single | 100A or 200A | Plated steel | 1.00 (25.4) | 16.0 | 39617 |
| Single | 100A or 200A | Stainless steel | 1.00 (25.4) | 16.0 | 52336 |
| Double | 100A or 200A | Plated steel | 1.00 (25.4) | 16.0 | 37863 |
| Double | 100A or 200A | Stainless steel | 1.00 (25.4) | 16.0 | 534687 |

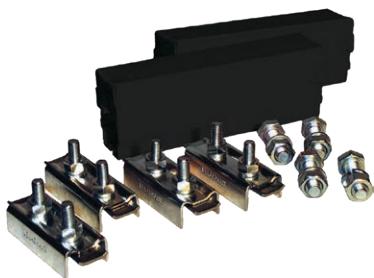


37863 or 534687

Safe-Lec 2 Splice Hardware Kits

When you're 40 feet in the air, small parts will unavoidably fall to the floor. Conductix-Wampfler now provides the spare parts that you need to make your installation easier. These parts are included with every Safe-Lec 2 system and are available using the information below.

For 100, and 125 Amp Systems



Includes:

- 4 Steel Splice Assemblies
- 2 Splice Covers
- 4 Bolts, Nuts, and Washers for the Bar Hangers

| Description | Part No. |
|-------------------------------|----------|
| Hardware Kit, 100, or 125 Amp | 37906 |

For 160, 250, and 400 Amp Systems

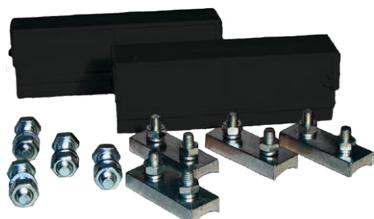


Includes:

- 4 Copper Splice Assemblies
- 2 Splice Covers
- 4 Bolts, Nuts, and Washers for the Bar Hangers

| Description | Part No. |
|------------------------------------|----------|
| Hardware Kit, 160, 250, or 400 Amp | 37907 |

For 200, 315 and 400 Amp Systems



Includes:

- 4 Aluminum Splice Assemblies
- 2 Splice Covers
- 4 Bolts, Nuts and Washers for the bar hangers

| Description | Part No. |
|------------------------------------|----------|
| Hardware Kit, 200, 315, or 400 Amp | 37908 |

Safe-Lec 2 Heater Wire

Heater Wire System



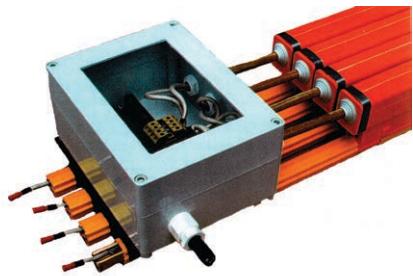
Heater Wire (Male/Female)

A heater wire system is recommended for outdoor applications where frost and ice buildup may occur. The thermostatic control box will automatically energize the heater wire system at temperatures of 35°F (1.66°C) and below. Heater wires are pre-installed in each section of bar. Please consult Conductix-Wampfler for assistance in selecting the correct heater wire system.

Heater Wire Connection

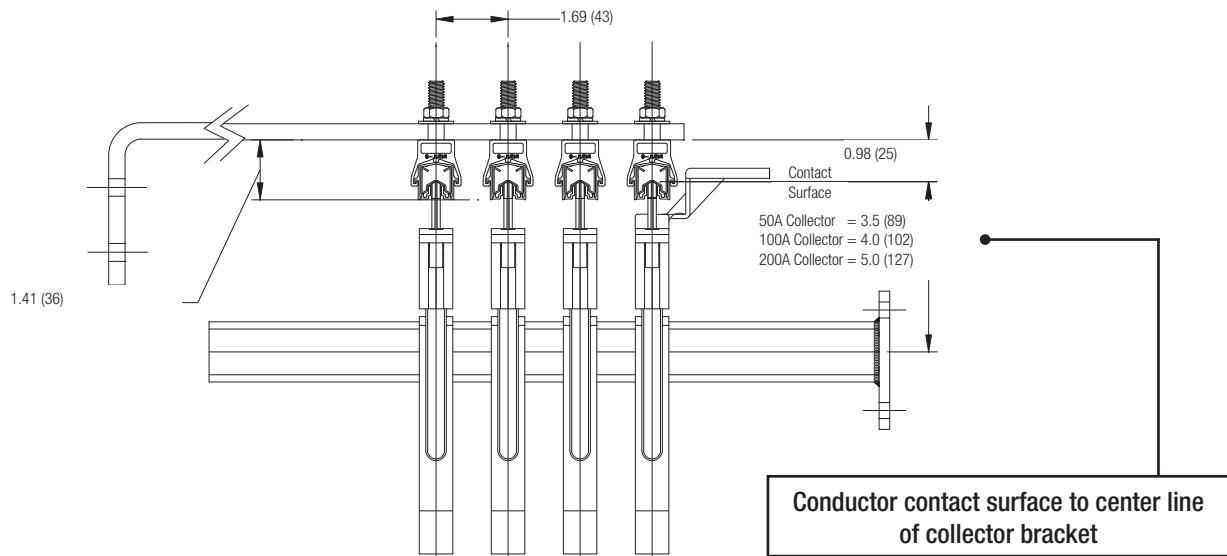


Main Connection Box

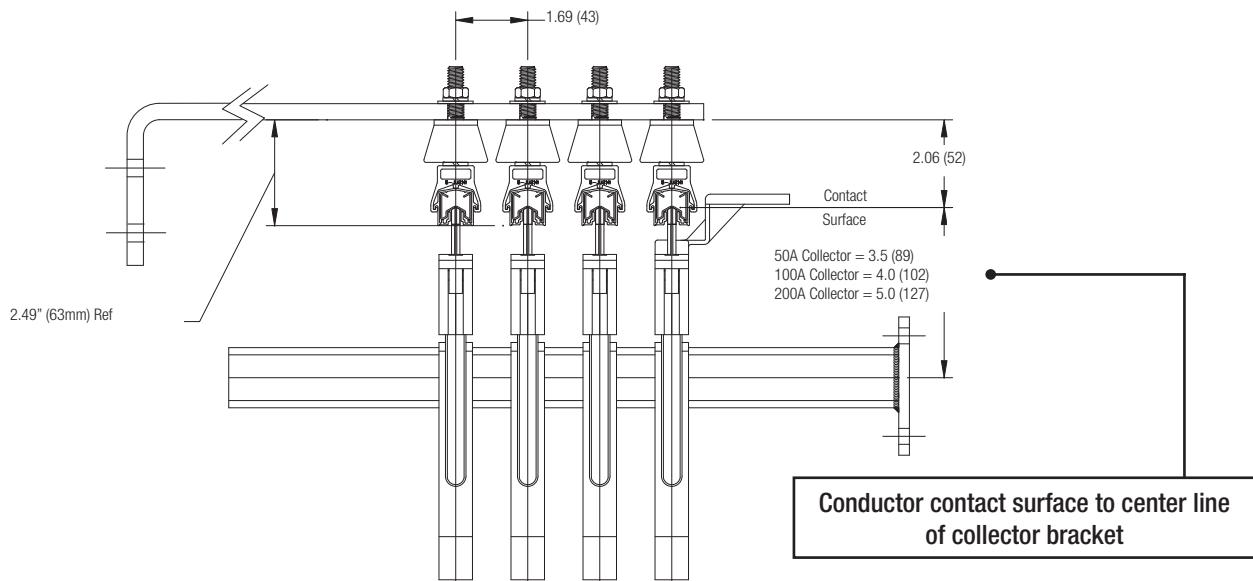


Safe-Lec 2 Installed Dimensions

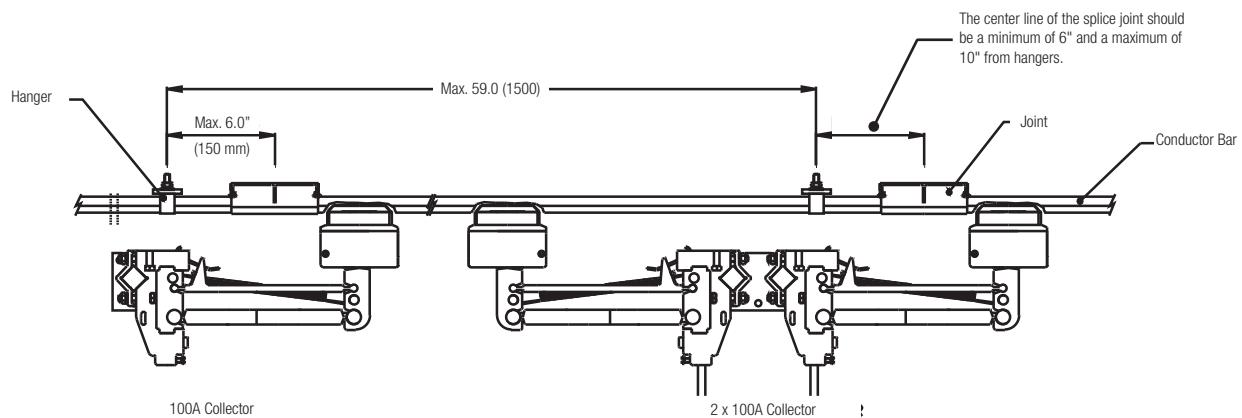
End View - Standard Hanger Clamps



End View - Hanger Clamps with Insulator



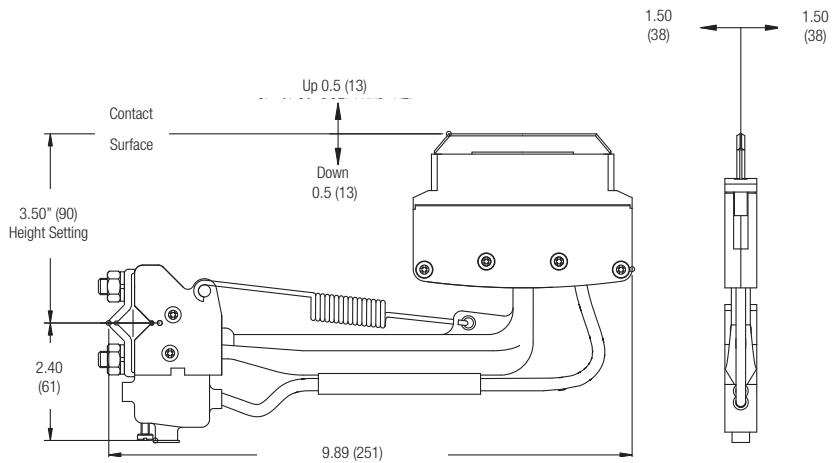
Side View



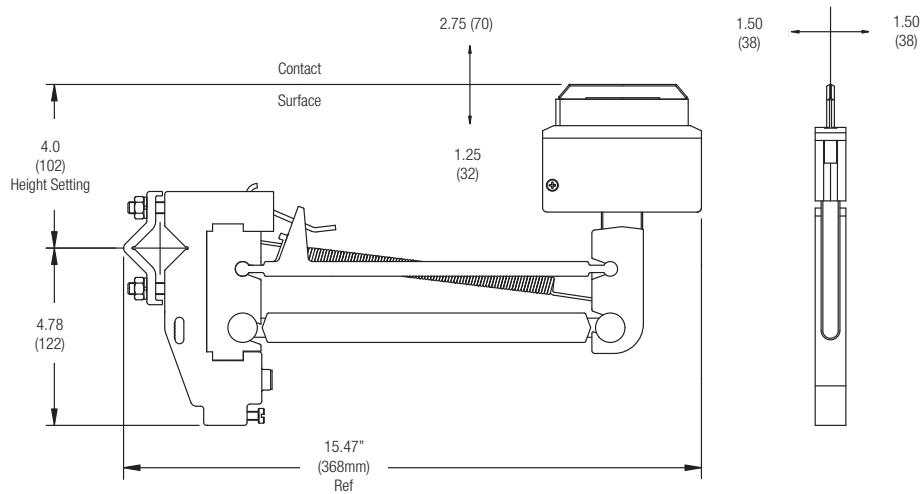
Safe-Lec 2 Collector Dimensions

All dimensions are inches (mm), reference dimensions only

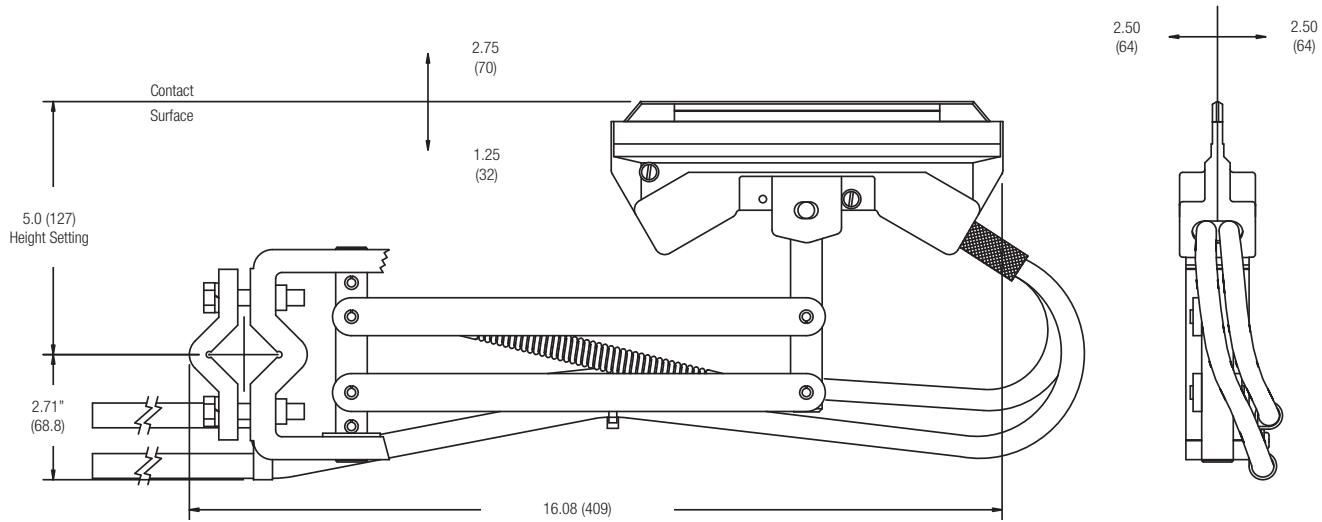
50A Collector (399360)



100A Collector (310990 / 399355)

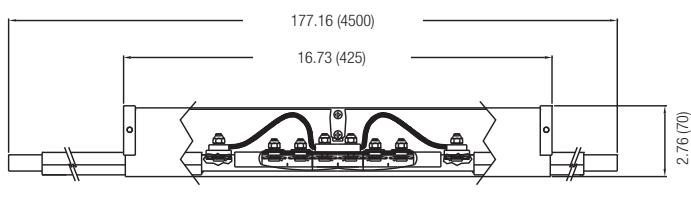


200A Collector (34956)

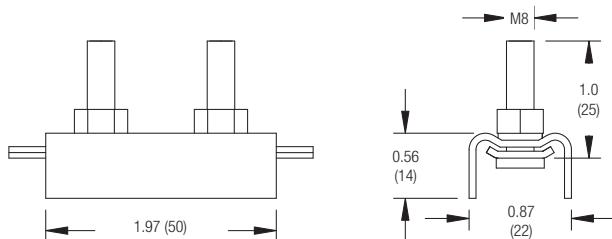


Safe-Lec 2 Component Dimensions

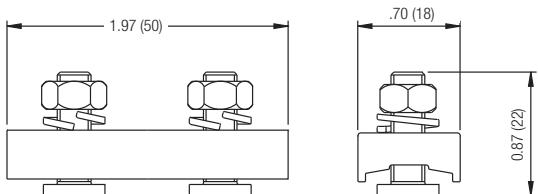
All reference dimensions are in inches (mm)



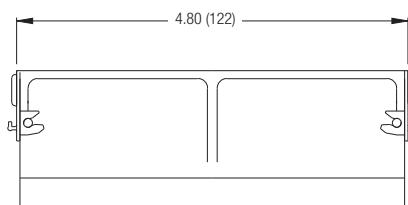
**Expansion Section
(Typical)**



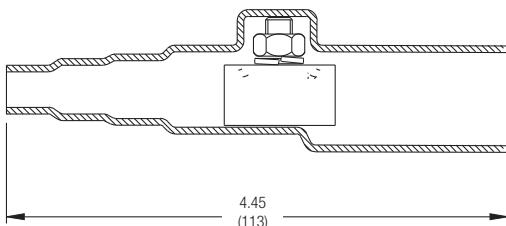
**Steel Joint / Copper
(310872) / (310873)**



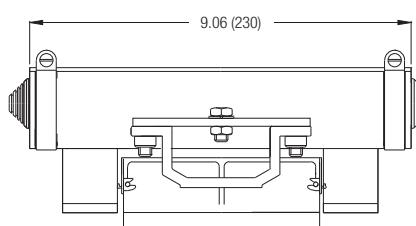
**Aluminum Joint
(310874)**



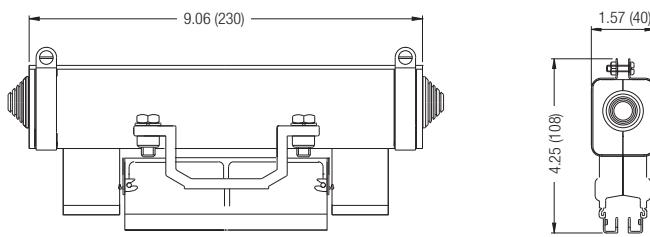
**Standard Phase Cover
(310850B)**



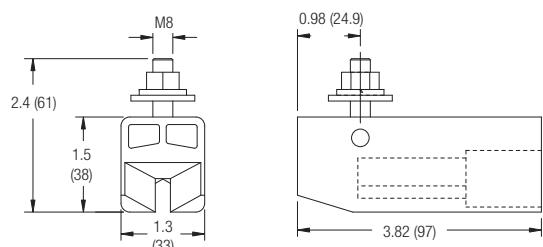
**End Power Feed
(310911)**



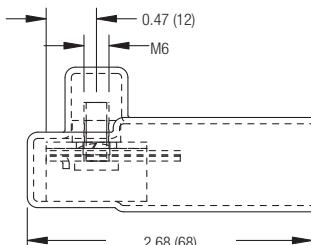
**400A Joint Power feed
(310912B)**



**250A Joint Power feed
(310910B)**

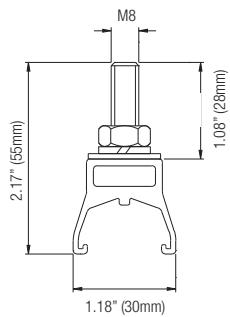


**Transfer End Cap
(310951)**

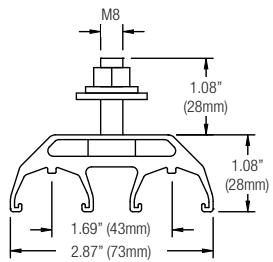


**End Cap
for Aluminum Bar
(310892)**

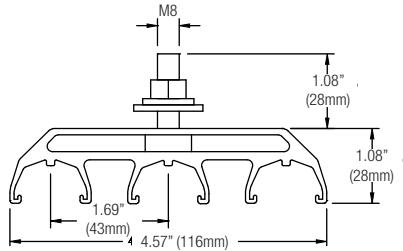
Safe-Lec 2 Component Dimensions



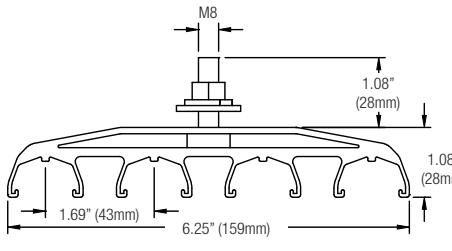
Single Pole
Hanger Clamp
Standard Mount
(310824)



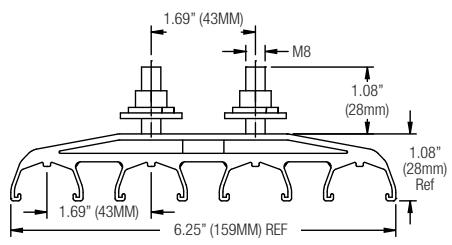
Two Pole
Hanger Clamp
Standard Mount
(310882)



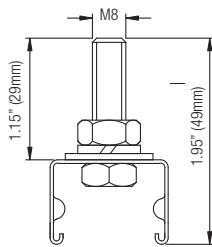
Three Pole
Hanger Clamp
Standard Mount
(310861)



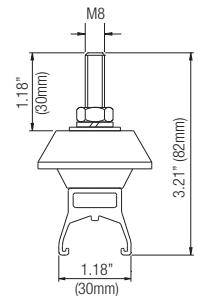
Four Pole
Hanger Clamp
Standard Mount
(310821)



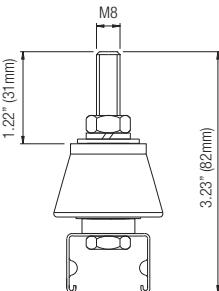
Four Pole
Hanger Clamp
Lateral Mount
(310835)



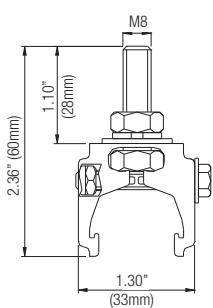
Stainless Steel
Hanger Clamp
(399416B)



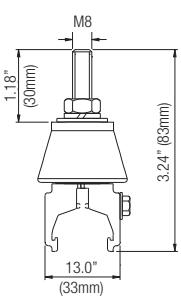
Single Pole
Hanger Clamp
with Insulator
(310918)



Stainless Steel
Hanger Clamp
with Insulator
(38779)



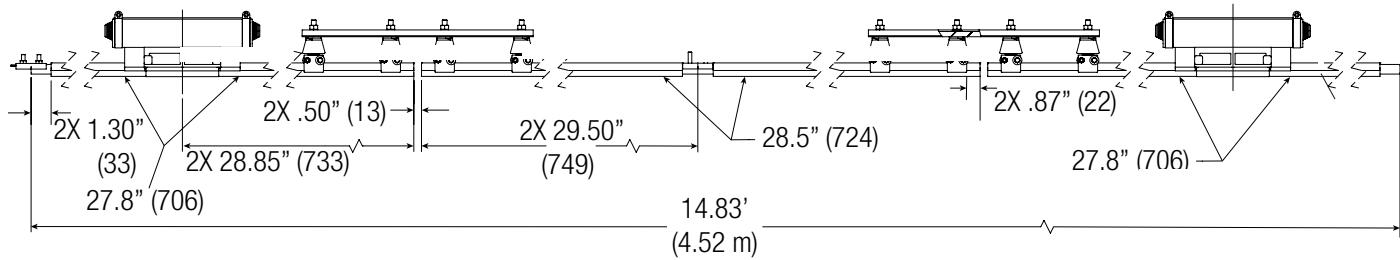
Anchor Clamp
(310832)



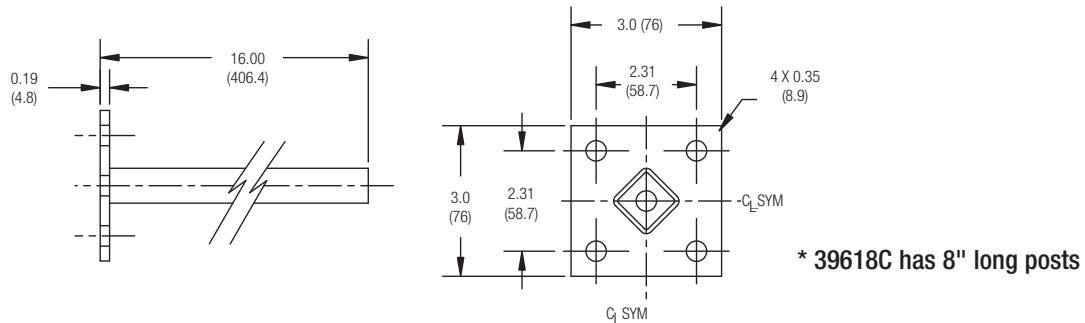
Anchor Clamp
With Insulator
(310969)

Safe-Lec 2 Component Dimensions

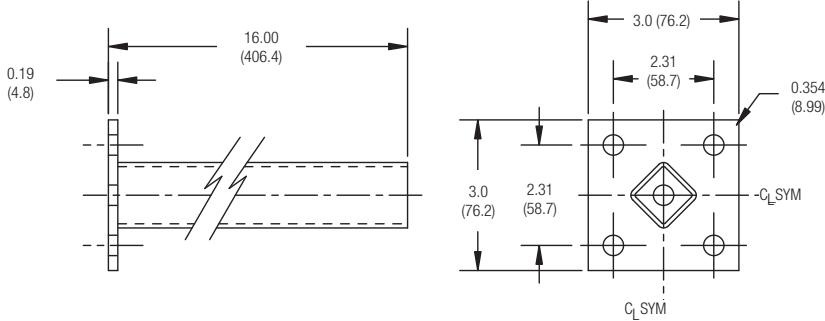
Power Interrupting Section (Typical)



Single Collector Bracket 39618 (1/2" Square Posts) *

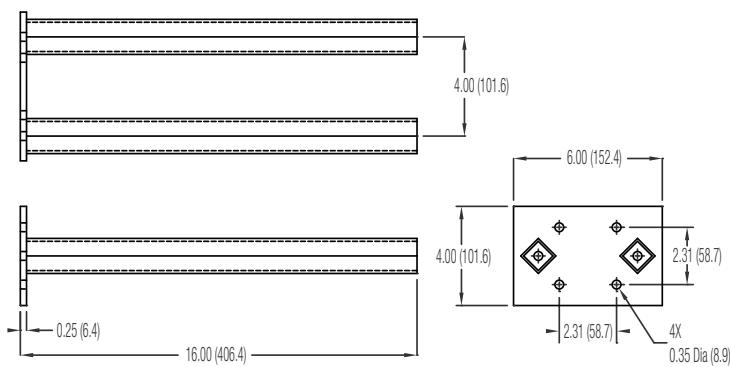


Single Collector Bracket 39617 and 52336 (1" Square Posts)

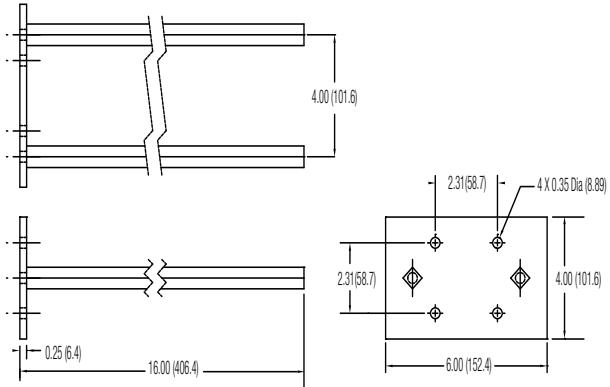


Dual Collector Brackets

37863 and (1" Square Posts)

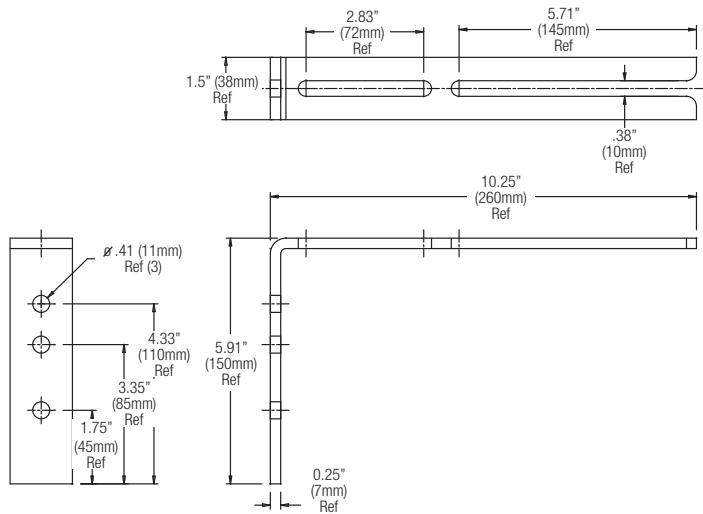


39050 (1/2" Square Posts)

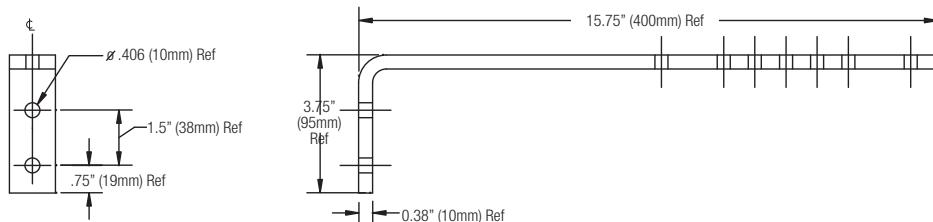
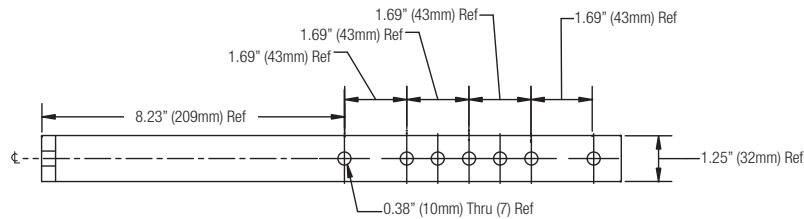


Safe-Lec 2 Bracket Dimensions

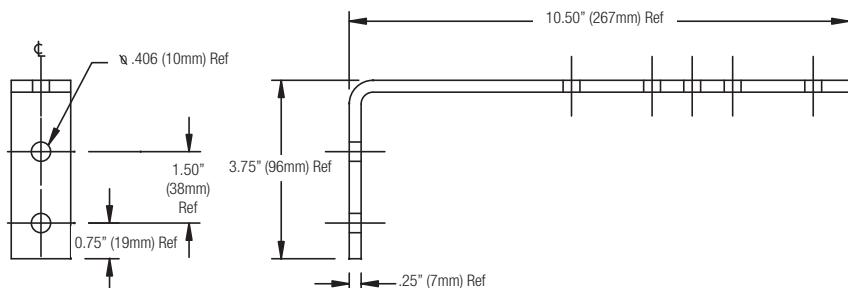
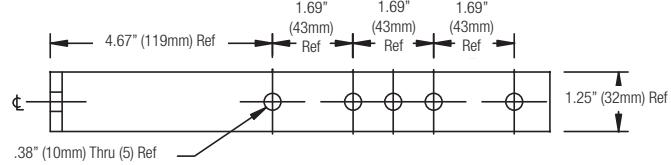
Web Bracket (310984)



Web Bracket (36197)

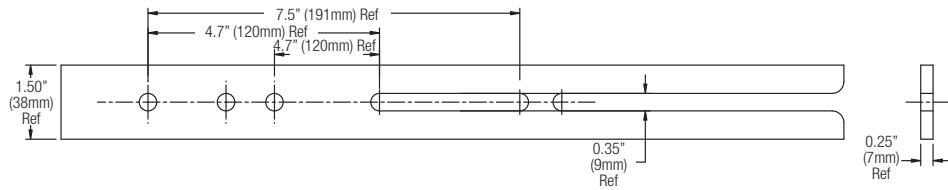


Web Bracket (36198)

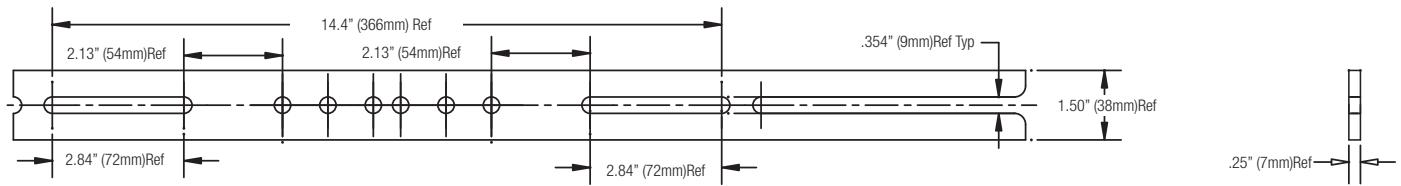


Safe-Lec 2 Bracket Dimensions

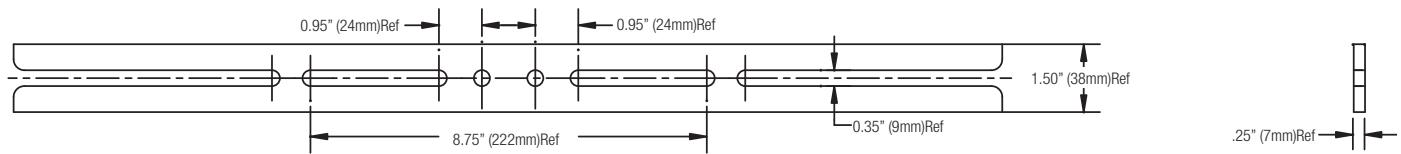
Single Sided Flange Bracket - Fits beam widths up to 7" (310980)



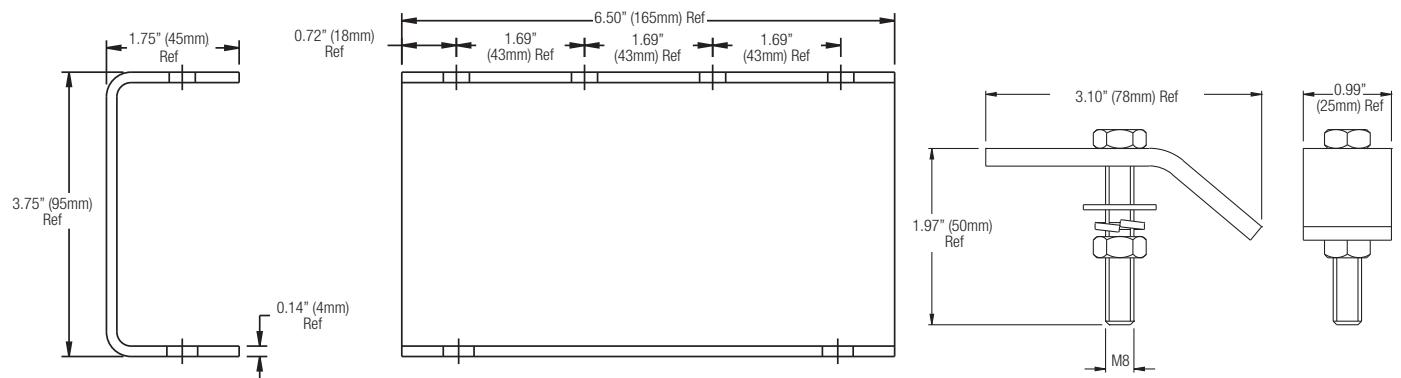
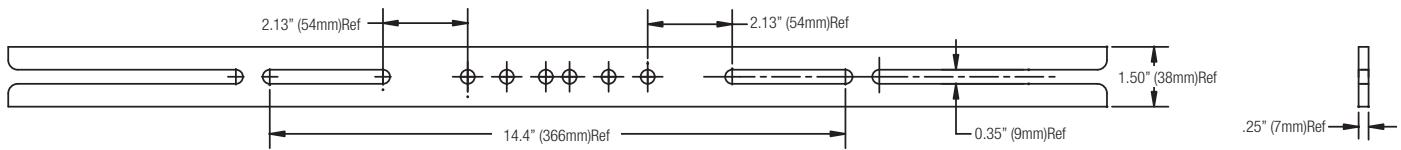
Single Sided Flange Bracket - Fits beam widths up to 14" (310982)



Double Sided Flange Bracket - Fits beam widths up to 8" (310981)



Double Sided Flange Bracket - Fits beam widths up to 14" (310983)



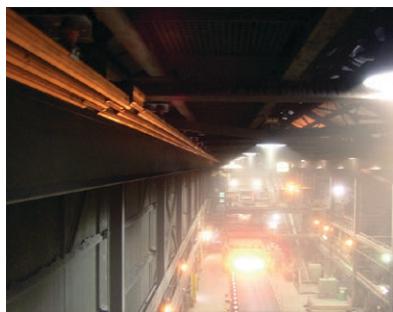
Lateral Web Bracket (399517)

Girder Clamp (51142)

Hevi-Bar II 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.

UL Listed



Hevi-Bar II is ideal for:

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

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 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 corrosive environments. Hevi-Bar II Dura-Coat uses a combined ceramic compound with epoxy binder to provide superior corrosion resistance. Our systems have been tested in 10% hydrochloric acid and 10% sulfuric acid vapor conditions for corrosion resistance. Concentrations that exceed these levels may cause accelerated wear. The entire bar is coated, with the exception of the stainless steel running surface. The insulating cover is applied over the coating.

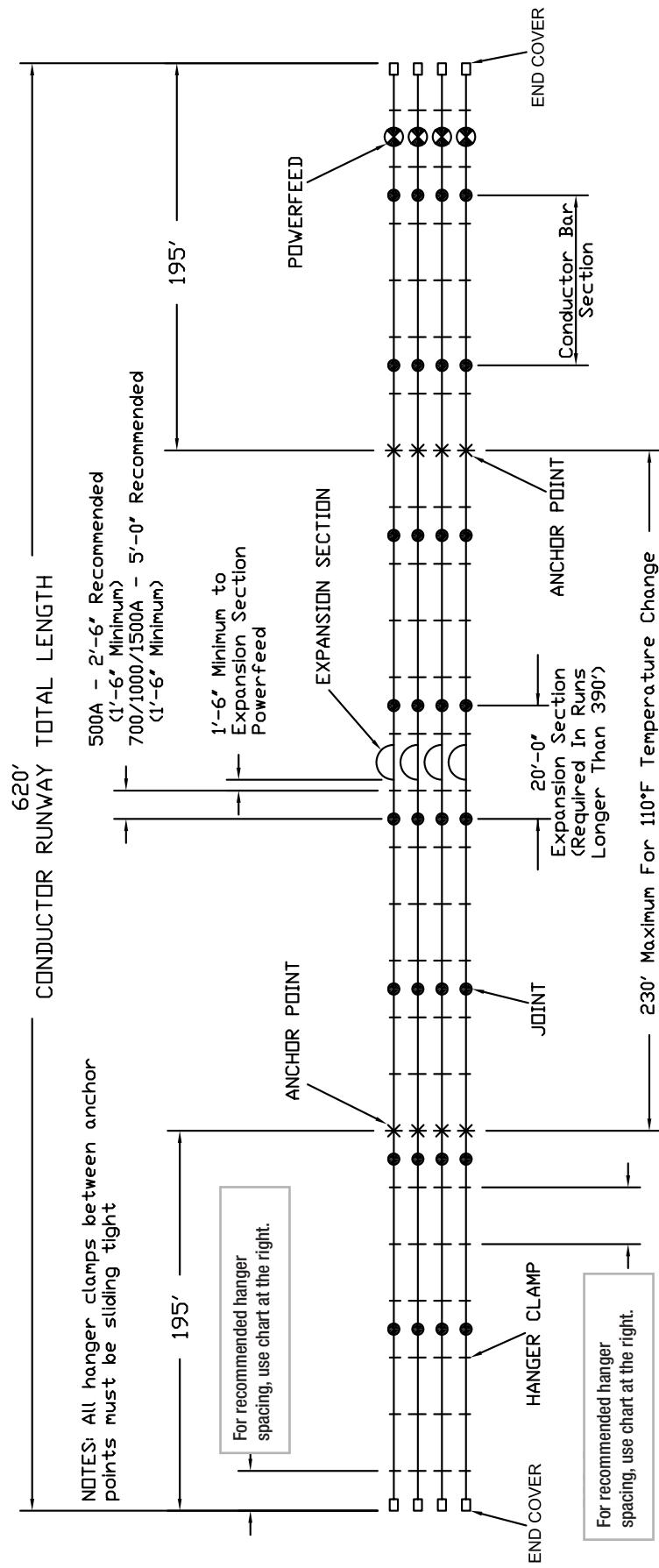
DURA-COAT is ideal for galvanizing and electro-plating lines, chemical plants, smelters, foundries and cast houses, coke and ore handling cranes, and oxidizing/electro-winning facilities.

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

For a list of job references, contact **Conductix-Wampfler**

Hevi-Bar II Typical 4-Bar System

EXAMPLE OF 4 CONDUCTOR RUNWAY
HEAVY BAR 2
(3 PHASE + 1 GROUND)



HANGER SPACING CHART

| SYSTEM | FIRST HANGER | MAX.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" |

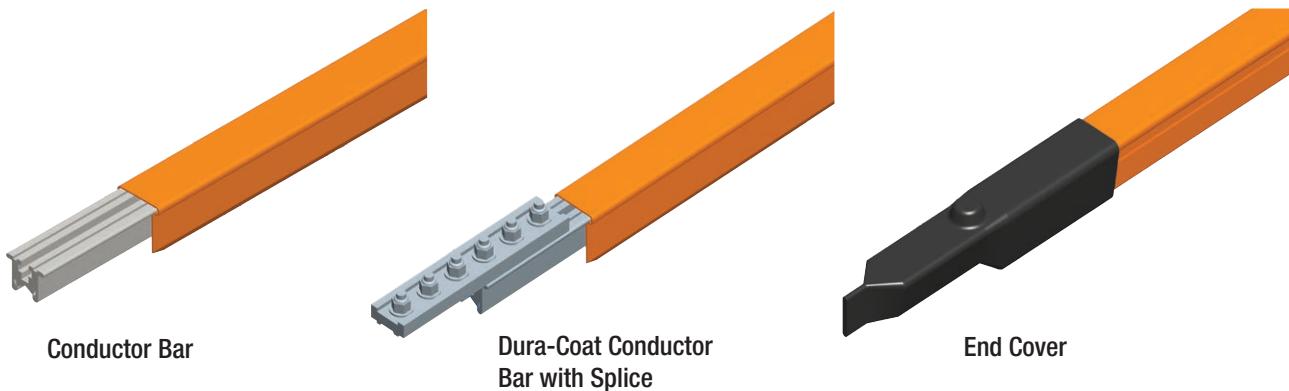
| | | |
|------------------------------|-----|-----------------|
| CONDUCTOR BAR | —□— | END COVER |
| SPLICE JOINT | —+— | HANGER CLAMP |
| EXPANSION SECTION | *—* | ANCHOR LOCATION |
| PICKUP GUIDE OR TRANSFER CAP | —○— | POWERFEED |

Hevi-Bar II - 500A Conductors

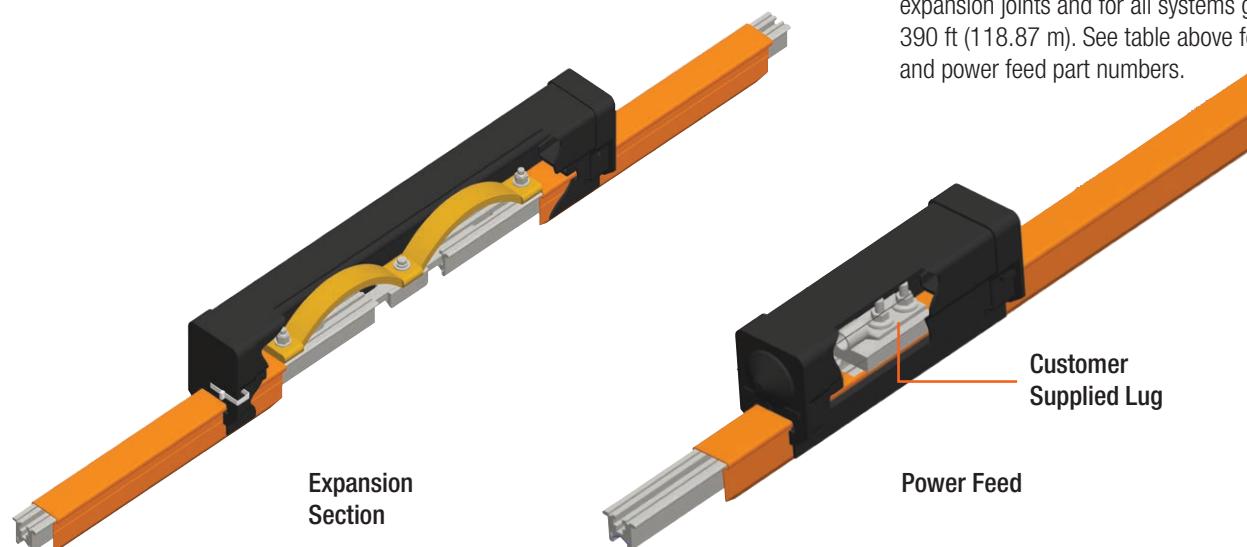
Standard Conductor Bar and Components

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice | Power Feed | Power Interrupting Section ◆ | End Cover |
|---------------------------|---|---------------|---|-------------------|-------------|-------------|------------------------------|-------------|
| PVC 160° F | Phase / Indoors (Orange) | 27582 | 27583 | 37677 | 37676 | 37674 | 50746 | 27588 |
| | Ground / Indoors (Green) | 50258 | 50260 | 37677E | 37676 | 37674 | N/A | 27588 |
| | Phase & Ground / Outdoors UV Stable (Black) | 38925 | 38926 | 38946 | 37676 | 37674 | 50746B | 27588 |
| Poly - carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 32496 | 39225 | 32498 | 32499 | 32500 | 50747 | 27588 |
| Wt lb (kg) | | 26.0 (11.79) | .87 lb/ft. (1.29 kg/m) | 30.0 (13.61) | 1.2 (0.681) | 0.9 (0.408) | 50 (22.67) | 0.1 (0.045) |
| Length ft (m) | | 30.0 (9.114) | * | 30.0 (9.114) | / | / | 30.0 (9.114) | / |

◆ See Appendix IV Pgs. 63-64.



Expansion Sections and Power Feed



Expansion Sections are required at all structural expansion joints and for all systems greater than 390 ft (118.87 m). See table above for expansion and power feed part numbers.

Hevi-Bar II - 500A DURA-COAT & Hangers

DURA-COAT Conductor Bar & Components

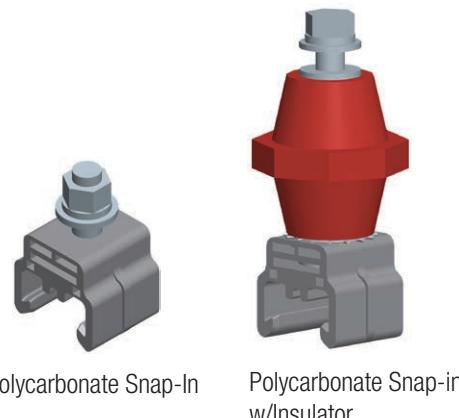
The ideal option for highly corrosive environments. Splices are pre-installed on Dura-Coat conductors.

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice Cover | Power Feed | Power Interrupting Section ♦ | End Cover |
|-------------------------|---|------------------------|---|-------------------|--------------|-------------|------------------------------|-----------|
| PVC 160° F | Phase / Indoors (Orange) | 39745-J | 39747-J | 39741-J | 51304 | 37674 | 50749-J | 27588 |
| | Ground / Indoors (Green) | 39745G-J | 51861-J | 39741G-J | 51304 | 37674 | N/A | 27588 |
| | Phase & Ground / Outdoors UV Stable (Black) | 39745B-J | 51367-J | 39741B-J | 51304 | 37674 | 50749B-J | 27588 |
| Poly-carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 50731-J | 51383-J | 50741-J | 51305 | 32500 | 50750-J | 27588 |
| Wt lb (kg) | 27.0 (12.24) | 0.90 lb/ft (1.34 kg/m) | 28 (12.7) | 0.73 (0.33) | 4.0 (1.81) | 50 (22.67) | 1.0 (0.45) | |
| Length ft (m) | 30.0 (9.144) | - | 30.0 (9.14) | / | / | 30.0 (9.14) | / | |

♦ See Appendix IV Pgs. 63-64.

Hangers

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



Polycarbonate Snap-In

Polycarbonate Snap-in w/Insulator

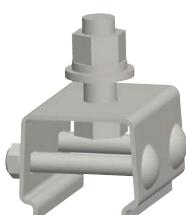
| Hangers - Used with 500A Bar Only | Plated Hardware | Stainless Steel Hardware | Wt lb (kg) |
|--|-----------------|--------------------------|-------------|
| Polycarbonate Snap-In | 26591 | 28368 | 0.29 (0.14) |
| Polycarbonate Snap-in w/Insulator | 27483 | 27780 | 0.89 (0.40) |
| Stainless Steel Cross Bolt | 27481 | 27788 | 0.60 (0.27) |
| Stainless Steel Cross Bolt w/Insulator | 27482 | 29574 | 1.14 (0.50) |

Anchor Pin

| Anchor Pin | Part No. | Wt lb (kg) |
|---|----------|------------|
| Anchor Pin (2 Req'd Per Hanger to turn a hanger into an anchor) | 23946 | .1 (0.05) |

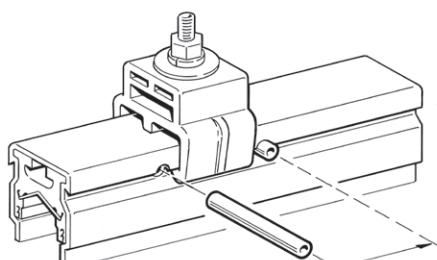
Stainless Steel Cross Bolt

Stainless Steel Cross Bolt w/Insulator



Stainless Steel Cross Bolt

Stainless Steel Cross Bolt w/Insulator



Anchor Pin 23946 (Two Shown)

Hevi-Bar II - 700A Conductors

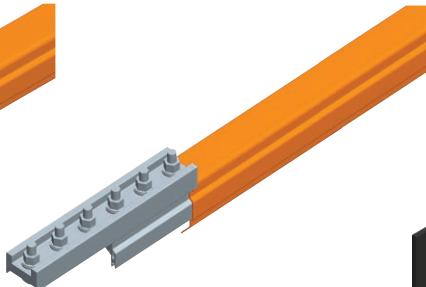
Standard Conductor Bar and Components

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice | Power Feed | Power Interrupting Section ♦ | End Cover |
|--|---|---------------|---|-------------------|------------|------------|------------------------------|------------|
| PVC 160° F | Phase / Indoors (Orange) | 24528 | 24529 | 24566 | 38115 | 38117 | 50748 | 50859 |
| | Ground / Indoors (Green) | 24528B | 51369 | 24566B | 38115 | 38117 | N/A | 50859 |
| | Phase & Ground / Outdoors UV Stable (Black) | 38934 | 38936 | 38949 | 38115 | 38117 | 50748B | 50859 |
| Poly Carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 50733 | 51371 | 50738 | 38115C | 50067 | 50752 | 50859 |
| Fiberglass Reinforced Polyester 400°F | Phase & Ground / Indoors (Orange) | 24554 | 24555 | 24567D | 24558 | 24594 | 50754 | 24585 |
| Wt lb (kg) | | 34.0 (15.42) | 1.13 lb/ft (1.69 kg/m) | 24.0 (10.86) | 1.9 (0.86) | 1.4 (0.64) | 66.0 (29.93) | 1.8 (0.82) |
| Length ft (m) | | 30.0 (9.114) | * | 15.0 (4.572) | / | / | 30.0 (9.114) | / |

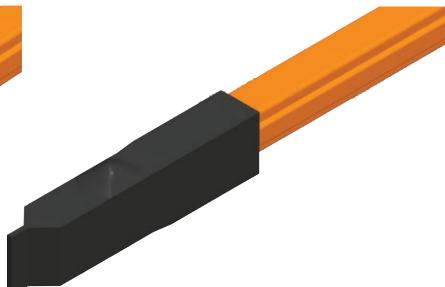
♦ See Appendix IV Pgs. 63-64.



Conductor Bar



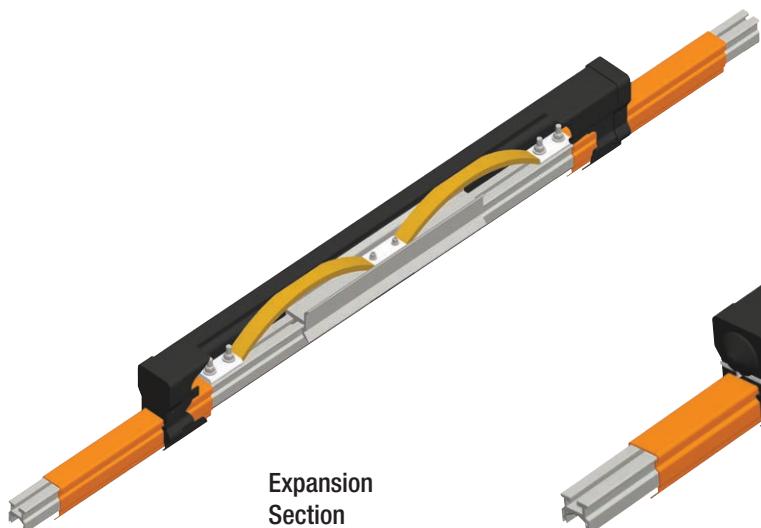
Dura-Coat Conductor Bar with Splice



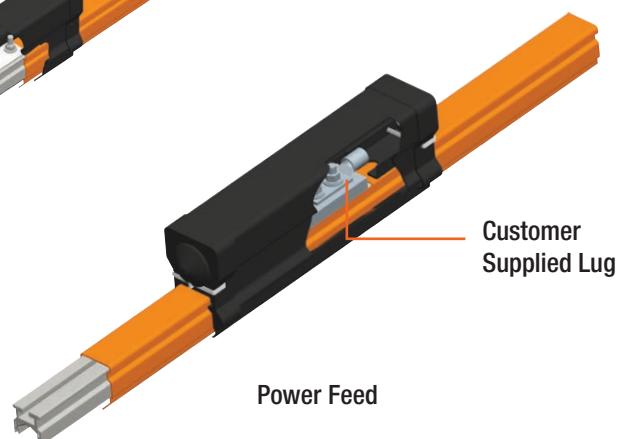
End Cover

Expansion Sections and Power Feed

Expansion Sections are required at all structural expansion joints and for all systems greater than 390 ft (118.87 m). See table above for expansion and power feed part numbers.



Expansion Section



Customer Supplied Lug

Power Feed

Hevi-Bar II - 700A DURA-COAT & Hangers

DURA-COAT Conductor Bar & Components

The ideal option for highly corrosive environments Splices are pre-installed on Dura-Coat conductors.

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice Cover | Power Feed | Power Interrupting Section ◆ | End Cover |
|---------------------------|---|---------------|---|-------------------|--------------|-------------|------------------------------|-------------|
| PVC 160° F | Phase / Indoors (Orange) | 39847-J | 51372-J | 50739-J | 51320 | 38117 | 50751-J | 50859 |
| | Ground / Indoors (Green) | 39847G-J | 51862-J | 50739B-J | 51320 | 38117 | N/A | 50859 |
| | Phase & Ground / Outdoors UV Stable (Black) | 39847B-J | 51376-J | 50740-J | 51320 | 38117 | 50751B-J | 50859 |
| Poly - carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 50062-J | 51374-J | 50063-J | 51321 | 50067 | 50753-J | 50859 |
| Wt lb (kg) | | 35.0 (15.87) | 1.17 lb/ft (1.74 kg/m) | 25.0 (11.33) | 0.7 (0.31) | 5.0 (2.268) | 66.0 (29.93) | 2.0 (0.907) |
| Length ft (m) | | 30.0 (9.114) | - | 15.0 (4.57) | 1.5 (0.457) | 1.5 (0.457) | 30.0 (9.114) | 1.5 (0.457) |

◆ See Appendix IV Pgs. 63-64.

Hangers

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



Polycarbonate Snap-In



| Hangers - Used with 700 to 1500A Bar | Plated Hardware | Stainless Steel Hardware | High Temp. | Wt lb (kg) |
|--|-----------------|--------------------------|------------|-------------|
| Polycarbonate Snap-In | 23223 | 28220 | N/A | 0.27 (0.13) |
| Polycarbonate Snap-in w/insulator | 24902 | 24902B | N/A | 0.83 (0.40) |
| Stainless Steel Cross Bolt | 27481 | 27788 | 51972 | 0.58 (0.28) |
| Stainless Steel Cross Bolt w/insulator | 27482 | 32807 | 34361B | 1.11 (0.53) |

Anchor Pin

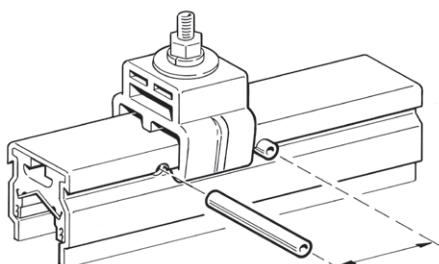
| Anchor Pin | Part No. | Wt lb (kg) |
|---|----------|------------|
| Anchor Pin (2 Req'd Per Hanger to turn a hanger into an anchor) | 23946 | .1 (0.05) |



Stainless Steel Cross Bolt w/insulator



Stainless Steel Cross Bolt



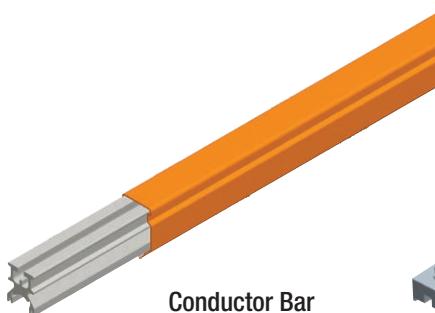
Anchor Pin 23946 (Two Shown)

Hevi-Bar II - 1000A Conductors

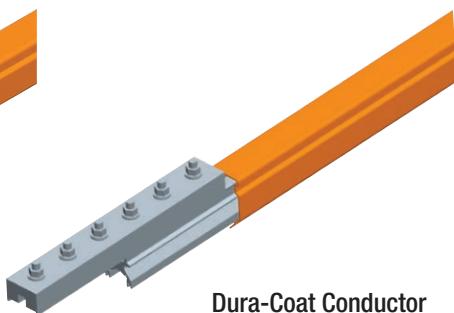
Standard Conductor Bar and Components

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice | Power Feed | Power Interrupting Section ♦ | End Cover |
|--|---|---------------|---|-------------------|------------|------------|------------------------------|------------|
| PVC 160° F | Phase / Indoors (Orange) | 23500 | 23503 | 23512 | 37746 | 38184 | 50755 | 33796B |
| | Phase & Ground / Outdoors UV Stable (Black) | 23500D | 38938 | 23512C | 37746 | 38184 | 50755B | 33796B |
| Poly-carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 31991 | 51408 | 50941 | 31964 | 38184D | 50756 | 33796B |
| Fiberglass Reinforced Polyester 400°F | Phase & Ground / Indoors (Orange) | 23508 | 23511 | 23514 | 23520 | 23530 | 50757 | 23523 |
| Wt (lb) | | 48 (21.77) | 1.6 lb/ft (2.39 kg/m) | 60 (27.21) | 3.0 (1.36) | 1.5 (0.68) | 79 (35.83) | 1.3 (0.59) |
| Length (ft.) | | 30 | - | 20.0 | / | / | 30.0 | / |

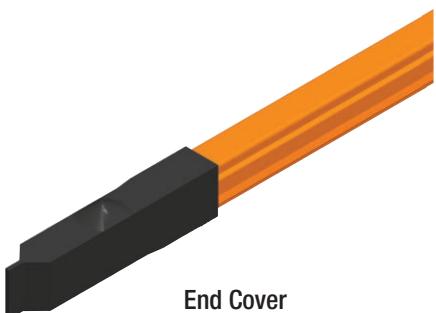
♦ See Appendix IV Pg. 63-64.



Conductor Bar



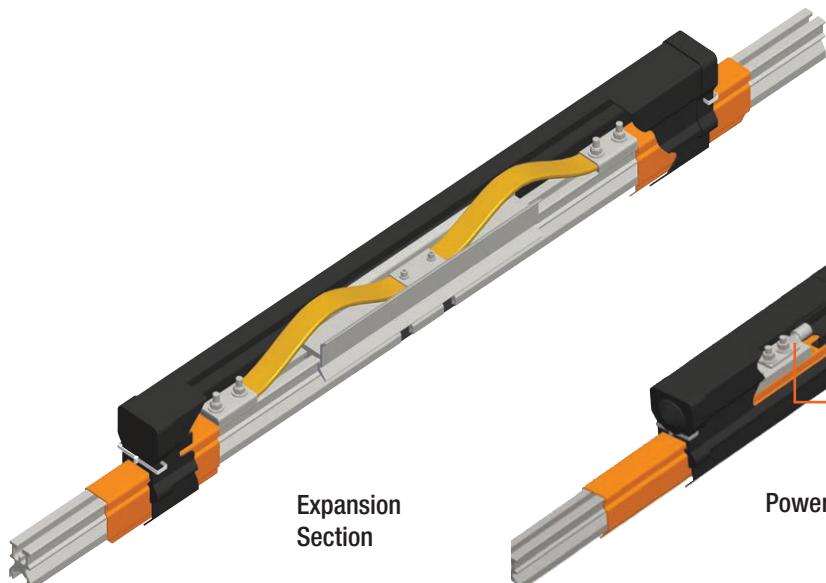
Dura-Coat Conductor Bar with Splice



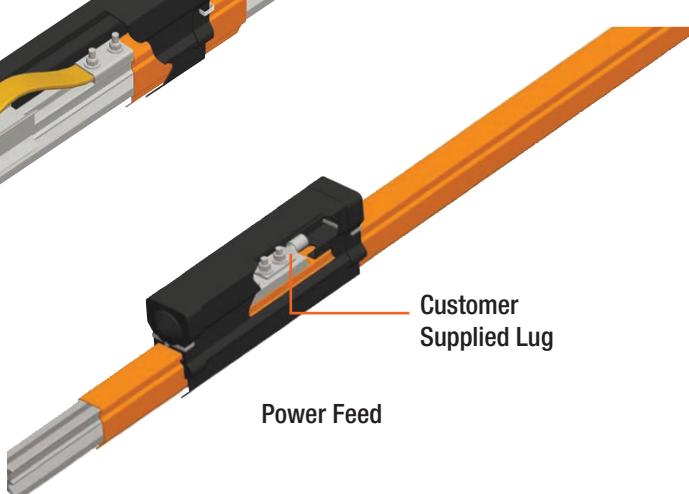
End Cover

Expansion Sections and Power Feed

Expansion Sections are required at all structural expansion joints and for all systems greater than 390 ft (118.87 m). See table above for expansion and power feed part numbers.



Expansion Section



Power Feed

Hevi-Bar II - 1000A DURA-COAT & Hangers

DURA-COAT Conductor Bar & Components

The ideal option for highly corrosive environments Splices are pre-installed on Dura-Coat conductors.

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice Cover | Power Feed | Power Interrupting Section ◆ | End Cover |
|---------------------------|---|------------------------|---|-------------------|--------------|------------|------------------------------|-----------|
| PVC 160° F | Phase / Indoors (Orange) | 50736-J | 51377-J | 50743-J | 51322 | 38184 | 50758-J | 33796B |
| | Phase & Ground / Outdoors UV Stable (Black) | 50736B-J | 51381-J | 50743B-J | 51322 | 38184 | 50758B-J | 33796B |
| Poly - carbonite 250°F | Phase & Ground / Indoors & Outdoors (Red) | 50735-J | 51379-J | 50817-J | 534845 | 38184D | 50759-J | 33796B |
| Wt lb (kg) | 49 (22.22) | 1.63 lb/ft (2.44 kg/m) | 40 (18.14) | 1.2 (0.54) | 6.5 (2.95) | 77 (34.92) | 1.5 (0.68) | |
| Length ft (kg) | 30 (9.114) | * | 20 (6.096) | / | / | 30 (9.114) | / | |

◆ See Appendix IV Pgs. 63-64.

Hangers

Hangers can be installed on brackets up to 1/2" thick (12.7mm).



Polycarbonate Snap-In



Polycarbonate Snap-in w/Insulator

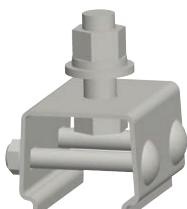
| Hangers - Used with 700 to 1500A Bar | Plated Hardware | Stainless Steel Hardware | High Temp. | Wt lb (kg) |
|--|-----------------|--------------------------|------------|-------------|
| Polycarbonate Snap-In | 23223 | 28220 | N/A | 0.28 (0.13) |
| Polycarbonate Snap-in w/insulator | 24902 | 24902B | N/A | 0.87 (0.40) |
| Stainless Steel Cross Bolt | 27481 | 27788 | 51972 | 0.61 (0.28) |
| Stainless Steel Cross Bolt w/insulator | 27482 | 32807 | 34361B | 1.16 (0.53) |

Anchor Pin

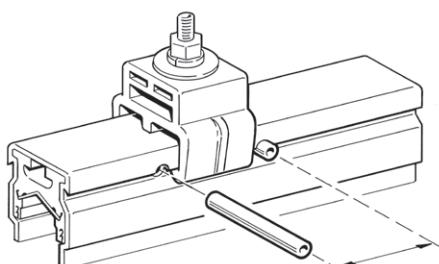
| Anchor Pin | Part No. | Wt lb (kg) |
|---|----------|------------|
| Anchor Pin (2 Req'd Per Hanger to turn a hanger into an anchor) | 23946 | .1 (0.05) |



Stainless Steel Cross Bolt w/Insulator



Stainless Steel Cross Bolt



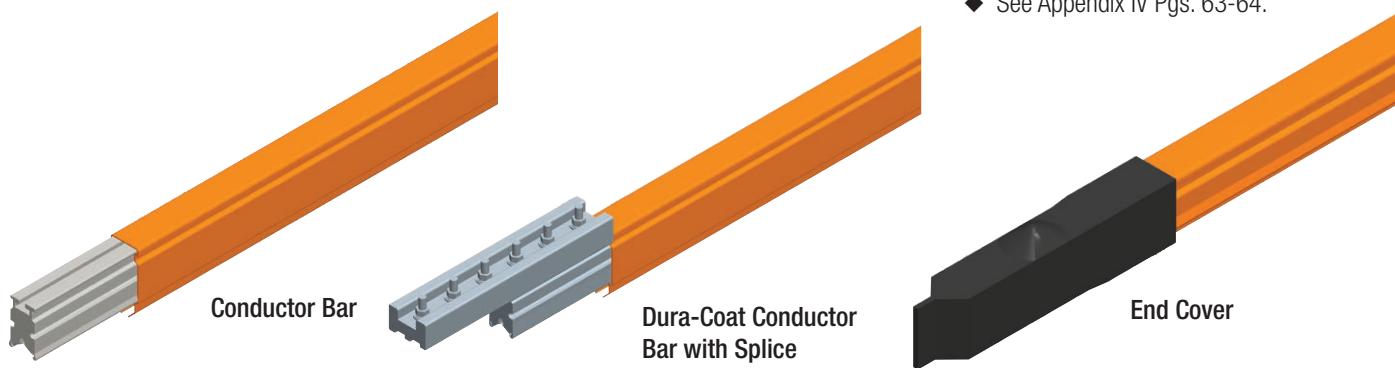
Anchor Pin 23946 (Two Shown)

Hevi-Bar II - 1500A Conductors

Standard Conductor Bar and Components

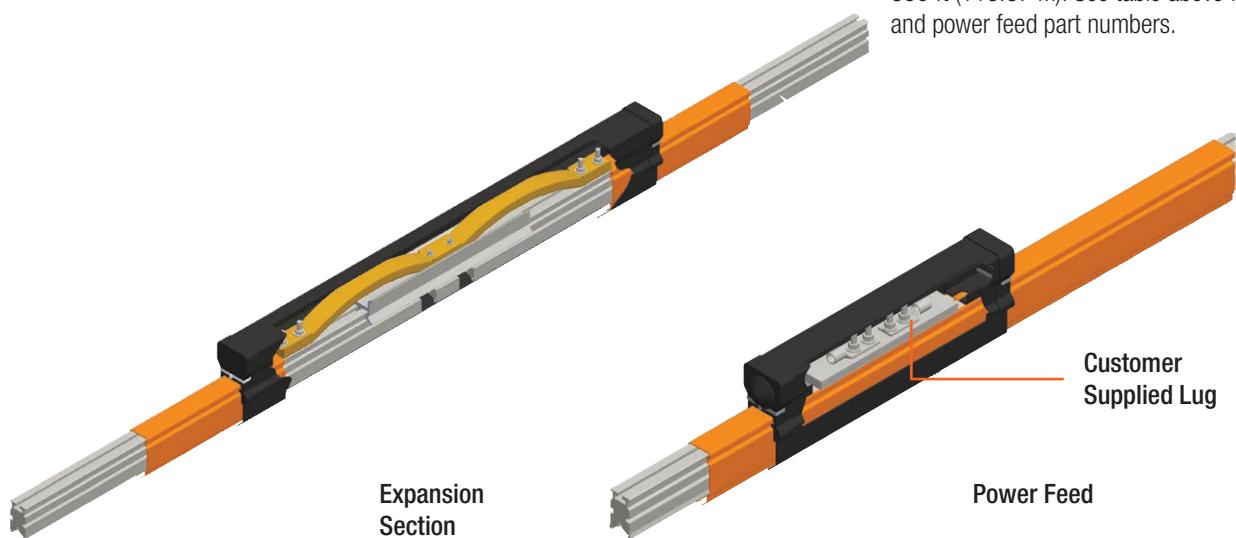
| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice | Power Feed | Power Interrupting Section ♦ | End Cover |
|-------------------------|---|---------------|---|-------------------|------------|------------|------------------------------|-------------|
| PVC 160° F | Phase / Indoors (Orange) | 24000 | 24003 | 32820 | 38968 | 50227 | 50760 | 33796B |
| | Phase & Ground / Outdoors UV Stable (Black) | 24000C | 38944 | 38952 | 38968 | 50227 | 50760B | 33796B |
| Poly-carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 39296 | 39296 | 39287 | 34802 | 50227C | 50761 | 33796B |
| | Wt lb (kg) | 96 (43.54) | 3.2 lb/ft (4.78 kg/m) | 71 (32.2) | 3.8 (1.72) | 2.1 (0.95) | 123.0 (55.8) | 1.5 (0.680) |
| | Length ft (m) | 30 (9.114) | - | 20 (6.10) | / | / | 30 (9.114) | / |

♦ See Appendix IV Pgs. 63-64.



Expansion Sections and Power Feed

Expansion Sections are required at all structural expansion joints and for all systems greater than 390 ft (118.87 m). See table above for expansion and power feed part numbers.



Hevi-Bar II - 1500A DURA-COAT & Hangers

DURA-COAT Conductor Bar & Components

The ideal option for highly corrosive environments Splices are pre-installed on Dura-Coat conductors.

| Type / Max Temp. | Use (Color) | Conductor Bar | Conductor Bar Cut Lgth (Specify 5 to 29 ft) | Expansion Section | Splice Cover | Power Feed | Power Interrupting Section ♦ | End Cover |
|-------------------------|---|---------------|---|-------------------|--------------|-------------|------------------------------|------------|
| PVC 160° F | Phase / Indoors (Orange) | 50734-J | 51382-J | 50742-J | 51297 | 50227 | 50762-J | 33796B |
| | Phase & Ground / Outdoors UV Stable (Black) | 50734B-J | 50230-J | 50742B-J | 51297 | 50227 | 50762B-J | 33796B |
| Poly-carbonate 250°F | Phase & Ground / Indoors & Outdoors (Red) | 39430-J | 39430-J | 50060-J | 51297B | 50227C | 50763-J | 33796B |
| | Wt lb (m) | 97 (44) | 3.23 lb/ft (4.83 kg/m) | 72 (36.65) | 1.41 (0.64) | 130 (58.97) | 126 (57.15) | 1.5 (0.68) |
| | Length ft (m) | 30.0 (9.144) | - | 20.0 (6.10) | / | / | 30.0 (9.144) | / |

♦ See Appendix IV Pgs. 63-64.

Hangers

Hangers can be installed on brackets up to 1/2" thick (12.7mm).



Polycarbonate Snap-In



Polycarbonate Snap-in w/Insulator

| Hangers - Used with 700 to 1500A Bar | Plated Hardware | Stainless Steel Hardware | High Temp. | Wt lb (kg) |
|--|-----------------|--------------------------|------------|--------------|
| Polycarbonate Snap-In | 23223 | 28220 | N/A | 0.28 (0.127) |
| Polycarbonate Snap-in w/insulator | 24902 | 24902B | N/A | 0.87 (0.395) |
| Stainless Steel Cross Bolt | 27481 | 27788 | 51972 | 0.61 (0.277) |
| Stainless Steel Cross Bolt w/insulator | 27482 | 32807 | 34361B | 1.16 (0.526) |

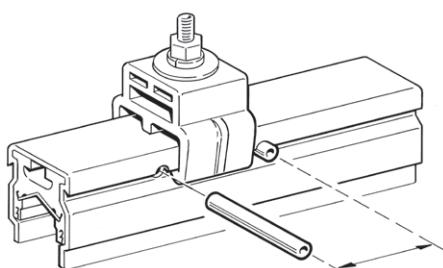
Anchor Pin

| Anchor Pin | Part No. | Wt lb (kg) |
|---|----------|------------|
| Anchor Pin (2 Req'd Per Hanger to turn a hanger into an anchor) | 23946 | .1 (0.05) |



Stainless Steel Cross Bolt

Stainless Steel Cross Bolt w/insulator

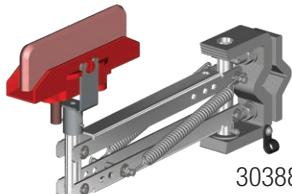


Anchor Pin 23946 (Two Shown)

Hevi-Bar II 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. 57-60.

Single Collector - 125 Amp

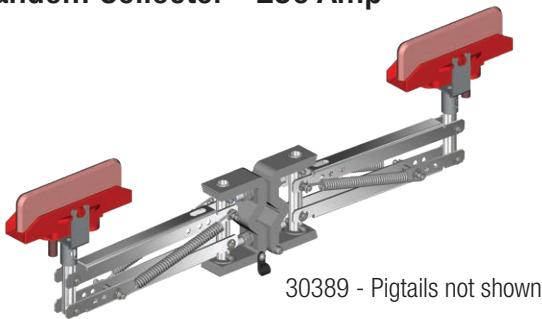


30388 - Pigtauls not shown

21" long pigtauls, 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 | Cap. (amps) | Part No. | Wt lb (kg) |
|-------------------------------------|-------------|----------|-------------|
| Standard Collector with Shoe | 125 | 30388 | 3.50 (1.58) |
| Stainless Steel Collector with Shoe | 125 | 50205 | 3.58 (1.76) |
| Lateral Mount Collector with Shoe | 125 | 532272 | 3.36 (1.52) |
| Replacement Shoe | 125 | 30516 | 1.00 (0.45) |
| Cast Iron Cleaning Shoe | n/a | 39166 | 1.38 (0.63) |

Tandem Collector - 250 Amp

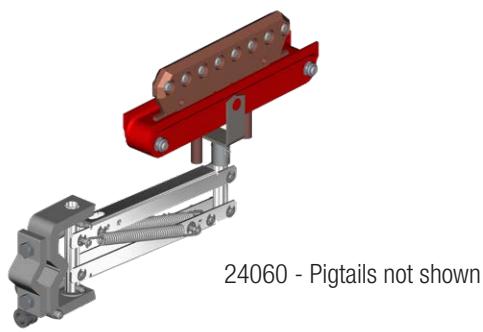


30389 - Pigtauls not shown

21" long pigtauls, 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 | Cap. (amps) | Part No. | Wt lb (kg) |
|---|-------------|----------|-------------|
| Standard Collector with Shoes | 250 | 30389 | 6.54 (2.96) |
| Stainless Steel Collector with Shoes | 250 | 39752 | 6.76 (3.06) |
| Lateral Mount Collector with Shoes | 250 | 532273 | 6.39 (2.90) |
| Replacement Shoe 2 required per collector | 250 | 30516 | 1.0 (0.45) |
| Cast Iron Cleaning Shoe 2 required per collector | n/a | 39166 | 1.38 (0.63) |

Single Collector - 200 | 300 Amp

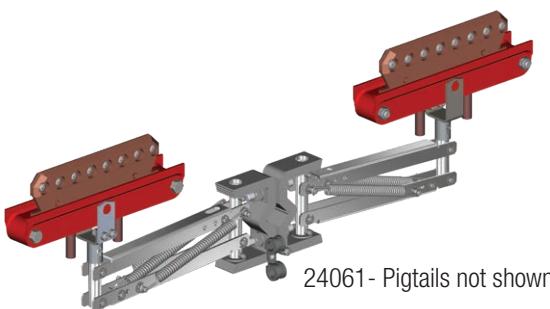


24060 - Pigtauls not shown

42" long pigtauls, 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 | Cap. (amps) | Part No. | Wt lb (kg) |
|-------------------------------------|-------------|----------|-------------|
| Standard Collector with Shoe | 200 | 24060 | 6.79 (3.08) |
| Stainless Steel Collector with Shoe | 200 | 51522 | 6.87 (3.11) |
| Standard Collector with Shoe | 300 | 24060Q | 6.89 (3.12) |
| Lateral Mount Collector with Shoe | 200 | 31933 | 4.80 (2.18) |
| Replacement Shoe | 200 | 11417X | 0.76 (0.34) |
| Cast Iron Cleaning Shoe | n/a | 28267 | 1.0 (0.45) |

Tandem Collector - 400 Amp



24061 - Pigtauls not shown

42" long pigtauls, 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 | Cap. (amps) | Part No. | Wt lb (kg) |
|--|-------------|----------|--------------|
| Standard Collector with Shoes | 400 | 24061 | 13.31 (6.04) |
| Stainless Steel Collector with Shoes | 400 | 39848 | 13.25 (6.01) |
| 600A Standard Collector with Shoes | 600 | 24061B | 13.31 (6.04) |
| Lateral Mount Collector with Shoes | 400 | 32111D | 21.36 (9.69) |
| Replacement Shoe (2 required/collector) | 400 | 11417X | 0.38 (0.17) |
| Cast Iron Cleaning Shoe (2 required /collector) | n/a | 28267 | 1.0 (0.45) |

Hevi-Bar II 500A - 700A 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

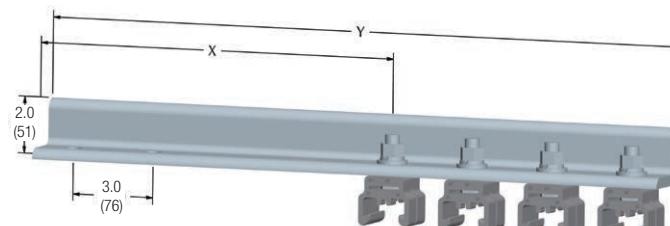
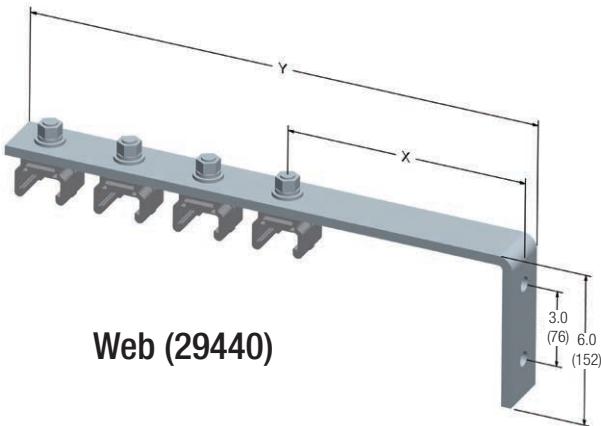
All holes to accept hangers are 3" on-center and .56" diameter.

Mounts to vertical web of beam. Bracket is 2" wide by 3/8" thick.

* Brackets 33655 & 35337 are 1/2" thick

Web Bracket

| For Bar | Bracket Finish | Dim X inches (mm) | Dim Y Inches (mm) | Part No. <u>Bracket Only</u> | Wt lb (kg) | Part Nos. - With Four Hangers Pre-Installed | | | |
|---------|-----------------|-------------------------|-------------------------|-------------------------------------|---------------|---|---|----------------------------------|---|
| | | | | | | Standard Polycarbonate | Standard Polycarbonate w/Insulators | Stainless Steel Cross-Bolt | Stainless Steel Cross-Bolt w/Insulator |
| 500A | Plated Steel | 6.0 (152) | 16.25 (413) | 29441 | 4.4 (2.996) | 29440 | 29440B | 29440C | 29440D |
| | Plated Steel | 9.0 (229) | 19.25 (489) | 30503 | 5.1 (2.313) | 51785 | 51785B | 51785C | 51785D |
| | Plated Steel | 11.0 (279) | 21.25 (540) | 33655 | 7.3 (3.311) | 38268 | 38268B | 38268C | 38268D |
| | Stainless Steel | 9.0 (229) | 19.25 (489) | 35337 | 6.7 (3.309) | 51786 | 51786B | 51786C | 51786D |
| | Hot Dip Galv. | 9.0 (229) | 19.25 (489) | 30697 | 5.1 (2.313) | 34814 | 34814B | 34814C | 34814D |
| 700A | Plated Steel | 6.0 (152) | 16.25 (413) | 29441 | 4.4 (2.996) | 537794 | 537794B | 537794C | 537794D |
| | Plated Steel | 9.0 (229) | 19.25 (489) | 30503 | 5.1 (2.313) | 537796 | 537796B | 537796C | 537796D |
| | Plated Steel | 11.0 (279) | 21.25 (540) | 33655 | 7.3 (3.311) | 537795 | 537795B | 537795C | 537795D |
| | Stainless Steel | 9.0 (229) | 19.25 (489) | 35337 | 6.7 (3.309) | n/a | n/a | n/a | n/a |
| | Hot Dip Galv | 9.0 (229) | 19.25 (489) | 30697 | 5.1 (2.313) | 537797 | 537797B | 537797C | 537797D |



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.

| For Bar | Bracket Finish | Dim X Inches (mm) | Dim Y Inches (mm) | Part No. <u>Bracket Only</u> | Wt lb (kg) | Part Nos. - With Four Hangers Pre-Installed | | | |
|---------|----------------|-------------------------|-------------------------|--|---------------|---|---|----------------------------------|---|
| | | | | | | Standard Polycarbonate | Standard Polycarbonate w/Insulators | Stainless Steel Cross-Bolt | Stainless Steel Cross-Bolt w/Insulator |
| 500A | Plated Steel | 13.25 (337) | 23.50 (597) | 30529 | 8.8 (3.992) | 30493 | 30493B | 30493C | 30493D |
| 700A | Plated Steel | 13.25 (337) | 23.50 (597) | 30529 | 8.8 (3.992) | 51878 | 51878B | 51878C | 51878D |

Hevi-Bar II 1000A - 1500A 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:

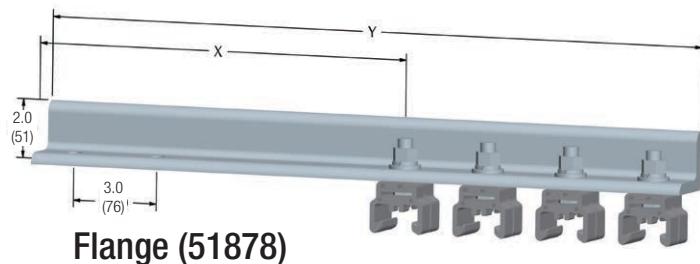
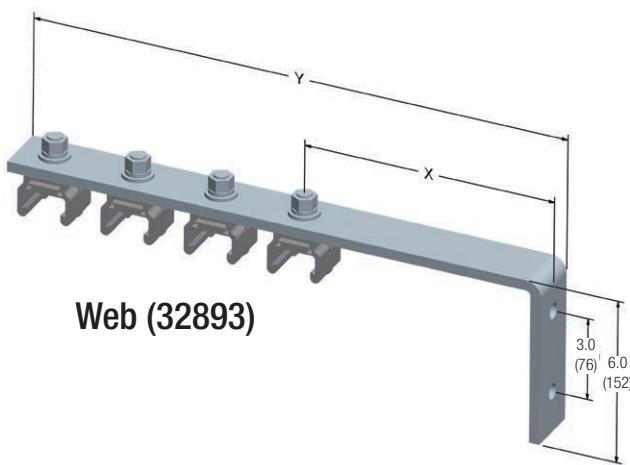
- Bracket only (no hangers included)
- Bracket with four pre-installed hangers - standard Polycarbonate
- Bracket with four pre-installed hangers - standard Polycarbonate w/insulators
- Bracket with four pre-installed hangers - stainless steel cross-bolt
- Bracket with four pre-installed hangers - stainless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

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

Web Bracket

Mounts to vertical web of beam. Bracket is 2" wide by 1/2" thick.

| Bracket Finish | Dim X Inches (mm) | Dim Y Inches (mm) | Part No. <u>Bracket Only</u> | Wt (lb) | Part No. - With Four Hangers Pre-Installed | | | |
|----------------|-------------------------|-------------------------|-------------------------------------|------------|--|---|----------------------------------|---|
| | | | | | Standard Polycarbonate | Standard Polycarbonate w/Insulators | Stainless Steel Cross-Bolt | Stainless Steel Cross-Bolt w/Insulator |
| Plated Steel | 6.0 (152) | 16.25 (413) | 537552 | 5.6 | 32893 | 32893B | 32893C | 32893D |
| Plated Steel | 9.0 (229) | 19.25 (489) | 537554 | 6.2 | 39923 | 39923B | 39923C | 39923D |
| Hot Dip Galv. | 9.0 (229) | 19.25 (489) | 537555 | 6.2 | 32932 | 32932B | 32932C | 32932D |



Flange Bracket

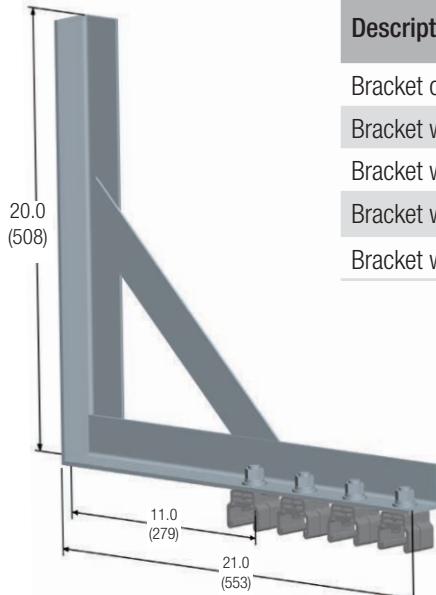
Mounts to top flange of beam. Bracket is a 2"x 2" angle, by 3/8" thick. The first hole is 1 1/4" from the end.

| Bracket Finish | Dim X Inches (mm) | Dim Y Inches (mm) | Part No. <u>Bracket Only</u> | Wt (lb) | Part Nos. - With Four Hangers Pre-Installed | | | |
|----------------|-------------------------|-------------------------|-------------------------------------|------------|---|---|----------------------------------|---|
| | | | | | Standard Polycarbonate | Standard Polycarbonate w/Insulators | Stainless Steel Cross-Bolt | Stainless Steel Cross-Bolt w/Insulator |
| Plated Steel | 13.25 (337) | 23.50 (597) | 30529 | 8.9 | 51878 | 51878B | 51878C | 51878D |

Hevi-Bar II 700A - 1000A - 1500A Support Brackets

Braced Web Bracket

Plated steel weldment with brace, used for heavier conductor bar (e.g. 1500A). Not for 500A bar.

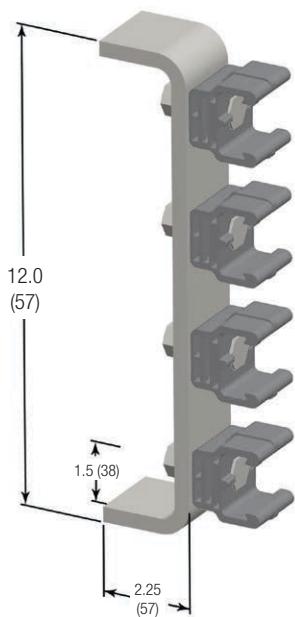


Braced Web (25691)

| Description | Hanger Type | Part No. | Wt lb (kg) |
|----------------------------------|---|---------------|------------|
| Bracket only | n/a | 25720 | 9.5 (4.30) |
| Bracket with 4 Hangers Installed | Polycarbonate (# 23223) | 25691 | 4.4 (2.00) |
| Bracket with 4 Hangers Installed | Polycarbonate w/insulators (# 24902) | 25691B | 6.8 (3.08) |
| Bracket with 4 Hangers Installed | Stainless Steel Cross Bolt (# 27481) | 25691C | 5.7 (2.59) |
| Bracket with 4 Hangers Installed | Stainless Steel Cross Bolt w/Insulators (# 27482) | 25691D | 7.9 (3.58) |

Lateral Bracket

Mounts to vertical web of beam to configure conductor bar one above the other. Bracket is 2" wide by 3/8" thick. Not for 500A bar.



Lateral (51876)

| Description | Hanger Type | Part No. | Wt lb (kg) |
|----------------------------------|---|---------------|------------|
| Bracket only | n/a | 50498 | 3.1 (1.41) |
| Bracket with 4 Hangers Installed | Polycarbonate (# 23223) | 51876 | 4.3 (1.95) |
| Bracket with 4 Hangers Installed | Polycarbonate w/insulators (# 24902) | 51876B | 6.7 (3.04) |
| Bracket with 4 Hangers Installed | Stainless Steel Cross Bolt (# 27481) | 51876C | 5.6 (2.54) |
| Bracket with 4 Hangers Installed | Stainless Steel Cross Bolt w/Insulators (# 27482) | 51876D | 7.8 (3.54) |

Hevi-Bar II Specifications

Conductor Bar Cover

| Material | Cover Type: | | | | |
|---------------------|---------------------------------|---------------------------------|-----------------------------------|------------------------------------|------------------------------------|
| | Standard (Ground) | UV Resistant | Medium Heat | Hi Heat* | Bare Bar |
| PVC | PVC | Lexan Polycarbonate | Fiberglass Reinforced | N/A | |
| Color | Orange (Green) | Black | Red | Orange | no color |
| Normal Ambient | -40°F to 104°F -40°C to 40°C | -40°F to 104°F -40°C to 40°C | -40°F to 200°F -40°C to 93.3°C | -40°F to 345°F -40°C to 173.8°C | -40°F to 690°F -40°C to 365.5°C |
| Max. Temperature | 160°F (71.1°C) | 160°F (71.1°C) | 250°F (121.1°C) | 400°F (204.4°C) | 750°F (398.8°C) |
| Material | Lexan Polycarbonate | | | | |
| | PVC | PVC | Fiberglass | N/A | |
| Dielectric Strength | 450 volts/mil | 450 volts/mil | 600 volts/mil | 200 volts/mil | N/A |
| Volume Resistivity | >10 ¹² (Ω/mil) | >10 ¹² (Ω/mil) | >10 ¹³ (Ω/mil) | >10 ¹¹ (Ω/mil) | N/A |
| Flame Test | Self Extinguishing | Self Extinguishing | Self Extinguishing | Self Extinguishing | N/A |
| Specific Density | 1.5 g/cm ³ | 1.5 g/cm ³ | 1.15 g/cm ³ | 1.24 g/cm ³ | N/A |

* 700A and 1000A only

Conductor Bar

| | Nominal Current of Bar | | | |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| | 500A | 700A | 1000A | 1500A |
| Cross Sectional Area, in. (mm) | 0.52 (333.5) | 0.70 (451.6) | 1.06 (680.6) | 2.30 (1483.9) |
| AC & DC Voltage | 600 | 600/4160 | 600/4160 | 600/4160 |
| DC Resistance at 20°C (Ω/ft.) | 3.27 x 10 ⁻⁵ | 2.11 x 10 ⁻⁵ | 1.41 x 10 ⁻⁵ | 0.64 x 10 ⁻⁵ |
| Phase Corrected Impedance Z at 20°C (Ω/ft.) | 5.40 x 10 ⁻⁵ | 4.21 x 10 ⁻⁵ | 3.39 x 10 ⁻⁵ | 2.28 x 10 ⁻⁵ |
| 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 |

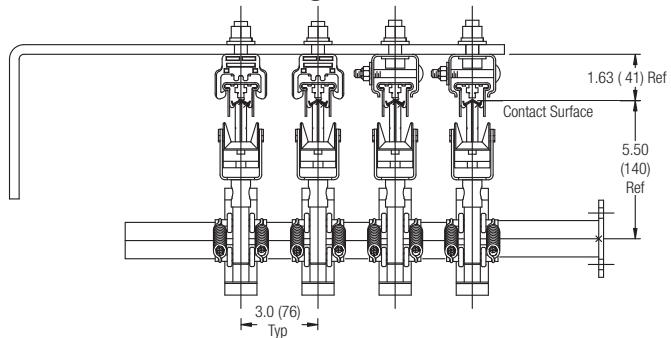
Available Accessories (Contact Conductix-Wampfler)

- 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

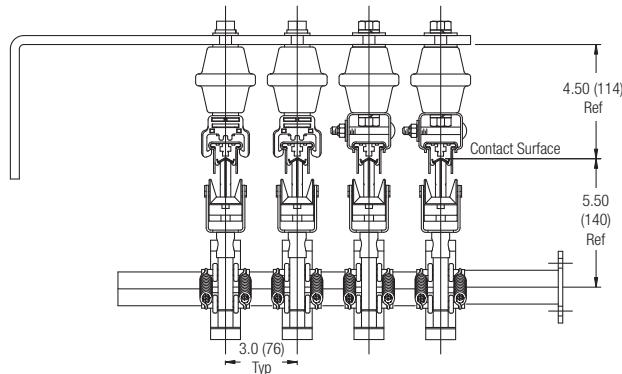
The appropriate conductor bar can be chosen only when all the relevant factors are known. Please refer to the Specification Data Sheet on Pg. 6, and to Appendices I through IV at the back of this catalog. Also, please consult Conductix-Wampfler Sales if you have any questions about the suitability of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

Hevi-Bar II Installed Dimensions

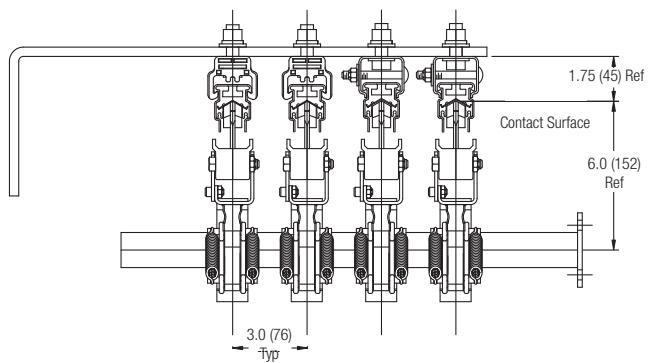
500A - Standard Hanger



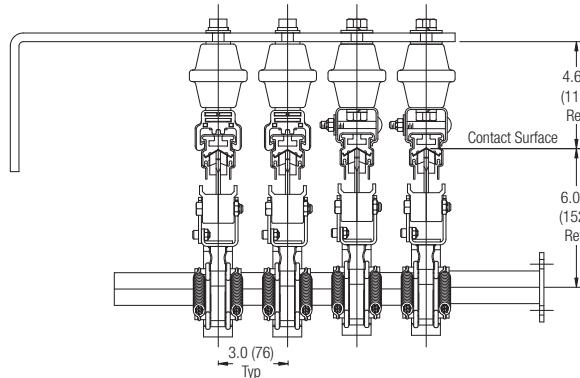
500A - with Insulators



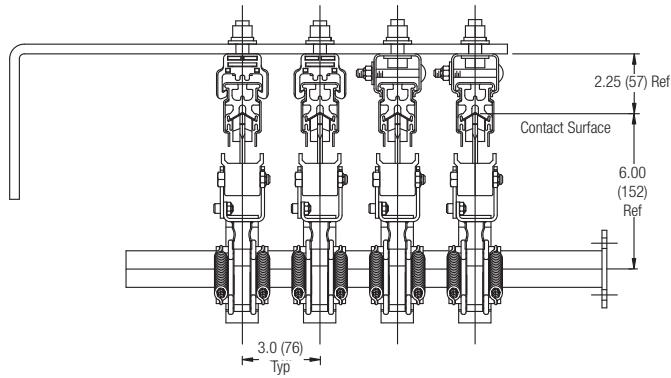
700A - Standard Hangers



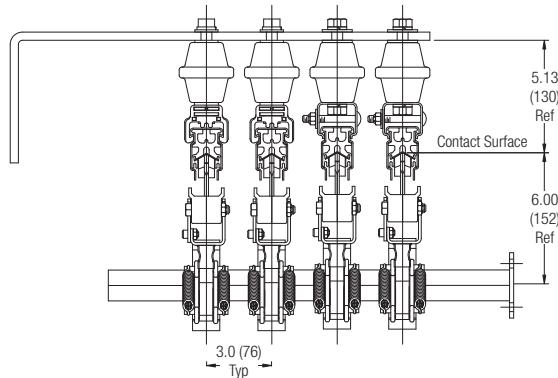
700A - with Insulators



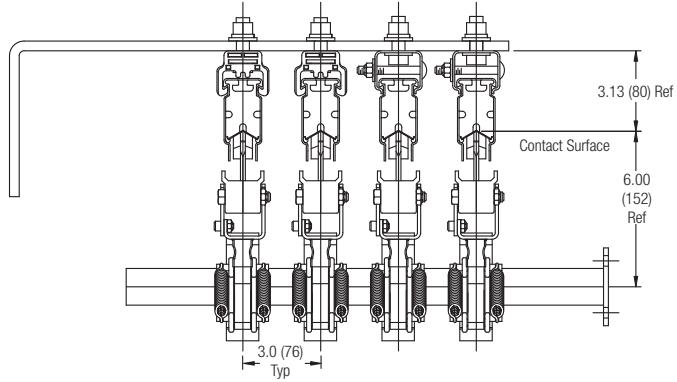
1000A - Standard Hangers



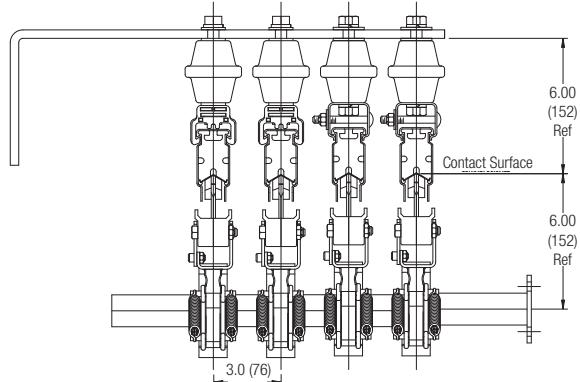
1000A - with Insulators



1500A - Standard Hangers

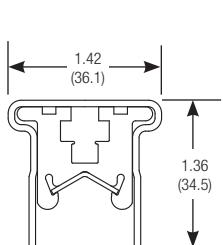


1500A - with Insulators

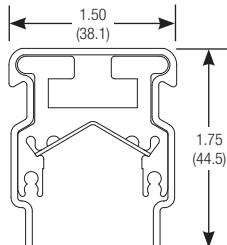


Hevi-Bar II Bar & Expansion Dimensions

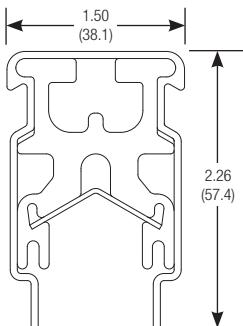
Bar Profiles



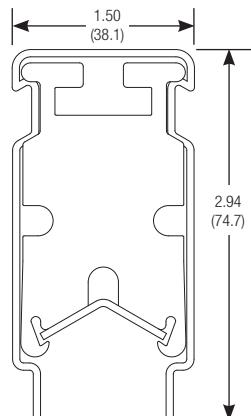
500A



700A

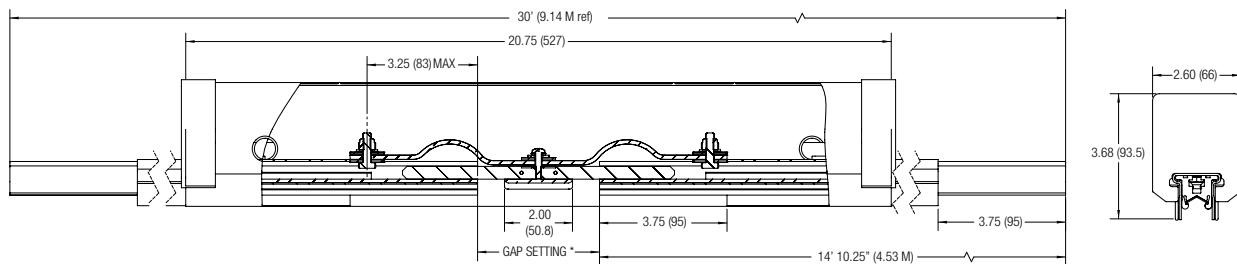


1000A

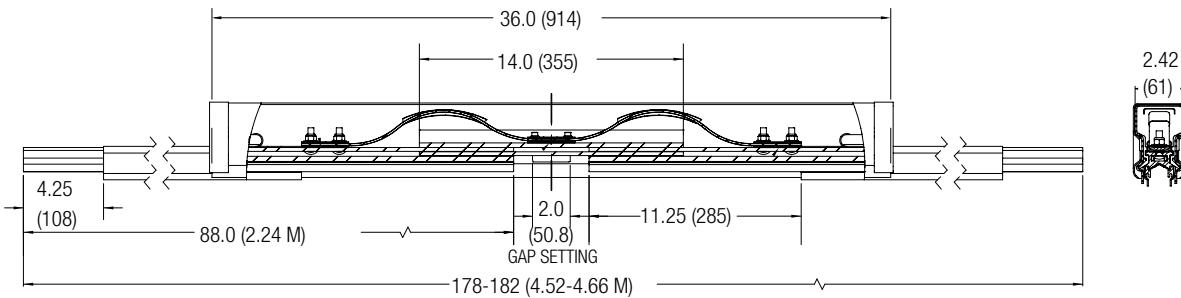


1500A

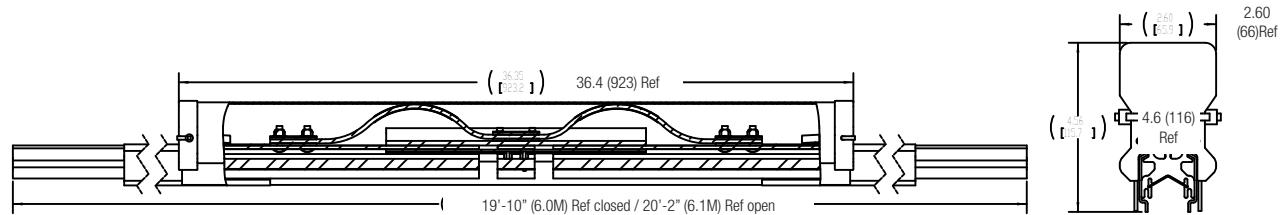
500A Expansion Section (37677 and 39741-J)



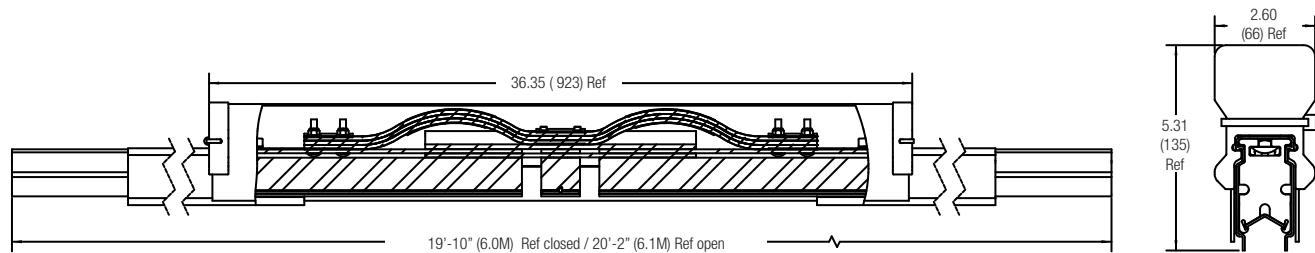
700A Expansion Section (24566 and 50739)



1000A Expansion Section (23512)

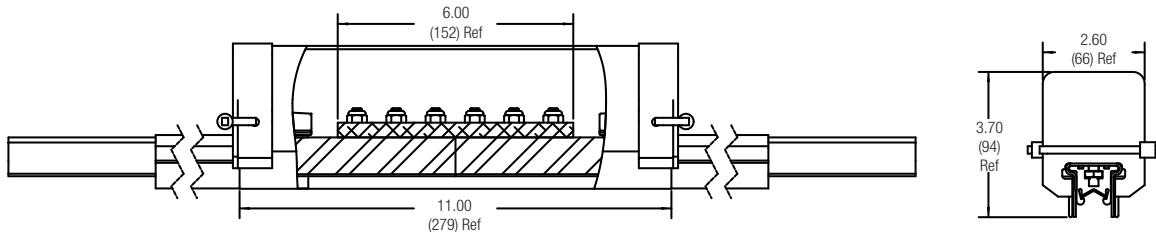


1500A Expansion Section (32820)

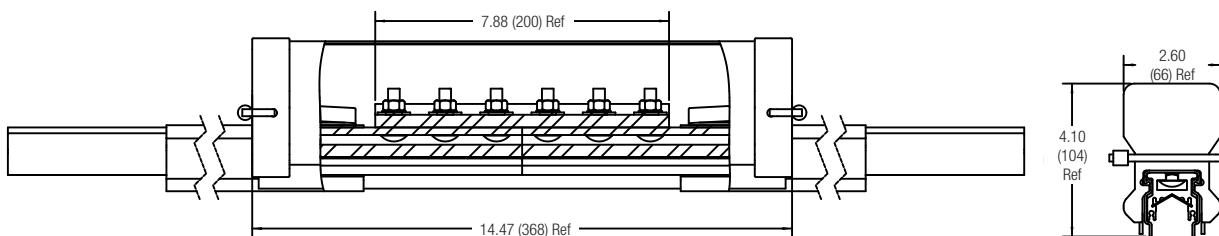


Hevi-Bar II Splice Dimensions

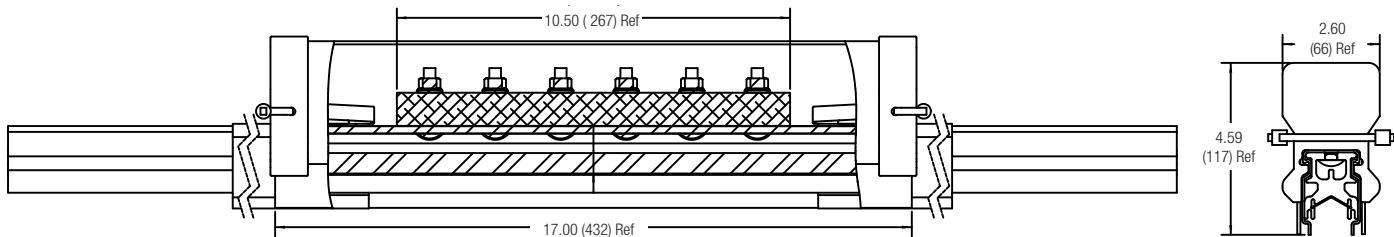
500A Splice (37676), 1/4" Bolts, Torque to 6 - 8 ft-lb



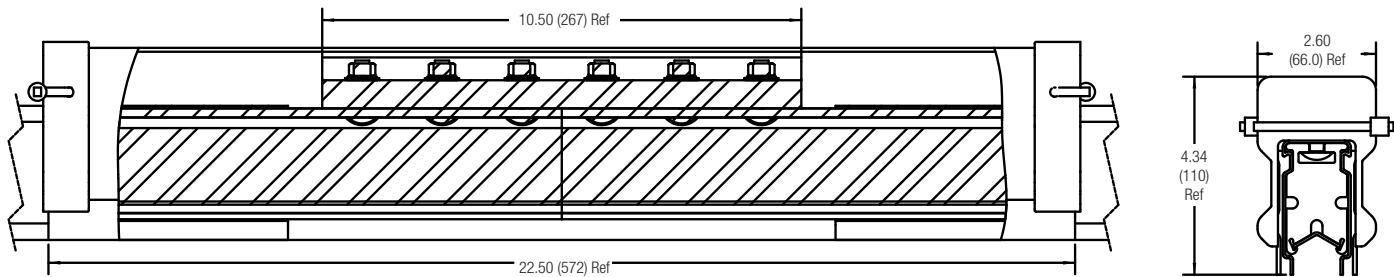
700A Splice (38115), 5/16" Bolts, Torque to 10 - 11 ft-lb



1000A Splice (37746), 5/16" Bolts, Torque to 10 - 11 ft-lb

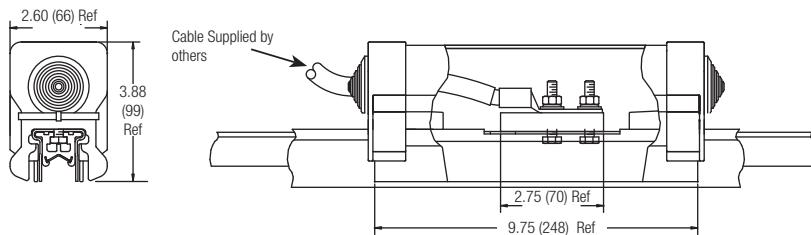


1500A Splice (38968), 5/16", Torque to 10 - 11 ft-lb

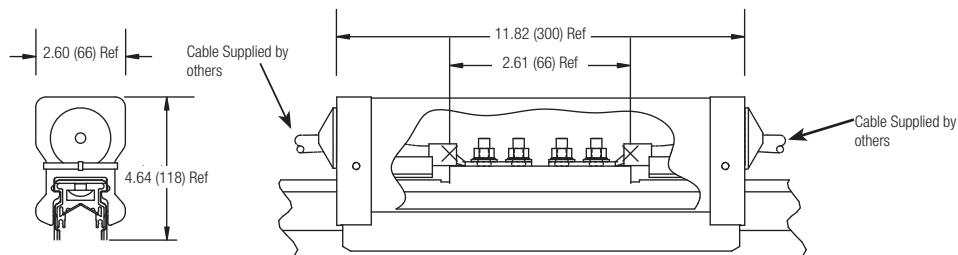


Hevi-Bar II Power Feed Dimensions

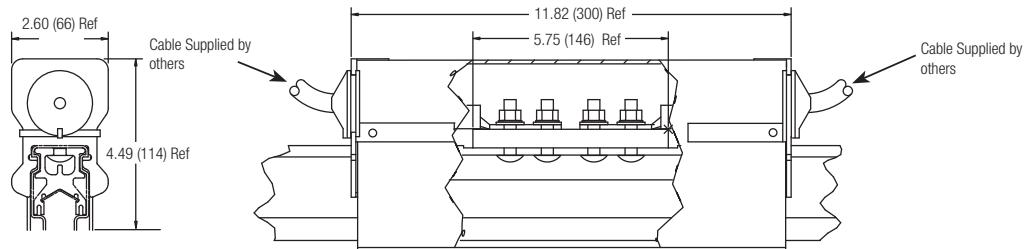
500A Power Feed (37674), 1/4" Bolts on 1" Centers, 6 -8 ft-lb



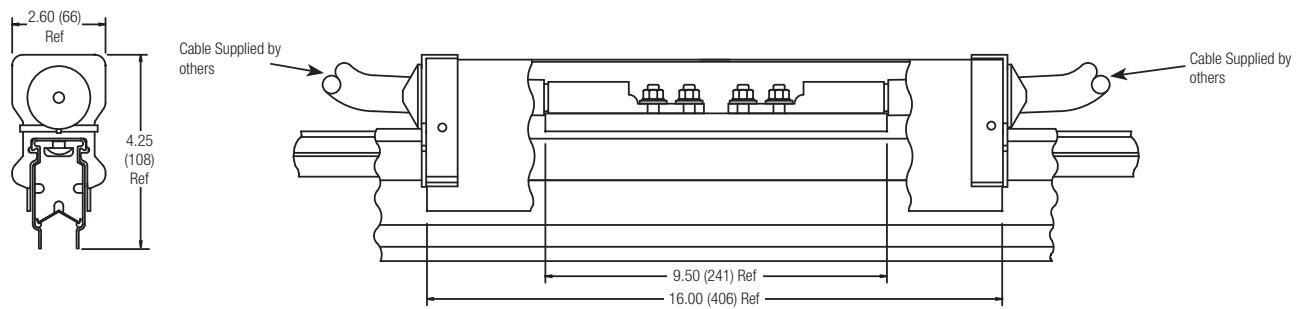
700A Power Feed (38117), 5/16" Bolts on 1" Centers, 10 - 11 ft-lb



1000A Power Feed (38184), 5/16" Bolts on 1" Centers, 10 - 11 ft-lb

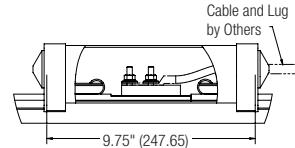
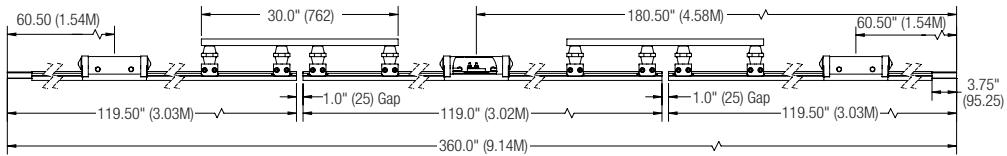


1500A Power Feed (50227), 5/16" Bolts on 1" Centers, 10 - 11 ft-lb

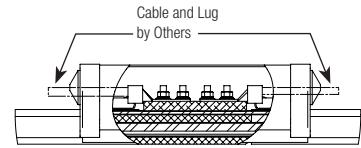
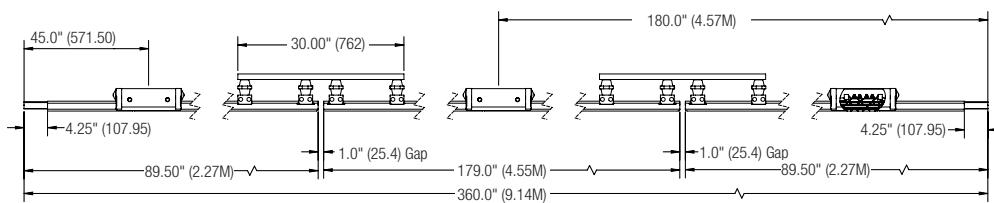


Hevi-Bar II Power Interrupting Section Dimensions

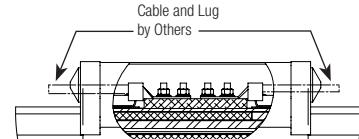
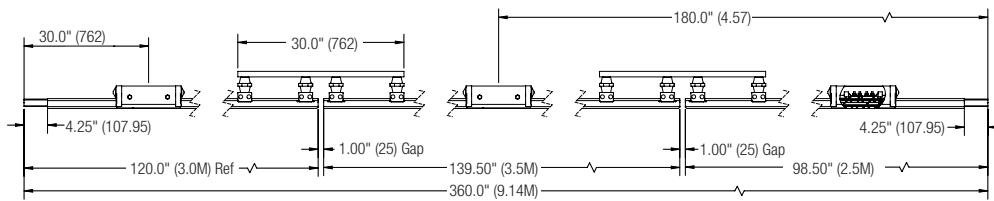
500A Power Interrupting Section (50746)



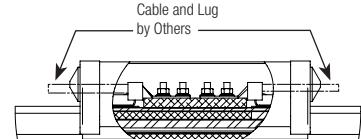
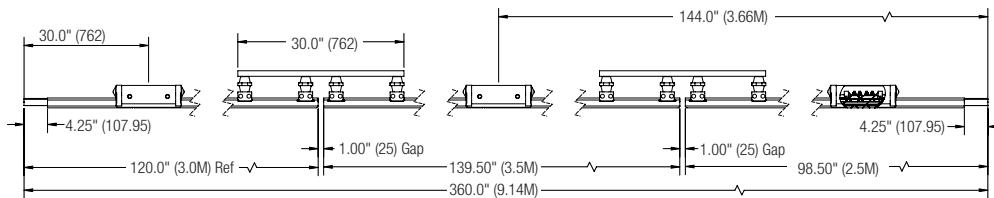
700A Power Interrupt (50748)



1000A Power Interrupt (50755)

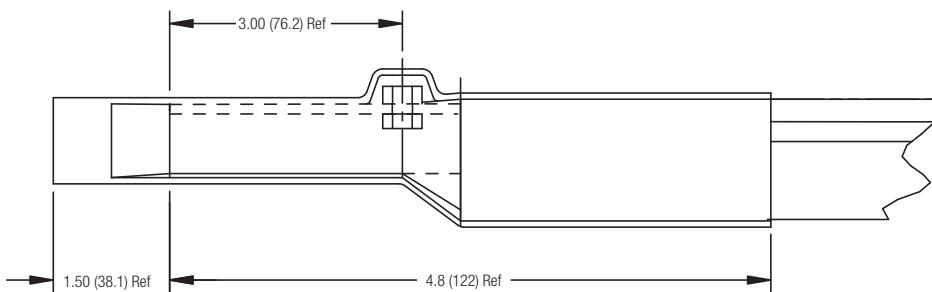


1500A Power Interrupt (50760)

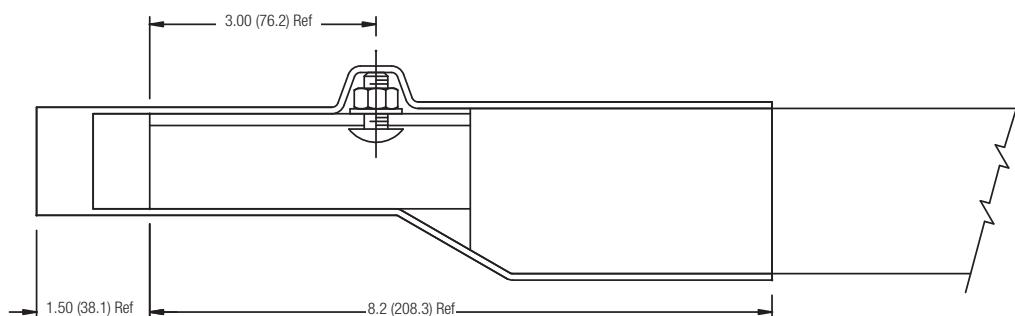


Hevi-Bar II End Cover Dimensions

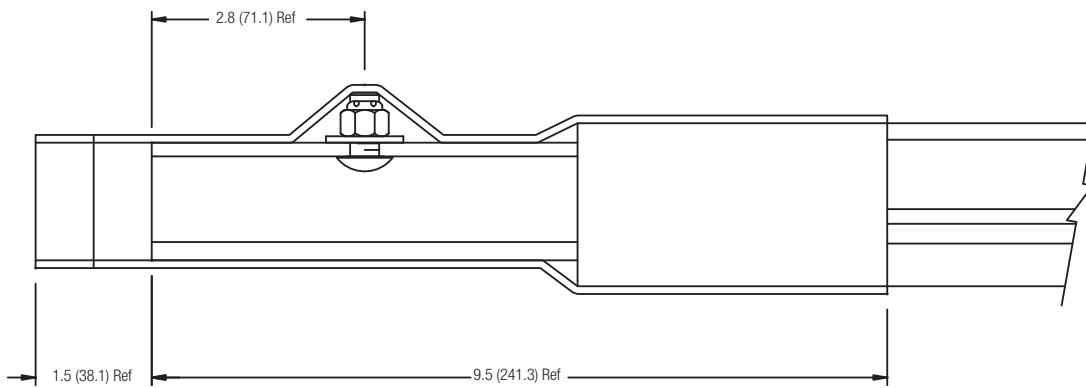
500A End Cover (27588)



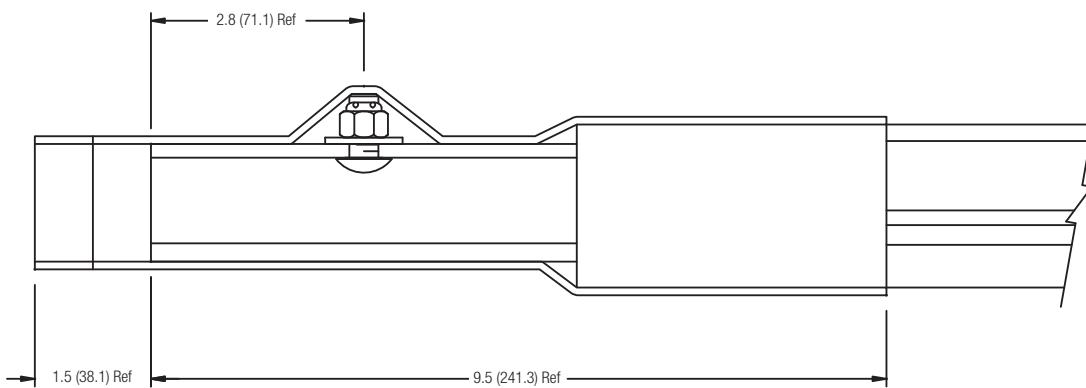
700A End Cover (50859)



1000A End Cover (33796B)

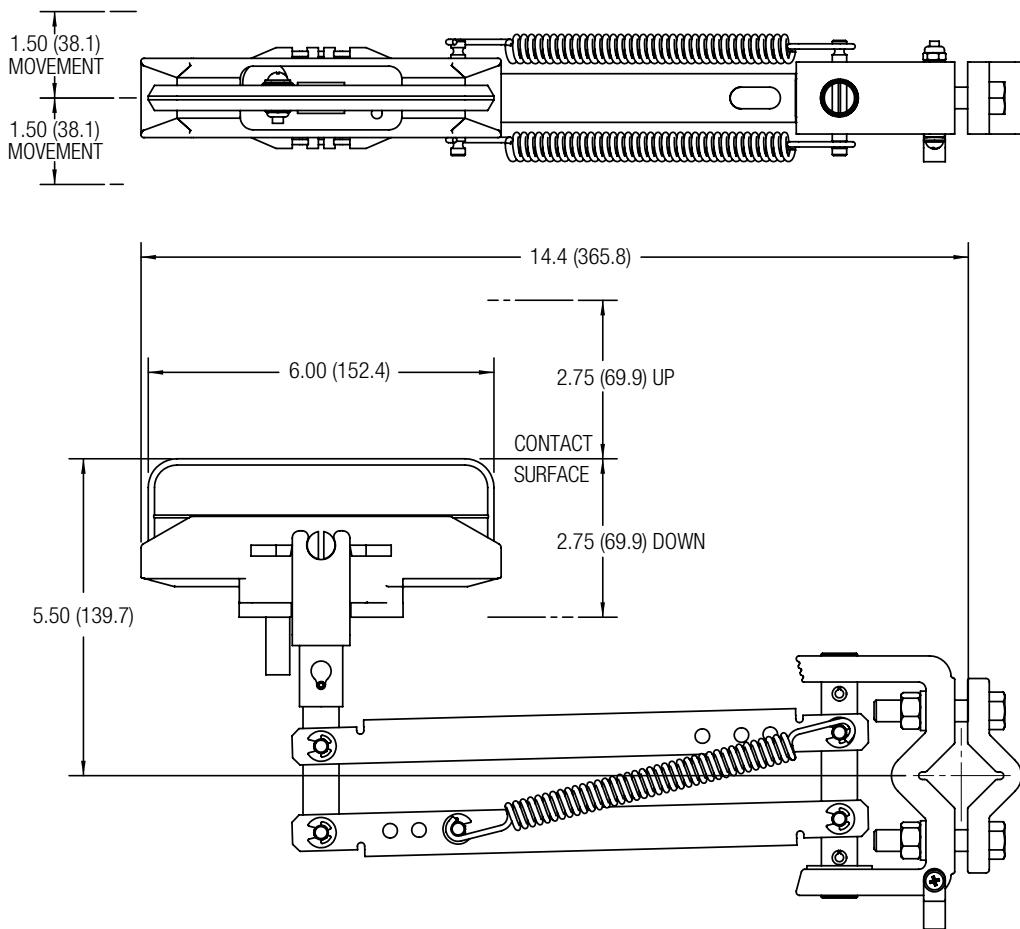


1500A End Cover (33796B)

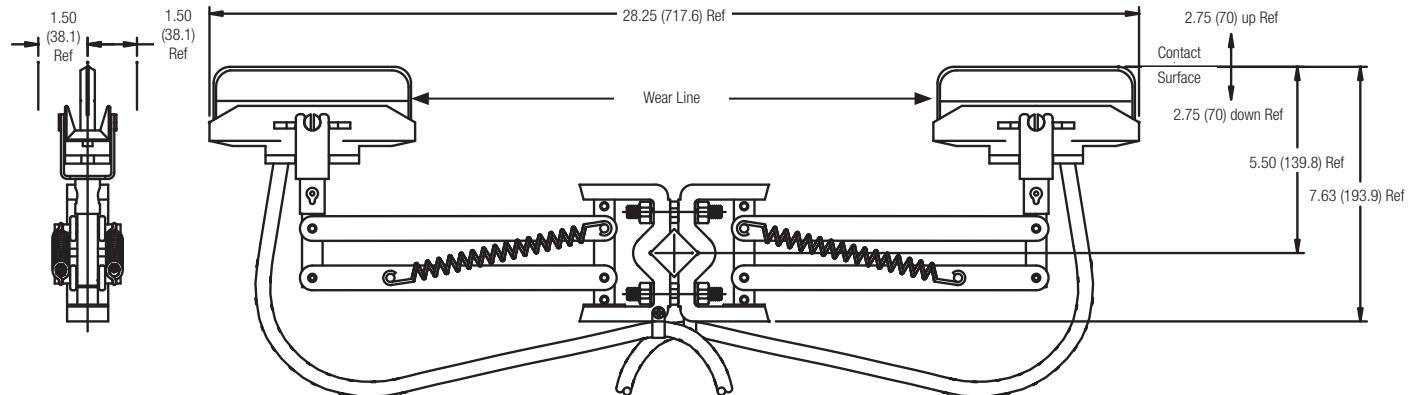


Hevi-Bar II Collector Dimensions

125A Single Collector * (30388/50205)



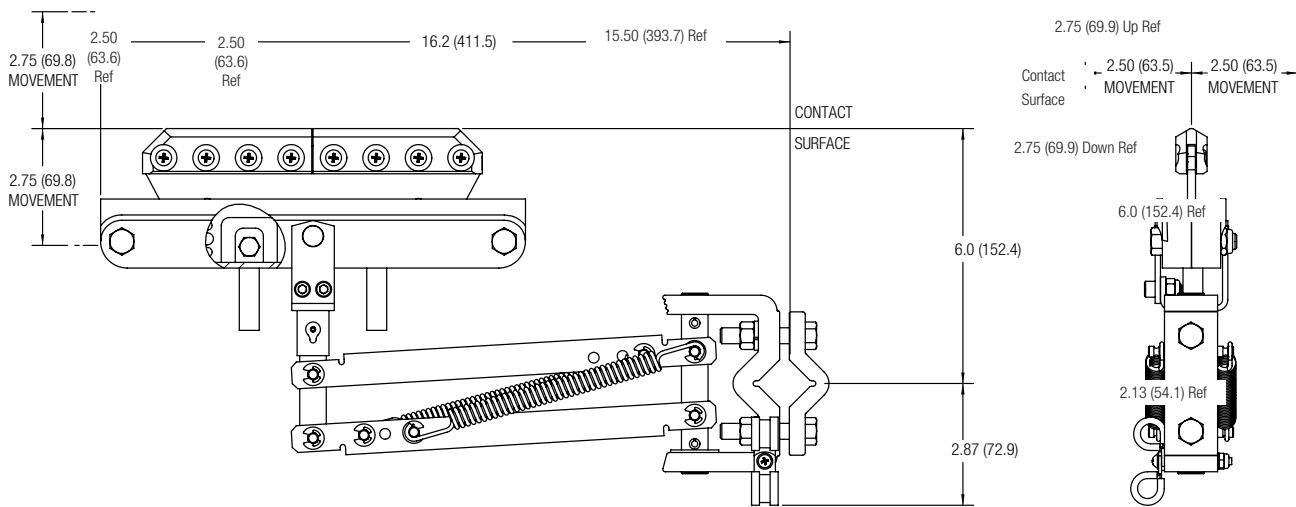
250A Tandem Collector * (30389/39752)



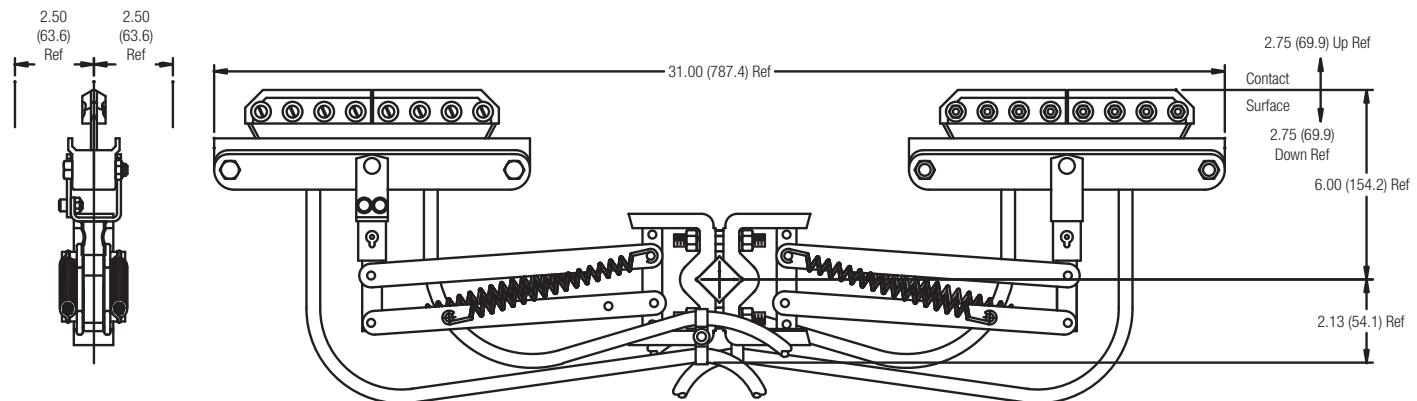
* Only for use with 500A Conductor Bar

Hevi-Bar II Collector Dimensions

200A & 300A Single Collector (24060 / 51522 / 24060Q)



400A & 600A Tandem Collector (24061 / 39848 / 24061B)



* Only for use with 700A, 1000A & 1500A Conductor Bar

Appendix I - Selection of Systems

Carefully review your equipment and application to chose 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 (Pgs. 37, 39, 41, 44).
- **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.

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. 6-7 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** - Use Conductix-Wampfler Quick Quote (see Pg. 5) to automate this calculation, as shown in the examples below. Voltage drop can also be manually calculated – see Appendix II, Pg. 61.

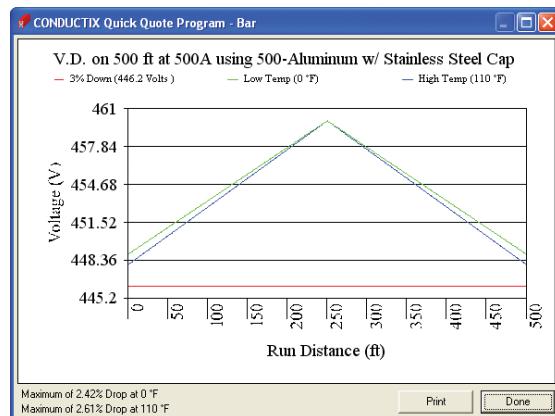


Figure 1 – Center Feed Example: Voltage drop along a 500 foot long runway with one crane drawing 500 amps at 460 volts on a 500 amp rated bar. The green line shows the voltage drop along the run at 0°F. The blue line shows the voltage drop at 110°F. The red line indicates the 3% maximum voltage drop. The voltage drop increases linearly as you move away from the center feed point.

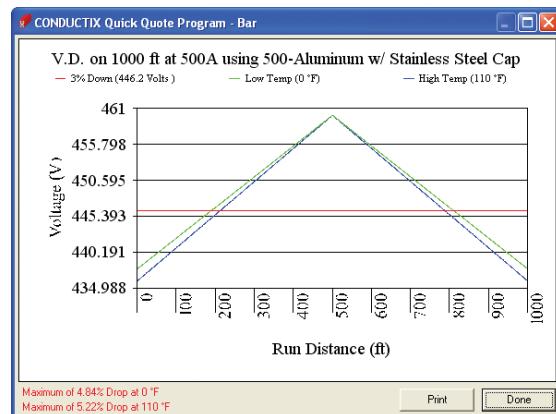


Figure 2: Same parameters as Fig. 1, except with a 1000 foot system. Note that the voltage drop is now greater than the recommended 3%.

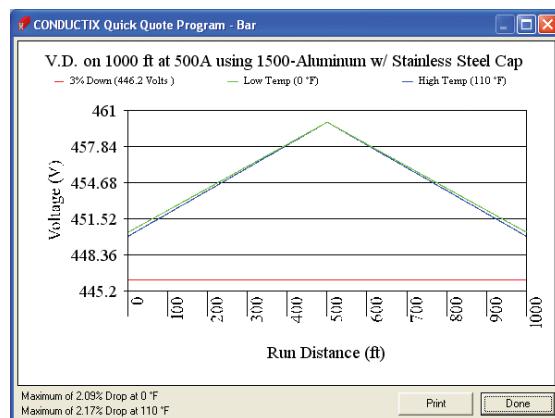


Figure 3: Center Power Example: With higher capacity 1500 amp bar to lower the voltage drop below 3%.

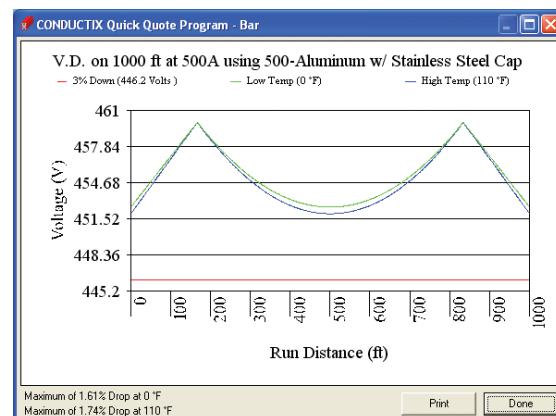


Figure 4: Two power feeds optimally located. The voltage drop remains under 3%, without the need to increase conductor capacity. A load positioned between the two feed points is supplied by both power feeds.

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.

Appendix I - Selection of Systems

- **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.

$$\text{Hoist} = 65A \times 1 = 65.0$$

$$\text{Bridge} = 27A \times .5 = 13.5$$

$$\text{Total} \quad \underline{\underline{78.5A}}$$

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.

Crane #1

$$\text{Hoist} = 65A \times 1 = 65.0$$

$$\text{Bridge} = 27A \times .5 = 13.5$$

$$\text{Total} \quad \underline{\underline{78.5A}}$$

Crane #2

$$\text{Hoist} = 52A \times 1 = 52.0$$

$$\text{Bridge} = 14A \times .5 = 7.0$$

$$\text{Total} \quad \underline{\underline{59.0A}}$$

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

- 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 | | |
| 25 | 89 | | |
| | | 100 | 341 |
| 30 | 106 | 125 | 425 |
| 40 | 140 | 150 | 506 |
| 50 | 173 | 200 | 675 |

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 100A of Current

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

3% at Max Amps and Length from Power feed

| Bar | Amps | 480V | 240V | |
|-----------|------|------|------|-------------------|
| SS | 40 | 102' | 51' | 3% of 480V = 14.4 |
| Galv | 90 | 99' | 49' | 2% of 240V = 7.2 |
| Galv | 110 | 130' | 65' | 2% of 180V = 9.6 |
| SS / CU | 250 | 287' | 144' | 2% of 240V = 4.8 |
| CU / Galv | 250 | 287' | 144' | |
| Rolled Cu | 350 | 296' | 148' | |
| Solid Cu | 500 | 381' | 191' | |

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

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

$$\text{Amperes} = \frac{\text{watts}}{\text{volts}} \quad (\text{not 3-Phase})$$

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

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

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

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

$$\begin{aligned} \text{3-phase Volt-Amperes} &= \text{volts} \times \text{amperes} \times 1.732 \end{aligned}$$

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

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

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 $\times 25.4$ |
| Inches | Millimeters $\times 0.0394$ |
| Meters | Feet $\times .3048$ |
| Feet | Meters $\times 3.281$ |
| Square Centimeters | Square Inches $\times 6.45$ |
| Square Inches | Square Centimeters $\times 0.155$ |
| Kilograms | Pounds $\times 0.4536$ |
| Pounds | Kilograms $\times 2.205$ |
| Kilograms per Meter | lb/ft (divided by) $.6719$ |
| Pounds per Foot | kg/m $\times .6719$ |
| Degrees Celsius | (Degrees F-32) $\times 5/9$ |
| Degrees Fahrenheit | (Degrees C $\times 9/5$) $+ 32$ |

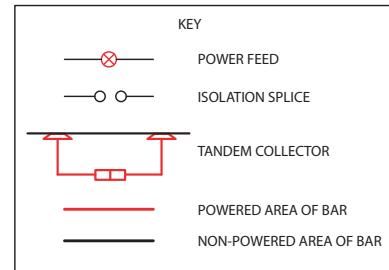
Appendix IV - Power Interrupting Sections

You can shut off power 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 your system or in the middle using a "Power Interrupting Section" along with the proper switch arrangement. The diagrams on pages 63-64 illustrate 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 a safe power-off situation. Conductix-Wampfler offers a safe switching arrangement called **PowerGuard™** shown in catalog CAT1017.

“End” Power Interrupting Sections

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

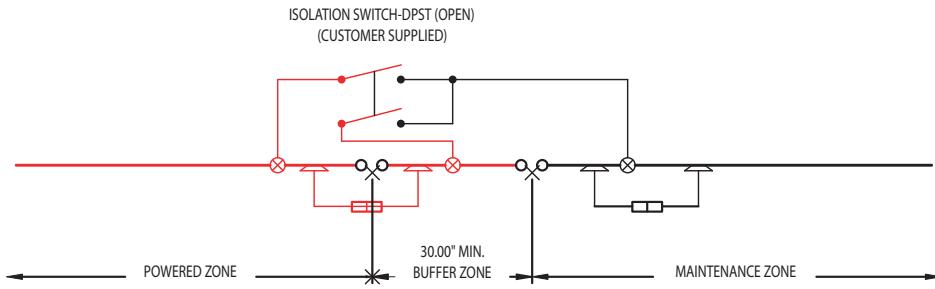
- Qty. 1 - "Power Interrupting Section" of the desired current rating (Pg. 21).
With this "kit" you get the required isolations and power feeds. Safe-Lec 2 interrupts are meant for indoor use only in dry, clean environments.
 - Qty. 1 - "Customer supplied" DPST switch per phase and necessary power wiring (ordered from others) - OR Conductix-Wampfler's **PowerGuard**.



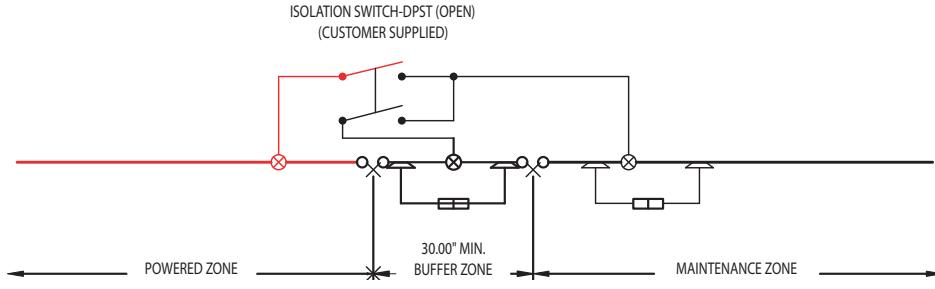
Hevi-Bar II System: For each power phase order:

- Qty. 1 - "Power Interrupting Section" of the desired current rating (Pgs. 36-43). 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)

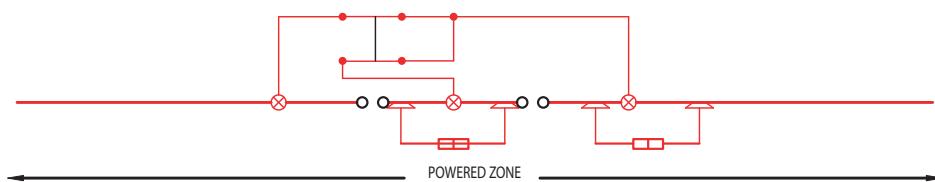
I: System with power off to the maintenance section (DPST switch open), but with tandem collector bridging the first (left-most) isolation joint.



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).

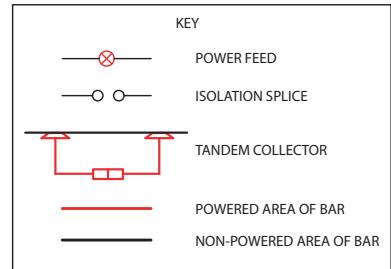


Appendix IV - Power Interrupting Sections

"Middle" Power Interrupting Sections

Safe-Lec 2: For each power phase order:

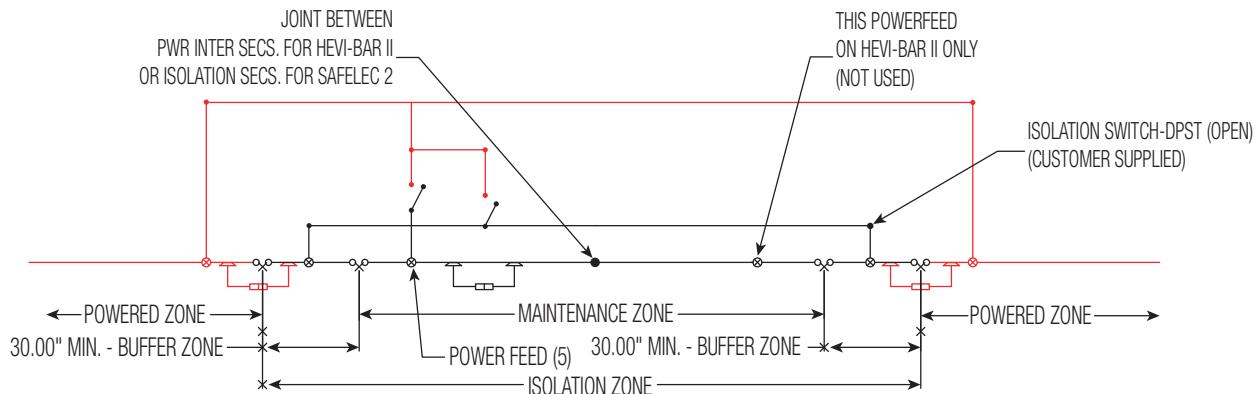
- Qty. 2 - "Power Interrupting Section" of the desired current rating (Pgs. 21). With this "kit" you get the required isolations and power feeds.
- Qty. 1 - "Customer supplied" DPST switch per phase and necessary power wiring (ordered from others) - OR Conductix-Wampfler's **PowerGuard**.



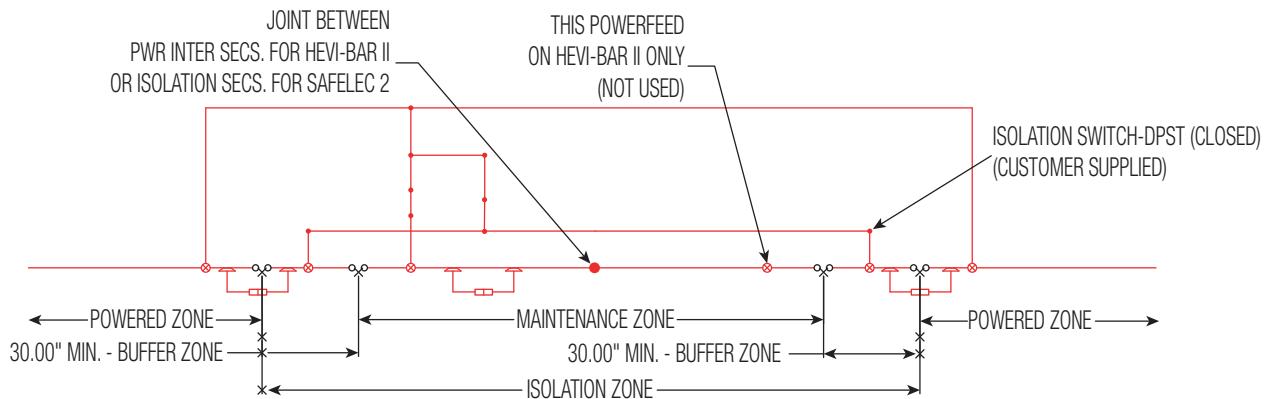
Hevi-Bar II: For each power phase order:

- Qty. 2 - "Power Interrupting Section" of the desired current rating (Pgs. 36-43). With this "kit" you get the required isolations and power feeds.
- Qty. 1 - "Customer supplied" DPST switch per phase and necessary power wiring (ordered from others) - OR Conductix-Wampfler's **PowerGuard**.

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



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



Appendix V Terms, Conditions, and Warranty

The technical data and images which appear in this catalog are for informational purposes only. NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE CREATED BY THE DESCRIPTIONS AND DEPICTIONS OF THE PRODUCTS SHOWN IN THIS CATALOG. Conductix-Wampfler ("seller") makes no warranty and assumes no liability as to the function of equipment or the operation of systems built according to customer design or of the ability of any of its products to interface, operate or function with any portions of customer systems not provided by Conductix-Wampfler.

Seller agrees to repair or exchange the goods sold hereunder necessitated by reason of defective workmanship, and material discovered and reported to Seller within one year after shipment of such goods to Buyer. Except where the nature of the defect is such that it is appropriate in Seller's judgment to effect repairs on site, the seller's obligation hereunder to remedy defects shall be limited to repairing or replacing (at Seller's option), FOB point of original shipment by Seller, any part returned to Seller at the risk and cost of Buyer. Defective parts replaced by Seller shall become the property of Seller.

Seller shall only be obligated to make such repair or replacement of the goods which have been used by Buyer in service recommended by Seller and altered only as authorized by Seller. Seller is not responsible for defects which arise from improper installation, neglect, or improper use or from normal wear and tear.

Additionally, Seller's obligation shall be limited by the manufacturer's warranty (and shall not be further warranted by Seller) for all parts procured from others according to published data, specifications, or performance information not designed by or for Seller.

Seller further agrees to replace, or at Seller's option to provide a refund of the sales price of any goods that did not conform to applicable specifications or which differ from that agreed to be supplied which non-conformity is discovered and forthwith reported to Seller within thirty (30) days after shipment to Buyer. Seller's obligation to replace or refund the purchase price for non-conforming goods shall arise once Buyer returns such good FOB point of original shipment by Seller at the risk and cost of Buyer. Goods replaced by Seller shall be come property of Seller.

There is no guarantee or warranty as to anything made or sold by Seller, or any service performed, except as to title and freedom from encumbrances, and except as herein expressly stated and particularly without limiting the foregoing. There is no guarantee or warranty, express or implied, of merchantability or of fitness for any particular purpose or against claim of infringement or the like.

Seller makes no warranty (and assumes no liability) as to function of equipment or operation of systems built to Buyer's design or of the ability of any goods to interface, operate or function with any portions of Buyer's system not provided by Seller.

Seller's liability on any claim; whether in contract (including negligence) or otherwise, for any loss or damage arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any products or, services shall in no case exceed the price paid for the product or services or any part thereof which give rise to the claim. In no event shall Seller be liable for consequential, special, incidental or other damages, nor shall Seller be liable in respect to personal injury or damage to property on the subject matter hereof unless attributable to gross misconduct of Seller, which shall mean an act of omission by Seller demonstrating reckless disregard of the foreseeable consequences thereof.

Seller is not responsible for incorrect choice of models or where products are used in excess of their rated and recommended capacities and design functions or under abnormal conditions. Seller assumes no liability for loss of time, damage or injuries to property or persons resulting from the use of Seller's products. Buyer shall hold Seller harmless from all liability, claims, suits and expenses in connection with loss or damage resulting from operation of products or utilization of services, respectively, of Seller and shall defend any suit or action which might arise there from Buyer's name, provided that Seller shall have the right to elect to defend any such suit or action for the account of Buyer. The foregoing shall be the exclusive remedies of the buyer and all persons and entities claiming through the Buyer.



Other Conductor Rail Products

Conductor rails made in the Weil am Rhein, Germany Conductix-Wampfler plant are an ideal choice for the transmission of digital data and power up to 2000 amps and beyond. Special metal rails are used for the accurate transmission of data. Conductix-Wampfler's innovative electronic Powertrans is an extremely efficient system that permits reliable data transmission even under difficult operation conditions.

Conductix-Wampfler rails are available in any number of poles in any desired length and are designed for ease of installation. The rails feature robust construction suitable for harsh industrial environments. Heavy-duty collector assemblies guarantee reliable transmission without interruption for trouble-free operation.

Current collectors move along three axes to compensate for variations in assembly tolerances and inevitable travel variations during operation. This permits uninterrupted transmission of energy and digital data and keeps wear to a minimum. Conductor rails are available for travel speeds up to 33 feet per second.

The experienced engineering and sales people at Conductix-Wampfler are experts in the application of conductor rails to all kinds of industrial applications

For more information on these rail sets, please contact Conductix-Wampfler.

All Conductix-Wampfler plants in the United States, Germany, France, and Italy are ISO 9001:2000 certified. Our stringent quality systems assure that you will get the right product every time. See Pg. 67 for a sampling of our other quality products.

In 2007, with the merger of Conductix and Wampfler, the company is now the world leader in the design and manufacture of high performance energy and data transmission products for industrial applications.



811 Series

Available from 10 to 100 amps for automated storage and retrieval systems, monorails, cranes, and special machines. Straight or curved tracks.



812 Series

Available from 25 to 400 amps. Ideal for mid-sized cranes, people movers, amusement rides, and special machines. Stainless steel running surface for straight or curved track.



813 Series

Available from 500 to 1250 amps. Works well for heavy cranes, people movers, and special machines. Patented stainless steel running surface for straight or curved tracks.



815 Series

Available from 32 to 100 amps. A compact multi-conductor system for electrified overhead monorails and slip rings. Either .47 inch (12mm) or .55 inch (14mm) spacing. Straight or curved tracks.



831 Series

Handles from 10 to 125 amps, in 3, 4, or 5 pole configuration. Great for cranes, automated storage and retrieval systems, and special machines. Straight tracks.



842 Series

Accommodates from 35 to 140 amps in a continuous conductor strip and enclosed "box track" system. 5 or 7 poles. For cranes, ASRS systems, and work stations.

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.



Energy guiding chains

The "Jack of all Trades" when it comes to managing energy and data cables and air and fluid hoses. A wide range of energy guiding chains are available for many industrial applications.



Air hoists and balancers

ENDO Air hoists accurately place delicate loads and continuously vary the speed for precise positioning. They run cool in continuous operations.



Bumpers

Conductix-Wampfler offers a complete range of bumpers for the auto industry, cranes, and heavy machinery. These include rubber, rubber/metal, and cellular types.



Spring balancers and retractors

ENDO spring balancers by Conductix-Wampfler are rugged, reliable high-precision positioning devices that reduce operator fatigue and assist with accurate tool placement.

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