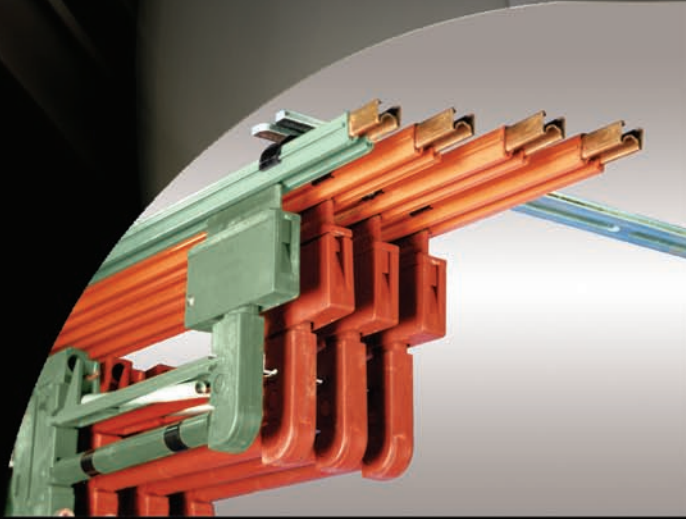


CONDUCTOR BAR



CONDUCTIX
INSUL 8

© DELACHAUX GROUP

P O W E R A N D D A T A T R A N S F E R

CONDUCTIX “Insul-8®” Conductor Bar

CONDUCTIX has designed and built state-of-the-art conductor bar systems for over 60 years.

The US branch of Conductix was founded in 1944 as Insul-8 Corporation. Insul-8 developed the first “figure 8” conductor bar system, which became the standard method of electrifying overhead cranes.

In 1975, Insul-8 became part of the worldwide Delachaux Group. In 1991 the company moved its manufacturing facility to the current location in Harlan, Iowa.

Now under the name **CONDUCTIX**, the company continues as a world leader in the design and manufacture of high-performance conductor bar systems for industrial applications.

Recent innovations include the new “finger-safe” **SAFELEC 2** V-contact bar and the **Hevi-Bar II** conductor system.

CONDUCTIX bar is manufactured in the USA to provide quick delivery, many configurations and options, and competitive prices.

Our experienced engineering and sales people are recognized experts in the application of conductor bar systems to solve industrial problems.

We offer a complete complement of mobile electrification products including Cable Festoon Systems, Cable Chain, Cable Reels, Push-Button Pendants, Radio Remote Controls, and Crane Bumpers.

All **CONDUCTIX** manufacturing facilities are ISO 9001:2000 certified. Our stringent quality systems assure that you will get the right product every time.



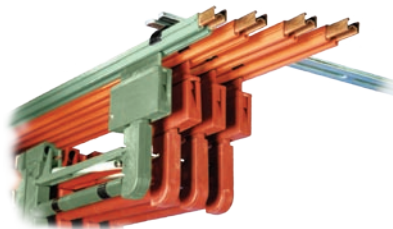
Omaha, NE Plant



Harlan, IA Plant



SAFELEC 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.

UL Listed



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



CONDUCTIX “Insul-8®” Conductor Bar

8-Bar



Originally developed by Insul-8 over 60 years ago, 8-Bar was the first insulated conductor system for crane/monorail electrification. If you need 8-bar, insist on the original! 8-Bar has many special options and components developed over 60 years of applications. The basic system is designed for bottom entry. A unique **Side Contact** system is available for lateral mounting. Able to accommodate small bend radii for curved systems and slip rings.

UL / CSA Listed



Side Contact



Cluster Bar



A compact conductor bar system with 3/4" minimum spacing between bars. For small cranes, material handling applications, and automated storage/retrieval systems. Finger-safe IP2 rating. Able to accommodate small bend radii for curved systems and slip rings. Can be mounted for bottom or lateral entry.

CSA Listed



Conductor Bar Summary Chart

Specification	SAFELEC 2	Hevi-Bar II	8-Bar	Side Contact	Cluster Bar
Ampacity	60, 100, 125, 160, 200, 250, 315, 400	500, 700, 1000, 1500	40, 90, 110, 250, 350, 500	40, 90, 110, 250, 350	40, 120
Max. Voltage	600	600 / 5000	600	600	600
Speed	1200 fpm	2000 fpm	900 fpm	600 fpm	600 fpm
Spacing Between Conductors	1.7"	3.0"	3.0"	1.375"	.75"
Max Cover Temperature: Low = 160°F; Med. = 250°F, High = 400°F	Low, Med	Low (all amps), Med. (all amps), High (700 & 1000A)	Low, Med, High	Low, Med	Low
Environment	Indoor or Outdoor	Indoor or Outdoor	Indoor or Outdoor	Indoor	Indoor
Corrosion Protection Option	No	Yes	40A only	40A only	No
Orientation (Collector Entry)	Bottom or Side	Bottom or Side	Bottom or Side	Side	Bottom or Side
Min. Bend Radius, Low Temp	60"	Consult Factory	18" (45" the "long way")	9"	16"
Min. Bend Radius, Med Temp	60"	Consult Factory	57"	57"	N/A
Heater Wire Available	Yes	500 & 1500A only	No	No	No
Common Applications	Small to Medium overhead cranes, moderate curves	Medium to large overhead cranes, higher speeds	Small to medium overhead cranes, tighter curves	Constrained spaces, slip ring applications	Monorail hoists, switches, constrained spaces, > 4 conductors

If you don't see what you need, give us a call.
We offer thousands of special designs and options!

Conductor Bar Data Sheet - Quote Request

Fax to: 800-780-8329 or 402-339-9627

E-mail to: info@conductix.us

Request Date ____/____/____

Sales Person _____

Company _____

Contact _____

Title _____

Tel _____

Fax _____

Company Type _____

E-mail _____

APPLICATION

1. Application Type: ☐ Runway ☐ Bridge ☐ Monorail ☐ Other

2. ☐ New Approved Installation? ☐ Extended Existing? ☐ Replacement?

3. System Length: _____ (feet) 4. Total # of Conductors: _____

Will one conduct 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 F

3. Will a heater wire need to be included? ☐ Yes ☐ No (If yes, consult factory)

4. Is there a source of corrosion present? ☐ Yes ☐ No **Refer to Appendix I Pg. 97**

If yes, describe the corrosive: _____

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

MECHANICAL DATA

1. Vehicle Speed _____ (feet per min.) Duty Cycle: _____

2. Number of vehicles or trolleys: _____ Crane Class (if applicable) _____

Refer to Appendix I Pg. 100

3. Will **CONDUCTIX** be supplying mounting brackets? ☐ Yes ☐ No

4. Does the system include any curves? ☐ Yes ☐ No (if yes, consult factory)

5. 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. 98**

☐ 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 - U.S. is 60 Hz)

Conductor Bar Data Sheet - Quote Request

* 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:

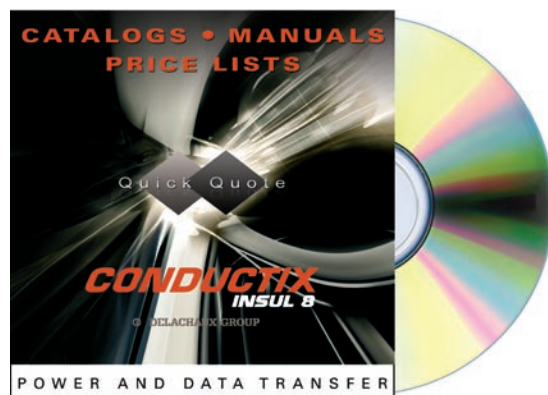
# of Cranes/vehicles	Demand Factor
2	.95
3	.91
4	.87
5	.84
6	.81
7	.78

Conductix “Quick Quote” Software

If you configure or purchase conductor bar systems, festoon systems, push button pendants, radio controls, and cable reels on a regular basis, you need a copy of our innovative Quick Quote software! This advanced program automatically configures complete systems. It generates bills of materials, quotations, and system drawings. You can also load your customers into the program and send quotes automatically. You can turn your quote into an order with a click! Here is just a partial list of Quick Quote’s advanced features:

Conductor Bar Systems:

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



Festoon Systems:

- Handles advanced festoon mounting configurations
- Allows set-up cable package arrangements and clamp configurations
- Handles festoon pre-wiring and pre-assembly options

Pendants & Radios:

- Handles custom ratio applications and kits
- Handles custom pendant configurations

Contact Conductix Sales today at 1-800-521-4888 or email us at info@conductix.us for more information. Quick Quote is supplied on our CD ROM “All Catalogs and Quick Quote”, which can be ordered on www.conductix.us from the Catalogs section. The program requires an access code which can be obtained from Conductix.

Table of Contents

Conductix Conductor Bar Products - Overview	2-3
Conductor Bar Summary Chart	3
Quotations Data Sheet	4
Quick Quote Software	5
Table of Contents	6-7

SAFELEC 2

Overview and Design Features	8-9
Typical 4-Bar System	10
Electrical Ratings	11-12
Specifications	13

System Components

Galvanized Steel Bar (60, 100, 125A)	14	Copper Bar (160, 250, 400A)	15
Aluminum/Stainless Steel Bar (200, 315, 400A)	16	Splice Joints and Joint Compound	17
Power Feeds	17-18	Hanger Clamps	18-19
Anchor Clamps	19	End Caps	20
Pick Up Guides	20	Power Interrupting Sections	21
Collectors and Shoes	22	Hanger Brackets	23
Collector Brackets	23	Girder Clamps	23
Heater Wire System	24		

SAFELEC 2 Dimensions

Installed	25	Collectors	26
Components	27-29	Brackets	30-31

HEVI-BAR II

Overview and Design Features	32
<i>DURA-COAT</i> Corrosion Protection	32
Typical 4-Bar System	33
Specifications	46

Conductor Bar, Expansion Sections, Splices, Power Feeds, Power Interrupting Sections, End Covers

500A	34-35	700A	36-37
1000A	38-39	1500A	40-41
Collectors and Shoes	42		

Support Brackets

500A	43	700A / 1000A / 1500A	44-45
------	----	----------------------	-------

Hevi-Bar II Dimensions

Installed	47	Bar Profiles	48
Expansion Sections	48	Splice Joints	49
Power Feeds	50	Power Interrupting Sections	51
End Covers	52	Collectors	53-54

INSUL-8™ 8-BAR

Overview, Design Features, and Main Components	55
Typical 4-Bar System	56
Specifications	57

Conductor Bar

Stainless Steel Bar (40A)	58	Galvanized Steel Bar (90, 110A)	58
Stainless Clad Copper Bar (250A)	58	Copper Steel Laminate Bar (250A)	59
Rolled Copper Bar (350A)	59	Solid Copper Bar (500A)	59

Table of Contents

System Components			
Bar Cover	60	Connector Pins & Joint Covers	60
Copper Connector Clamp	61	Joint Keeper	61
Joint Repair Kit	61	Connector Tool	61
End Cover	62	Power Feed	62
Expansion Sections	63	Isolation Section and Parts	63
Transfer Caps	64	Pick Up Guides	64
Hanger Clamp	65	Collectors and Shoes	66-67
Hanger Brackets	68-70	Curves and Slip Rings	71-72
Dimensional Pages			73-75

SIDE CONTACT

Overview and Main Components			76
Conductor Bar			
Stainless Steel Bar (40A)	77	Galvanized Steel Bar (90, 110A)	77
Stainless Clad Copper Bar (250A)	78	Copper Steel Laminate Bar (250A)	78
Rolled Copper Bar (350A)	78	Expansion Sections	78
System Components			
Connector Pins	79	Bar Cover	79
End Covers	79	Power Feed	80
Pick Up Guide	80	Hanger Clamps and Brackets	81
Collectors	82-83	Collector Dimensions	84
Slip Rings and Curves	85		

CLUSTER BAR

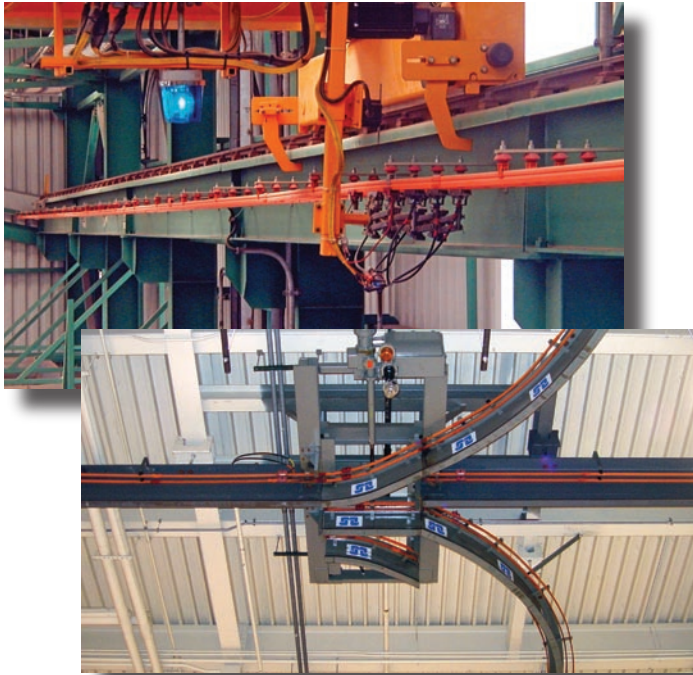
Overview Design Features			86
Typical 4-Bar System			87
Specifications			88
System Components			
Conductor Bar (40, 120A)	89	Expansion Sections	89
Power Feed	89	End Power Feed	90
End Cover and Splice Cover	90	Crimping Tool	90
Splice Joint	91	Transfer Cap	91
Pick Up Guide	91	Isolation Section	91
Isolation Kit	92	Power Interrupting Section	92
Take Up Section	92	Hanger and Anchor Clamps	93
Brackets	93-94	Collectors and Mounting Staff	95
Slip Rings, Curves and Curving Machine	96		

APPENDICES

I - Selection of Conductor Bar Systems	97-100
II - Manual Voltage Drop Calculations	101
III - Electrical Formulas and Conversions	102
IV - Power Interrupting Sections	103-104
About Conductix	105
Terms and Conditions	106
Conductor Bar in Action	107
Conductix Worldwide Locations	108

Insul-8™ 8-Bar Overview

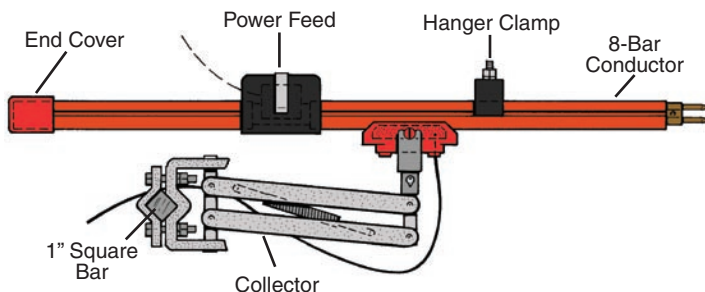
Conductix Insul-8™ 8-Bar, designed by Insul-8 Corporation over 50 years ago - the **original** “figure 8” conductor bar system! This innovative system provided the first safe, insulated electrification solution for cranes, monorails, hoists, conveyors, and many other applications. Hundreds of miles of this bar system are in use all around the world. There are many “copy cat” systems around - don’t settle for imitations - get the original 8-Bar system!



Wide current range: 40A, 90A, 110A, 250A, 350A, 500A @ 600 volts max.

Maximum Speed: 900 fpm

Many Options: Stainless steel hardware, green bonding (ground) conductor covers, black “UV stable” outdoor covers, curved systems to 18” minimum radii (the “easy” way) or 45” the “hard way” (low heat cover).



UL and CSA Listed



Designed and built in the USA under stringent ISO 9001: 2000 standards



Insul-8™ 8-Bar Features:

- In stock availability for quick shipment
- A large number of special options and adaptations developed over 70 years of usage to handle numerous industrial situations.
- The ability to be curved into a tighter radius than most other systems.
- Knurled joints pins for secure joints. Won't pull apart under normal conditions when properly installed.
- Backed by the best customer service and engineering services in the industry.

8-Bar installs quickly and easily:

- Minimum number of basic parts
- Quick “pin-style” splice joints
- Bar snaps into mating hanger

Power Feed: Conducts the power source to the conductor bar

Collector: “Collects” power from the bar and transfers it to the moving machine. Connects to a 1” mounting staff

Hanger Clamp: Supports the conductor bar

End Cover: Caps off the end of the conductor bar

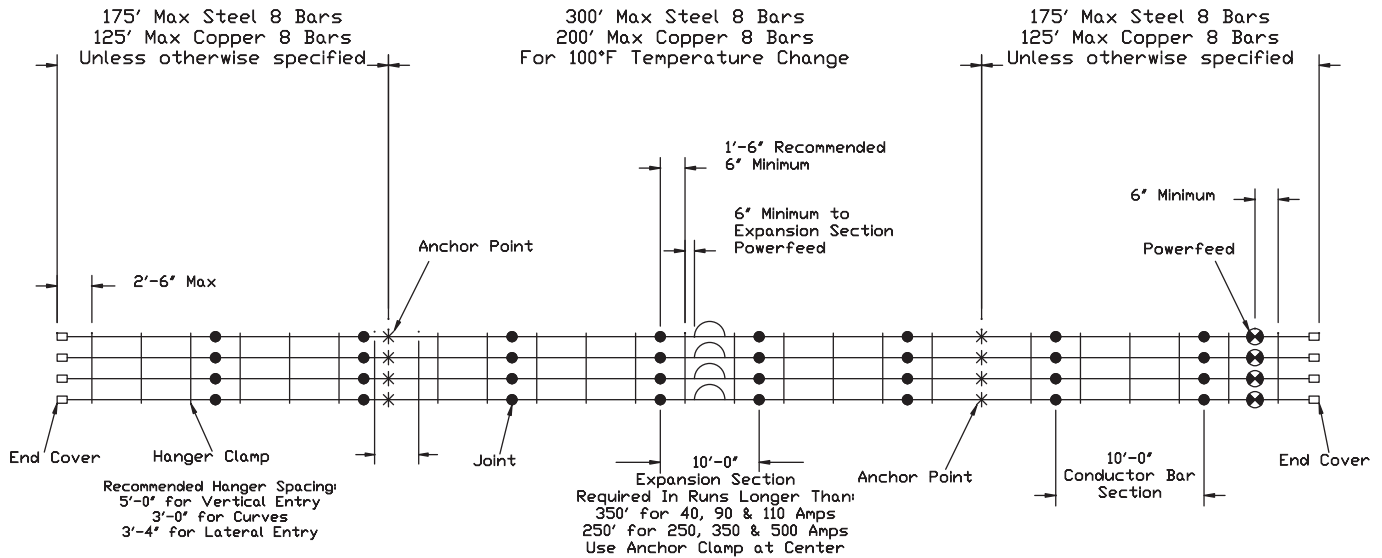
Bracket: Attaches to crane beam or other structure to support multiple hangers

Anchor Clamp: Connects the bar to the structure and directs movement of the conductors during thermal expansion/contraction

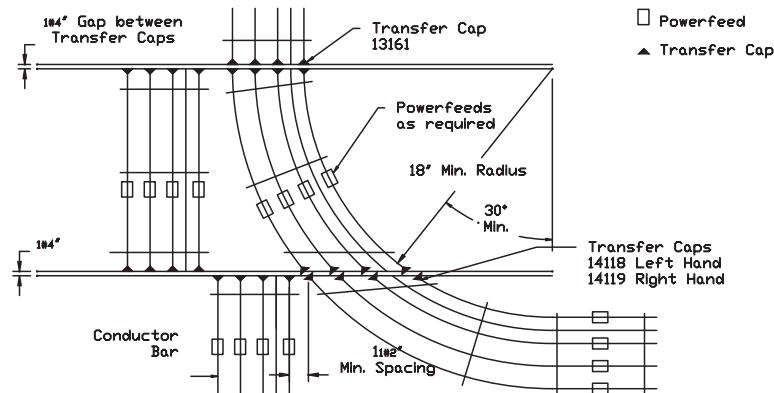
Automate your work with our advanced “Quick Quote” software - see Pg. 5.

8-Bar Typical 4-Bar System

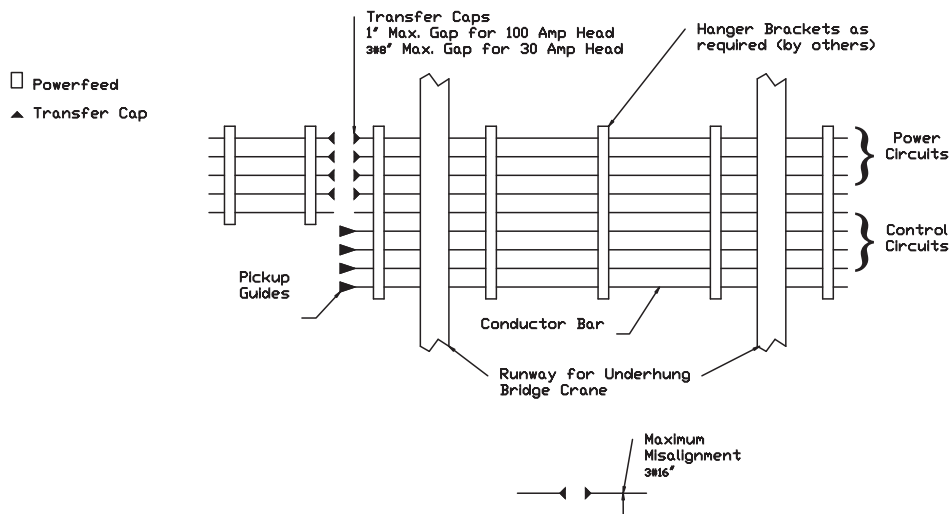
EXAMPLE OF 4 CONDUCTOR RUNWAY 8 BAR (3 PHASE + 1 GROUND)



2-WAY STUB SWITCH

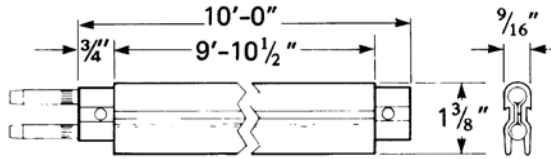


BRIDGE CRANE INTERLOCK



8-Bar Specifications

Conductor Bar



11000

Roll formed of 1/16" material except laminates which are 1/32" copper, 1/32" steel or stainless steel and 1/32" steel for 90A conductor. The cross-section area is 188 mcm (.1477 sq. in.) except solid copper bar which is 313 mcm (.2458 sq. in.). The equivalent rectangle for all conductors is 1" x 1/4". Supports are required at intervals of: 3' on curves, 3'-4" for lateral mount, 5' standard

Assembled with cover, 10' lengths						ELECTRICAL DATA *			
Material	PVC	Med. Heat	High Heat	Expansion Coefficient °F	Nominal Wgt. lbs./ft.	Ampacity (continuous duty)	Resistance R (DC)	Reactance x (60 Hz) 3ø	Impedance Z (60 Hz)
Stainless Steel	14299	24304	24307	.000007	0.72	40A	2230	60	2231
Galvanized Steel	22135	22141	22147	.000007	0.46	90A	750	600	960
Galvanized Steel	11000	11019	11038	.000007	0.65	110A	354	600	702
Stainless Clad Copper Laminate	11004	11023	11042	.000009	0.65	250A	100	60	116
Copper Steel Laminate	11008	11027	11046	.000009	0.65	250A	100	60	116
Rolled Copper	11012	11031	11050	.000009	0.76	350A	60	60	84
Solid Copper	11016	11035	11054	.000009	0.16	500A	40	60	70

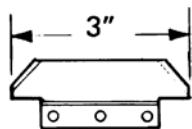
All roll-formed conductors (40-350A) are supplied assembled with connector pins and cover, in standard 10' lengths. Joint covers and joint keepers are furnished with each order as required. The solid copper (500A) conductors are supplied in 20' lengths, covered, with connector clamp and case. Conductor bar and covers may be ordered separately for replacement purposes.

* Electrical values R, X and Z are expressed in microhms per foot of single conductor. Example: .000060 ohms/ft. X values are calculated at 3" centerline spacing, adjusted for three conductors with multiplier 1:26 a nominal permeability μ of 10-12 is used for the steel conductor calculations.

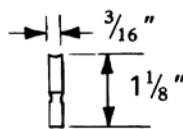
For reference, $X = \mu 52.9 \log 10 \frac{3 \times 1.26}{1250} + 34.5$. $Z = \sqrt{R^2 + X^2}$

Collector Shoe Information

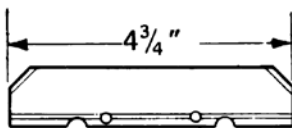
FOR 30 AMP.



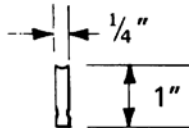
18" Min. Radius



FOR 100 AMP.



48" Min. Radius

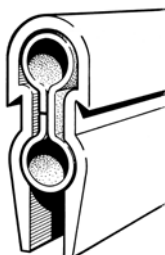


Part No.	Wgt. lbs.	Description	Current Rating	Wgt. lbs.
3" OVERALL LENGTH FOR 30A COLLECTORS				
13136	(.16)	Sintered copper graphite (standard)	30A	(1.41)
13137	(.08)	Carbon	20A	(.50)
13138	(.16)	Cast Iron	30A	(1.92)
19678	(.16)	Insuloy	30A	(1.92)
3" OVERALL LENGTH FOR 60A COLLECTORS (100A CASE ONLY)				
11154		Sintered copper graphite (standard)	60A	(.81)
11155		Carbon	30A	
11156		Cast Iron	60A	
4.75" OVERALL LENGTH FOR 100A COLLECTORS				
11157	(.45)	Sintered copper graphite (standard)	100A	(1.5)
11158	(.22)	Carbon	50A	(1.32)
11159	(.45)	Cast Iron	100A	(2.7)
19347	(.45)	Insuloy	100A	(2.7)

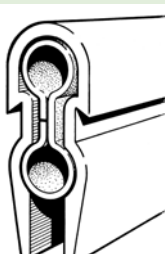
The appropriate conductor bar can be chosen only when all the relevant factors are known. Please refer to the Data Sheet on Pg. 4, and to Appendices I through IV at the back of this catalog. Also, please consult Conductix Sales if you have any questions about the suitability of this product to your application.

8-Bar Conductor Bar

Stainless Steel 40A - with Connector Pins

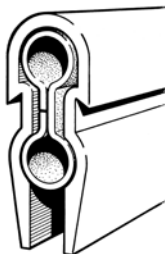
40A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60° F To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	14299	7.0	24304	6.6	24307	7.5
	Conductor Length	5'	14823	3.5	24305	3.3	24308	3.8
	Expansion Section	10'	24279	11.0	24306	7.0	24309	11.8
	Power feed		11091	0.34	11091	0.34	11122	0.34
	End Cover		11088	0.10	11088	0.10	11633	0.4

Galvanized Steel 90A and 110A - with Connector Pins

90A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60° F To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	22135	4.4	22141	4.1	22147	4.9
	Conductor Length	5'	22136	3.5	22142	2.1	22148	2.5
	Expansion Section	10'	22140	6.7	22146	6.3	22152	7.4
	Power feed		11091	0.34	11091	0.34	11122	0.4
	End Cover		22070	0.03	22070	0.10	11633	0.4

110A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60° F To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	11000	4.4	11019	4.1	11038	4.9
	Conductor Length	5'	11001	3.5	11020	2.1	11039	2.5
	Expansion Section	10'	11057	6.7	11064	6.3	11070	7.4
	Power feed		11091	0.34	11091	0.34	11122	0.4
	End Cover		11088	0.03	11088	0.10	11633	0.4

Stainless Clad Copper 250A - with Connector Pins

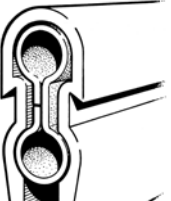
250A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60° F To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	11004	6.6	11023	6.2	11042	7.1
	Conductor Length	5'	11005	3.3	11024	3.1	11043	3.6
	Expansion Section	10'	11059	8.5	11065	8.0	11071	9.2
	Power feed		11092	0.7	11092	0.7	11093	0.7
	End Cover		11088	0.10	11088	0.10	11633	0.4

8-Bar Conductor Bar

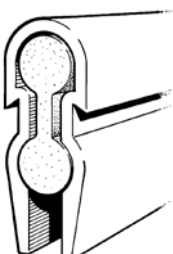
Copper Steel Laminate 250A - with Connector Pins

250A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60°F. To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	11008	6.2	11027	5.8	11046	6.7
	Conductor Length	5'	11009	3.1	11028	2.9	11047	3.4
	Expansion Section	10'	11060	10.0	11066	9.4	11072	10.8
	Power feed		11092	0.7	11092	0.7	11093	0.7
	End Cover		11088	0.10	11088	0.10	11633	0.4

Rolled Copper 350A - with Connector Pins

350A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60°F. To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	10'	11012	7.0	11031	6.6	11050	7.5
	Conductor Length	5'	11013	3.5	11032	3.3	11051	3.8
	Expansion Section	10'	11062	11.0	11068	11.0	11074	11.8
	Power feed		11092	0.7	11092	0.7	11093	0.7
	End Cover		11088	0.10	11088	0.10	11633	0.4

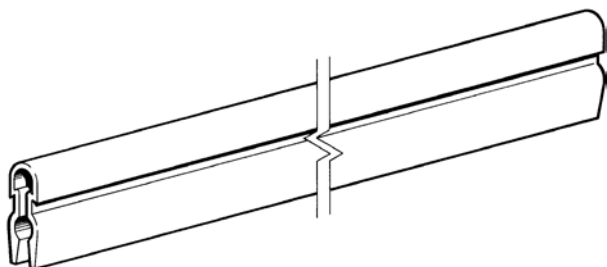
Solid Copper 500A - uses Clamped Joints (see Pg. 61)

500A	Description		W / Rigid PVC Cover -10° F to 160° F		W / Medium Heat Cover -25° F To 250° F		W / High Heat Cover -60° F To 400° F	
	Length		Part No.	Wgt. lbs.	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
	Conductor Length	20'	11016	23.6	11035	22.1	11054	24.6
	Conductor Length	5'	11017	11.8	11036	11.0	11055	12.3
	Expansion Section	10'	11063	18.5	11069	17.3	11075	20.0
	Power feed		11094	2.6	11094	0.66	11094	2.6
	End Cover		12171	0.2	11633	0.2	11633	0.4

8-Bar Cover and Connectors

8-Bar Cover

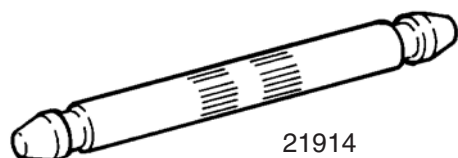
Meets all requirements for plastic electrical insulation and may be used indoors or outdoors.



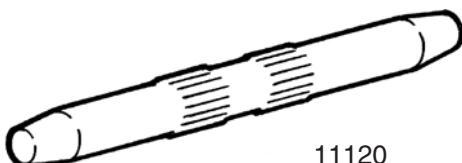
Part No.	Material	Temp-Rating	Replacement Length	Wgt. lbs.
11114	Rigid PVC (Orange)	-10° F to +160° F	9' - 10 1/2"	1.2
1114G	Rigid PVC (Green)	-10° F to +160° F	9' - 10 1/2"	1.2
11114B	UV Stable PVC (Black)	-10° F to +160° F	9' - 10 1/2"	1.2
11115	Medium Heat (Lexan) (Red)	-25° F to +250° F	9' - 10 1/2"	0.9
11116	High Heat (Polyester)	-60° F to +400° F	9' - 10 1/2"	1.7

Connector Pins

Used to connect two bar sections together. For quick and easy installation. Supplied with conductor bar.



21914

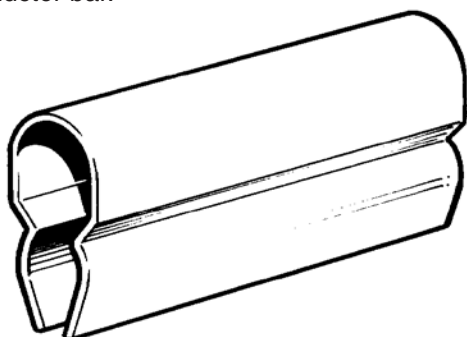


11120

Part No.	Description
11120	Steel zinc plated use with galvanized steel 110A 8-Bar
11121	Used with rolled copper and laminated 8-Bar
24196	Stainless steel used with Stainless steel 40A 8-Bar
21914	Steel zinc plated used with galvanized steel 90A 8-Bar
22885	Transition Pin for 90 and 110A 8-Bar, 3" long

Joint Cover

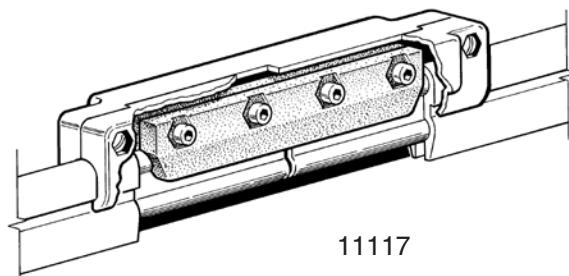
Insulated protective covers for conductor bar joining parts. Supplied with the conductor bar.



Part No.	Description	Wgt. lbs.
13601	For 40 - 350A PVC Cover	.03
13600	For 40 - 350A Medium Heat Cover	.03
11123	For 40 - 350A High Heat Cover	.40

Copper Connector Clamp and Case

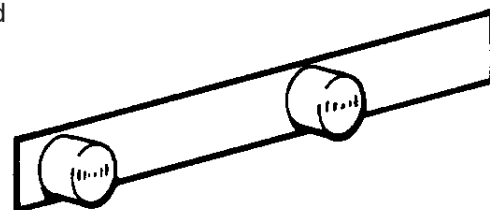
Used To connect 500A solid copper conductor together. Used with all cover types



11117

Joint Keeper

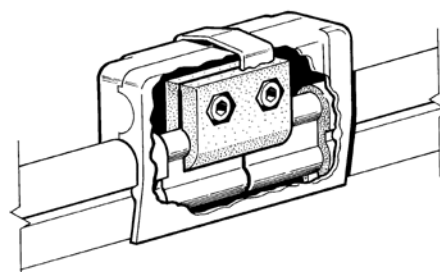
Used to help secure and stabilize copper conductor bar. Supplied at "no charge with the appropriate system ord



8-Bar

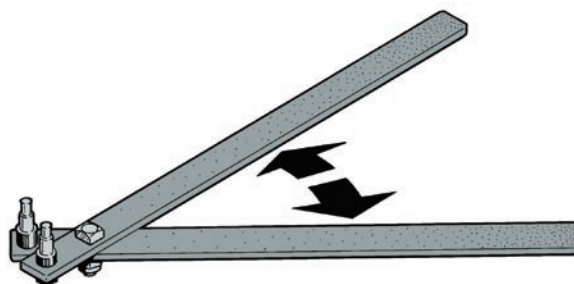
Joint Repair Kit

To repair joints of damaged conductor bar



Connector Tool

Inserts into pre-punched holes of the conductor bar to pull together conductor sections securely. Supplied with complete systems at "no charge".



Part No.	Description	Wgt. lbs.
11117	Complete assembly for solid copper 8-Bar, or for repairs	1.5
11118	Connector Case Only	0.5
11119	Connector Clamp Only	1.0

Part No.	Description	Wgt. lbs.
11125	For rolled or laminated copper 8-Bar (250 and 350A)	0.01

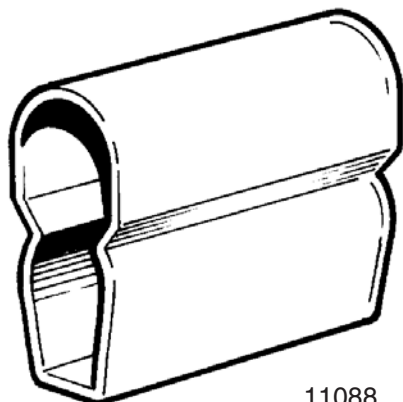
Part No.	Description	Wgt. lbs.
24632	For 40 - 350A formed 8-Bar	0.66
51666	For high heat applications	0.66

Part No.	Description	Wgt. lbs.
11134	Used with 40 - 350A 8-Bar	2.3

8-Bar End Covers & Power Feeds

End Cover

For covering the exposed ends of 8-Bar.

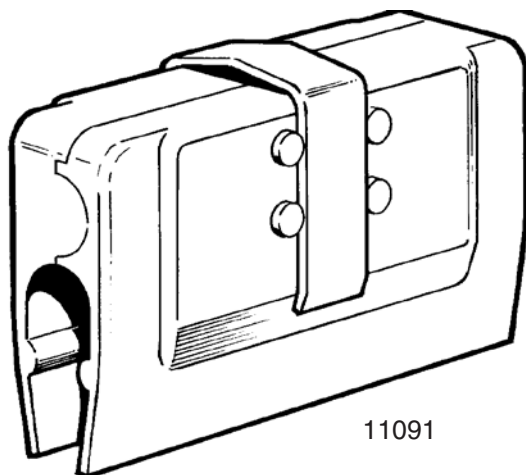


11088

Part No.	Description	Wgt. lbs.
11088	For 40, 110 - 350A Conductors up to 300° F	.03
22070	For 90A Conductors to 400° F	.03
11633	For all 8-Bar conductors to 400° F	.40
12171	For 500A (solid copper) conductors to 160° F	.40
27102	For 500A (Solid copper) to 160° F (stainless steel hardware)	.40

Power feed and Accessories

Provides attachment of incoming power to the conductor rails. Fully insulated, simple clamp design for easy installation anywhere on the system.



11091

Part No.	Description	Wgt. lbs.
11091	90/110A steel clamp and PVC case 160° F	.34
11122	90/110A steel clamps and high heat case, 400° F	.38
11092	250A copper clamp and PVC case, 160° F	.66
11093	250A copper clamp and high heat case, 400° F	.70
11094	500A copper clamp with high heat case, 400° F	2.60
27104	250A copper clamp and PVC case, 160° F (stainless hardware)	.66
27106	500A copper clamp with high heat case 400° F (stainless hardware)	2.60

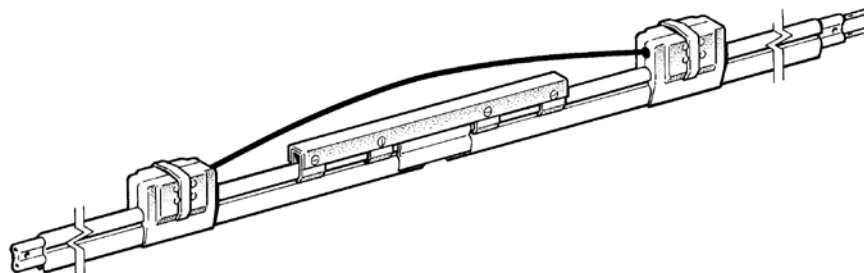
Part No.	Description	Wgt. lbs.
11131	Case clip only. PVC 90/110, 250A	.2
11132	Case clip only. High heat. 90/110, 250A	.3
11133	Case clip only. High heat 500A	1.0
11128	Clamp only. Steel 90/110A	.10
11129	Clamp only. Copper, 250A	.4
11130	Clamp only. Copper, 500A	1.6

8-Bar Expansions & Isolation Sections

Expansion Section

Required every 300' for steel conductors or every 200' for copper conductors to compensate for thermal expansion. Power feeds and flexible jumpers are factory installed to meet electrical and mechanical requirements of your system.

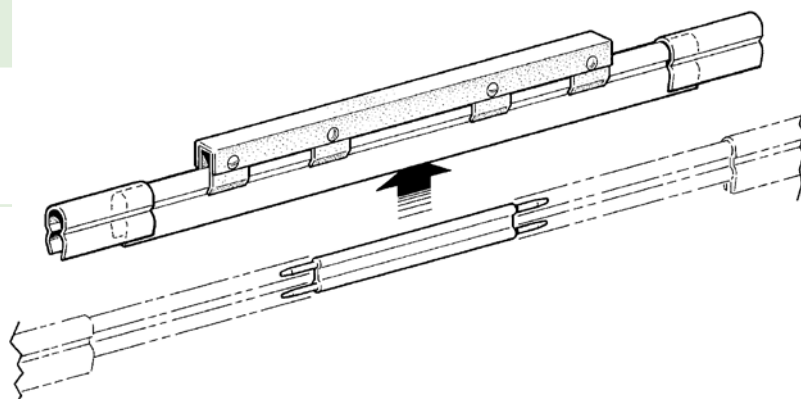
Note: Part numbers are located with the bar - see Pgs. 58-59.



Isolation Section

Conductor isolation sections are used to electrically isolate control circuits, maintenance bays, etc. Refer to Appendix IV. Pgs. 103 - 104, or consult factory for proper selection.

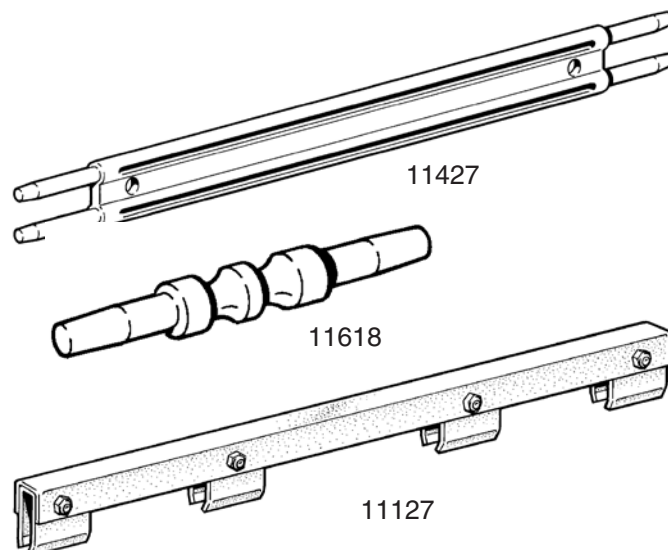
Part No.	Description	Wgt. lbs.
21841	Kit includes 11127 guide assembly, PVC cover, and isolation piece for 40 - 350A (not including 90A)	2.3



Isolation Section Parts

Components used for in-field modification

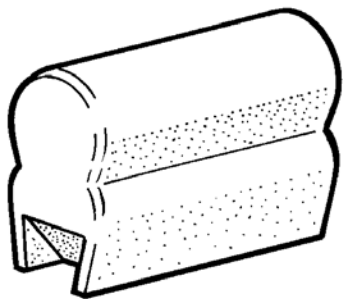
Part No.	Description	Wgt. lbs.
11427	Molded plastic insulating piece only for 21841	0.3
11615	Molded plastic 1" isolating pin. For 40-350A except for 90A (2 per location required)	0.03
11618	Molded plastic, 1" isolating pin. For 90A only. (2 per location required)	0.03
11127	Galvanized Steel Guide Assembly Provides rigid support at isolation areas.	1.5



8-Bar Transfer Caps & Pickup Guides

Transfer Caps

Used in switches and interlocks to accomplish smooth Collector transfer.

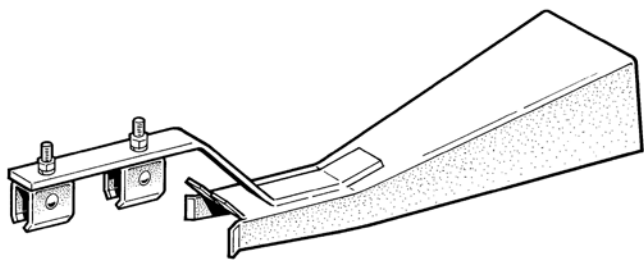


Part No.	Description	Wgt. lbs.
22070	End/transfer cap for 90A bar.	0.03
22395	Left transfer cap for 90A bar.	0.03
22396	Right transfer cap for 90A bar.	0.03
13161	End/transfer cap for 40-350A bar	0.03
14118	Left hand cap for 40-350A bar	0.03
14119	Right hand cap for 40-350A bar	0.03

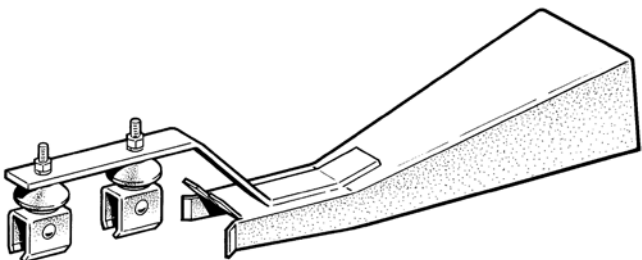
Pick-Up Guide

Requires use of self-centering collectors, see Pg. 66 - 67, to allow the Collector to leave the conductor and re-track upon return. Consult factory for selection.

Part No.	Description	Wgt. lbs.
13142	For "J" head Collectors, indoors, for 3" bar spacing	1.75
11089	For "J" head collectors, indoors, for 4" bar spacing	1.75
13143	For "J" head collectors, outdoors, for 3" bar spacing	2
11090	For "J" head collectors, outdoors, for 4" bar spacing	2



13142



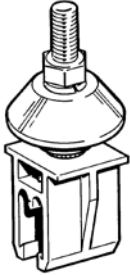
13143

8-Bar Hanger Clamps

Hanger Clamps are designed to grip 8-Bar Conductors for stable support. They are required every 5' for vertical entry, 3' for curved systems and every 3' 4" for lateral entry.

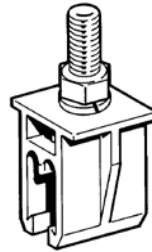
Plastic Snap-in Hanger Clamp

For standard mount, not recommended for curves or lateral mount.



With Insulator

Description	Part No.	Wgt. lbs.
Polycarbonate plastic With plated hardware	24405	0.3
Polycarbonate plastic with stainless steel hardware	28122	0.3



Without Insulator

Description	Part No.	Wgt. lbs.
Polycarbonate plastic With plated hardware	22800	0.3
Polycarbonate plastic with stainless steel hardware	23370	0.3

Steel Snap-in Hanger Clamp

For standard mount, not recommended for curves or lateral mount



With Insulator

Description	Part No.	Wgt. lbs.
Spring Steel	22000	0.23



Without Insulator

Description	Part No.	Wgt. lbs.
Spring Steel	21600	0.11

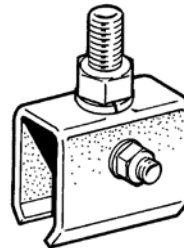
Cross-Bolt Hanger Clamp

For standard mount, lateral mount, and curved systems.



With Insulator

Description	Part No.	Wgt. lbs.
Plated Steel	11082	0.4
Stainless Steel	11084	0.4

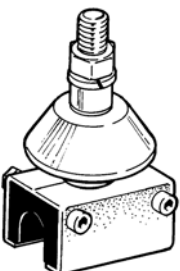


Without Insulator

Description	Part No.	Wgt. lbs.
Plated Steel	11076	0.25
Stainless Steel	11078	0.3

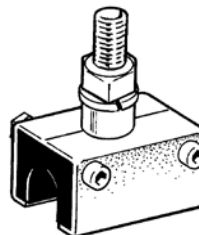
Anchor Clamp

For standard mount, not recommended for curves or lateral mount.



With Insulator

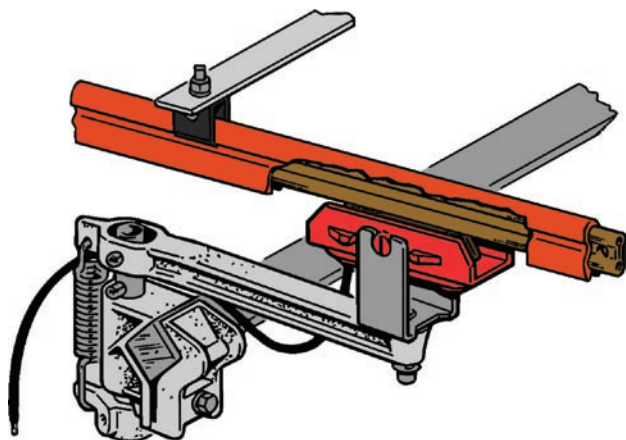
Description	Part No.	Wgt. lbs.
Plated Steel	21982	0.5
Stainless Steel	28124	0.5



Without Insulator

Description	Part No.	Wgt. lbs.
Plated Steel	21833	0.3
Stainless Steel	28123	0.3

8-Bar Collectors

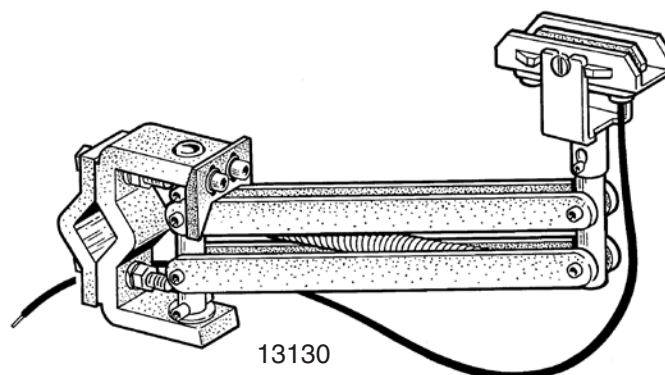
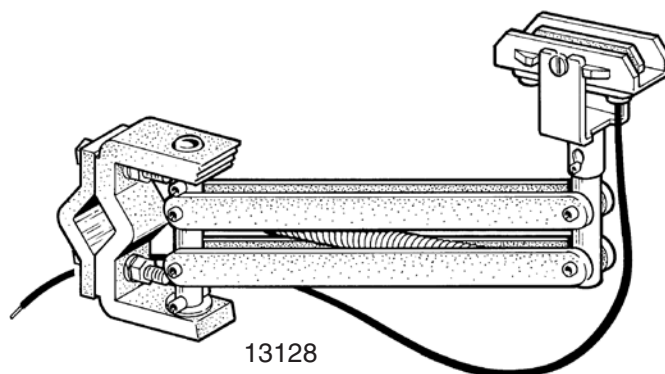


Sliding contact Collector Assemblies are offered in either single or double contact shoe types providing current capacities from 30A to 200A. Operational wear is confined to easily replaceable contact shoes. The shoes are supported by insulated holders on articulating, spring-loaded collector arms.

30A “J” Head “C” Base Type

For systems up to 600 volts with straight runs and curves to 18” minimum radius. For lateral mount, consult factory.

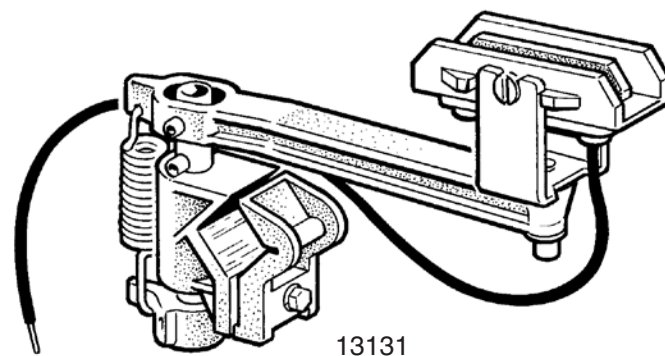
Description	Part No.	Wgt. lbs.
Standard Mount	13128	2.5
Standard Mount, self centering *	13130	2.6
Standard tandem Mount	13082	4.7
Standard tandem mount, self centering *	13084	4.9
Replacement Shoe		
30 amp replacement shoe	13136	0.4



30A “J” Head “H” Base Type

For systems up to 600 volts with straight runs and curves to 18” minimum radius. For lateral mount, consult factory.

Description	Part No.	Wgt. lbs.
Standard Mount	13131	1.4
Standard Mount, self centering *	13132	1.7
Replacement Shoe		
30 amp replacement shoe	13136	0.4

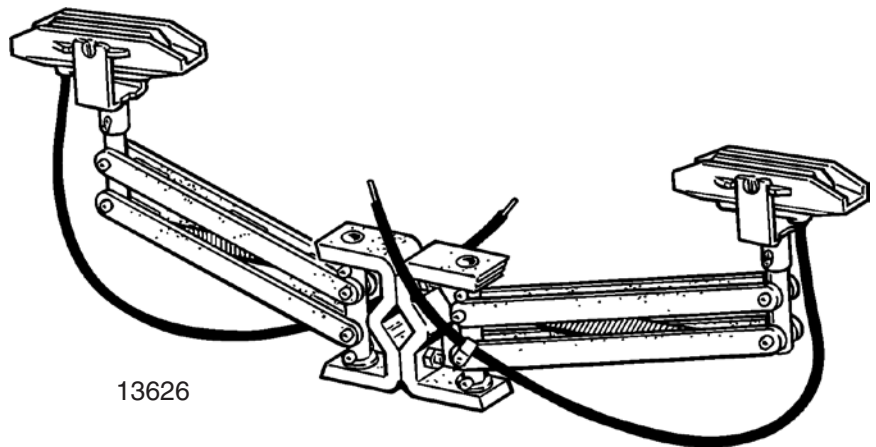


* For use with Pick-up Guides only, see Pg. 64.

100A “J” Head “C” Base Type

For straight system runs of 600V or less. For lateral mount, consult factory.

Description	Part No.	Wgt. lbs.
Standard Mount	13613	3.1
Standard Mount, self centering *	13625	3.2
Standard tandem Mount	13626	5.8
Standard tandem mount, self centering *	13628	6.0
Replacement Shoe		
100 amp replacement shoe	11157	0.9



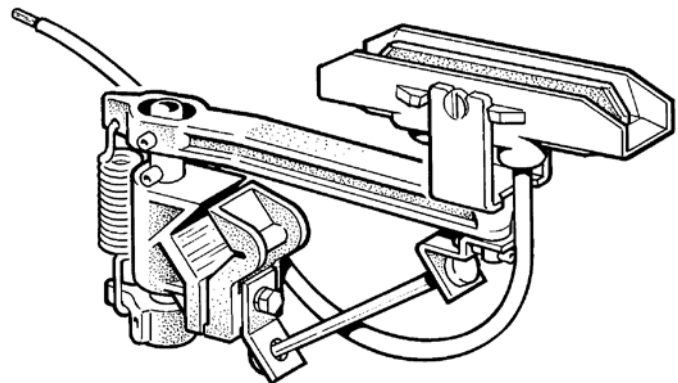
13626

8-Bar

100A “J” Head “H” Base Type

For straight system runs of 600V or less, and curves to a minimum of 48" radius. For lateral mount, consult factory.

Description	Part No.	Wgt. lbs.
Standard Mount	13629	1.4
Standard Mount, self centering *	13630	1.7
Replacement Shoe		
100 amp replacement shoe	11157	0.9



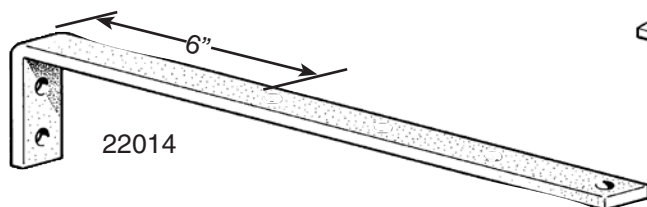
13630

* For use with Pick-up Guides only, see Pg. 64.

8-Bar Brackets

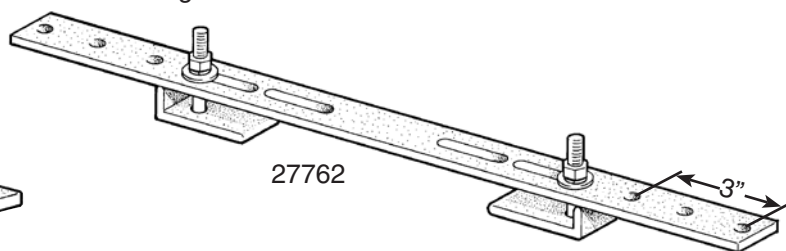
Web Mount

For top running, web-mounted, bottom entry systems. Zinc plated steel. See Pg. 65 for hangers.



Flange Mount

For bottom entry monorail and under hung systems, flange-mounted. Zinc plated steel. See Pg. 65 for hangers.

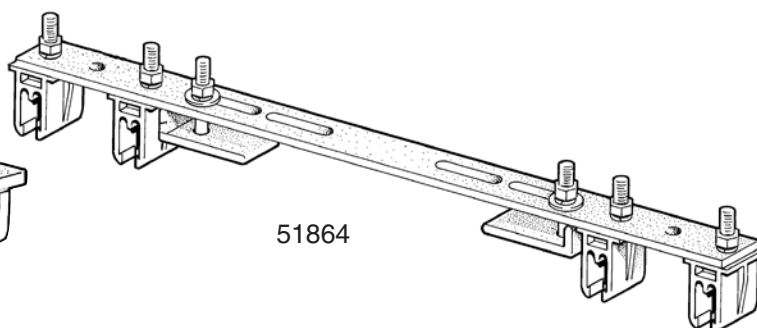
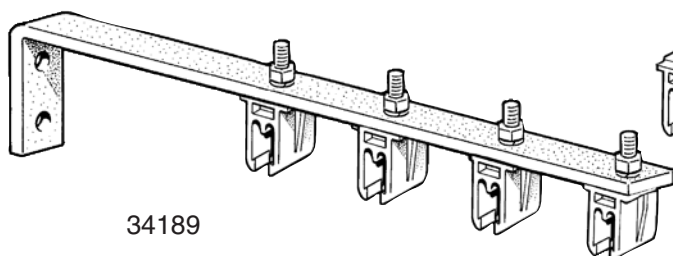


Part No.	Description	Wgt. lbs.
22014	Web Bracket - 6" to first hole	2.4
29876	Web Bracket - 9" to first hole, includes position for fourth hanger at 6"	4.5

Part No.	Description	Wgt. lbs.
27762	For 2 hangers each side	2.5
27767	For 4 hangers on one side	2.5

Brackets with Hanger Clamps

The following brackets have hanger clamps on 3" centers, brackets are zinc plated steel.



Polycarbonate Snap-In Clamps

Description	Without Insulators		With Insulators	
	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
Web type 5"	28829	2.0	51004	2.4
Web type 9"	34189	3.1	50314	3.5
Flange type, 2 hangers each side	51864	2.6	51865	3.1
Flange type, 4 hangers on one side	51870	2.6	51871	3.1

Steel Snap-In Clamps

Description	Without Insulators		With Insulators	
	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
Web type 6"	30281	1.55	51005	1.95
Web type 9"	50313	2.68	50315	3.10
Flange type, 2 hangers each side	51866	2.1	51867	2.5
Flange type, 4 hangers on one side	51872	2.1	51873	2.5

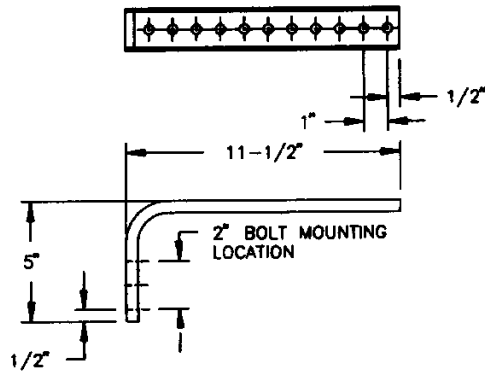
Cross-Bolt Clamps

Description	Without Insulators		With Insulators	
	Part No.	Wgt. lbs.	Part No.	Wgt. lbs.
Web type 6"	31762	1.97	29534	2.33
Web type 9"	50312	3.10	50316	3.50
Flange type, 2 hangers each side	51868	2.52	51869	2.88
Flange type, 4 hangers on one side	51874	2.52	51875	2.88

8-Bar Universal Brackets

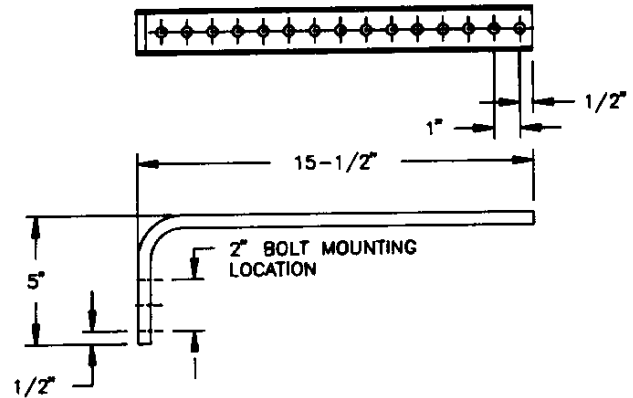
Larger number of positions allows "Universal Brackets" to address most applications. Holes are drilled on 1" centers.

Web Bracket - Short



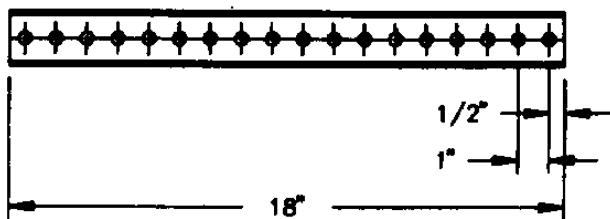
Part No.	Wgt. lbs.
31409	1.0

Web Bracket - Long



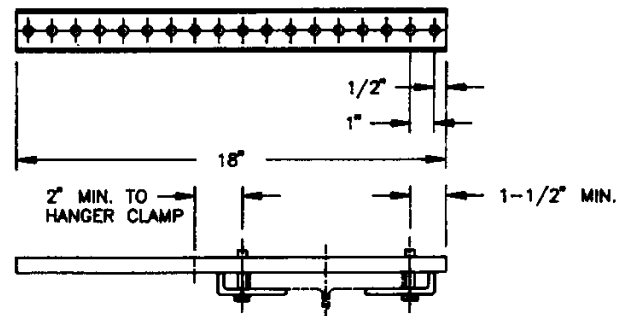
Part No.	Wgt. lbs.
31407	1.25

Flange Bracket



Part No.	Wgt. lbs.
31408	1.15

Flange Bracket with Clips



Length	Part No.	Wgt. lbs.
18"	31418	1.55
24"	31911	2.1

***Order pre-assembled brackets
with your choice of hangers on Pg. 70***

8-Bar Brackets

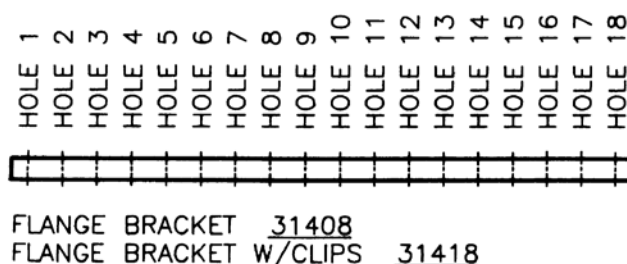
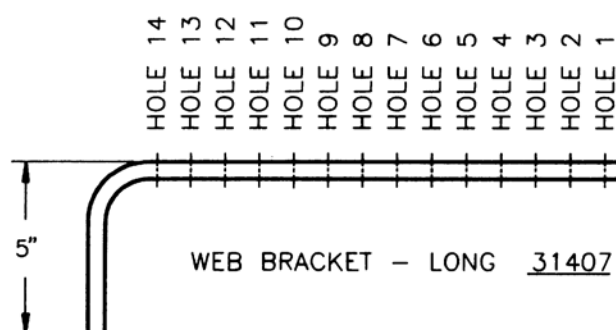
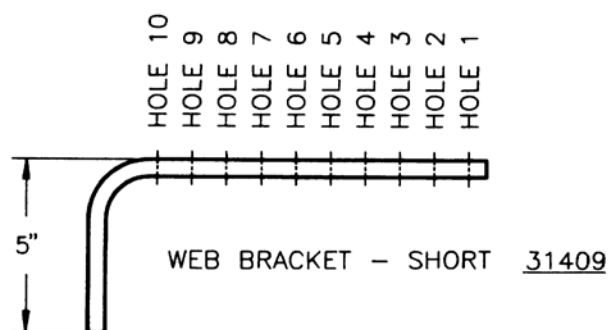
Directions

- 1) Select **BRACKET** and identify (in parentheses) the hole number locations in which hangers are to be assembled. See bottom of page for recommended minimum hanger spacing.
- 2) Select hangers from Pg. 65.

EXAMPLE:

<u>Qty.</u>	<u>Part No.</u>	<u>Description</u>
10	31407 (1, 3, 5, 7)	Long Bracket
40	22800	Plastic Snap Hanger

Bracket Hole Listing (1" Spacing Between)



Recommended Minimum Conductor Bar Spacing

	<u>Indoor</u>	<u>Outdoor</u>
8 Bar (bottom entry)	2"	3"
Side Contact (Lateral Mount)	3"	Not for outside use

For less than 2" spacing. consult factory

8-Bar Curves & Slip Rings

Curves

Factory curved conductors. Refer to page 72 to specify your curve requirements. Maximum length: 10'

PVC Cover, Min. Radius 18"

Conductor Bar	Current Cap.	Part No.
Galvanized Steel	110A	11003
Stainless Clad Copper Laminate	250A	11007
Copper Steel Laminate	250A	11011
Rolled Copper	350A	11015
Solid Copper	500A	11018

Med. Heat Cover, Min. Radius 57"

Conductor Bar	Current Cap.	Part No.
Galvanized Steel	110A	11022
Stainless Clad Copper Laminate	250A	11026
Copper Steel Laminate	250A	11030
Rolled Copper	350A	11034
Solid Copper	500A	11037

High Heat Cover, Min. Radius 57"

Conductor Bar	Current Cap.	Part No.
Galvanized Steel	110A	11041
Stainless Clad Copper Laminate	250A	11045
Copper Steel Laminate	250A	11049
Rolled Copper	350A	11053
Solid Copper	500A	11056

Slip Rings

Curved segments for factory manufactured ring.

Conductor Bar	Ring Description	Part No.
Galvanized Steel (110A)	18" to 35" radius 2-180° pieces	23626
Stainless Clad Copper Laminate (250A)		23627
Copper Steel Laminate (250A)		23628
Rolled Copper (350A)		23629
	PVC Cover	

Conductor Bar	Ring Description	Part No.
Galvanized Steel (110A)	54.1" to 72" radius 4-90° pieces	23634
Stainless Clad Copper Laminate (250A)		23635
Copper Steel Laminate (250A)		23636
Rolled Copper (350A)		23637
Solid Copper (500A)	PVC Cover	24293

Conductor Bar	Ring Description	Part No.
Galvanized Steel (110A)	35.1" to 54" radius 3-120° pieces	23630
Stainless Clad Copper Laminate (250A)		23631
Copper Steel Laminate (250A)		23632
Rolled Copper (350A)		23633
Solid Copper (500A)	PVC Cover	24292

Conductor Bar	Ring Description	Part No.
Galvanized Steel (110A)	57" to 72" radius 4-90° pieces	23638
Stainless Clad Copper Laminate (250A)		23639
Copper Steel Laminate (250A)		23640
Rolled Copper (350A)		23641
Solid Copper (500A)	Medium Heat Cover	24294

Consult factory for assistance with your curve and slip ring requirements

8-Bar Curves & Slip Rings

This worksheet is intended to assist you in choosing the correct curved section for your application. Consult factory when calculating your requirements.

Conductix Conductor Bars Curve Definition

Customer:

Project No.:

Item No.:

Date:

1. Bar type, Rating (Amps/Volts):

2. Environment / Ambient Temp:

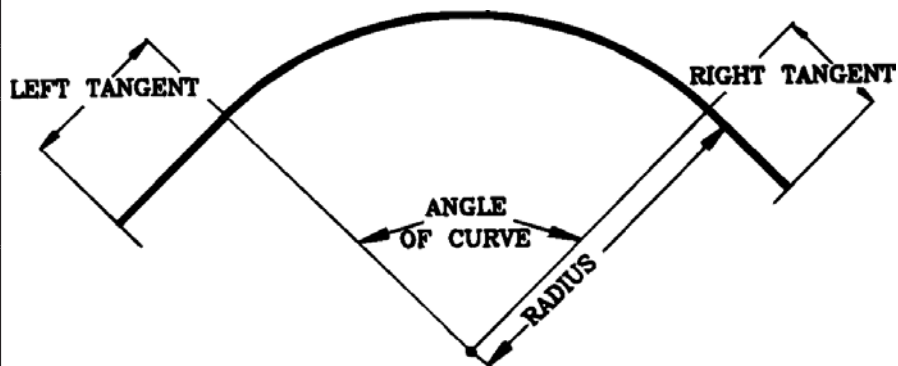
3. Fill in

Angle of curve:

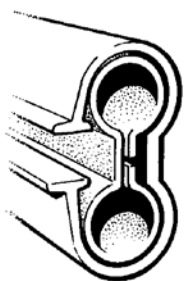
Left tangent
6" standard:

Right tangent
6" standard:

Radius to contact
surface:
(Consult Pg. 71 for
minimum radii.)



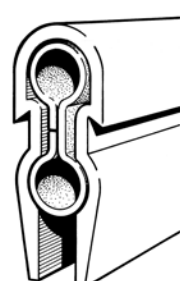
4. Select style of bar:



☐ Outside Contact



☐ Inside Contact



☐ Bottom Contact

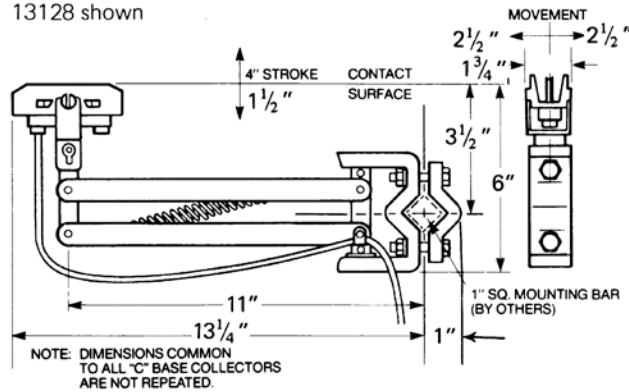
5. For systems with parallel curves, sketch layout below and indicate the radius, angle and tangent for each.

8-Bar Collector Drawings

C BASE				
	30 Amp	60 Amp Tandem	100 Amp	200 Amp Tandem
Standard Mount	13128	13082	13613	13626
Self-Centering	13130	13084	13625	13628

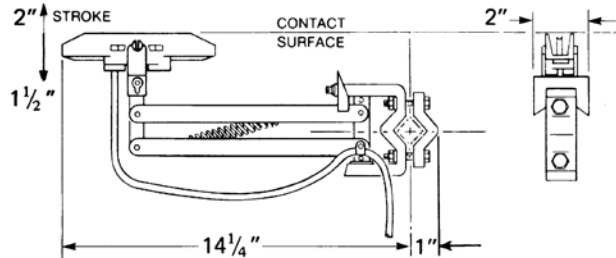
"C" BASE, STANDARD MOUNT

13128 shown



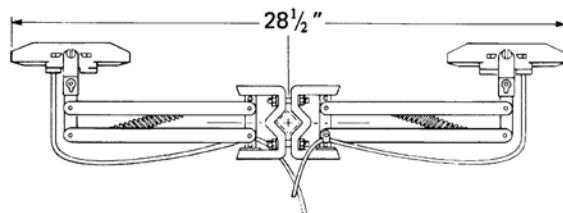
"C" BASE, SELF-CENTERING

13625 shown



"C" BASE, STANDARD MOUNT

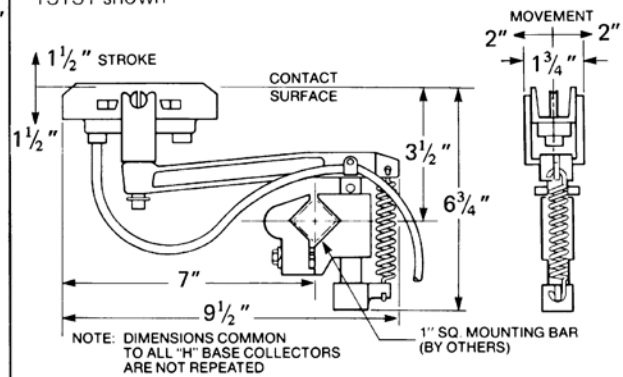
13626 Tandem (Shown)



H BASE		
	30 Amp	100 Amp
Standard Mount	13131	13629
Self-Centering	13132	13630

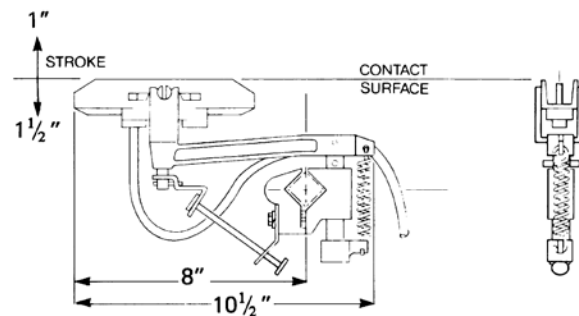
"H" BASE, STANDARD MOUNT

13131 shown



"H" BASE, SELF-CENTERING

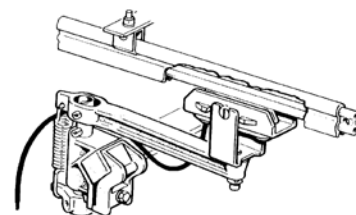
13630 shown



COLLECTOR MOUNTING

Standard mount
(vertical entry)

13131 shown



SHOE PRESSURE

30 amp 3-5 lbs.
100 amp 6-9 lbs.

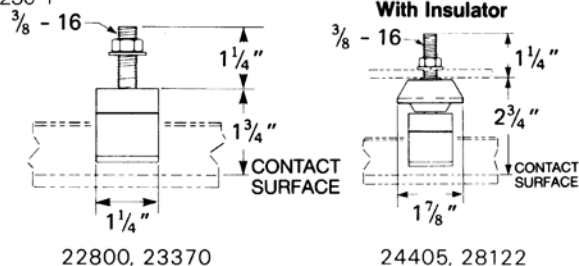
8-Bar Hanger & Power Feed Drawings

Hangers

PLASTIC SNAP-IN HANGER CLAMPS

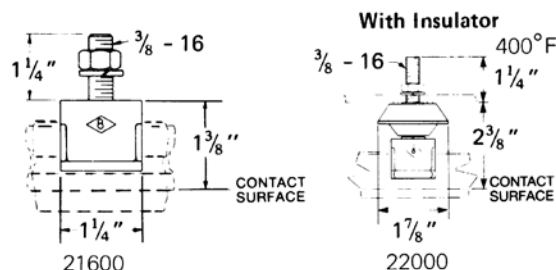
(Not recommended for curves)

250°F

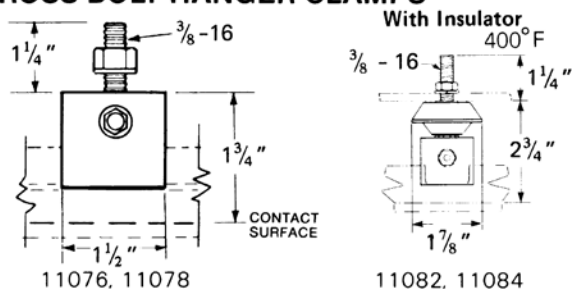


STEEL SNAP-IN HANGER CLAMPS

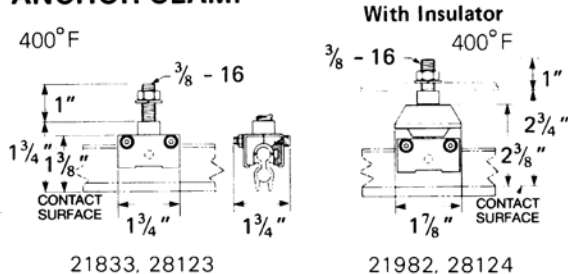
(Not recommended for lateral mount or curves)



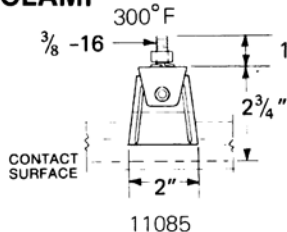
CROSS-BOLT HANGER CLAMPS



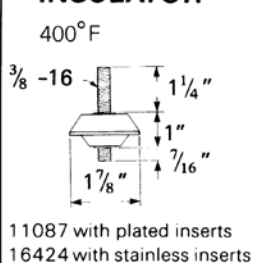
ANCHOR CLAMP



INSULATING HANGER CLAMP



INSULATOR



TRANSFER CAP

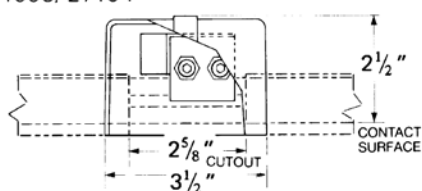
Molded plastic for use at switches with pickup guides and other transfer points for 40-350 amp. conductors, to 300°F.



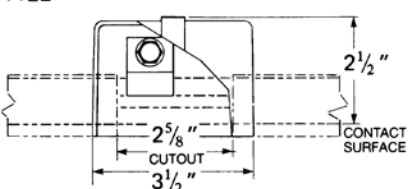
13161	For 40, 110, 250 350 amp bar	22070	For 90 amp only
14118	Left hand	22395	Left hand
14119	Right hand	22396	Right hand

Powerfeeds

11092, 11093, 27104



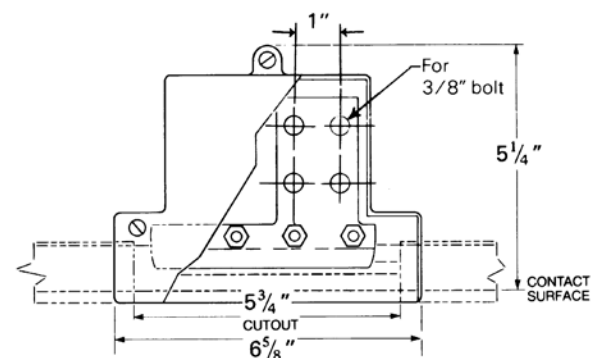
11091, 11122



11091 Steel clamp type. Complete assembly of clamp and PVC case for steel systems only. Single bolt hole 1/4" For crimp lug 3/0 and temperatures to 160°F.

11122 Steel clamp type. Complete assembly of clamp and high heat case for steel systems only. To 400°F.

11092/27104 Copper clamp type. Complete assembly of clamp and PVC case for systems with feed wires of #8-1/0. To 160°F.



11094, 27106

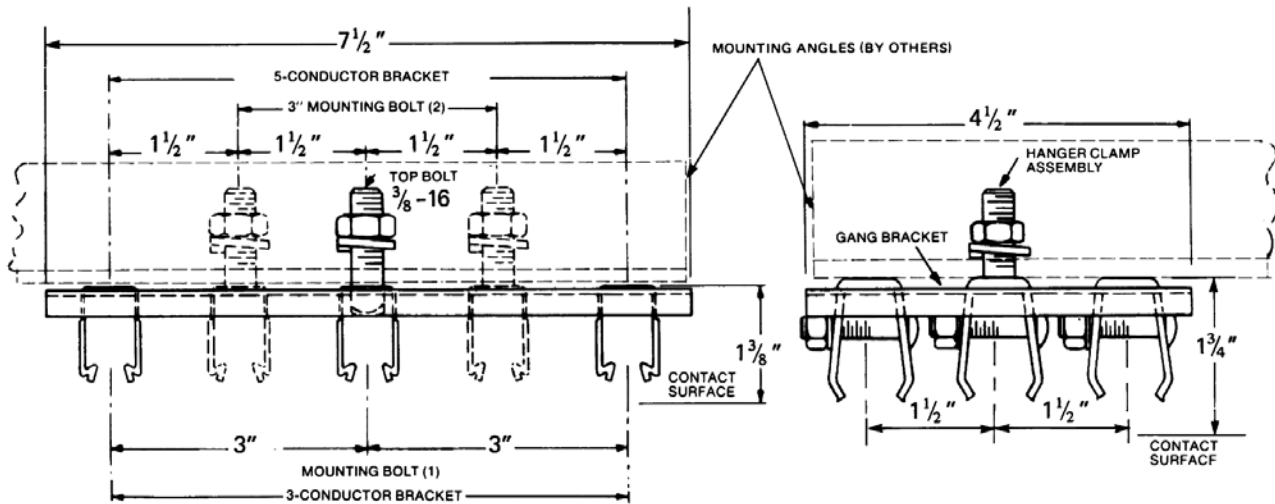
11093
250 Amp.

Copper clamp type. Complete assembly of clamp and high heat case for systems with feed wires of #8-1/0 and temperatures to 400°F.

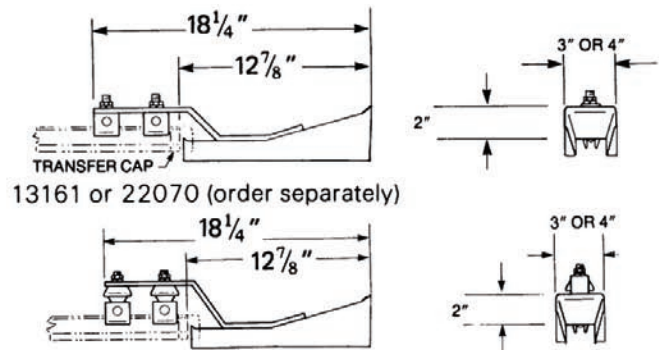
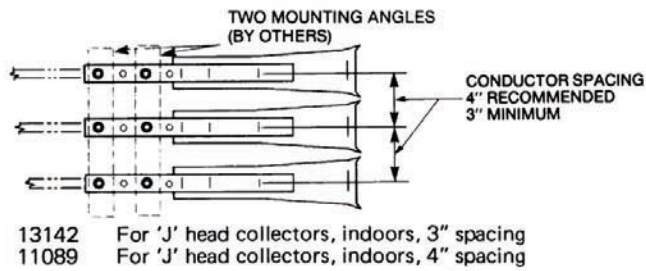
11094/27106 Copper clamp type with stub. Complete assembly of clamp with NEMA standard four-hole stub and case for temperatures to 400°F. Feed wires to 500 MCM.

8-Bar Hanger & Pickup Guide Drawings

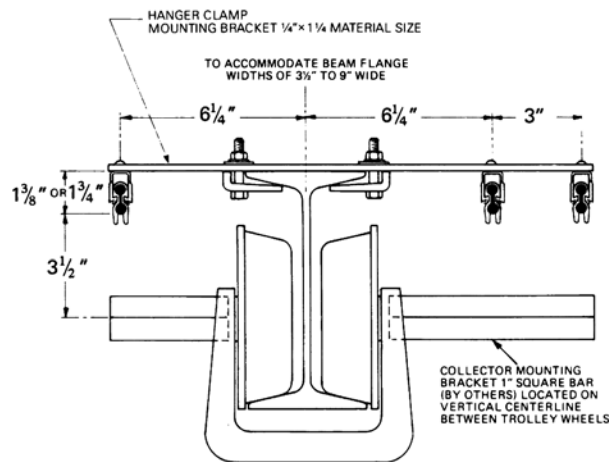
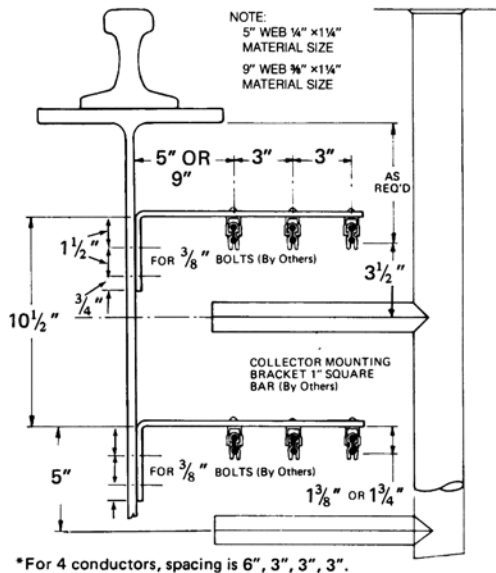
Gang Hanger Clamp Bracket



Pick-up Guides



Crane Bridges and Runways



*For 4 conductors, spacing is 6", 3", 3", 3".

Appendix I - Selection of Systems

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

Environmental Conditions: Have all aspects of the operating environment been accounted for?

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

Mounting and Installation: How is your system to 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. But 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 Conductor Bar Data Sheet, Pg. 5 for further “total load” calculation details.

Appendix I - Selection of Systems

- **Voltage Rating** - 600 volt rated insulating covers are standard. Higher voltages require covers 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 offsets the cost to install the multiple power feed locations.
- **Calculating Voltage Drop** - use Conductix 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.

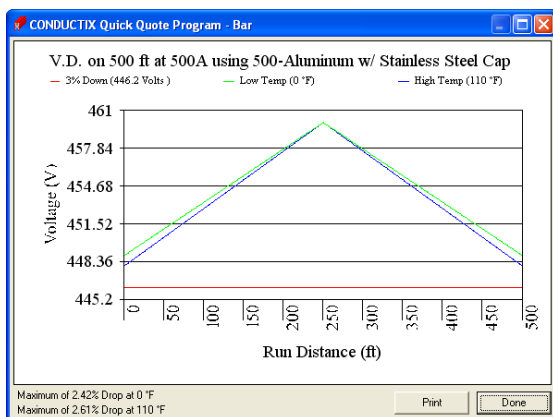


Figure 1 – Center Feed Example: Voltage drop along a 500 foot long runway with one crane drawing 500 amps at 460 volts on a 500 amp rated bar. The green line shows the voltage drop along the run at 0° F. The blue line shows the voltage drop at 110° F. The red line indicates the 3% maximum voltage drop.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

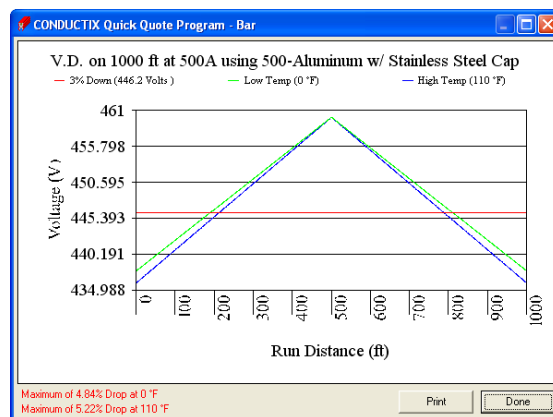


Figure 2 - Same parameters as Fig. 1, except with a 1000 foot system. Note that the voltage drop is now greater than the recommended 3%.

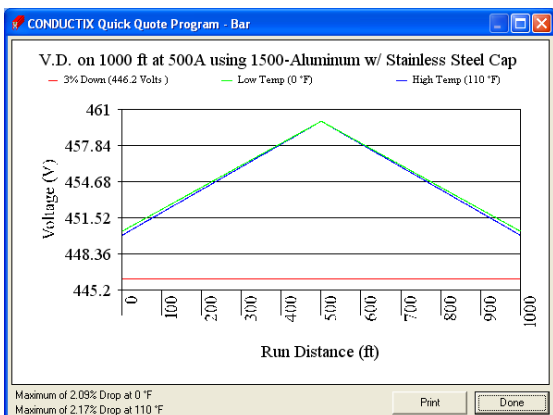


Figure 3: Center Power Example – with higher capacity 1500 amp bar to lower the voltage drop below 3%.

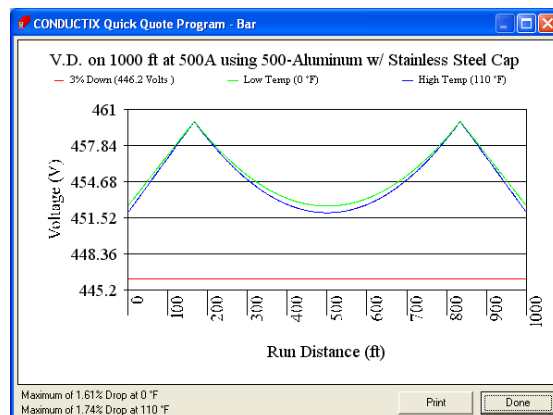


Figure 4: Two power feeds optimally located. The voltage drop remains under 3% , without the need to increase conductor capacity. A load positioned between the two feed points is supplied by both power feeds.

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”**, which are 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 offers “Medium Heat” or “High Heat” covers for most systems – see Pg. 3.

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 Sales.**

Appendix II - Voltage Drop Calculations

Proper selection of conductor and covers for Conductix / Insul-8™ conductor systems is simple, requiring only the ampacity, voltage and ambient conditions.

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

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

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

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

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

$$\begin{aligned} \text{Crane \#2} \\ \text{Hoist} &= 52\text{A} \times 1 = 52.0 \\ \text{Bridge} &= 14\text{A} \times .5 = 7.0 \\ \text{Total} &= \underline{59.0\text{A}} \\ \text{Total} &= 137.5 \times .195 = 130.0\text{A} \end{aligned}$$

- 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 and 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	Rolled Copper 3-phase 350' long, 250A load. Vd = 1.39 x 3.5 x 2.5 = 12.1 volts Assume load pF is 90
Galvanized Steel 90A	16.2	15.0	
Galvanized Steel 110A	10.1	7.1	
Stainless Clad Copper 250A	2.01	2.0	
Copper Steel Laminates 250A	2.01	2.0	
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'
Galv	90	99'	49'
Galv	110	130'	65'
SS / CU	250	287'	144'
CU / Galv	250	287'	144'
Rolled Cu	350	296'	148'
Solid Cu	500	381'	191'

$$\begin{aligned} 3\% \text{ of } 480\text{V} &= 14.4 \\ 2\% \text{ of } 240\text{V} &= 7.2 \\ 2\% \text{ of } 180\text{V} &= 9.6 \\ 2\% \text{ of } 240\text{V} &= 4.8 \end{aligned}$$

Appendix III Electrical Formulas & Conversions

Electrical Formulas

Ohms Law

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

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

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

Power

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

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

(not 3-Phase)

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

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

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

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

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

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

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

Speed

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

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

Metric Conversion

Celsius° / Fahrenheit°

For quick and easy temperture conversion, please use the **Celsius / Fahrenheit** crossover chart provided on Pg. 41.

To Obtain	Multiply
Millimeters	Inches x 25.4
Inches	Millimeters x 0.0394
Meters	Feet x .3048
Feet	Meters x 3.281
Square Centimeters	Square Inches x 6.45
Square Inches	Square Centimeters x 0.155
Kilograms	Pounds x 0.4536
Pounds	Kilograms x 2.205
Kilograms per Meter	lb/ft (divided by) .6719
Pounds per Foot	kg/m X .6719

Appendix IV - Power Interrupting Sections

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

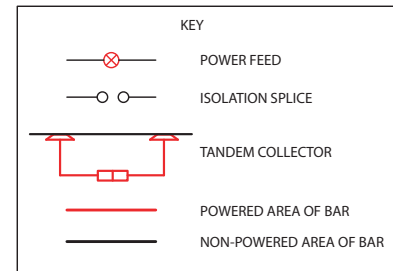
“End” Power Interrupting Sections

SAFELEC 2: For each power phase order:

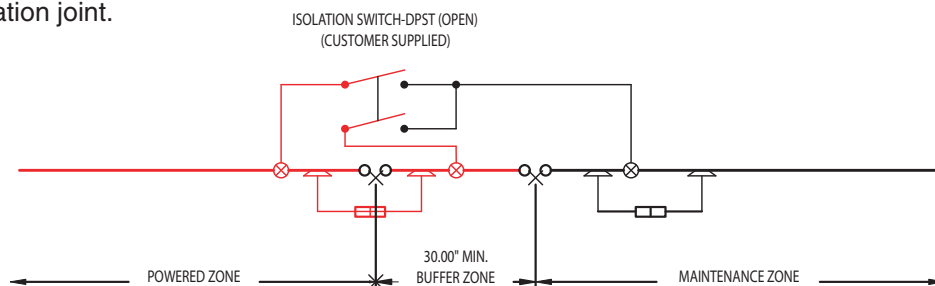
- Qty. 1 - “Power Interrupting Section” of the desired current rating (Pg. 21). With this “kit” you get the required isolations and power feeds.
- Qty. 1 - “Customer supplied” DPST switch per phase and necessary power wiring (ordered from others)

Hevi-Bar II: For each power phase order:

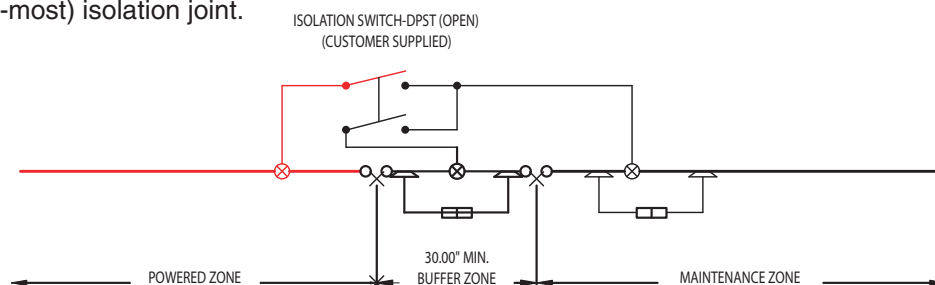
- Qty. 1 - “Power Interrupting Section” of the desired current rating (Pgs. 35-42). With this “kit” you get the required isolations and power feeds.
- Qty. 1 - “Customer supplied” DPST switch per phase and necessary power wiring (ordered from others)



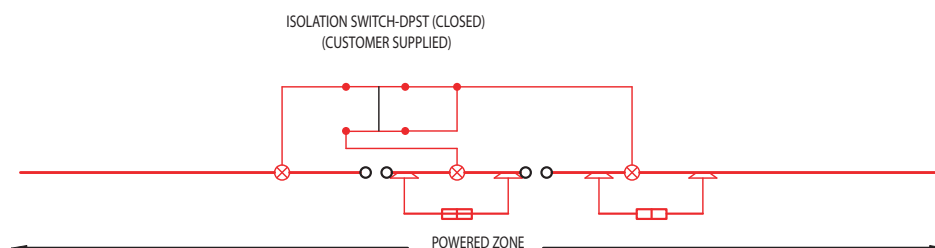
I: System with power off to the maintenance section (DPST switch open), but with tandem collector bridging the first (left-most) isolation joint.



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

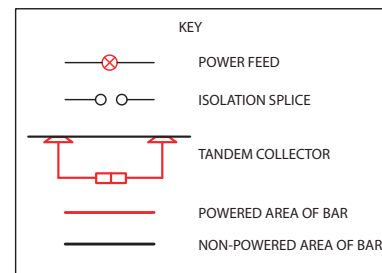
“Middle” Power Interrupting Sections

SAFELEC 2: For each power phase order:

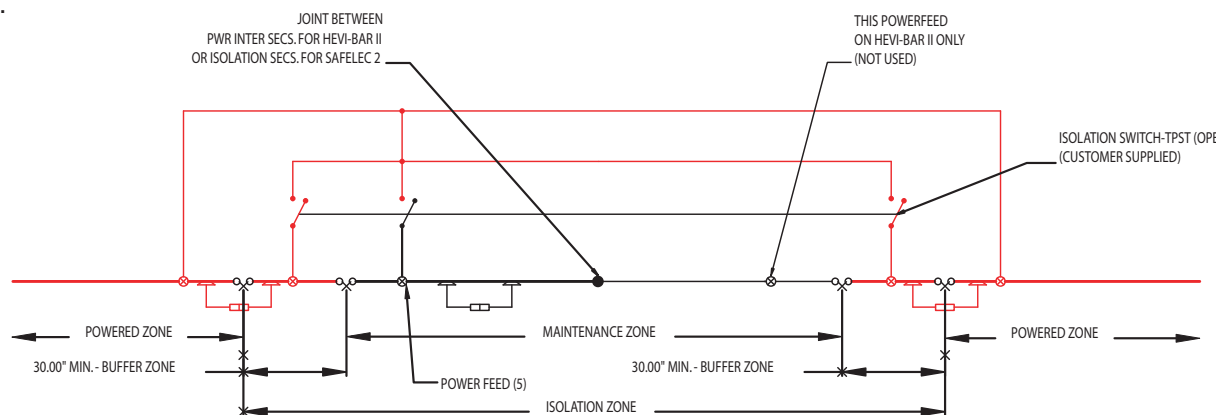
- Qty. 2 - “Power Interrupting Section” of the desired current rating (Pgs. 21). With this “kit” you get the required isolations and power feeds.
- Qty. 1 - “Customer supplied” TPST switch per phase and necessary power wiring (ordered from others)

Hevi-Bar II: For each power phase order:

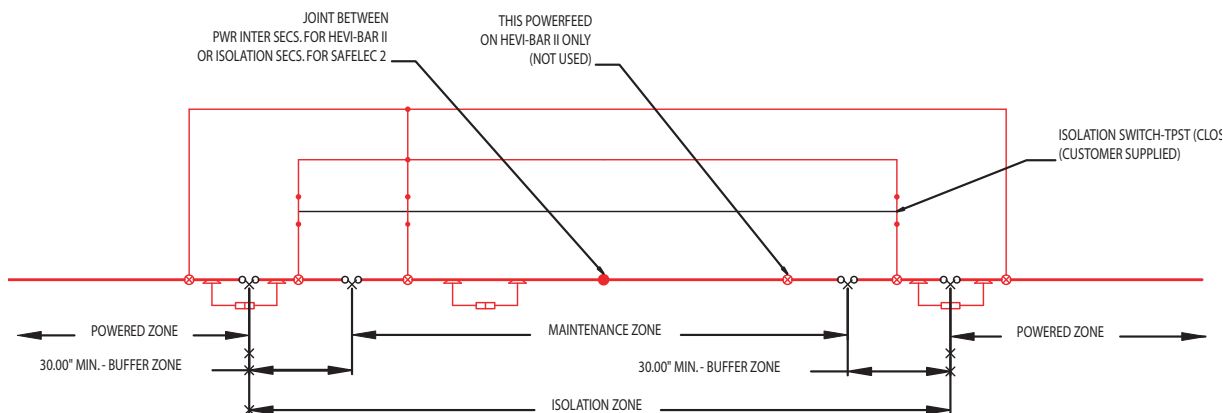
- Qty. 2 - “Power Interrupting Section” of the desired current rating (Pgs. 35-42). With this “kit” you get the required isolations and power feeds.
- Qty. 1 - “Customer supplied” TPST switch per phase and necessary power wiring (ordered from others)



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



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



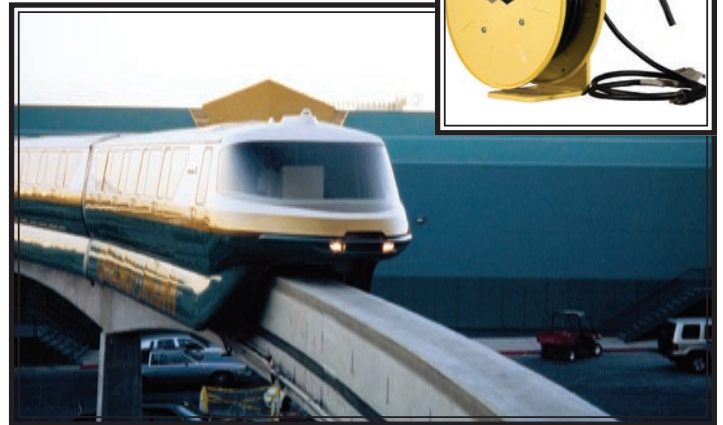


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Insul-8 Corporation began in safety-covered metal conductor systems for the material handling industry since 1944. Insul-8 was the first company to design and produce a stainless steel capped aluminum conductor and the only manufacturer of such a product for almost 20 years. Today, there are over 20 million meters (nearly 12,500 miles) of Insul-8 contact conductors and tens of thousands of collecting devices throughout the world. Every major port in the United States currently uses Insul-8's aluminum/stainless steel contact conductors on container cranes due to the dependability of the bar under the most severe conditions. Insul-8's festoon systems range from the smallest box-track systems to our most rugged Heavy-Duty Festoon. Insul-8's festoons are known for their safe and efficient operation in which large numbers of conductors can be handled in minimum space.

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- ◆ cable and hose reels ◆ conductor bar systems ◆
- ◆ cable festoon systems ◆ slip rings ◆
- ◆ pendant stations ◆ radio controls ◆

CONDUCTIX
INSUL 8

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