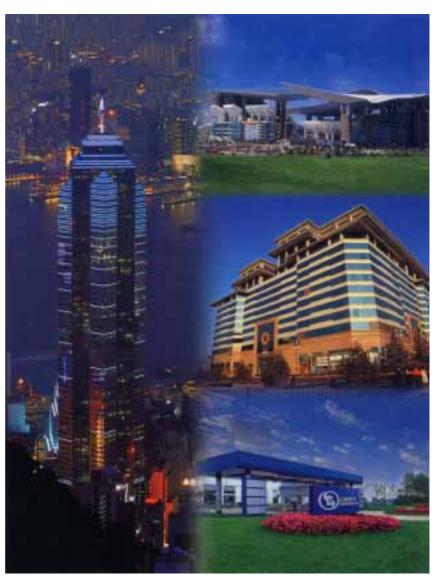
# Square D

Catalogue

# I-LINE Busbar Trunking System

Applications and Specifications









# **Delivering Power** to the People

I-LINE busbar trunking system was first introduced by Square D in 1961 in its production facility in Oxford. Ohio U.S.A. As one of the major brands of Schneider Electric, Square D has acquired worldwide recognition in a variety of busway applications.

I-LINE busbar trunking system is designed with maximum flexibility, ease of installation and electrical efficiency in the distribution of power of 600V and below, for both commercial and industrial application. It is available in ratings from 250A to 4000A with aluminium conductors; and 250A to 5000A with copper conductors. Configuration offered are TP and TP&N with 100% capacity, neutral, and the unique 50% capacity integral earthing conductor.

To cope with rapid expansion of power network in the Greater China and South East Asia, Schneider Electric set up a joint venture in 1997 in Guangzhou Economic & Technological Development District of PR China, namely Schneider Busway (Guangzhou) Ltd., to manufacture I-LINE busbar trunking system. Apart from I-LINE, the Company is also marketing Telemecanique's Canalis lighting busway to the regions.

I-LINE busbar trunking system manufactured in Guangzhou achieves a high level of quality and product excellence. It complies with international standards of UL857, NEMA, CSA, ZBK, IEC439 and GB; and was accredited of ISO9002 and CCIB. The product also passed testing of ASTA and China Electrical Equipment Testing Centre, Low Voltage Equipment Testing Centre. To ensure product is of the highest standard in the market, specialists from Oxford facility visit Guangzhou factory regularly to conduct training and audit. In return, Guangzhou products are sent to U.S.A. for periodical testing and inspection on a quarter basis.

Square D's success in launching I-LINE busbar trunking system, for sure, should be attributed to the technological expertise and quality assurance of the product itself. Yet merit should also go to the dedicated sales and after-sales supports from Schneider Electric's local representative offices, only with which a total and meticulous solution can be tailored to every unique application requirements. Empowered by the electrical engineers who master sound knowledge and practical experience, Schneider Electric can provide diversified project management services to customers, from on-site measurement, proposal on the best busducts routing, to installation assistance at site and "missing link units" arrangement. We trust this is the definite asset of Schneider Electric that you customer can always count on.

Want to know more about Schneider Electric or I-LINE busbar trunking system? Do contact our local representative offices as printed on this publication.



Square D facility in Oxford, Ohio U.S.A. is an ISO 9001 registered busbar trunking manufacturing facility.



Schneider Busway (Guangzhou) Ltd. was certified to achieve ISO9002 quality management system.

Schneider Busway (Guangzhou) Ltd. receives product certification from ASTA and ISO system accreditation from DNV.



ISO 9002: 1994 Certificate No. 99-RGC-AQ-0086



Square D I-LINE busbar trunking is designed and manufactured in a facility that is quality system registered by UL and BSI to ISO 9001.

> Certificate No FM23076





# I-LINE Busbar Trunking System Table of Contents

## Company background

Section I : I-LINE and I-Line II Busbar Trunking System
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Appendix
Application of I-LINE Busbar Trunking System 42 Suggested Specification of I-LINE
Busbar Trunking System

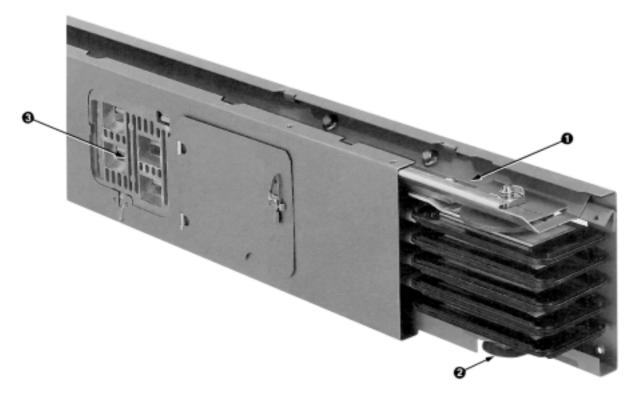
## I-LINE Busbar Trunking System General Description

#### What is I-LINE busbar trunking system?

I-LINE busbar trunking system is a time proven design with installations all over the world. Available in two ranges with ratings from 250 through 630 ampere and 800 through 5000 ampere, this "sandwich type" plug-in and feeder busbar trunking accepts existing I-LINE plug-in (250A to 1600A) unit (subject to trunking amperage restrictions).

The features of the design include the VISI-TITE bolt, plated aluminium or copper busbars and the integral earth conductor. I-LINE II busbar trunking has the additional standard features of internal barriers, the Joint-Pak assembly, and universal tie channels.

## I-LINE Busbar Trunking (250A to 630A)



#### Systems:

TP and N (100% neutral capacity) for AC systems; SP and TP for DC systems.

#### Ratings:

2

From 250 to 630 ampere in aluminium or copper plated conductors. The 600 volts maximum busbar trunking is fully rated for mounting in either horizontal or vertical positions.

Earthing conductor: Rated at 50% of the nameplate rating of the busbar trunking, the top part of the conductor is made of aluminium.

#### **2** VISI-TITE bolt:

Double headed bolts are supplied on all joint connections to assure proper torque on the joint connector. Only a standard spanner is required to tighten the bolt until the outside head breaks off. A 76mm Belleville washer with a cupped surface dispenses uniform pressure across the full joint surface area.

Plug-in openings:

All I-LINE busbar trunking has a plug-in opening for plug-in unit every 610mm on both sides of the trunking. The openings are covered by hinged doors which cover the openings when not in use.

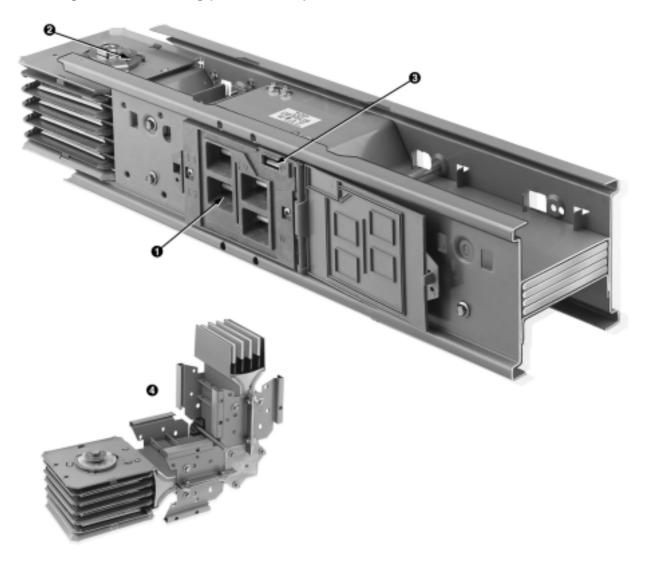
## Hangers:

I-LINE busbar trunking requires support every 3 metres when run horizontally flatwise and 4.8 metres vertically. It must be supported every 1.5 metres in the horizontal edgewise position.

#### **Enclosure:**

A three-piece formed steel housing with plug-in openings, supported by moulded rigid insulators. Available in indoor enclosures only.

## I-LINE II Plug-in Busbar Trunking (800A to 5000A)



## Systems:

TP and N (100% neutral capacity) for AC systems; SP and TP for DC systems.

#### Ratings:

From 800 to 4000 ampere with aluminium and from 800 to 5000 ampere with copper conductors. Busbars are plated over their entire length. 600 volts maximum busbar trunking is fully rated for mounting in either vertical or horizontal positions.

#### Moulded plug-in Opening insulator: Adds insulation and support at plug-in contact area.

2 Joint-Pak connector assembly:

assembly:
Includes common
phase connector on
higher amperage
ratings utilizing more
than one conductor per
phase (plug-in busbar
trunking only.)

## Searth jaw for plug-in unit:

"Blow-on" design similar to phase jaw connection. This "blow-on" design provides maximum strength at contact areas during fault current conditions.

#### 4 Fittings:

Elbows, tees and flanged ends are easily removed and refitted with the use of our Joint-Pak assembly without disturbing adjacent lengths.

## Internal barriers:

Internal barriers are standard on I-LINE II feeder and plug-in busbar trunking. All interior spaces are barriered to protect against heated gases.

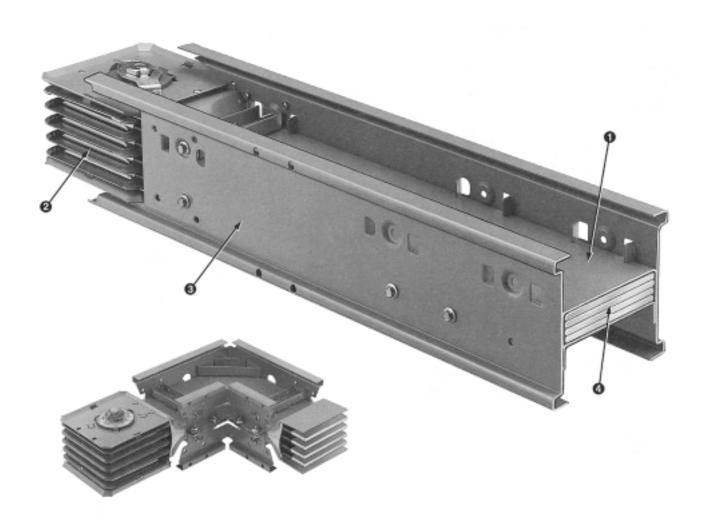
#### **Sandwich Construction:**

I-LINE II plug-in busbar trunking also includes features depicted on page 4 for I-LINE II feeder trunking.

Available in indoor (IP-40/41) or indoor, drip resistant (IP-54/55) construction.

## I-LINE Busbar Trunking System General Description

## I-LINE II Indoor Feeder Busbar Trunking (800A to 5000A)



#### Systems:

TP and N (100% neutral capacity) for AC systems; SP and TP for DC systems.

#### Ratings:

4

From 800 to 4000 ampere with aluminium and from 800 to 5000 ampere with copper conductors. Busbars are plated over their entire length. 600 volts maximum busbar trunking is fully rated for mounting in either vertical or horizontal positions.

#### **1** Earthing conductor:

Provided as standard on I-LINE II system and consists of two 1.6mm thick aluminium busbars. The earthing conductor is formed to serve as the top and bottom of the trunking housing.

## 2 Joint-Pak connector:

Removable for isolation and maintenance of system. The VISI-TITE bolt is included.

#### **3** Common housing:

For I-LINE II plug-in and feeder busbar trunking. Same accessories fit both. Steel side channels and aluminum housing.

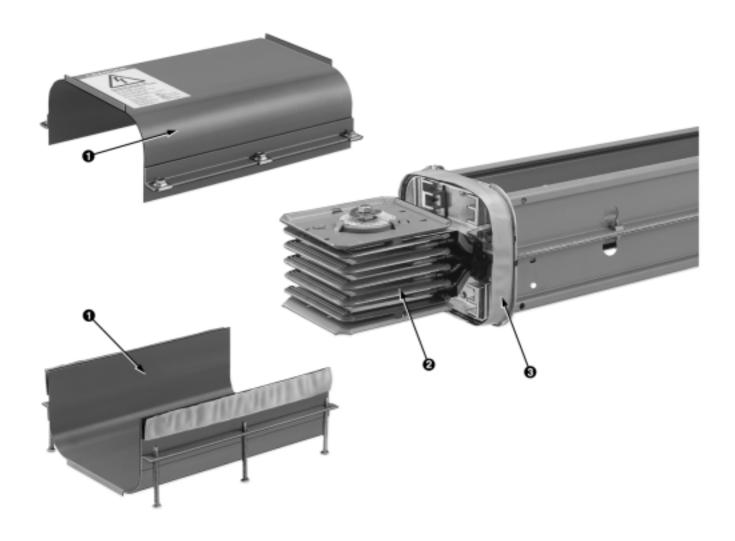
#### 4 Insulation:

Indoor (IP-40/41/54/55/65) busbars are insulated with two full length heat formed layers of Class B 130°C polyester film.

## Electrodeposition:

A paint process provides corrosion-resistant, long-lasting uniform appearance.

## I-LINE II Outdoor Feeder Busbar Trunking (800A to 5000A)



## **1** Joint Covers:

Two piece joint covers with quick-fasten nut for speedy installation of the busbar trunking.

#### **2** EZ Joint-Pak:

The same Joint-Pak used on indoor I-LINE II trunking is continued in outdoor feeder design.

**3 Flanged Collar:** Simple installation of the joint covers is assisted by a smooth flange surface with the joint of Butyl rubber sealant strip factory installed.

Removal of the sealant's protective paper covering and installation of the joint covers with the quick fasten nut, sealing joint from contamination by water.

## **4** Completed Joint:

The assembled joint with all installation activities complete.

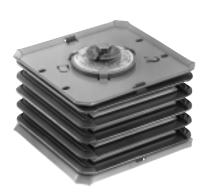
Indoor transition devices are available which directly connect an outdoor (IP-66) device to an indoor (IP-40/41/54/55/ 65) device. (Suffix-IV or



## I-LINE Busbar Trunking System Product Features

#### Simple to install and maintain

Square D pioneered the single bolt joint in 1961 when it introduced I-LINE busbar trunking. Continuing research and improvements have led to our current design. I-LINE busbar trunking system features the following time-saving installation and maintenance features:



#### Joint-Pak

Joint-Pak is standard on I-LINE II system. It allows for quick removal of lengths from the busbar trunking runs for load shifting or maintenance. It also can be removed and relocated on the opposite end of the length for last minute changes.

#### **VISI-TITE** bolt

VISI-TITE bolt is standard on all I-LINE busbar trunking. The double head design, introduced by Square D in 1967 allows the customer to tighten the joint to the proper torque using a standard spanner. The outer head will break off when the correct torque is achieved. When the head breaks off, a red plastic "VISI-TITE" disc drops off, indicating that the joint is properly torqued. A second bolt head remains to allow for joint maintenance or busbar relocation. No need to purchase a replacement bolt. A cupped Belleville washer provides equal pressure across the complete joint contact area to assure proper electrical contact.



#### **Universal fittings**

Universal fittings, which are standard on I-LINE II system, allow feeders and plug-in ducts to be connected without special joint covers. All fittings are also universal allowing simpler installation and maintenance of your system.

#### **Broad range of products**

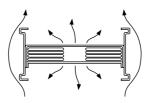
I-LINE busbar trunking system comes in two basic ranges of products:

- I-LINE From 250 to 630 ampere, aluminium or copper conductors.
- I-LINE II From 800 to 4000 ampere with aluminium conductors, and
  - From 800 to 5000 ampere with copper conductors.

I-LINE is provided as a plug-in or feeder system, and I-LINE II is available as a feeder, plug-in or riser plug-in system.

#### Totally enclosed housing - no de-rating necessary

I-LINE busbar trunking systems has a totally enclosed housing design which requires no de-rating, regardless of the mounting position. No longer do you have to worry about preferred mounting positions or de-rating factors. With the I-LINE family of busbar trunking, the 100% current ratings remain constant in any mounting position.



Another advantage of our totally enclosed housing versus ventilated trunking is superior protection from accidental contact with busbars and from accumulation of dirt on exposed busbars through the ventilating screens.

I-LINE busbar trunking is available in an indoor version only. I-LINE II plug-in and feeder are available in indoor and indoor drip-resistant versions. There is also a version of I-LINE II feeder busbar trunking suitable for outdoor use.

#### Harmonics and electrical equipment neutrals

Harmonics and the effects of nonlinear loads on electrical equipment neutral conductors are subjects of concern. Nonlinear load devices, such as variable speed drives, electronic ballast lighting, computers, printers, and fax machines, generate harmonics, and their use is increasing. Harmonic effects are often exaggerated and singled out as the cause for overloading electrical equipment neutrals. The research by Square D indicates that oversized neutrals are an unnecessary expense to most customers. In 480Y/277 systems, neutral currents normally do not exceed 100 percent of the neutral rating. In 208Y/120 systems, neutral overloads occur only in rare, unusual cases. Therefore, oversized neutrals are an unnecessary expense to customers.

Nonlinear loads, such as computers and electronic ballast lighting, create harmonics. In rare cases in 208Y/120 systems, distortion from harmonics may necessitate the use of oversized neutral conductors in applications of 600 amperes and below. In 480Y/277 systems, oversized neutrals are not required.

For more information on this subject, please order the Square D document no. 0104ED9501, *Neutral Currents in Three Phase Wye Systems*, by R. Arthur and R. A. Shanahan, P.E. or 0104PD9501, *Harmonics and Electrical Equipment Neutrals*.

## Internal smoke/gas barriers

Continuous air spaces inside I-LINE busbar trunking housing are closed off with special barriers to help prevent the spread of smoke and gases in the event of a fire in the area of the busbar trunking installation. This standard internal barrier allows busbar trunking to extend through walls or floors without creating open space for a "chimney effect" fire path.

## High grade conducting and insulation material

I-LINE busbar trunking system uses either high grade tin plated aluminium or silver flashed copper for their conducting material. The conductors are plated over their entire surface for better corrosion protection. All busbars are insulated using Class B 130° C vendor certified polyester film (Mylar) for long insulation life. I-LINE busbar trunking insulation consists of two layers of 7.5 mil heat formed polyester film surrounding each busbar. I-LINE II busbar trunking uses the same two layers of polyester film to insulate the busbars in indoor trunking.

#### Short circuit strength and testing

I-LINE busbar trunking design gives high short circuit strength suitable for today's industrial and commercial electrical systems. The system is certified at a 3 cycle rating by Underwriters Laboratories and 1 sec/3sec certification by ASTA.

Square D tests its products frequently at its own testing laboratory in Cedar Rapids, Iowa, USA, to ensure the high standards of quality and performance that I-LINE busbar trunking system has come to symbolize.

#### **Degree of Protection**

Square D offers the I-LINE II busbar trunking system in a variety of housing constructions to meet your application and needs. Choose from the following styles:

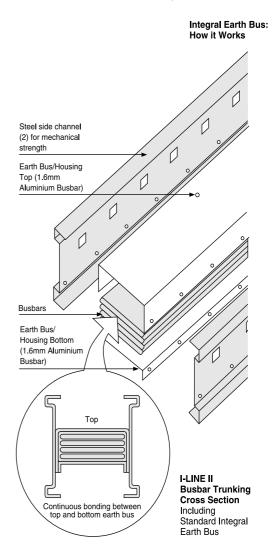
Location	Type of Trunking	Degree of Protection
Indoor	Feeder and Plug-in	IP-40/41/54/55
Indoor	Feeder	IP-65
Outdoor	Feeder	IP-66

#### Integral earthing conductor

I-LINE busbar trunking system is available with a 50% capacity integral aluminium earthing conductor as an option. The conductor is unique in that it is a part of the housing itself, which provides an effective path to earth for high level ground faults.

I-LINE II is furnished with the integral earthing bus as standard. The earthing bus is the bus housing itself and completely encloses the bus sandwich. Like I-LINE, it is rated at 50% capacity.

Square D believes an earthing conductor is extremely important, to provide the maximum amount of protection for a distribution system in today's ever expanding electrical systems. With our design, we have given the maximum amount of protection in an economical package.



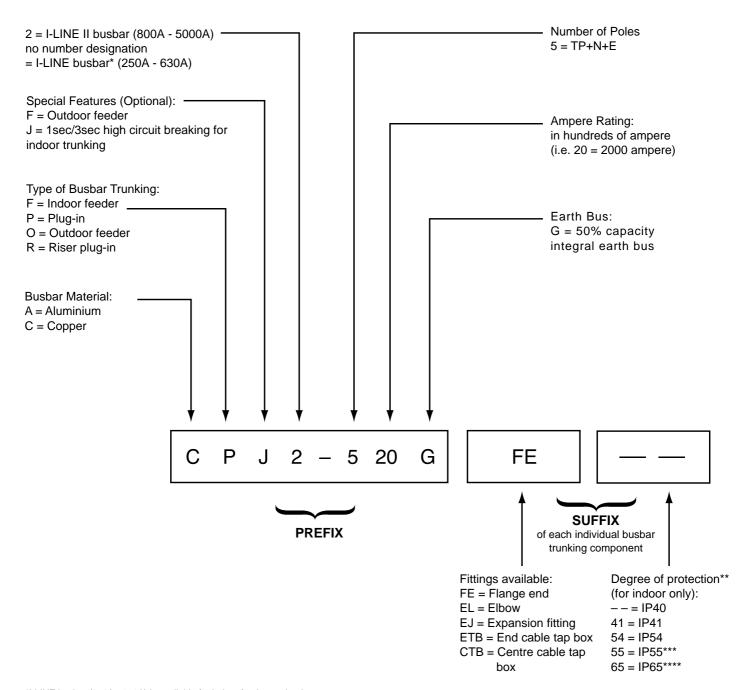
## I-LINE Busbar Trunking System Catalogue Numbering System

#### I-LINE Busbar Trunking

Catalogue numbers are composed of 2 basics parts – the PREFIX (as below) plus the SUFFIX of each individual busbar trunking component.

The PREFIX contains necessary trunking information except individual component descriptive details which are defined by the SUFFIX. The catalogue number PREFIX will generally remain unchanged throughout a trunking system while the SUFFIX will vary with each individual length or fitting selected. A table of the standard SUFFIX designations can be found on page 28.

A few devices, such as hangers and wall flanges, do not follow the exact pattern described above. For these exceptions, a more complete listing of device catalogue numbers is shown with the individual device drawing(s) beginning on page 25.



<sup>\*</sup>I-LINE busbar (250A - 630A) is available for indoor feeder or plug-in system

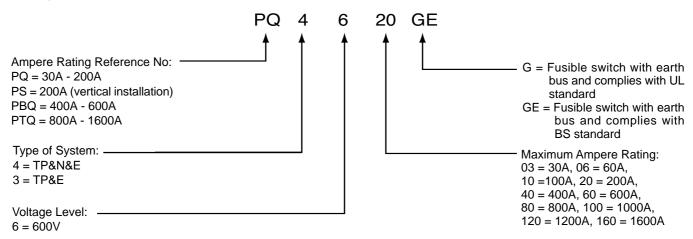
<sup>\*\*</sup> Not applicable in I-LINE busway (250A - 630A)

<sup>\*\*\*</sup> IP55 available for feeder system only

<sup>\*\*\*\*</sup> IP65 available for feeder system only

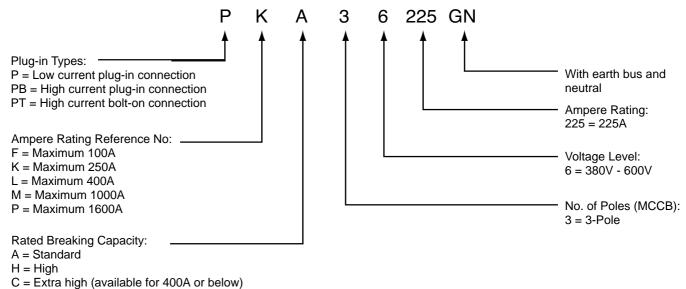
### Plug-in Unit

#### A. Plug-in unit with BS88 fusible switch



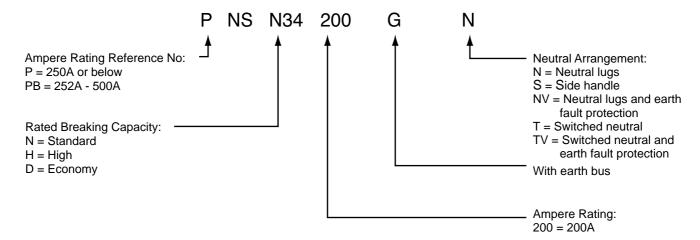
Note: Fuse unit is not included in the plug-in unit

## B. Plug-in unit with Square D MCCB



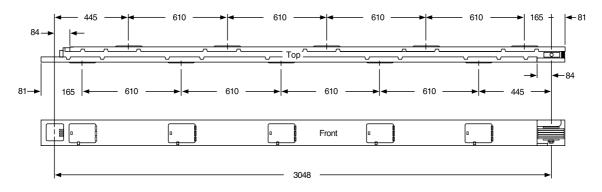
#### C. Plug-in unit with Merlin Gerin MCCB

I = Limited



## I-LINE Busbar Trunking Physical Data

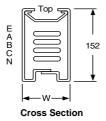
## I-LINE busbar trunking (250A-630A)



Straight Lengths

Standard Lengths — Feet	10	6	
Standard Lengths — Meters	3.05	1.83	
Number of Plug-In Openings	10	6	

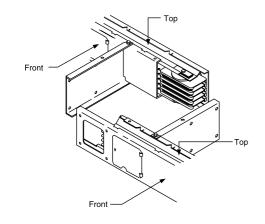




## Content and weight

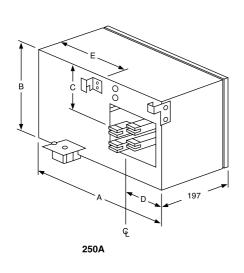
Aluminum				
Ampere Rating	Width	Busbars Per Phase	Weights	Basic Catalogue Number
(A)	W		4-Pole	· · · · · · · · · · · · · · · · · · ·
	mm	mm	kg/m	TP+N+E
250	57	One – 6 x 24	9.5	AP502G
400	86	One – 6 x 51	1.8	AP504G
630	121	One – 6 x 86	15.8	AP506G

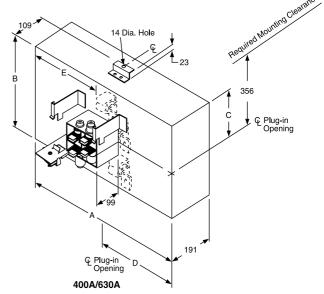
Ampere Rating (A)	Width W	Busbars Per Phase	Weights 4-Pole	Basic Catalogue Number	
(* ')	mm	mm	kg/m	TP+N+E	
250	57	One – 6 x 24	10.4	CP502G	
400	86	One – 6 x 51	20.7	CP504G	
630	86	One – 6 x 51	20.7	CP506G	



Front All Dimensions In Millimetres

Joint Detail

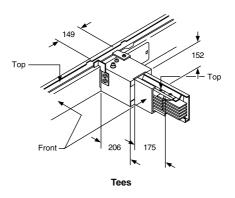




**Cable Tap Boxes** 

### Cable tap boxes

Ampere Rating (A)	А	В	С	D	Е	Lugs per Phase and Neutral	Earth Lug	Catalogue Number (with Earth Bus)
	mm	mm	mm	mm	mm	mm²	$mm^2$	TP+N+E
250	416	216	102	84	267	1-150	1-50	PTB-502G
400	659	468	248	191	356	2-240	1-240	PBTB-506G
630	659	468	248	191	356	2-240	1-240	PBTB-506G

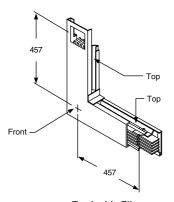


### Tees

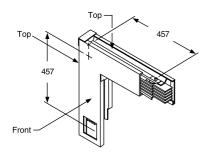
1662			
Ampere Rating (Tee Leg) (A)		Catalogue Number (With Earth Bus)	
Aluminum	Copper	TP+N+E	
250	250	PTT-2-4WG	
400	400	PTT-3-4WG	
_	630	PTT-3-4WG	
630	_	PTT-4-4WG	

Note: Accessories such as cable tap boxes, tees and other accessories are listed by a separate catalogue number. These should be ordered in addition to the busbar trunking.

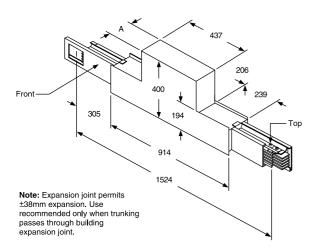
## I-LINE Busbar Trunking Physical Data



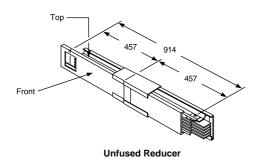
Top Inside Elbow Catalogue Number Suffix – LTI

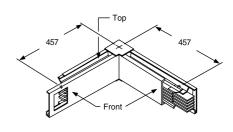


Top Outside Elbow Catalogue Number Suffix – LTO

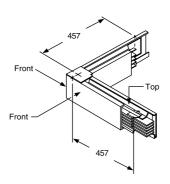


Expansion Fitting Catalogue Number Suffix – EJ





Front Inside Elbow Catalogue Number Suffix – LFI



Front Inside Elbow Catalogue Number Suffix – LFO

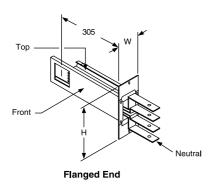
## **Expansion Fitting**

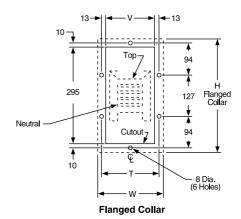
Copper	mm
250	114
400	141
630	141
_	176
	250 400

#### **Unfused Reducer**

Bolt End	Catalogue Number Suffix		
Ampere	Slot End Ampere Rating		
Rating (A)	250	400	630
250	_	_	_
400	-R02	_	_
630	-R02	-R04 <b>▲</b>	_

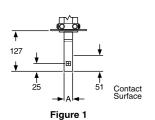
<sup>▲</sup> Aluminium busbar trunking only.

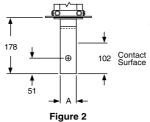




Flanged End Cutout and Drilling Template
Catalogue Number Suffix – FES 12 (Slot end) – FEB 12 (Bolt end)

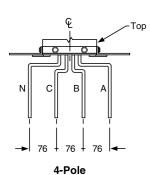
Ampere Rating (A)		Н	W	V	Т
Aluminium	Copper	mm	mm	mm	mm
250	250	340	113	62	87
400	400	340	140	89	114
_	630	340	140	89	114
630	_	340	175	124	149

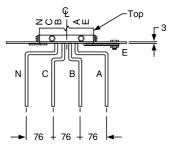


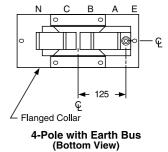


Copper	Figure	mm
250	1	24
400	2	51
630	2	51
_	2	86
	250 400	250 1 400 2 630 2

Flanged End Details







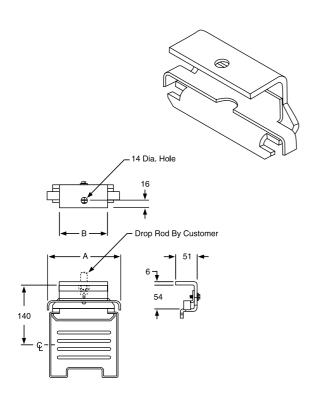
4-Pole with Earth Bus

## Flexible Connector

I TEXIDIE COTTILEC	loi	
Ampere Rating (A)	Catalogue No.	Piece required per phase & neutral
250	FLEX502	1
400	FLEX504	1
630	FLEX506	2

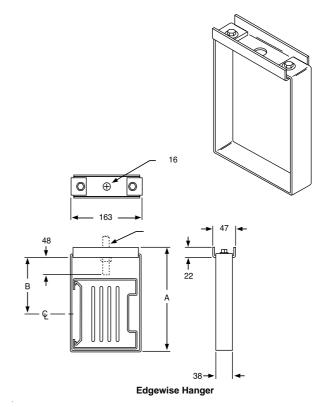
Note: Please refer to Page 21 for dimension

## I-LINE Busbar Trunking Physical Data



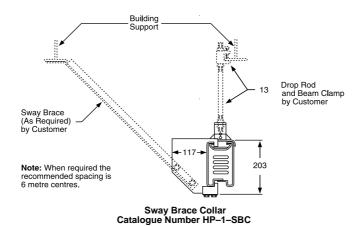


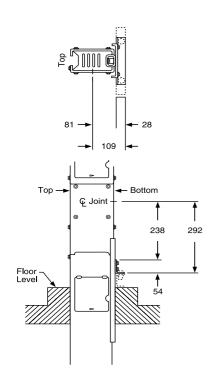
Ampere Rating (A)		Α	В	Catalogue
Aluminium	Aluminium Copper		mm	Number
250	250	67	27	HP-2-F
400	400	94	36	HP-3-F
_	630	94	36	HP-3-F
630	_	129	72	HP-5-F

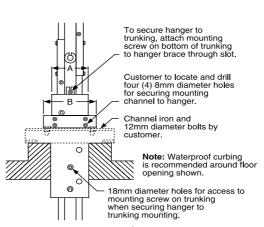


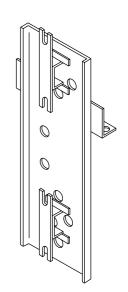
Ampere Rating (A)		Α	В	Catalogue
Aluminium	luminium Copper		mm	Number
250	250	160	91	HP-3-E
400	400	160	91	HP-3-E
_	630	160	91	HP-3-E
630	_	195	108	HP-5-E

Hanger spacing on 1.5 metre centres maximum when mounted edgewise.





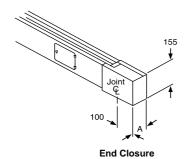




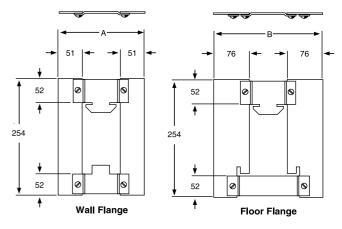
#### **Vertical Hanger**

Ampere Rating	(A)	А	В	Catalogue
Aluminium	Copper	mm	mm	Number
250	250	109	166	HP-2-V
400	400	135	192	HP-3-V
_	630	135	192	HP-3-V
630	_	170	228	HP-4-V

**Note:** Dimensions shown apply to 1829mm and 3048mm straight lengths only. Consult factory for dimensions that apply for fractional straight lengths.



Ampere Rating (A	)	Α	Catalogue
Aluminium	Copper	mm	Number
250	250	68	ACP - 2 -EC
400	400	89	ACP - 3 -EC
_	630	89	ACP - 3 -EC
630	_	124	ACP - 4 -EC

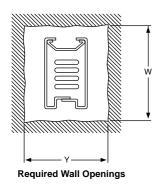


#### Wall and floor flange

Wall alla 11001 Ila	1190						
Ampere Rating (A)		Α	В	Catalogue Number			
Aluminium	Copper	mm	mm	Wall flange	Floor Flange		
250	250	160	212	ACP-2-WF	ACP-2-FF		
400	400	186	239	ACP-3-WF	ACP-3-FF		
_	630	186	239	ACP-3-WF	ACP-3-FF		
630	_	221	274	ACP-4-WF	ACP-4-FF		

Note: To be used only as a barrier to cover hole in wall/floor where busbar trunking penetrates. Not to be used as a trunking support.

## I-LINE Busbar Trunking Electrical Data



Ampere Ration	ng (A)	Straig	ht	Flan	ged	Flat	Elbow V	Wall Thic	kness				Edge	Elbov	v Wall	Thick	ness		
		Length	h	End	S		100	200	300	400	500	600		100	200	300	400	500	600
Aluminium	Copper	Y*	W	Y*	W	W			Y*				Y*			W			
250	250	152		152			203	254	305	356	406	457	152						
400	400	178	203	178	381	203	229	279	330	381	431	483	178	330	381	431	483	533	584
_	630	178		178			229	279	330	381	431	483	178						
630	_	203		203			279	330	381	431	483	533	203						

<sup>\*</sup> Dimension allows clearance for vertical hanger. Subtract 25 mm for horizontal mounted busbar trunking

50 Hz Impedance Values

Line to Neu	tral (Millioh	ıms per Metre)				
	Alun	ninium	Copper			
Ampere Rating (A)	R	X <sub>50</sub>	R	X <sub>50</sub>		
250	.222	.086	.123	.095		
400	.113	.066	.064	.058		
630	.062	.040	.064	.058		

#### **Resistance Values for Aluminium Integral Earth Bus**

Ampere Rating (A) DC Resistance (Milliohms per Metre)									
TP+E & TP+E+N	Aluminium Phase Conductors	Copper Phase Conductors							
250	.266	.266							
400	.210	.210							
630	.174	.210							

Resistance values for the Integral Earth Bus are at a 20°C operating temperature.

50 Hz Voltage drop average TP line-to-line voltage drop in volts per metre

Aluminium busbar trunking									Copper Busbar trunking						
Ampere Rating	Power	Factor						Power F	actor						
(A)	100	90	80	70	50	30	20	100	90	80	70	50	30	20	
250	.087	.093	.090	.085	.073	.058	.051	.048	.060	.061	.060	.056	.050	.046	
400	.044	.051	.051	.049	.044	.038	.034	.025	.033	.034	.034	.032	.029	.027	
630	.024	.029	.029	.028	.026	.022	.020	.025	.033	.034	.034	.032	.029	.027	

Notes: 1. For balanced 3-Phase Line-to-Neutral voltage drop, multiply values from table by 0.577.

2. For other than rated current, multiply values from table by Actual Current.

Rated Current

3. For different lengths, multiply values from table by Actual Length (metres).

30.5 metres

Note: Short Circuit Ratings for I-LINE busbar trucking are

listed on Page 29 of this manual.