



E+I ENGINEERING GROUP

HIGH POWERBAR

ALUMINIUM



PowerBar

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E+I Engineering's High Powerbar (HPB) is a 1000 Volt totally encased, non-ventilated, low impedance sandwich construction. The range is available from 800A - 5000A with multiple bar configurations to suit project requirements.

The busbar is housed in an aluminium casing which acts as an earth. Ingress protection ratings are available from IP55 - IP67.

Features:

- Aluminium conductor's mill, with tin or silver coated finish
- Joint pack construction with double headed shear nuts for quick installation
- Up to 5 tap off points per 3m length
- All tap offs have mechanical/ electrical interlocks with an 'earth first, break last' safety feature
- Pressed out tags for tap off connections

STANDARDS

Standards

The HPB range is fully ASTA Tested Certified and is CE approved. It is manufactured in a certified management system environment where Quality ISO 9001, Safety OHSAS 18001 and Environmental ISO 14001 standards are applied to all aspects of the manufacturing and installation processes. It is manufactured in accordance with IEC61439-1 and IEC61439-6.

Type Tests

Verification of:

- 10.2 Strength of Materials and Parts
- 10.3 Degree of Protection of Enclosures
- 10.4 Clearance and Creepage Distances
- 10.5 Protection against Electric Shock and Integrity of Protective Circuits
- 10.9 Dielectric Properties
- 10.10 Temperature Rise Limits
- 10.11 Short-circuit Withstand Strength

ASTA Certificates

E+I Engineering completed extensive testing at ASTA and KEMA accredited laboratories to ensure the product we supply meets the international requirements.

Seismic Compliance

The product has a qualification level - high in accordance to IEEE standard 693-2005.

All certificates available on request



OHSAS 18001:2007
OHS 533652



ISO 9001:2015
FM 12680



ISO 14001:2015
No: EMS 566536



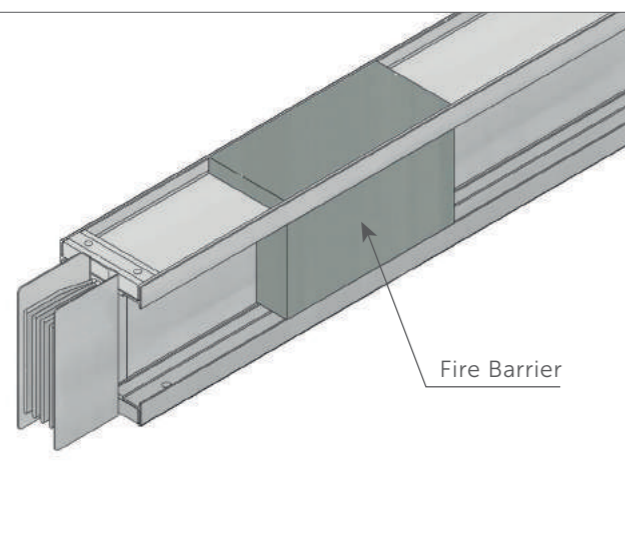
TECHNICAL FEATURES

- High Powerbar is constructed from high density 55% conductivity aluminium
- The low impedance sandwich design:
 - Improves heat dissipation
 - Improves short circuit rating
 - Reduces voltage drop/ impedance compared to cable
 - Removes potential pathways for flame, smoke and gas to pass through the busbar system
- E-I Engineering's patented process of pressing tabs into the conductor to allow the connection of tap off units ensures that no welding is necessary and protects the integrity of the conductor
- HPB is constructed with an all-aluminium housing which offers numerous advantages:
 - At 2.72g/cm³ aluminium is a very light metal making the product cheaper to transport and easier to install
 - It is a non-magnetic metal with much lower reactivity than steel. Aluminium is also naturally highly corrosive resistant making the product more durable and easier to maintain
 - Aluminium is an excellent heat and conductivity conductor so the housing can be used as an earth along the length of the busbar
- Powerbar offer a 50% or 100% fully isolated earth for systems where earth isolation is required. Continuity is maintained through the joint pack
- A fully rated 200% neutral option is available for busbar systems with non-linear loads. The additional neutral capacity prevents overloading caused by zero sequence harmonic currents
- Powerbar offer a fully certified fire wall penetration barrier for either a four hour or two hour rating

Phase Configurations

Configuration	Phases	Neutral	Earth
TP	100%	0%	Case
TP/N	100%	100%	Case
TP/E	100%	0%	100% or 50%
TP/NE	100%	100%	100% or 50%
TP/DN	100%	200%	Case

Note: Case refers to the Aluminium casing been used as an earth.



STRAIGHT LENGTHS

Straight Lengths

Straight lengths can be supplied at any length between 600mm - 3000mm.

Feeder Lengths

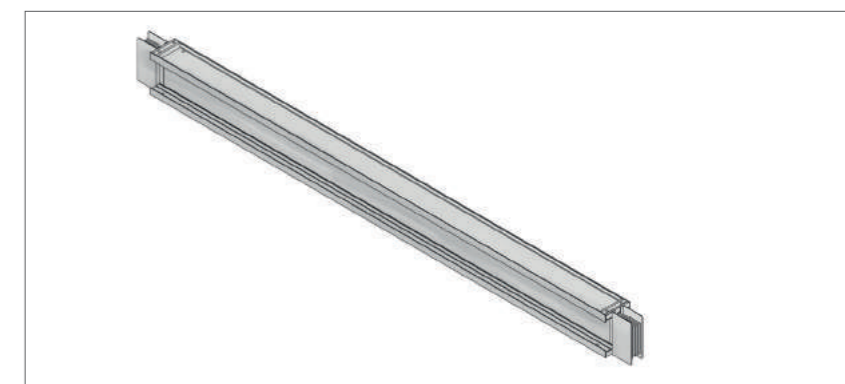
Feeder lengths account for the bulk of a busbar run.

Distribution Lengths

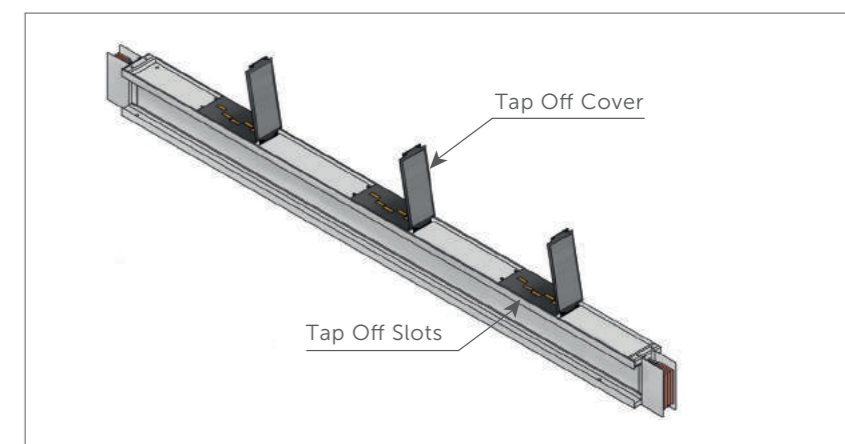
Distribution lengths allow tap off units to be plugged into the busbar run.

The tap off slot outlet and cover are made from a durable, high strength, Class B, 130°C insulation material.

The tap off slot cover prevents access to the contacts behind the cover and protects it from the entry of dirt, dust or moisture. Tap off units are IP55 as standard but higher levels up to IP67 can be achieved upon request.



Feeder Length



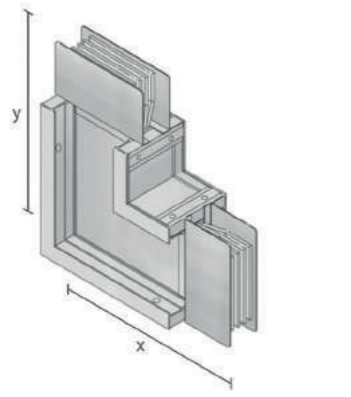
Distribution Length

The different types of build arrangement depending on rating of the required busbar

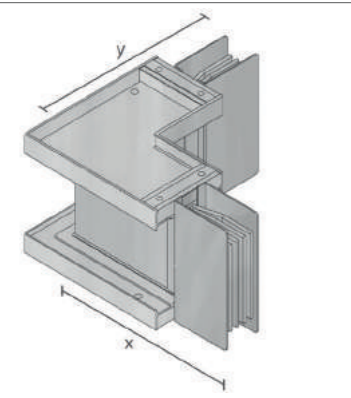
Busbar Rating (Amps)	Construction Type	Busbar Size (mm)	
		Height	Width
800A	Single	128mm	148mm
900A	Single	118mm	148mm
1000A	Single	138mm	148mm
1250A	Single	168mm	148mm
1400A	Single	183mm	148mm
1600A	Single	203mm	148mm
2000A	Single	258mm	148mm
2500A	Double	361mm	148mm
3200A	Double	431mm	148mm
4000A	Double	541mm	148mm
5000A	Triple	704mm	148mm

Note: The maximum and minimum sizes we recommend are not the limits of what we can produce, but a guideline to help you choose the correct product. Dimensions are taken from the centre of the joint.

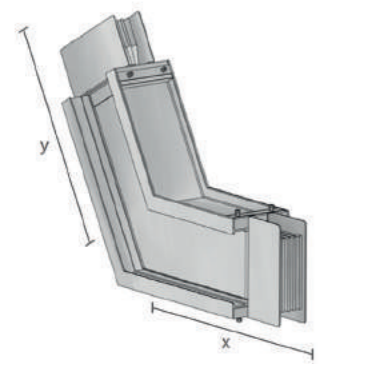
ELBOWS



Flatwise Elbows



Edgewise Elbows



Custom Elbows

Flatwise and Edgewise Elbows

Flatwise and edgewise elbows are used to make 90° changes in the direction of the busbar system. E+I Engineering can also manufacture specially angled elbows for both flatwise and edgewise products.

Flatwise Elbow (Up or Down)

Ratings (Amps)	Minimum Leg Size		Standard Leg Size		Maximum Leg Size	
	X	Y	X	Y	X	Y
800A	248mm	248mm	350mm	350mm	750mm	750mm
900A	243mm	243mm	350mm	350mm	750mm	750mm
1000A	253mm	253mm	350mm	350mm	750mm	750mm
1250A	268mm	268mm	350mm	350mm	750mm	750mm
1400A	275mm	275mm	350mm	350mm	750mm	750mm
1600A	285mm	285mm	350mm	350mm	750mm	750mm
2000A	313mm	313mm	350mm	350mm	750mm	750mm
2500A	364mm	364mm	350mm	350mm	750mm	750mm
3200A	399mm	399mm	500mm	500mm	750mm	750mm
4000A	454mm	454mm	500mm	500mm	750mm	750mm
5000A	536mm	536mm	600mm	600mm	750mm	750mm

Edgewise Elbow (Left or Right)

Ratings (Amps)	Minimum Leg Size		Standard Leg Size		Maximum Leg Size	
	X	Y	X	Y	X	Y
800A, 900A, 1000A, 1250A, 1400A, 1600A, 2000A, 2500A, 3200A, 4000A, 5000A	257mm	257mm	350mm	350mm	600mm	600mm

Offset Sections

An offset is used to avoid any obstacles eg. pipes or steel columns and to conform to the structure of the building.

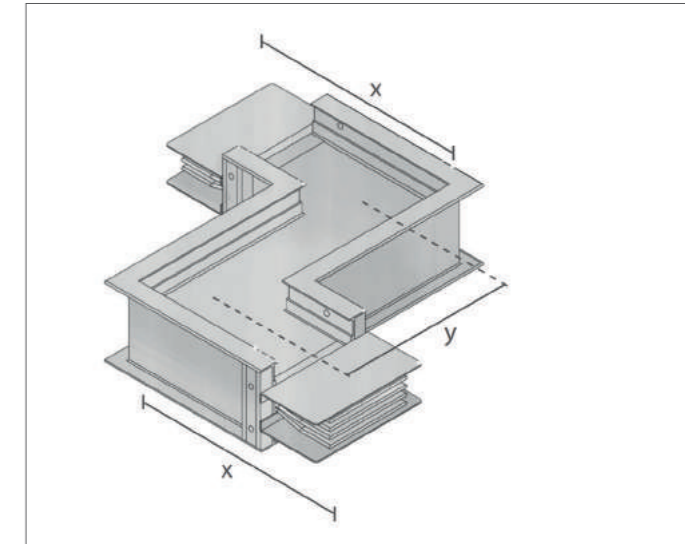
Flatwise Offset (Up or Down)

Ratings (Amps)	Minimum Leg Size		Maximum Leg Size	
	X	Y	X	Y
800A	248mm	50mm	650mm	496mm
900A	243mm	50mm	650mm	486mm
1000A	253mm	50mm	650mm	506mm
1250A	268mm	50mm	650mm	536mm
1400A	275mm	50mm	650mm	550mm
1600A	285mm	50mm	650mm	570mm
2000A	313mm	50mm	650mm	626mm
2500A	364mm	50mm	650mm	728mm
3200A	399mm	50mm	650mm	798mm
4000A	454mm	50mm	650mm	908mm
5000A	536mm	50mm	650mm	1072mm

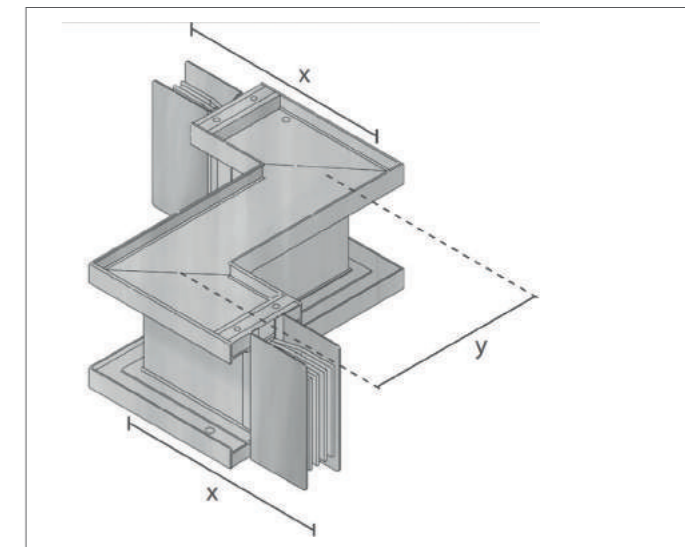
Edgewise Offset (Left or Right)

Ratings (Amps)	Minimum Leg Size		Maximum Leg Size	
	X	Y	X	Y
800A, 900A, 1000A, 1250A, 1400A, 1600A, 2000A, 2500A, 3200A, 4000A, 5000A	257mm	80mm	600mm	513mm

OFFSETS

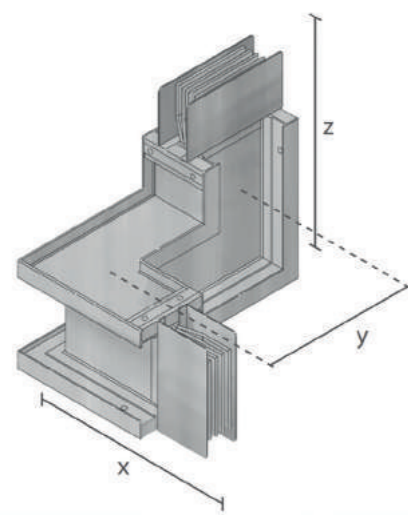


Flatwise Offset

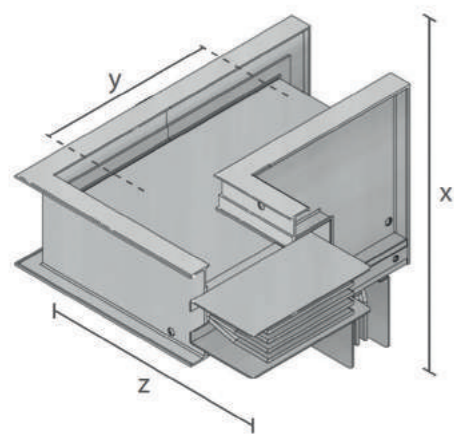


Edgewise Offset

COMBINATIONS



Edge Right Flatwise Up



Flatwise Up Edgewise Right

Combination Elbows

Combination elbows are used to conform to the building's structure and to change the direction of the busbar within a confined space.

Ratings (Amps)	Minimum Leg Size		
	X (Edgewise side)	Y	Z (Flatwise side)
800A	255mm	188mm	248mm
900A	257mm	183mm	243mm
1000A	257mm	193mm	253mm
1250A	257mm	208mm	268mm
1400A	257mm	215mm	275mm
1600A	257mm	225mm	285mm
2000A	257mm	253mm	313mm
2500A	257mm	304mm	364mm
3200A	257mm	339mm	399mm
4000A	257mm	394mm	454mm
5000A	257mm	476mm	536mm

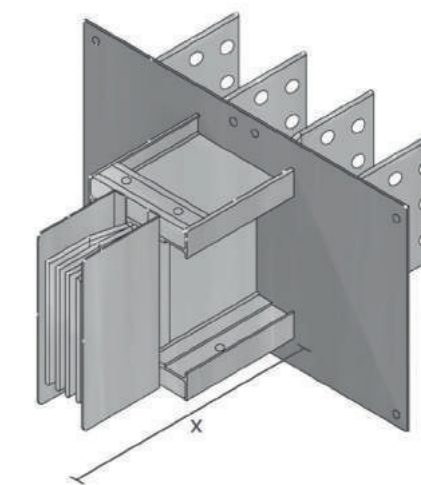
Ratings (Amps)	Maximum Leg Size		
	X (Edgewise side)	Y	Z (Flatwise side)
800A	600mm	503mm	750mm
900A	600mm	498mm	750mm
1000A	600mm	508mm	750mm
1250A	600mm	523mm	750mm
1400A	600mm	530mm	750mm
1600A	600mm	540mm	750mm
2000A	600mm	568mm	750mm
2500A	600mm	619mm	750mm
3200A	600mm	654mm	750mm
4000A	600mm	709mm	750mm
5000A	600mm	791mm	750mm

Flange Connections

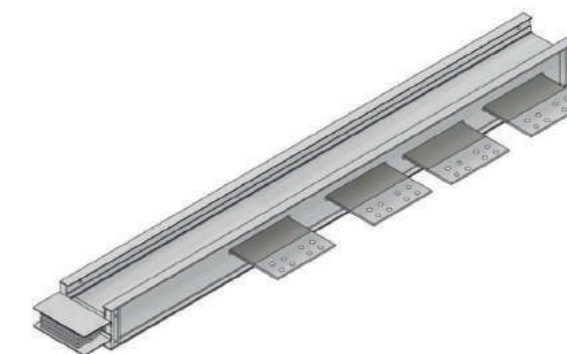
Flange connections provide a direct connection to low voltage switchgear, transformer enclosures and other electrical equipment. Standard flanges can be offset to the left or right of the section as required.

Panel Flange

Ratings (Amps)	Minimum Leg Size	
	X	Y
800A, 900A, 1000A, 1250A, 1400A, 1600A, 2000A, 2500A, 3200A, 4000A, 5000A	220mm	840mm



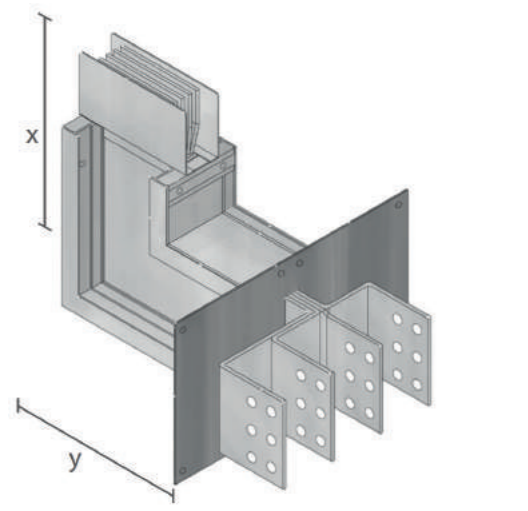
Panel Flange



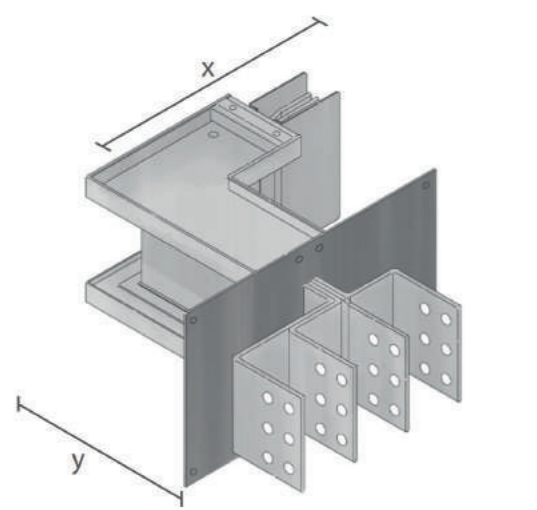
Parallel Flange

FLANGES

FLANGES



Flatwise Elbow Flange



Edgewise Elbow Flange

Combination Flange

A flange combination elbow is used when the minimum leg lengths for either the standard elbow or the standard flange cannot be met.

Flange/Elbows (Flatwise)

Ratings (Amps)	Minimum Leg Size		Maximum Leg Size	
	X	Y	X	Y
800A	248mm	115mm	750mm	488mm
900A	243mm	110mm	750mm	483mm
1000A	253mm	120mm	750mm	493mm
1250A	268mm	135mm	750mm	508mm
1400A	275mm	143mm	750mm	515mm
1600A	285mm	153mm	750mm	525mm
2000A	313mm	180mm	750mm	553mm
2500A	364mm	232mm	750mm	604mm
3200A	399mm	267mm	750mm	639mm
4000A	454mm	322mm	750mm	694mm
5000A	536mm	403mm	750mm	776mm

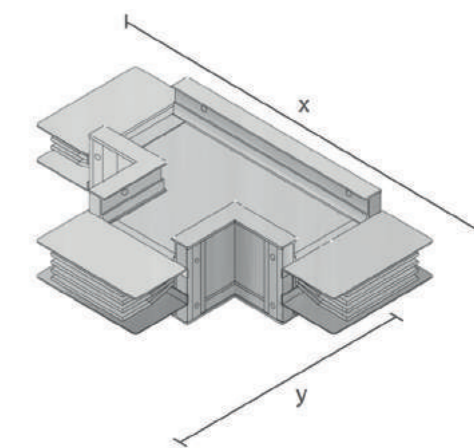
Flange/Elbows (Edgewise)

Ratings (Amps)	Minimum Leg Size		Maximum Leg Size	
	X	Y	X	Y
800A, 900A, 1000A, 1250A, 1400A, 1600A, 2000A, 2500A, 3200A, 4000A, 5000A	257mm	124mm	600mm	495mm

SPECIALS

Flatwise Tee

Flatwise tee's are used to split one busbar run into two runs going in different directions. This reduces the amount of space needed when supplying two different parts of a building with power.



Flatwise Tee

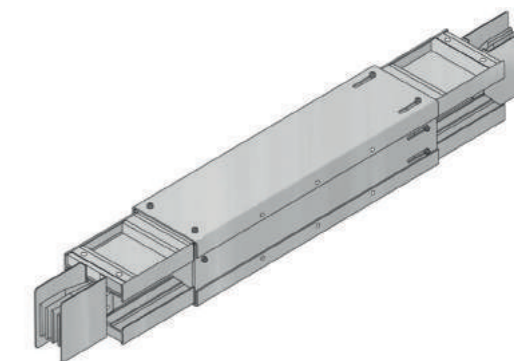
Flatwise Tee

Ratings (Amps)	Minimum Leg Size		Standard Leg Size		Maximum Leg Size	
	X	Y	X	Y	X	Y
800A	496mm	248mm	700mm	350mm	1500mm	650mm
900A	486mm	243mm	700mm	350mm	1500mm	650mm
1000A	506mm	253mm	700mm	350mm	1500mm	650mm
1250A	536mm	268mm	700mm	350mm	1500mm	650mm
1400A	550mm	275mm	700mm	350mm	1500mm	650mm
1600A	570mm	285mm	700mm	350mm	1500mm	650mm
2000A	626mm	313mm	700mm	350mm	1500mm	650mm
2500A	728mm	364mm	700mm	350mm	1500mm	650mm
3200A	798mm	399mm	1000mm	500mm	1500mm	650mm
4000A	908mm	454mm	1000mm	500mm	1500mm	650mm
5000A	1072mm	536mm	1200mm	600mm	1500mm	650mm

Expansion Units

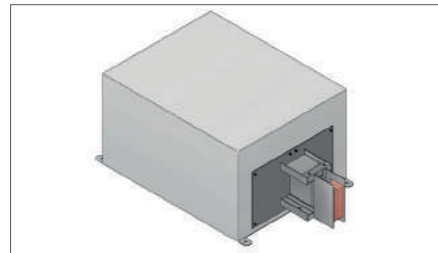
Expansion units are used to accommodate the expansion and contraction of a busbar system as well as allow for building movement. They allow for a 40mm movement along the length of the busbar.

Expansion units are recommended when a straight busbar run exceeds 60m. They are installed in the centre of long busbar runs, or at the beginning of riser runs to minimise the stress on the lower section of the busbar run.

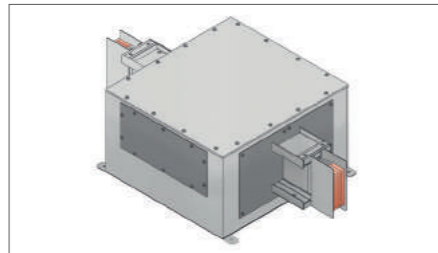


Expansion Unit

FEED UNITS & END CAPS



End Feed Units



Centre Feed Units

Cable Feed Units

End feed units are used on the ends of busbar risers which are cable fed. They can be on top or the bottom of the busbar. Centre feed units are used in the middle of busbar risers which are cable fed.

The size of end feed required depends on a number of factors:

- rating of busbar
- size of cable
- number of cables
- use of a protective device or isolator

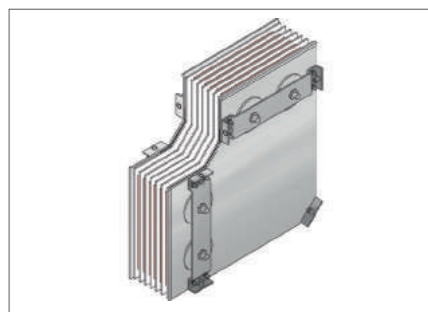
End Caps

End caps are used to safely cap off the end of a busbar run. The end cap units are factory fitted but can be easily removed to allow for the extension of the system.

JOINT PACKS



Joint Packs



Flatwise Elbow Joint Packs

Joint Packs

The joint pack is a compression joint design which uses a specially designed Belleville washer to distribute the pressure evenly over the joint pack. Joint packs are used to connect all the components in a busbar system together. The earth is maintained through the joint by both the joint pack cover and the earth side plate. The joint pack is supplied in specific sizes depending on the rating of busbar required.

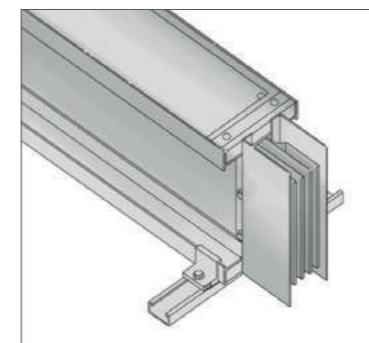
Flatwise Elbow Joint Packs

Flatwise elbow joint packs can be used to make 90° changes in the direction of the busbar system.

INSTALLATION

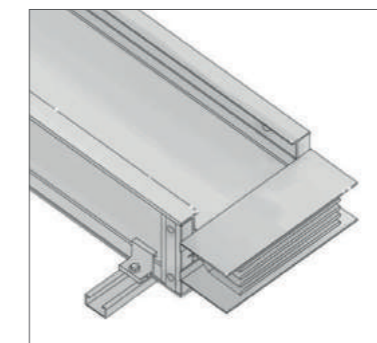
The modular design of HPB allows it to be installed flat or on its edge. The installation is determined by:

- Busbar route
- Type of installation
- Available space
- Size of busbar



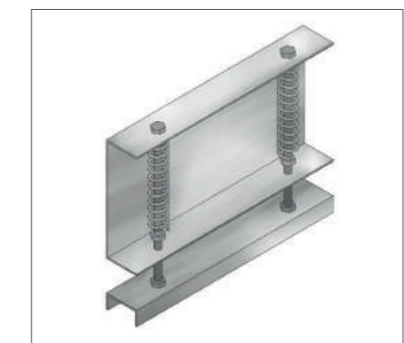
Edge Installation

Edge installation is the preferred method of installation for a smaller rated busbar system. It is also the main method used to install distribution busbar in building risers as tap off units can be connected easily.



Flat Installation

Flat installation is the preferred method of installation for a higher rated, multistack busbar system. When installed on its flat all busbar rating has a height of 145mm.



Spring Hanger


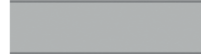

Spring hangers are used to support vertical busbar runs on each floor. They compensate for building movement and thermal expansion.

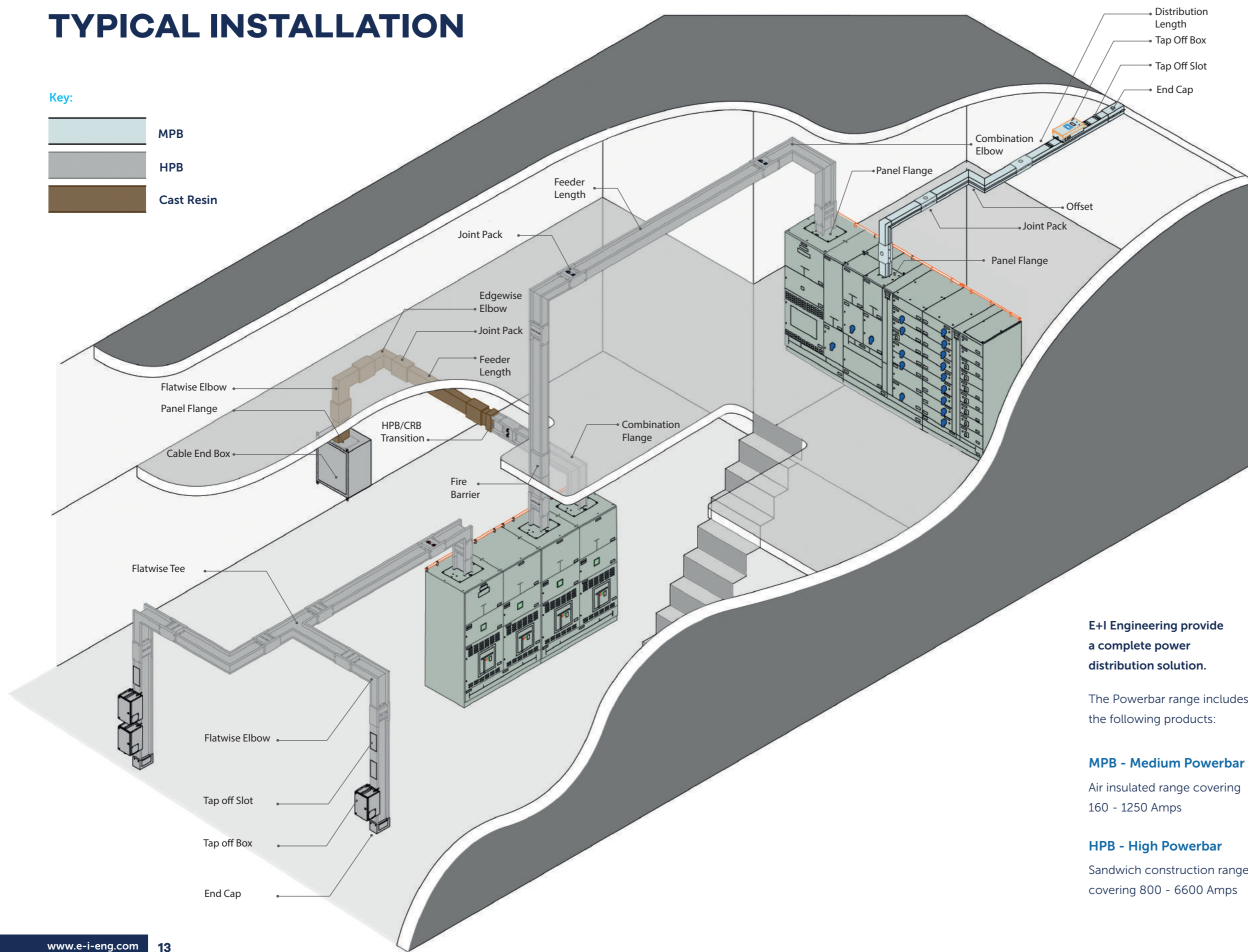
Special Sections

E+I Engineering manufacture a variety of more specialised units and components to meet unique system requirements. These include: edgewise tee's, flatwise cross, step up/ step down reducers, phase rotation units, in-line disconnect cubicles, in-line tap off units, custom built busbar connection units.

TYPICAL INSTALLATION

Key:

-  MPB
-  HPB
-  Cast Resin



E-I Engineering provide a complete power distribution solution.

The Powerbar range includes the following products:

MPB - Medium Powerbar

Air insulated range covering 160 - 1250 Amps

HPB - High Powerbar

Sandwich construction range covering 800 - 6600 Amps

CRB - Cast Resin Powerbar

IP68 rate polymer concrete product for use in extreme conditions covering 800 - 6300 Amps. CRPB can be directly connected to HPB through a special jointing system.

All products are available with both copper and aluminium conductors.

TECHNICAL DATA

Technical Data						
Rated Current (A)	800	900	1000	1250	1400	1600
Rated Operational Voltage (V)	1000	1000	1000	1000	1000	1000
Rated Insulation Voltage (V)	1000	1000	1000	1000	1000	1000
Short Circuit						
1 Second (kA rms)	25	32.5	50	65	65	65
Peak Value (kA)	55	71.5	105	143	143	143
Phase Conductor						
Cross Sectional Area (mm ²)	328	360	480	660	750	870
Neutral Conductor						
Cross Sectional Area (mm ²)	328	360	480	660	750	870
Isolated Earth Conductor						
100% Earth Cross Sectional Area (mm ²)	328	360	480	660	750	870
50% Earth Cross Sectional Area (mm ²)	210	180	240	330	375	435
Overall Dimensions						
Height x Width of 4 Bar System (mm)	130 x 145	118 x 148	140 x 145	170 x 145	185 x 145	205 x 145
Weight						
Weight of 4 Bar System (kg/m)	8.7	9.2	10.4	12.8	14	15.6
Resistance						
Resistance (mΩ/m) at 20°C	0.0753	0.0191	0.0659	0.0504	0.0444	0.0382
Resistance (mΩ/m) at 80°C	0.0946	0.024	0.0829	0.0633	0.0557	0.0481
Reactance						
Reactance (mΩ/m) at 50Hz	0.0157	0.0044	0.0141	0.0111	0.0099	0.0087
Impedance						
Impedance (mΩ/m) at 80°C	0.077	0.036	0.0675	0.0515	0.0458	0.0392
Voltage Drop at Full Load 50Hz						
Power Factor = 0.7 (V/m) at 80°C	0.107	0.111	0.118	0.113	0.112	0.111
Power Factor = 0.8 (V/m) at 80°C	0.118	0.121	0.129	0.124	0.123	0.121
Power Factor = 0.9 (V/m) at 80°C	0.128	0.130	0.140	0.134	0.132	0.130
Power Factor = 1.0 (V/m) at 80°C	0.131	0.133	0.144	0.137	0.135	0.133
Voltage Drop Full Load 60Hz						
Power Factor = 0.7 (V/m) at 80°C	0.111	0.112	0.122	0.117	0.115	0.114
Power Factor = 0.8 (V/m) at 80°C	0.121	0.122	0.133	0.127	0.126	0.124
Power Factor = 0.9 (V/m) at 80°C	0.130	0.132	0.142	0.136	0.134	0.133
Power Factor = 1.0 (V/m) at 80°C	0.131	0.136	0.144	0.137	0.135	0.133

Technical Data					
Rated Current (A)	2000	2500	3200	4000	5000
Rated Operational Voltage (V)	1000	1000	1000	1000	1000
Rated Insulation Voltage (V)	1000	1000	1000	1000	1000
Short Circuit					
1 Second (kA rms)	80	80	100	120	120
Peak Value (kA)	176	176	220	264	264
Phase Conductor					
Cross Sectional Area (mm ²)	1200	1320	1740	2400	2880
Neutral Conductor					
Cross Sectional Area (mm ²)	1200	1320	1740	2400	2880
Isolated Earth Conductor					
100% Earth Cross Sectional Area (mm ²)	1200	1320	1740	2400	2880
50% Earth Cross Sectional Area (mm ²)	600	660	870	1200	1440
Overall Dimensions					
Height x Width of 4 Bar System (mm)	260 x 145	363 x 145	433 x 145	543 x 145	706 x 145
Weight					
Weight of 4 Bar System (kg/m)	20.1	25.7	31.3	40.1	50.6
Resistance					
Resistance (mΩ/m) at 20°C	0.0277	0.0254	0.0191	0.0139	0.0111
Resistance (mΩ/m) at 80°C	0.0348	0.0319	0.024	0.0174	0.0138
Reactance					
Reactance (mΩ/m) at 50Hz	0.0066	0.0055	0.0044	0.0033	0.0025
Impedance					
Impedance (mΩ/m) at 80°C	0.0284	0.026	0.0196	0.0142	0.0113
Voltage Drop at Full Load 50Hz					
Power Factor = 0.7 (V/m) at 80°C	0.101	0.098	0.111	0.101	0.085
Power Factor = 0.8 (V/m) at 80°C	0.110	0.111	0.121	0.110	0.097
Power Factor = 0.9 (V/m) at 80°C	0.119	0.125	0.130	0.119	0.108
Power Factor = 1.0 (V/m) at 80°C	0.121	0.138	0.133	0.121	0.120
Voltage Drop Full Load 60Hz					
Power Factor = 0.7 (V/m) at 80°C	0.104	0.099	0.114	0.104	0.086
Power Factor = 0.8 (V/m) at 80°C	0.113	0.112	0.124	0.113	0.097
Power Factor = 0.9 (V/m) at 80°C	0.121	0.125	0.133	0.121	0.109
Power Factor = 1.0 (V/m) at 80°C	0.121	0.138	0.133	0.121	0.120

BIM LIBRARY

E+I Engineering are committed to supporting our clients by providing direct access to our comprehensive BIM library.

Architects, contractors, engineering consultants and others are able to directly place specific items into a 3D BIM environment to produce accurate and efficient plans, containment drawings and bills of quantities to form a fully integrated overall project.

E+I Engineering provide high quality digitized data, available in a range of formats. Our intelligent BIM libraries are maintained and updated to reflect any changes in the products.

Log on to www.e-i-eng.com/bim-content to access the library

QUICK REFERENCE GUIDE

Critical Dimensions

- The distance from the centre of a joint to the wall, ceiling or floor must be at least 190mm.
- All joints must be accessible for maintenance. Joints should not be located inside a wall, ceiling or floor.
- There must be a minimum distance of 50mm between the busbar and any wall/ ceiling/ other busbar.
- Allow adequate space for tap off units to be installed easily and safely.
- Busbar lengths are available from 600mm - 3000mm.
- Distribution busbar lengths are available from 600mm - 3000mm.
- Edgewise elbow sections are available with leg lengths from 255mm - 600mm.
- Flatwise elbow sections are available with a maximum leg length of 750mm. The minimum leg length varies depending on the busbar.

Operating Conditions

- Ambient temperature from -5°C to +55°C
- Relative humidity of 95% or below.
- This product designed for indoor use and can be installed horizontally or vertically.

Critical Details

- Busbar drawings must include all relevant dimensions. Centre-line dimensions are expected. Please highlight any dimensions that are not centre-line.
- Walls and floors must be indicated and the relevant dimensions provided.
- The phasing and location of all switchboards must be provided.
- Full details are required for any transformer connections.
- Horizontal busbar must be installed with the neutral phase to the top. Please indicate the phase orientation for vertically installed busbar.



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