Busways
Solutions
BMR Busbar

BAHRA TBS

BAHRA TBS

Saudi Innovator & Specialist in Electrical

Index

Bahra Electric

Company Overview

Bahra Electric began in 2008 and it is a leading manufacturer of an extensive range of electricity distribution products.
In 2015, Bahra Electric expanded its manufacturing facilities & product range by creating a new factory "Transformers and Busways Solutions Company" specialized in producing high efficiency transformers and busways in partnership with Legrand France as an initiative to localize the important industries in the kingdom of Saudi Arabia and to become market leader in its industry.
In-line with Kingdom of Saudi vision 2030, Bahra Electric has acquired Transformers and Busways Solutions Company (TBS) in 2021 and has signed a license agreement with Legrand France SA permitting to use the existing designs and know-how.
Bahra Electric has crafted the new brand of TBS to be a Bahra TBS.

Bahra TBS

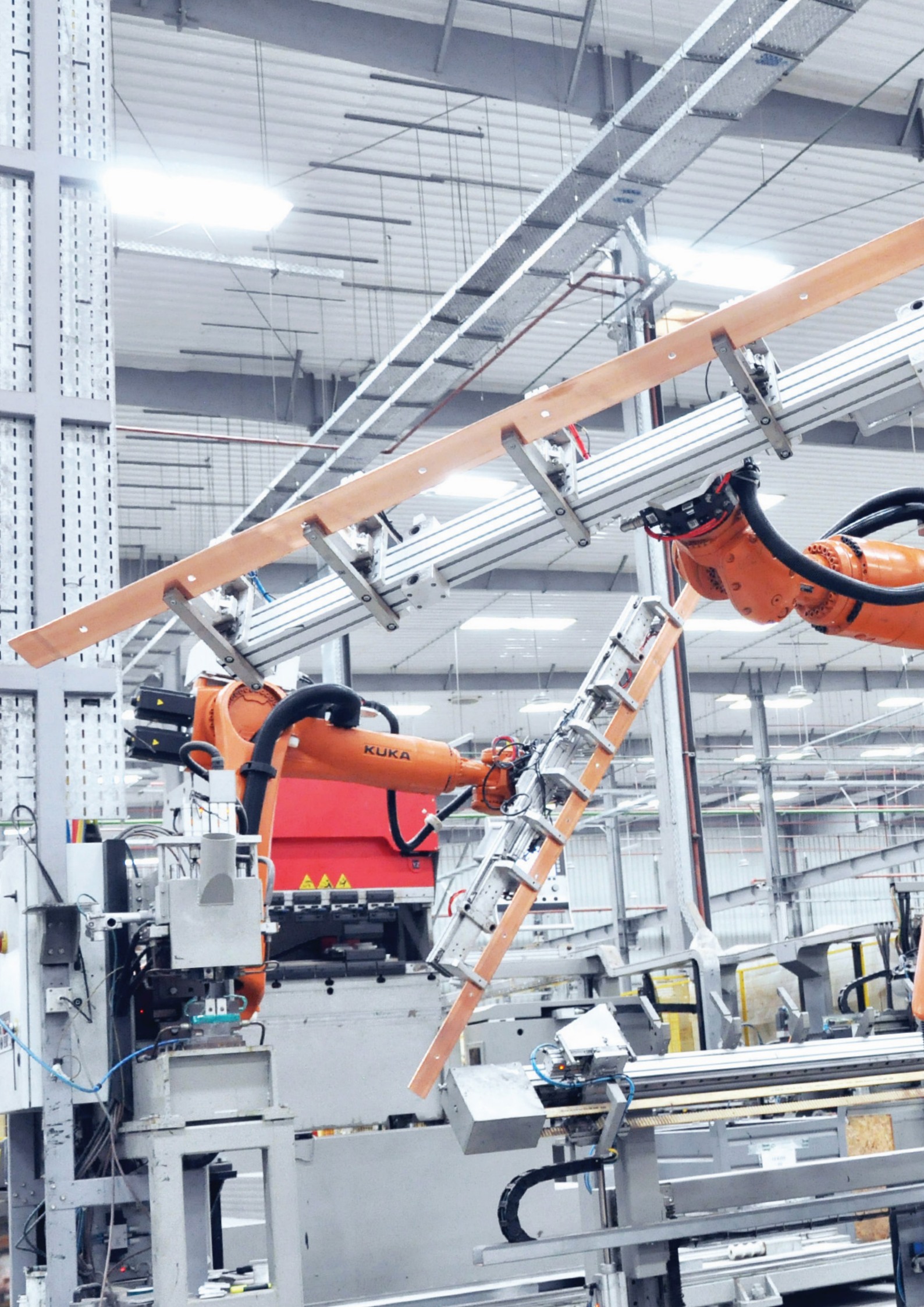
Bahra TBS is spread across 50,000 sq m area equipped with state-of-the-art latest European & Italian technology with complete backward process integration including epoxy casting and tinning. The manufacturing facility have implemented the Integrated Management Systems: ISO 9001, ISO 14001 & OHSAS 18001 as well as SASO mark.

Details matter. At TBS you can rest assured that your project is managed and executed in a professional manner. Every single detail is important. A full-fledged team of experts overlook your projects from the very beginning of the design stage all the way to the testing and commissioning and even after the handing over of your project.

Support Service

We provide consultants a design support from the very beginning. Our design department is able to make solid electrical systems covering every detail of your requirements. Technical Suppor Our skilled technical expertise is at your disposal for consultation, training, orientation and support during the course of your project. We conduct regular training courses. Product Availability Our factory along with our wide network of partners and distributors in the Middle East region ensure a sustainable product availability to secure fast deliveries, efficient logistics Testing & Commissioning. We cover all preliminary tests and inspections, functional performance tests and the supervision of commissioning of busways & transformers. After Sales Service A vast team of technical experts within Bahra TBS and our partners teams are at your disposal for extending full After Sales Support meeting your expectations. Technical Support at your service Bahra TBS with its innovation and cutting-edge technology continue setting up latest trends in the market which enables us to meet the needs of our customers. You can be assured that your project is handled in the most efficient and professional manner meeting industry standards and specifications. We have all the necessary resources used to keep pace with market trends through our. • Technical expertise - capable of providing the most practical and cost effective solutions for projects of any size. • Bahra TBS Design office - supports customers throughout every step of their project providing a single contact, which is competent and easy to reach.
• Strong presence and experience of all our partners and distributors in the market.

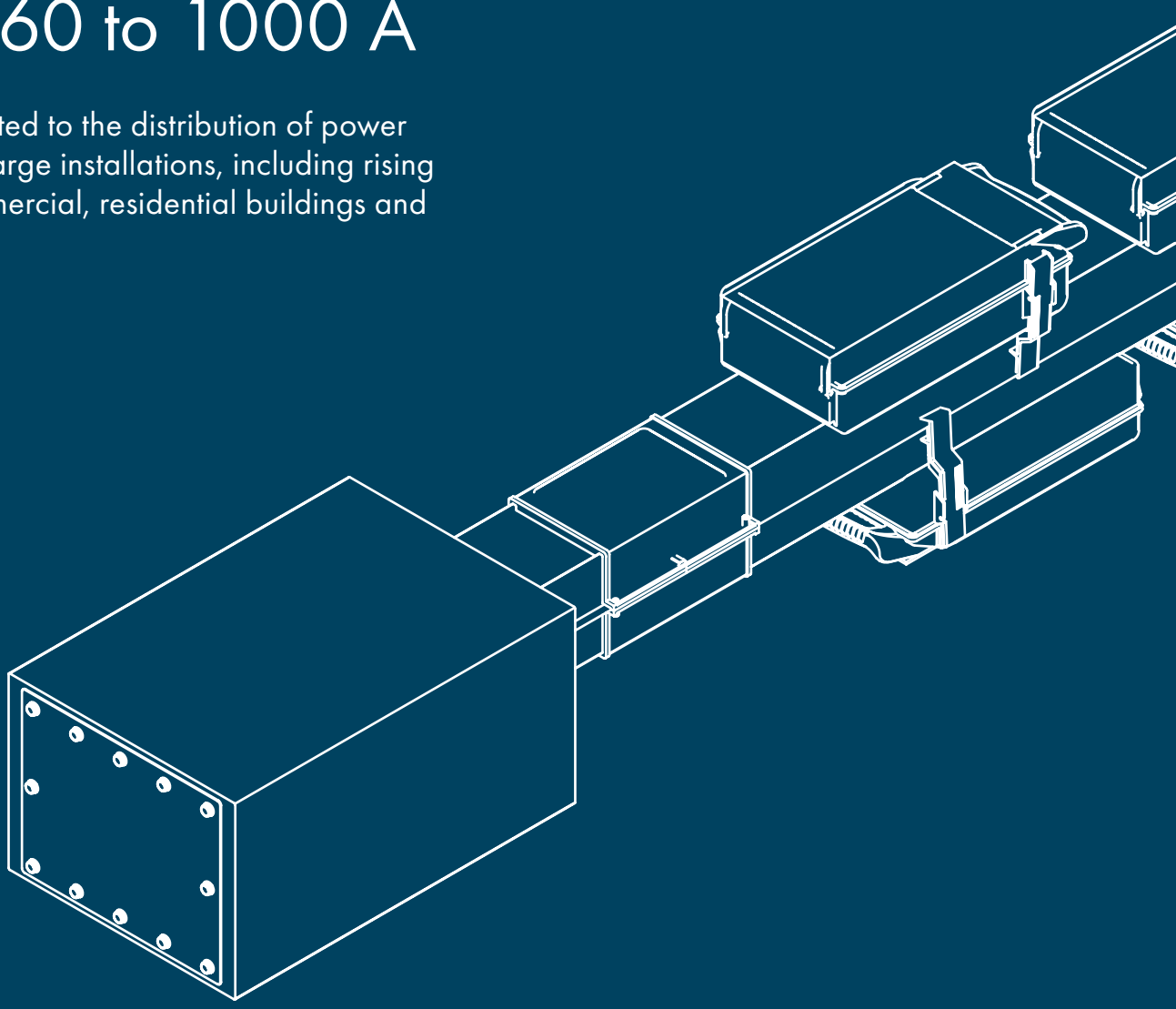
*with our proprietary software PSB.


KUKA

BMR Busbar

Busbar
From 160 to 1000 A

BMR is dedicated to the distribution of power in medium to large installations, including rising mains, in commercial, residential buildings and data centers.



Range

The main features of the BMR range are:
- speed, simplicity, and flexibility during the installation and design of busbar routings;
- available in various sizes: from 160 A up to 800 A with tinned aluminium alloy conductors, and from 250 A to 1000 A with 99.9% electrolytic copper conductors;
- compliance with the IEC 61439-1 and 6 standard;
- reference ambient temperature 40 °C, 60 Hz.

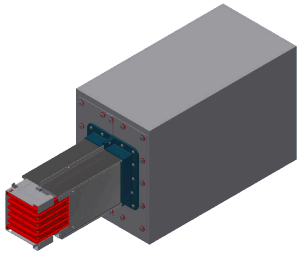
WIDE RANGE OF TAP-OFF BOXES
The range of tap-off boxes is capable fit all needs of the customers.
Tap-off boxes from 16 A to 160 A are available, inside which it is possible to install protection devices, such as fuses, MCBs, MCCBs, Power meters and any kind of sockets.

QUALITY MATERIAL
Each component is made using high quality materials, in compliance with technical and safety requirements. During each stage of the manufacturing process, maximum attention is given to each and every element.

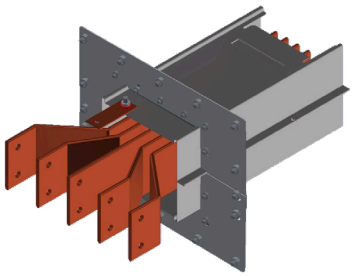
STURDINESS AND FUNCTIONALITY
BMR busbars guarantee maximum system functionality thanks to careful design of the components, easy installation, and the construction characteristics, which make BMR busbars the most evolved and simple solution on the market.

MAXIMUM ADVANTAGE IN DISTRIBUTION
The special design of the BMR monobloc compensates the thermal expansion of conductors. This is a key benefit for vertical (rising mains) applications as the system does not require busbar blocking elements, or thermal expansion elements.

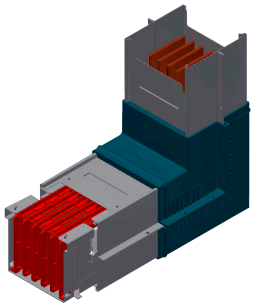
Installation Accessories



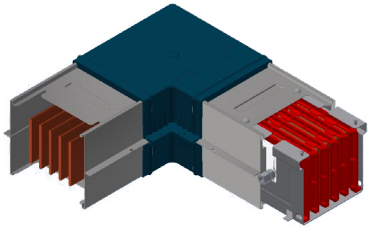
Feed unit



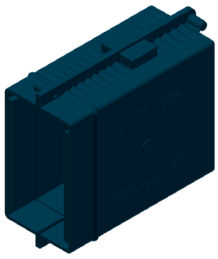
Feed Unit for switchboard and Transformers



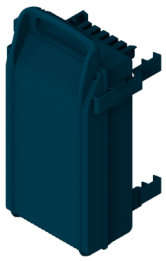
Horizontal elbow



Vertical elbow



End cover



Plug-in Box

Installation Fields

The typical applications for BMR busbars are:
industry,
commercial and residential,
hospitals,
data centre,
shopping centres...
and everywhere there is the need for power distribution
(up to 1000 A)

INDUSTRIAL

COMMERCIAL BUILDINGS

DATA CENTRE

Features

PRE-ASSEMBLED MONOBLOC

All trunking components (straight lengths, elbows, feeders etc.) are provided with a pre-assembled monobloc and junction covers which considerably speeds up the installation of the system and make transportation and storage operations easier.

EXTREMELY FAST INSTALLATION

The pre-installed monobloc and the self-breaking nut allow a very fast installation of the whole line

DYNAMOMETRIC MONOBLOC

Tighten the self-breaking nut of the monobloc until it breaks will ensure the correct and most efficient electrical connection the elements. The breakage of the self-breaking nut guarantees long-lasting reliability and safety. The connection is service free. In case of a future modification on the line, the monobloc must be retightened using the nut head with a torque wrench at the correct settings (see installation manual)

CONNECTION FLANGES

If the busways are connected improperly, the special design self-breaking nut and asymmetric casing design will prevent the mechanical coupling from closing. The connection flanges and the seals serve as a protection for the element during transportation and ensure their degree of protection as well as their mechanical rigidity when being installed.

PROTECTION DEGREE

The BMR system has a standard IP55 protection degree according IEC 60529.

EXCELLENT FIRE RESISTANCE

The BMR system has lengths provided with a fire barrier (EI according to EN 1366-3) and structures which guarantee a time resistance against propagation of flames, transmission of gases, and transmission of heat.
The fire load of BMR is extremely low compared to the quantity of plastic materials needed to insulate cables with the same capacity.

GLOW-WIRE TEST

All plastic materials are resistant and in compliance with the 'glow-wire' test (IEC EN61439-6).

VERSIONS

BMR is available in the following configurations:
3P + N + PE casing
3P + N + FE + PE casing
All versions are available in a painted version (RAL to be defined by the customer)

SIMPLE AND RELIABLE

The monobloc connection of the BMR busway is able to compensate for any heat expansion affecting the conductors, thus avoiding the need to insert special expansion lengths even in considerably long systems. If the BMR line is installed vertically (riser main) there is no need to install busbar thrust units because the monobloc prevents the conductors from sliding.

MAXIMUM STRENGTH

The BMR range has been designed and manufactured with a strong casing. The degree of impact resistance of the casing which houses this line is the maximum stated in IEC EN60068-2-62: IK10.

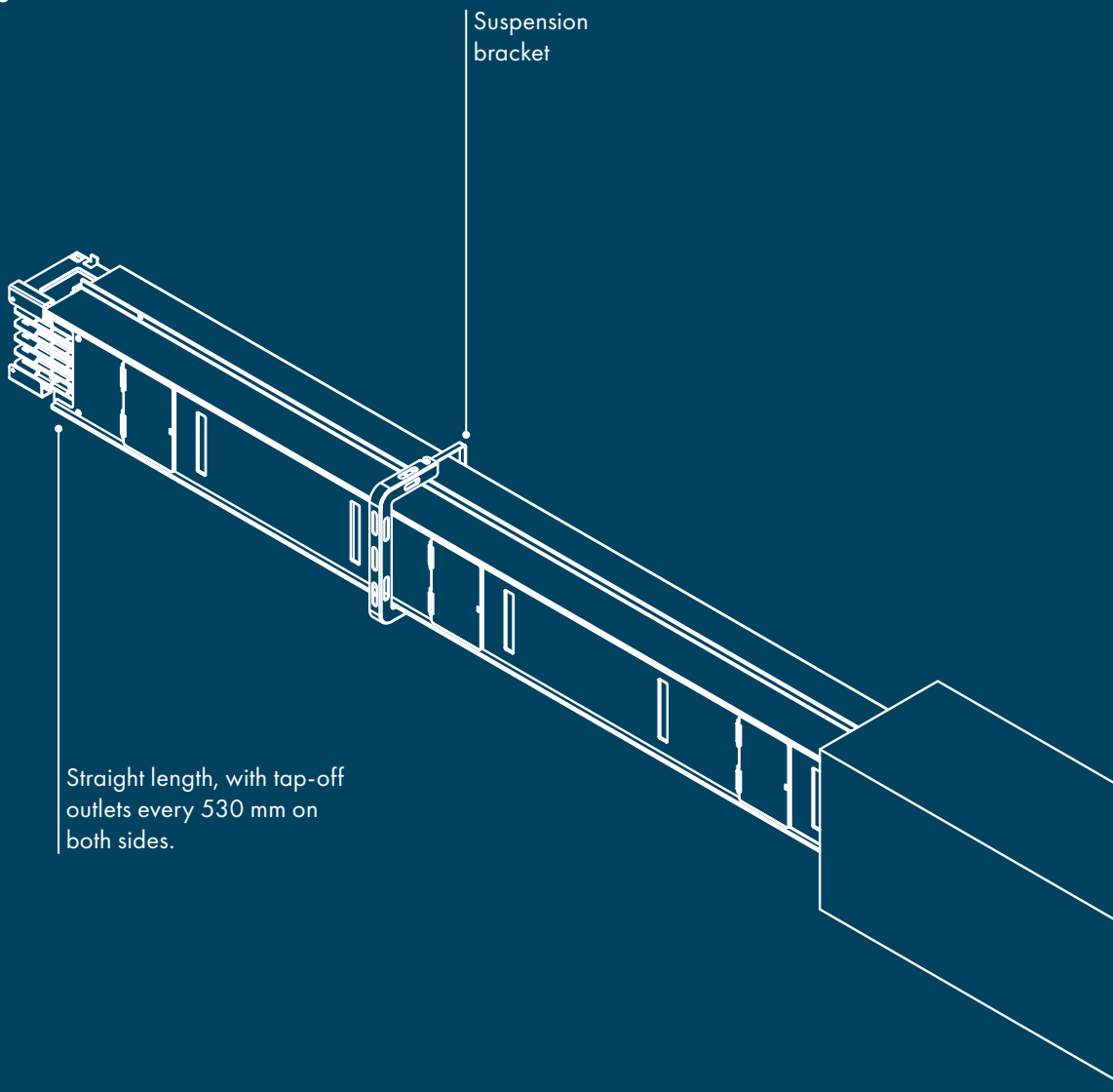
ALUMINIUM AND COPPER RATING

Al 160 250 400 500 630 800
Cu 250 400 500 630 800 100

IEEE
KEMA
GCC Lab
المختبر الخليجي
علامة الجودة
SASO
QUALITY MARK
IEC
Committed to Standard
الشركة السعودية للكهرباء
Saudi Electricity Company
طاقة مثمرة
ISO 14001: 2015
ASR
American Systems REGISTRAR
Certificate No. 4058
ISO 9001: 2015
ASR
American Systems REGISTRAR
Certificate No. 3749
ISO 45001: 2018
ASR
American Systems REGISTRAR
Certificate No. 8315

Trunking Components

& additional accessories



Technical Solutions

Depending on installation requirements Bahra TBS can provide various technical solutions:

a) 90° horizontal and vertical elbows: available for carrying out changes of direction both horizontally and vertically. There is a quick connection, as for the straight lengths. The standard degree of protection is IP55;

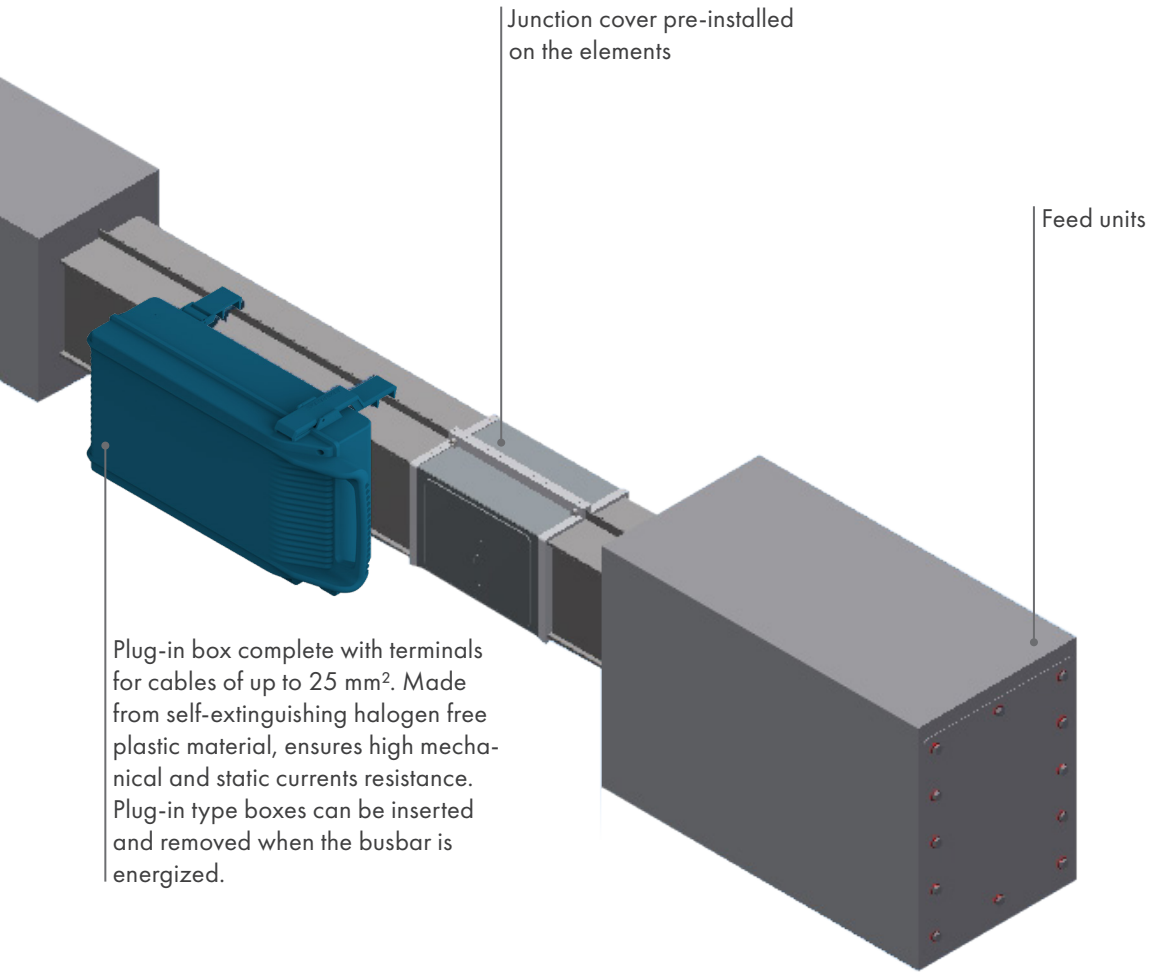
b) Tees, crossovers and double elbows available. The standard degree of protection is IP55;

c) Straight elements with fire barrier (internal + external) REI120.
Tested in laboratories (in compliance with Standards EN 1366-3)

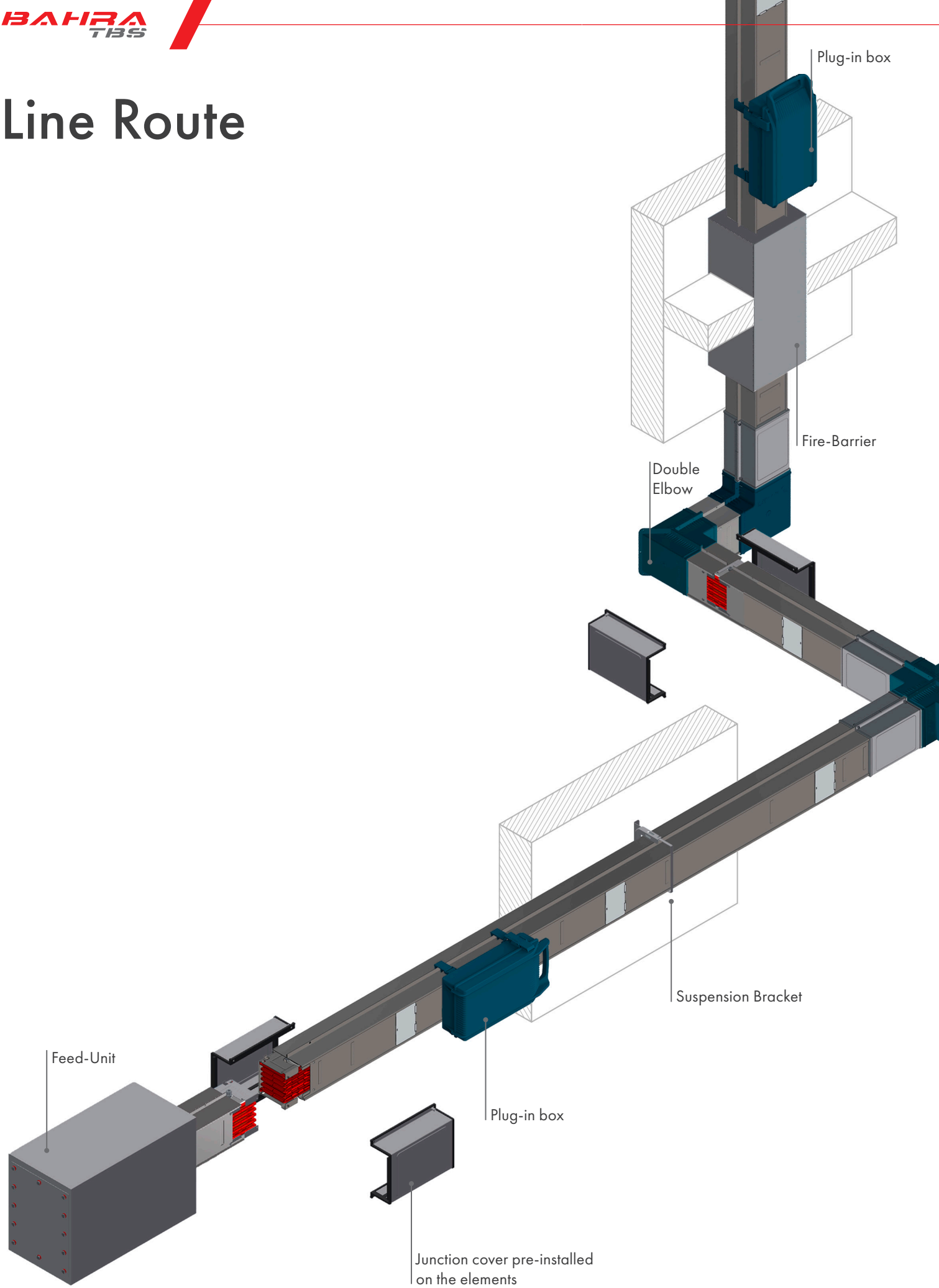
d) Straight 3m lengths with up to 5 on one side; ideal solution for riser mains;

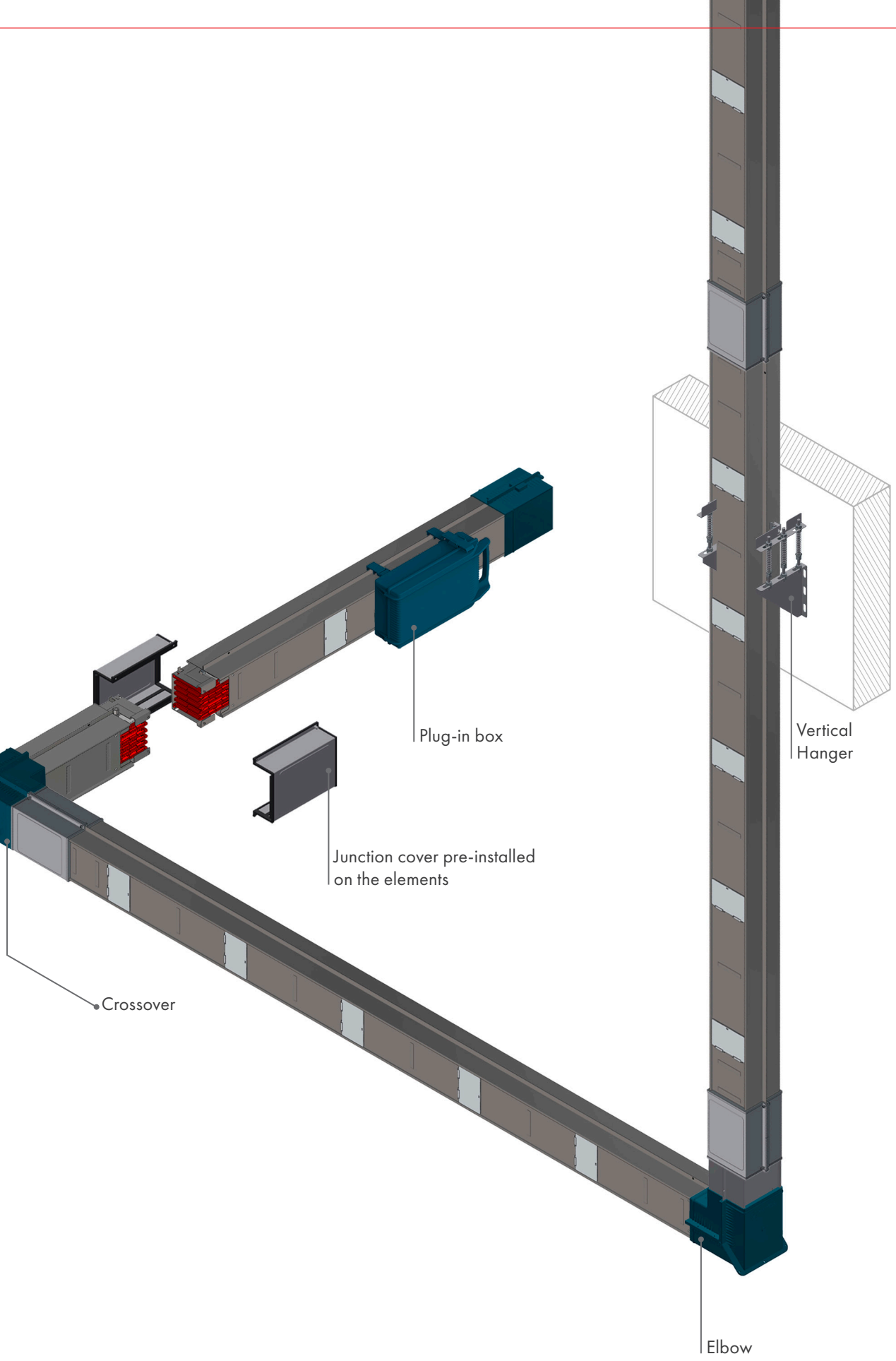
e) Straight lengths 3m with 5 outlets both sides; ideal for data centre solutions;

f) Straight lengths with no outlets, used for energy transport only.


Junction cover pre-installed on the elements
Feed units
Plug-in box complete with terminals for cables of up to 25 mm². Made from self-extinguishing halogen free plastic material, ensures high mechanical and static currents resistance. Plug-in type boxes can be inserted and removed when the busbar is energized.

Line Route


Plug-in box
Fire-Barrier
Double
Elbow
Suspension Bracket
Feed-Unit
Plug-in box
Junction cover pre-installed
on the elements


Plug-in box
Junction cover pre-installed
on the elements
Crossover
Vertical
Hanger
Elbow

Straight Element

BMR 160-1000A straight length without derivation

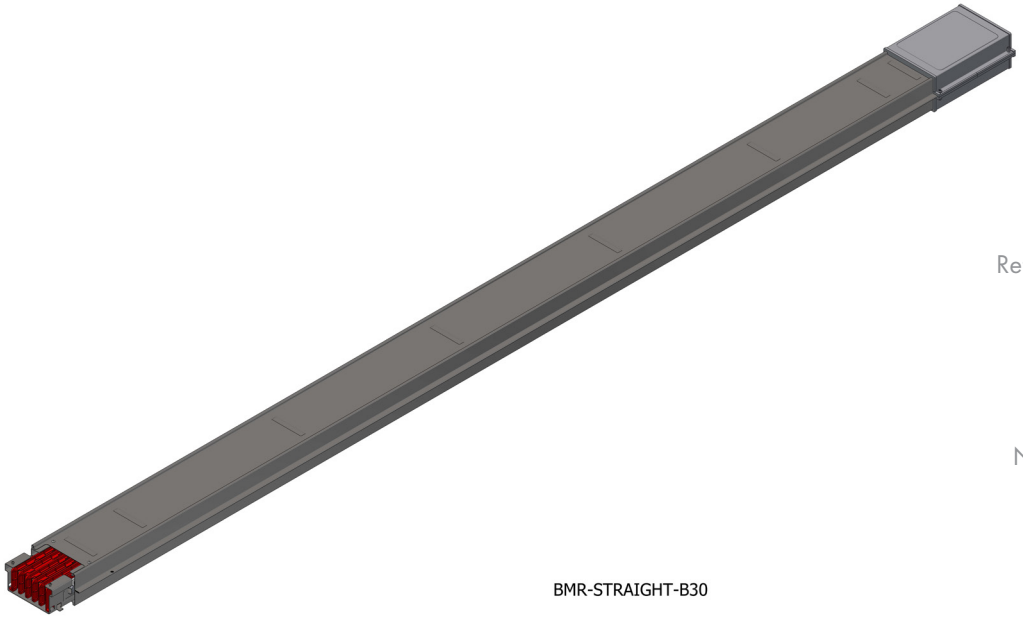
BMR 160-1000A straight length with derivation

Data Centre

Fire Barrier EI

BMR 160-1000A

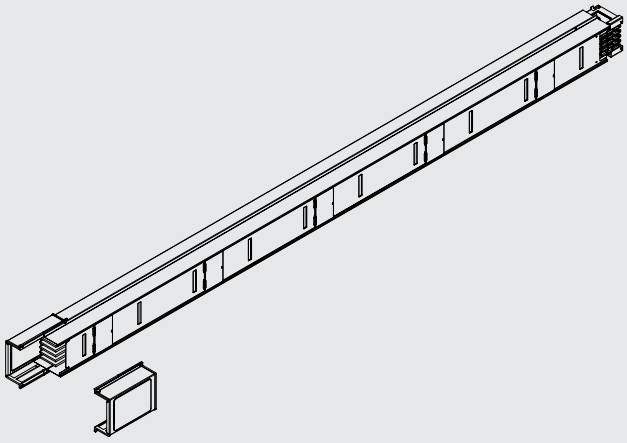
straight length without derivation



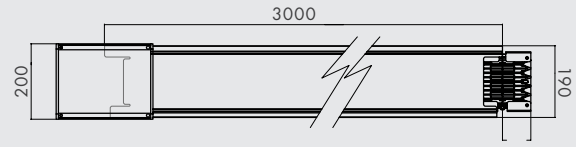
BMR-STRAIGHT-B30

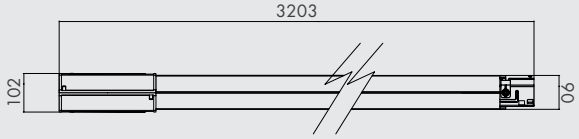
Reference standard: IEC 61439-1 and 6
Reference temperature: 40 °C
Reference power frequency: 60Hz
Protection degree: IP55
Thickness: 0.8 mm;
Dimension (HxW): 90-150x190 mm;
N° of conductors: 4 with equal section
3P+N or 5 (3P+N+PE)
Conducting «flame retardant» in accordance with EN 60332-3
Separation between the conductors by plastic insulators reinforced with fibreglass, guarantees a degree of V0 self-extinguishing (according to UL94) and conform to the glow-wire test according to IEC 60695-2-10

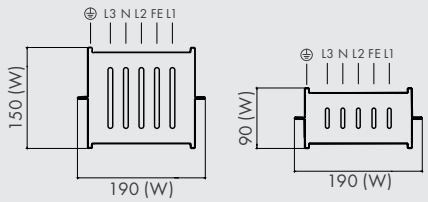
Dimensions

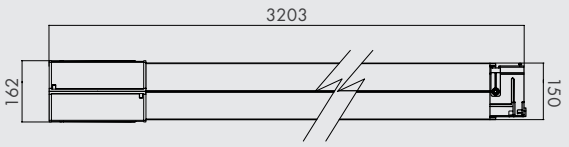


For Straight Length = 3000 mm









Rating [A]	Al	Cu	L
160	50**10**0110		
250	50**10**0111	51**10**0111	
400	50**10**0112	51**10**0112	
500	50**10**0113	51**10**0113	500-999
630	50**10**0114	51**10**0114	
800	50**10**0115	51**10**0115	
1000		51**10**0116	
160	50**10**0120		
250	50**10**0121	51**10**0121	
400	50**10**0122	51**10**0122	
500	50**10**0123	51**10**0123	1000-1500
630	50**10**0124	51**10**0124	
800	50**10**0125	51**10**0125	
1000		51**10**0126	
160	50**10**0130		
250	50**10**0131	51**10**0131	
400	50**10**0132	51**10**0132	
500	50**10**0133	51**10**0133	1501-2000
630	50**10**0134	51**10**0134	
800	50**10**0135	51**10**0135	
1000		51**10**0136	
160	50**10**0140		
250	50**10**0141	51**10**0141	
400	50**10**0142	51**10**0142	
500	50**10**0143	51**10**0143	2001-2500
630	50**10**0144	51**10**0144	
800	50**10**0145	51**10**0145	
1000		51**10**0146	
160	50**10**0150		
250	50**10**0151	51**10**0151	
400	50**10**0152	51**10**0152	
500	50**10**0153	51**10**0153	2501-2999
630	50**10**0154	51**10**0154	
800	50**10**0155	51**10**0155	
1000		51**10**0156	
160	50**10**0100		
250	50**10**0101	51**10**0101	
400	50**10**0102	51**10**0102	
500	50**10**0103	51**10**0103	3000
630	50**10**0104	51**10**0104	
800	50**10**0105	51**10**0105	
1000		51**10**0106	

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

*Color to be defined by customer

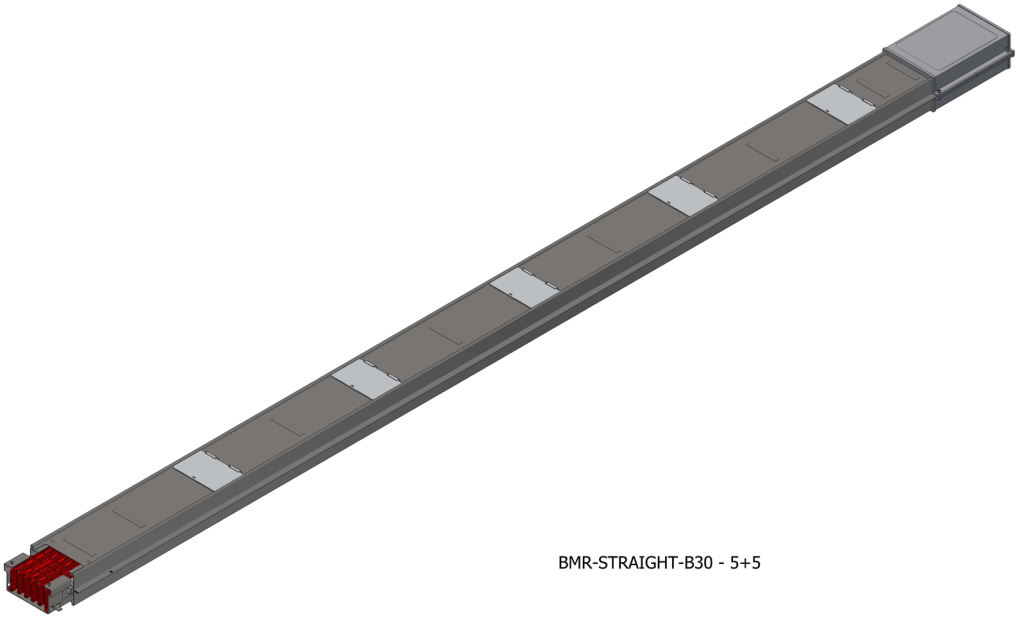
In your Purchase Order please specify the required length see page: (How to take measurements pag 56)

Busway length		1000mm		
Rating [A]	Al	Weight [kg]	Cu	Weight [kg]
160	50**10**0110	6,0		0,0
250	50**10**0111	6,6	51**10**0111	8,0
400	50**10**0112	8,7	51**10**0112	11,2
500	50**10**0113	9,6	51**10**0113	14,2
630	50**10**0114	11,7	51**10**0114	15,8
800	50**10**0115	13,8	51**10**0115	21,4
1000			51**10**0116	28,7
Busway length		1500mm		
160	50**10**0120	9,0		
250	50**10**0121	10,0	51**10**0121	12,0
400	50**10**0122	13,0	51**10**0122	16,8
500	50**10**0123	14,4	51**10**0123	21,4
630	50**10**0124	17,5	51**10**0124	23,7
800	50**10**0125	20,7	51**10**0125	32,1
1000			51**10**0126	43,1
Busway length		2000mm		
160	50**10**0130	12,0		
250	50**10**0131	13,3	51**10**0131	16,0
400	50**10**0132	17,3	51**10**0132	22,4
500	50**10**0133	19,1	51**10**0133	28,5
630	50**10**0134	23,3	51**10**0134	31,6
800	50**10**0135	27,5	51**10**0135	42,7
1000			51**10**0136	57,4
Busway length		2500mm		
160	50**10**0140	15,0		
250	50**10**0141	16,6	51**10**0141	20,0
400	50**10**0142	21,7	51**10**0142	28,0
500	50**10**0143	23,9	51**10**0143	35,6
630	50**10**0144	29,2	51**10**0144	39,5
800	50**10**0145	34,4	51**10**0145	53,4
1000			51**10**0146	86,1
Busway length		3000mm		
160	50**10**0150	18,0		
250	50**10**0151	19,9	51**10**0151	24,0
400	50**10**0152	26,0	51**10**0152	33,6
500	50**10**0153	28,7	51**10**0153	42,7
630	50**10**0154	35,0	51**10**0154	47,4
800	50**10**0155	41,3	51**10**0155	64,1
1000			51**10**0156	
Busway length		3000mm		
160	50**10**0100	18,0		
250	50**10**0101	19,9	51**10**0101	24,0
400	50**10**0102	26,0	51**10**0102	33,6
500	50**10**0103	28,7	51**10**0103	42,7
630	50**10**0104	35,0	51**10**0104	47,4
800	50**10**0105	41,3	51**10**0105	64,1
1000			51**10**0106	86,1

In the case of transport of electric energy is recommended to use BMR busbar duct

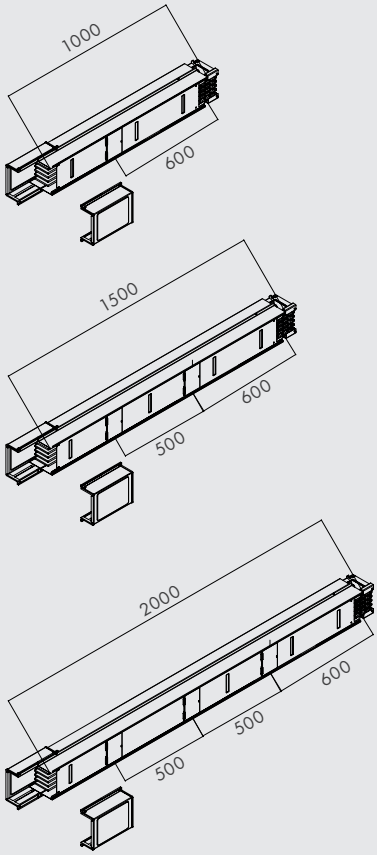
BMR 160-1000A

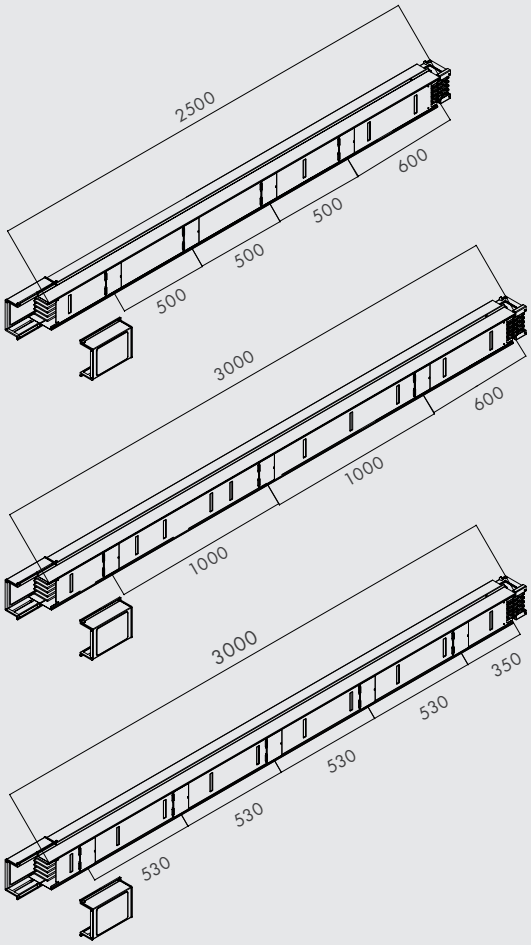
straight length with derivation



BMR-STRAIGHT-B30 - 5+5

Dimensions





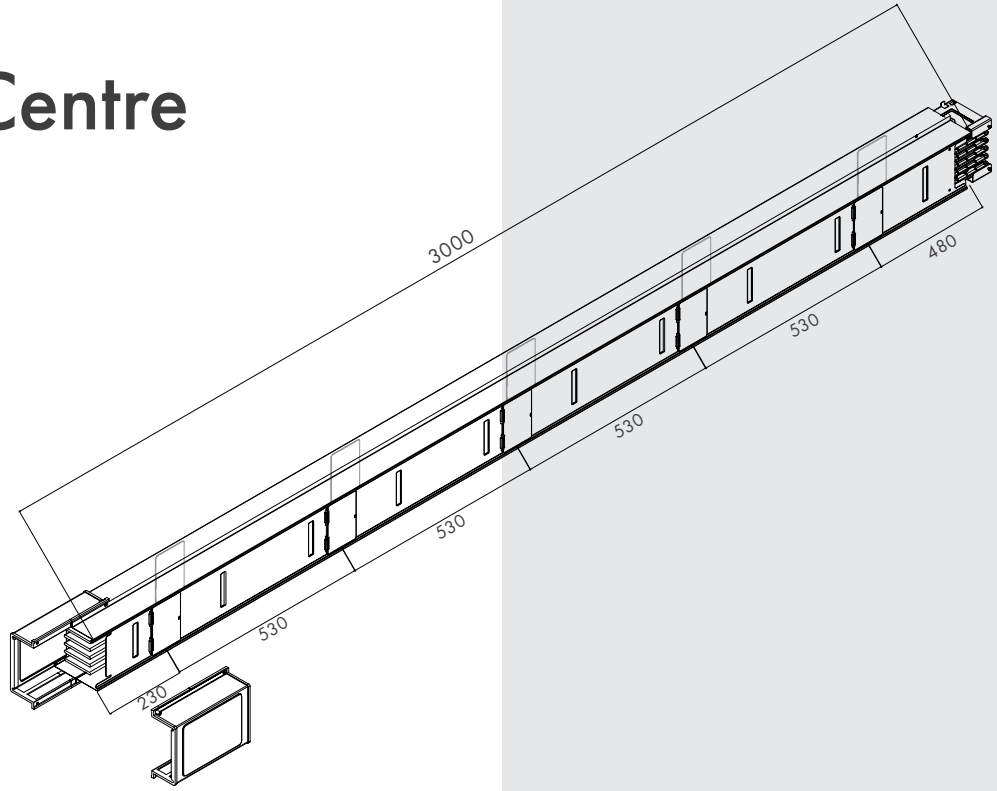
Rating [A]	Al	Cu	L	Number of outlets
160	50**10**0200		3m	3+3 standard position
250	50**10**0201	51**10**0201		
400	50**10**0202	51**10**0202		
500	50**10**0203	51**10**0203		
630	50**10**0204	51**10**0204		
800	50**10**0205	51**10**0205		
1000		51**10**0206		
160	50**10**0210		3m	3+3 special position
250	50**10**0211	51**10**0211		
400	50**10**0212	51**10**0212		
500	50**10**0213	51**10**0213		
630	50**10**0214	51**10**0214		
800	50**10**0215	51**10**0215		
1000		51**10**0216		
160	50**10**0220		3m	5+5 standard position
250	50**10**0221	51**10**0221		
400	50**10**0222	51**10**0222		
500	50**10**0223	51**10**0223		
630	50**10**0224	51**10**0224		
800	50**10**0225	51**10**0225		
1000		51**10**0226		
160	50**10**0230		3m	5+5 special position
250	50**10**0231	51**10**0231		
400	50**10**0232	51**10**0232		
500	50**10**0233	51**10**0233		
630	50**10**0234	51**10**0234		
800	50**10**0235	51**10**0235		
1000		51**10**0236		
160	50**10**0240		1m	1+1
250	50**10**0241	51**10**0241		
400	50**10**0242	51**10**0242		
500	50**10**0243	51**10**0243		
630	50**10**0244	51**10**0244		
800	50**10**0245	51**10**0245		
1000		51**10**0246		
160	50**10**0250		1.5m	2+2
250	50**10**0251	51**10**0251		
400	50**10**0252	51**10**0252		
500	50**10**0253	51**10**0253		
630	50**10**0254	51**10**0254		
800	50**10**0255	51**10**0255		
1000		51**10**0256		
160	50**10**0260		2m	3+3
250	50**10**0261	51**10**0261		
400	50**10**0262	51**10**0262		
500	50**10**0263	51**10**0263		
630	50**10**0264	51**10**0264		
800	50**10**0265	51**10**0265		
1000		51**10**0266		
160	50**10**0270		2.5m	4+4
250	50**10**0271	51**10**0271		
400	50**10**0272	51**10**0272		
500	50**10**0273	51**10**0273		
630	50**10**0274	51**10**0274		
800	50**10**0275	51**10**0275		
1000		51**10**0276		
160	50**10**0280		1000-1500	1+1
250	50**10**0281	51**10**0281		
400	50**10**0282	51**10**0282		
500	50**10**0283	51**10**0283		
630	50**10**0284	51**10**0284		
800	50**10**0285	51**10**0285		
1000		51**10**0286		
160	50**10**0290		1501-2000	2+2
250	50**10**0291	51**10**0291		
400	50**10**0292	51**10**0292		
500	50**10**0293	51**10**0293		
630	50**10**0294	51**10**0294		
800	50**10**0295	51**10**0295		
1000		51**10**0296		
160	50**10**1200		2001-2500	3+3
250	50**10**1201	51**10**1201		
400	50**10**1202	51**10**1202		
500	50**10**1203	51**10**1203		
630	50**10**1204	51**10**1204		
800	50**10**1205	51**10**1205		
1000		51**10**1206		
160	50**10**1210		2501-3000	4+4
250	50**10**1211	51**10**1211		
400	50**10**1212	51**10**1212		
500	50**10**1213	51**10**1213		
630	50**10**1214	51**10**1214		
800	50**10**1215	51**10**1215		
1000		51**10**1216		

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

*Color to be defined by customer

Version	1000mm 1+1			
Rating [A]	Al	Weight [kg]	Cu	Weight [kg]
160	50**10**0240	6,0		
250	50**10**0241	6,6	51**10**0241	8,0
400	50**10**0242	8,7	51**10**0242	11,2
500	50**10**0243	9,6	51**10**0243	14,2
630	50**10**0244	11,7	51**10**0244	15,8
800	50**10**0245	13,8	51**10**0245	21,4
1000			51**10**0246	28,7
Version	1500mm 2+2			
160	50**10**0250	9,0		
250	50**10**0251	10,0	51**10**0251	12,0
400	50**10**0252	13,0	51**10**0252	16,8
500	50**10**0253	14,4	51**10**0253	21,4
630	50**10**0254	17,5	51**10**0254	23,7
800	50**10**0255	20,7	51**10**0255	32,1
1000			51**10**0256	43,1
Version	2000mm 3+3			
160	50**10**0260	12,0		
250	50**10**0261	13,3	51**10**0261	16,0
400	50**10**0262	17,3	51**10**0262	22,4
500	50**10**0263	19,1	51**10**0263	28,5
630	50**10**0264	23,3	51**10**0264	31,6
800	50**10**0265	27,5	51**10**0265	42,7
1000			51**10**0266	57,4
Version	2500mm 4+4			
160	50**10**0270	15,0		
250	50**10**0271	16,6	51**10**0271	20,0
400	50**10**0272	21,7	51**10**0272	28,0
500	50**10**0273	23,9	51**10**0273	35,6
630	50**10**0274	29,2	51**10**0274	39,5
800	50**10**0275	34,4	51**10**0275	53,4
1000			51**10**0276	86,1
Version	3000mm 5+5			
160	50**10**0220	18,0		
250	50**10**0221	19,9	51**10**0221	24,0
400	50**10**0222	26,0	51**10**0222	33,6
500	50**10**0223	28,7	51**10**0223	42,7
630	50**10**0224	35,0	51**10**0224	47,4
800	50**10**0225	41,3	51**10**0225	64,1
1000		0,0	51**10**0226	86,1

Data Centre

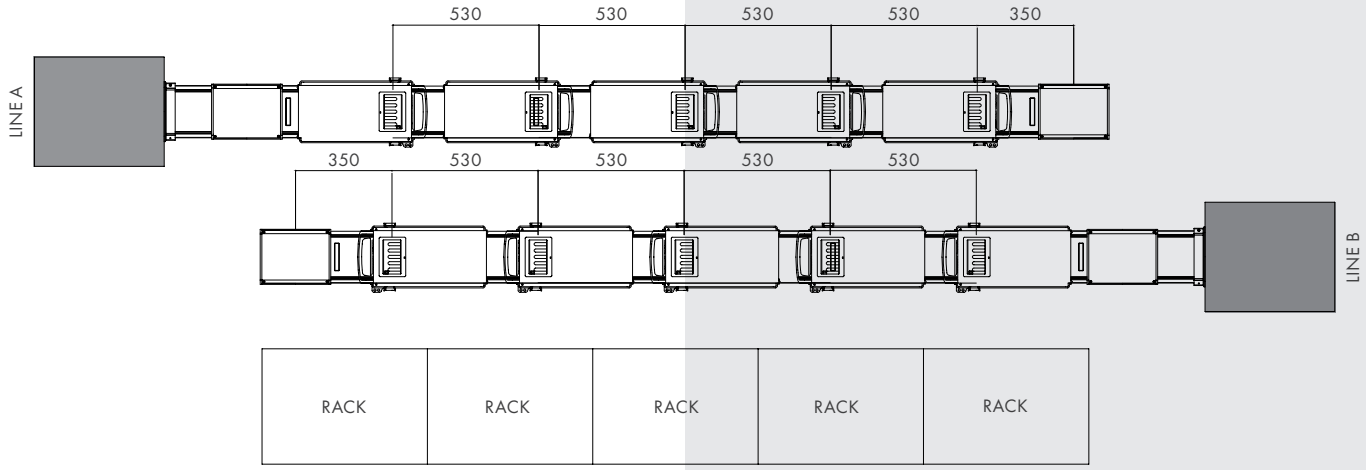


Standard lengths with 5+5 outlets center 530 mm (on both sides) 3 m

Standard lengths with 3+3 outlets center 800 mm (on both sides) 3 m

Dimensions

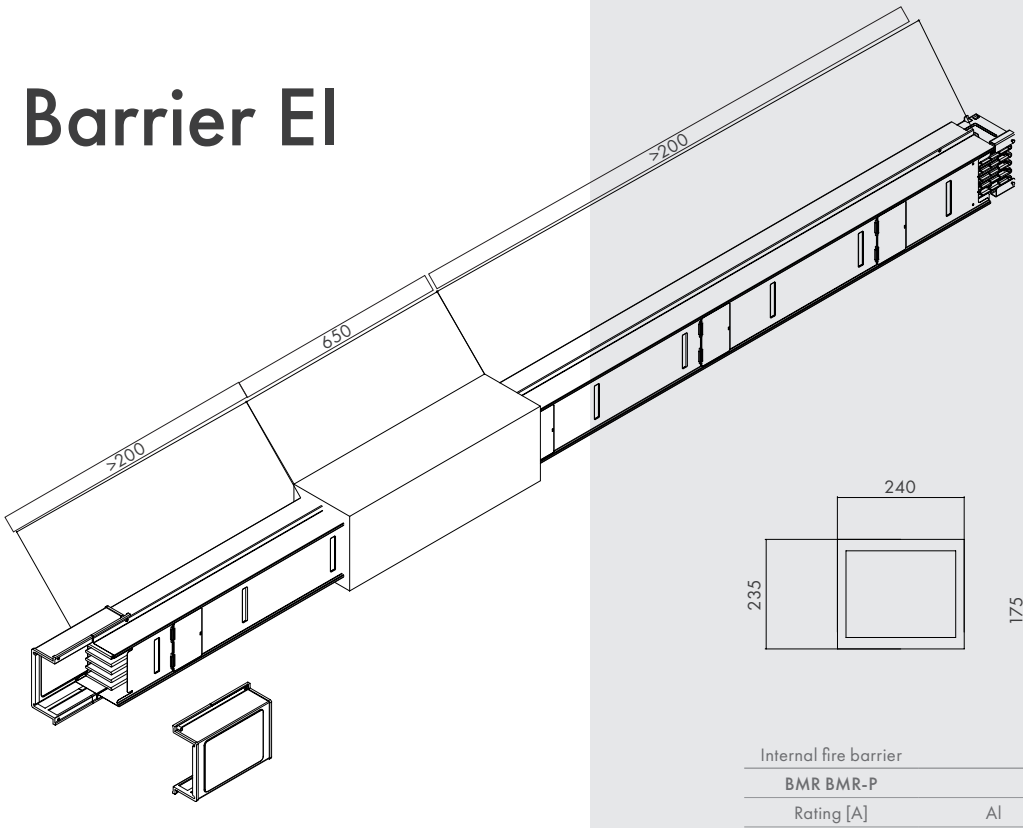
Example of connection between the cabinet containing rack and busbar
Straight lengths 3 m with 5 + 5 outlets centers 530 mm
Line 1: FRONT side is dedicated to supply of power, BACK side for the backup.
Line 2: FRONT and BACK side are dedicated for backup.

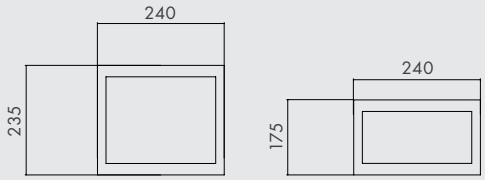


10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

*Color to be defined by customer

Fire Barrier EI





When ordering fire barrier, specify if only internal or complete
Provide dimension A = ... mm of the element that will be equipped with the fire barrier
In your Purchase Order please specify the required position of the fire barrier.
Take the measurement as shown in the Figure.
Both internal and external fire barrier are 650 mm long.
External fire barrier must be installed on busway by customers on site, detailed instructions are provided by Bahra TBS.

Internal fire barrier		
BMR BMR-P		
Rating [A]	Al	Cu
160	50**10**3500	
250	50**10**3501	51**10**3501
400	50**10**3502	51**10**3502
500	50**10**3503	51**10**3503
630	50**10**3504	51**10**3504
800	50**10**3505	51**10**3505
1000		51**10**3506
BMR-FE BMR FE-P		
Rating [A]	Al	Cu
160	50**11**3500	
250	50**11**3501	51**11**3500
400	50**11**3502	51**11**3501
500	50**11**3503	51**11**3502
630	50**11**3504	51**11**3503
800	50**11**3505	51**11**3504
1000		51**11**3505

Complete fire barrier REI 120		
BMR BMR-P		
Rating [A]	Al	Cu
160	50**10**3510	
250	50**10**3511	51**10**3511
400	50**10**3512	51**10**3512
500	50**10**3513	51**10**3513
630	50**10**3514	51**10**3514
800	50**10**3515	51**10**3515
1000		51**10**3516
BMR-FE BMR FE-P		
Rating [A]	Al	Cu
160	50**11**3510	
250	50**11**3511	51**11**3510
400	50**11**3512	51**11**3511
500	50**11**3513	51**11**3512
630	50**11**3514	51**11**3513
800	50**11**3515	51**11**3514
1000		51**11**3515

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

*Color to be defined by customer

Elbow Element

Horizontal Elbow & Vertical Elbow

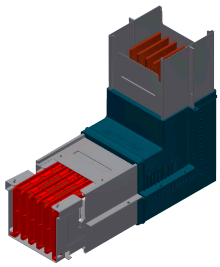
Double Horizontal & Double Vertical

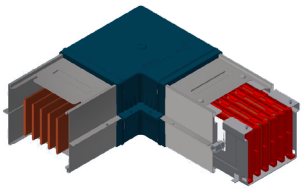
Double Horizontal + Vertical Double Vertical + Horizontal

Horizontal T Element

Crossovers

Horizontal elbow & Vertical elbow





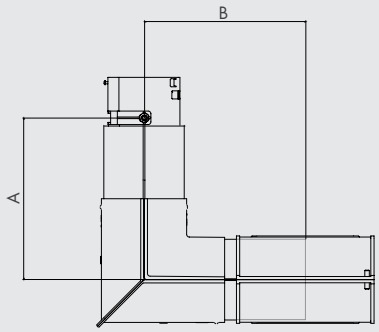
	Al	Cu	Al	Cu	
Rating [A]	Standard 300x300		Special AxB		Horizontal Elbow Right (Type 1)
160	50**10**0300		50**10**0320		
250	50**10**0301	51**10**0301	50**10**0321	51**10**0321	
400	50**10**0302	51**10**0302	50**10**0322	51**10**0322	
500	50**10**0303	51**10**0303	50**10**0323	51**10**0323	
630	50**10**0304	51100304	50**10**0324	51**10**0324	
800	50**10**0305	51**10**0305	50**10**0325	51**10**0325	
1000		51**10**0306		51**10**0326	
Rating [A]	Standard 300x300		Special AxB		
160	50**10**0310		50**10**0330		Horizontal Elbow Left (Type 2)
250	50**10**0311	51**10**0311	50**10**0331	51**10**0331	
400	50**10**0312	51**10**0312	50**10**0332	51**10**0332	
500	50**10**0313	51**10**0313	50**10**0333	51**10**0333	
630	50**10**0314	51**10**0314	50**10**0334	51**10**0334	
800	50**10**0315	51**10**0315	50**10**0335	51**10**0335	
1000		51**10**0316		51**10**0336	
Rating [A]	Standard 300x300		Special AxB		
160	50**10**0400		50**10**0420		Vertical Elbow Right (Type 1)
250	50**10**0401	51**10**0401	50**10**0421	51**10**0421	
400	50**10**0402	51**10**0402	50**10**0422	51**10**0422	
500	50**10**0403	51**10**0403	50**10**0423	51**10**0423	
630	50**10**0404	51**10**0404	50**10**0424	51**10**0424	
800	50**10**0405	51**10**0405	50**10**0425	51**10**0425	
1000		51**10**0406		51**10**0426	
Rating [A]	Standard 300x300		Special AxB		
160	50**10**0410		50**10**0430		Vertical Elbow Left (Type 2)
250	50**10**0411	51**10**0411	50**10**0431	51**10**0431	
400	50**10**0412	51**10**0412	50**10**0432	51**10**0432	
500	50**10**0413	51**10**0413	50**10**0433	51**10**0433	
630	50**10**0414	51**10**0414	50**10**0434	51**10**0434	
800	50**10**0415	51**10**0415	50**10**0435	51**10**0435	
1000		51**10**0416		51**10**0436	

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

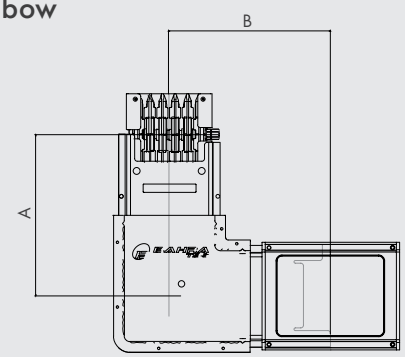
*Color to be defined by customer

Dimensions

Horizontal elbow Left



Vertical elbow Right



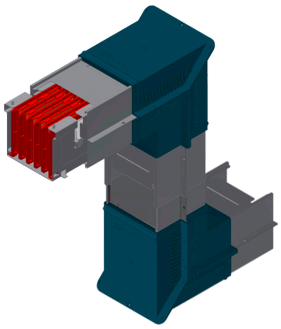
The weights indicated in the table refer to the standard elements (300 + 300 mm)

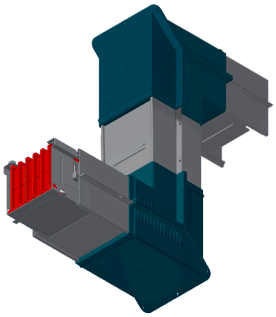
* For all the non standard elbows, only one of the two sides can exceed 600 mm. For example, when ordering a horizontal elbow with size A=650 mm, the B size must be ≤ = 600 mm
In your purchase order please specify the required length (see catalogue page: How to take measurements).

	Weight [kg]	
Rating [A]	Al	Cu
160	4,3	
250	4,8	5,8
400	6,2	8,1
500	6,9	10,2
630	8,4	11,4
800	9,9	15,4
1000		20,7

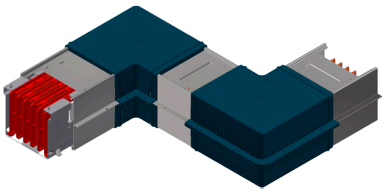
Double Horizontal
Double Vertical

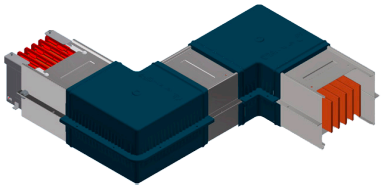
Double Horizontal





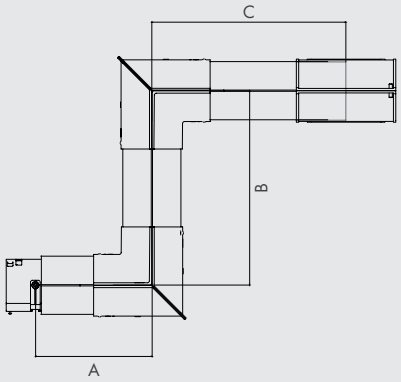
Double Vertical

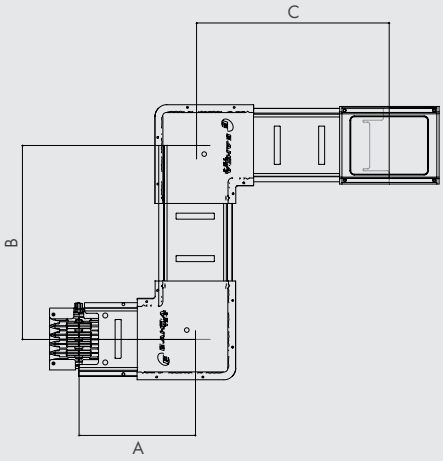




*For double elbows' codes, contact Bahra TBS or your local agent.

Dimensions





Weight (kg) for
Double Horizontal
Double Vertical

Rating [A]	Al	Cu
160	6,5	
250	7,2	8,6
400	9,4	12,1
500	10,3	15,4
630	12,6	17,1
800	14,9	23,1
1000		31,0

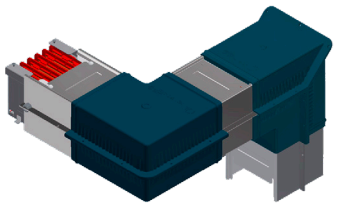
*For double elbows' codes, contact Bahra TBS or your local agent.

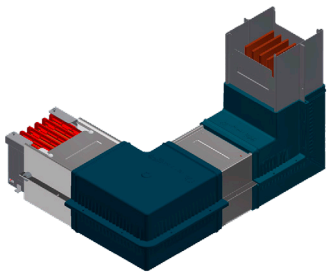
The weights indicated in the table refer to the standard elements (300 + 300 + 300 mm)

* For all the non standard elbows, only one of the two sides can exceed 600 mm. For example, when ordering a horizontal elbow with size A=650 mm, the B size must be ≤ = 600 mm
In your purchase order please specify the required length (see catalogue page: How to take measurements).

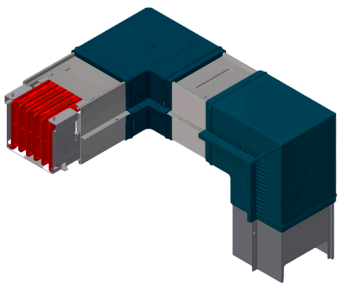
Double Horizontal + Vertical
Double Vertical + Horizontal

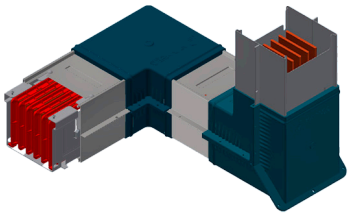
Double Vertical + Horizontal





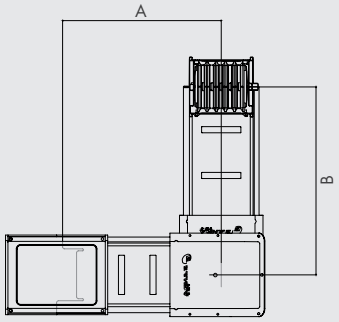
Double Horizontal +Vertical

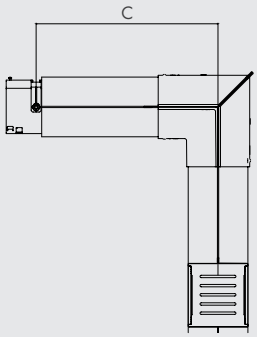


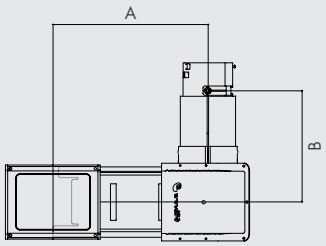


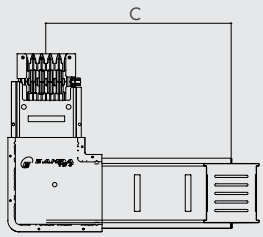
*For double elbows' codes, contact Bahra TBS or your local agent.

Dimensions









Weight (kg)
for Double Horizontal+Vertical
and Double Vertical+Horizontal

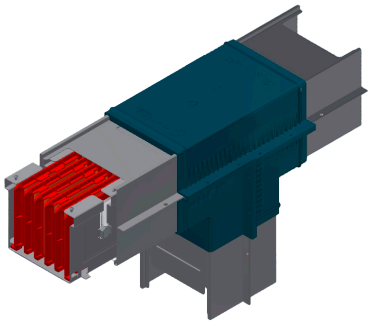
Rating [A]	Al	Cu
160	6,5	
250	7,2	8,6
400	9,4	12,1
500	10,3	15,4
630	12,6	17,1
800	14,9	23,1
1000		31,0

*For double elbows' codes, contact Bahra TBS or your local agent.

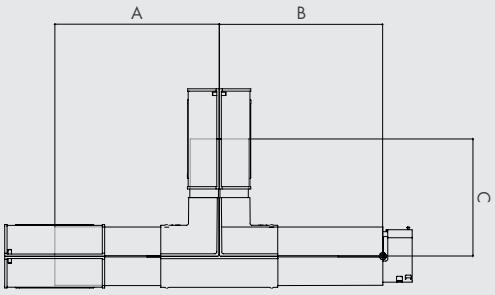
The weights indicated in the table refer to the standard elements (300 + 300 + 300 mm)

* For all the non standard elbows, only one of the three sides can exceed 600 mm. For example, when ordering a double horizontal elbow with size A=650 mm, the B and C sizes must be ≤ = 600 mm
In your purchase order please specify the required length (see catalogue page: How to take measurements).

Horizontal T Element



Dimensions



Horizontal standard T elements (300+300+300 mm)

	Al	Cu	
Rating [A]	Standard 300x300x300		
160	50**10**0500		T Elbow Right 1 (Type 1)
250	50**10**0501	51**10**0501	
400	50**10**0502	51**10**0502	
500	50**10**0503	51**10**0503	
630	50**10**0504	51**10**0504	
800	50**10**0505	51**10**0505	
1000		51**10**0506	
Rating [A]	Standard 300x300x300		
160	50**10**0510		T Elbow Right 2 (Type 2)
250	50**10**0511	51**10**0511	
400	50**10**0512	51**10**0512	
500	50**10**0513	51**10**0513	
630	50**10**0514	51**10**0514	
800	50**10**0515	51**10**0515	
1000		51**10**0516	
Rating [A]	Standard 300x300x300		
160	50**10**0520		T Elbow Left 1 (Type 3)
250	50**10**0521	51**10**0521	
400	50**10**0522	51**10**0522	
500	50**10**0523	51**10**0523	
630	50**10**0524	51**10**0524	
800	50**10**0525	51**10**0525	
1000		51**10**0526	
Rating [A]	Standard 300x300x300		
160	50**10**0530		T Elbow Left 2 (Type 4)
250	50**10**0531	51**10**0531	
400	50**10**0532	51**10**0532	
500	50**10**0533	51**10**0533	
630	50**10**0534	51**10**0534	
800	50**10**0535	51**10**0535	
1000		51**10**0536	

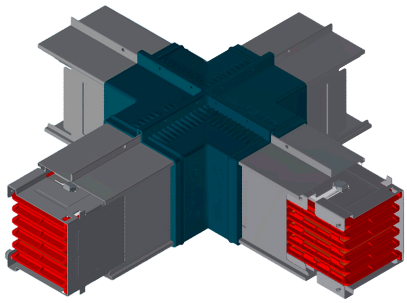
	Weight (kg)	
Rating [A]	Al	Cu
160	7,1	
250	7,9	9,5
400	10,3	13,3
500	11,4	16,9
630	13,9	18,8
800	16,4	25,4
1000		34,1

The weights indicated in the tables refer to the standard elements (300 + 300 + 300 mm)

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

For non standard T elements, only one of the three sides can exceed 600 mm. For example, when ordering a horizontal T element with size A=650 mm, B and C sizes must be ≤ 600 mm In your purchase order please specify the required length (see catalogue page: How to take measurements).

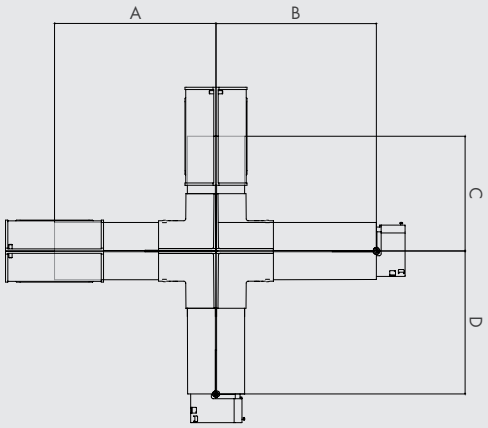
Crossovers



Cross standard elements (300+300+300+300 mm)		
	Al	Cu
	Standard 300x300x300	
160	5010**0**540	
250	5010**0**541	5110**0**541
400	5010**0**542	5110**0**542
500	5010**0**543	5110**0**543
630	5010**0**544	5110**0**544
800	5010**0**545	5110**0**545
1000		5110**0**546

10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

Dimensions



	Weight (kg)	
Rating [A]	Al	Cu
160	9,5	
250	10,5	12,7
400	13,7	17,7
500	15,2	22,5
630	18,5	25,0
800	21,8	33,8
1000		45,5

The weights indicated in the tables refer to the standard elements (300 + 300 + 300 + 300 mm)

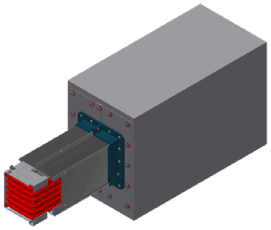
Special dimensions (not standard) are available on request, please contact Bahra TBS
The weights indicated in the tables refer to the standard elements (300 + 300 + 300 + 300 mm)

Feed Unit

Exit bar with metal box elements

Feeder elements for Panel board and transformers

Exit bar with metal box elements



Exit Bar

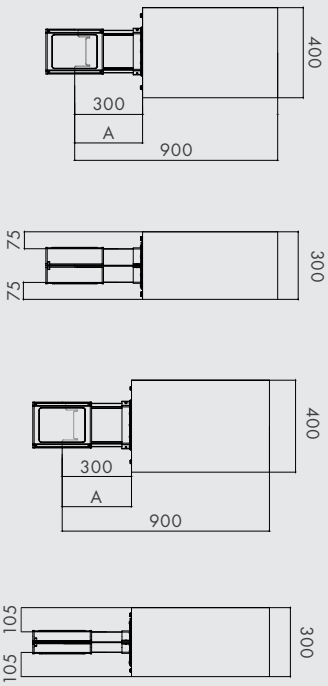
End Cover

	Al	Cu	Al	Cu	
Rating [A]	Standard 300		Special A		
160	50**10**1540		50**10**1550		
250	50**10**1541	51**10**1541	50**10**1551	51**10**1551	EXIT BARS WITH METAL BOX RIGHT (TYPE 1)
400	50**10**1542	51**10**1542	50**10**1552	51**10**1552	
500	50**10**1543	51**10**1543	50**10**1553	51**10**1553	
630	50**10**1544	51**10**1544	50**10**1554	51**10**1554	
800	50**10**1545	51**10**1545	50**10**1555	51**10**1555	
1000		51**10**1546		51**10**1556	
Rating [A]	Standard 300		Special A		
160	50**10**1560		50**10**1570		
250	50**10**1561	51**10**1561	50**10**1571	51**10**1571	EXIT BARS WITH METAL BOX LEFT (TYPE 2)
400	50**10**1562	51**10**1562	50**10**1572	51**10**1572	
500	50**10**1563	51**10**1563	50**10**1573	51**10**1573	
630	50**10**1564	51**10**1564	50**10**1574	51**10**1574	
800	50**10**1565	51**10**1565	50**10**1575	51**10**1575	
1000		51**10**1566		51**10**1576	

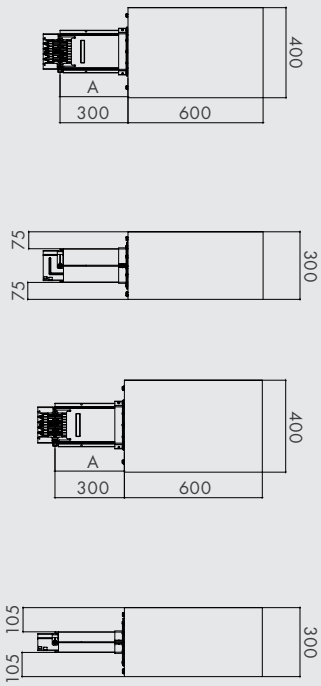
10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

Dimensions

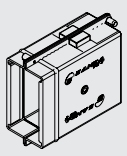
Type 1 Right



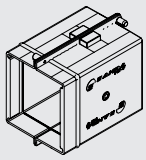
Type 2 Left



End cover IP55 (EN 60529)
For the following ratings: 160 -250A Al and 250-400A Cu
For the following ratings: 400-800A Al and 500-1000A Cu



cod. 50102500



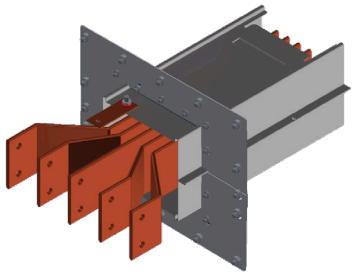
cod. 501025001

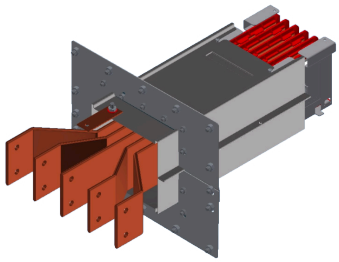
Rating [A]	Al	Cu	
160	14,8		
250	14,9	15,0	
400	15,1	15,2	
500	15,2	15,6	EXIT BARS WITH METAL BOX RIGHT (TYPE 1)
630	15,3	15,7	
800	15,5	16,2	
1000		16,9	

Rating [A]	Al	Cu	
160	16,8		
250	16,8	16,9	
400	18,3	17,8	
500	18,8	19,2	EXIT BARS WITH METAL BOX LEFT (TYPE 2)
630	19,7	19,4	
800	19,7	20,6	
1000		21,9	

The box is shipped with its body part positioned inside to reduce its overall dimensions. Take it out and screw it into the position shown here. The dimensions of the bars and holes are described in the corresponding rating of the next page

Feeder elements for Panel board and transformers





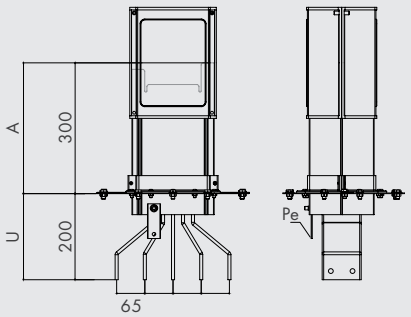
Feeder element is the best solution for direct connection of the busbar to a switchboard or to the LV terminals of a distribution transformer.

	Al	Cu	Al	Cu	
Rating [A]	Standard 300x200		Special AxU		
160	50**10**1500		50**10**1510		
250	50**10**1501	51**10**1501	50**10**1511	51**10**1511	
400	50**10**1502	51**10**1502	50**10**1512	51**10**1512	
500	50**10**1503	51**10**1503	50**10**1513	51**10**1513	Feeder Right (Type 1)
630	50**10**1504	51**10**1504	50**10**1514	51**10**1514	
800	50**10**1505	51**10**1505	50**10**1515	51**10**1515	
1000		51**10**1506		51**10**1516	
Rating [A]	Standard 300x200		Special AxU		
160	50**10**1520		50**10**1530		
250	50**10**1521	51**10**1521	50**10**1531	51**10**1531	
400	50**10**1522	51**10**1522	50**10**1532	51**10**1532	
500	50**10**1523	51**10**1523	50**10**1533	51**10**1533	Feeder Left (Type 2)
630	50**10**1524	51**10**1524	50**10**1534	51**10**1534	
800	50**10**1525	51**10**1525	50**10**1535	51**10**1535	
1000		51**10**1526		51**10**1536	

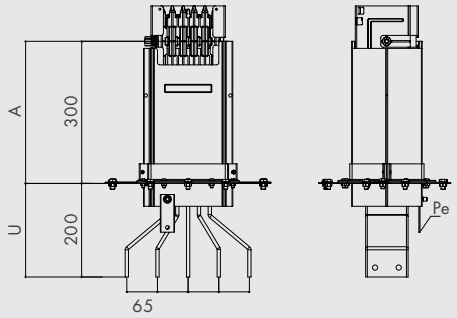
10 - 3P+N+PE casing
11 - 3P+N+FE+PE casing
20 - 3P+N+PE casing (painted version)*
21 - 3P+N+FE+PE casing (painted version)*

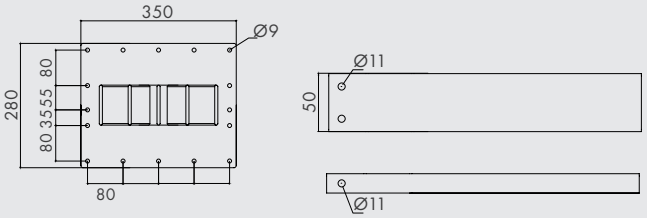
Dimensions

Type 1 Right



Type 2 Left





Rating [A]	Al	Cu	
160	3,1		
250	3,1	3,2	
400	3,4	3,5	
500	3,4	3,9	Feeder Element Right (Type 1))
630	3,6	4,0	
800	3,8	4,5	
1000		5,1	

Reference holes	Al	Cu
Type 1	160	250
	250	400
Type 2	400	500
	500	630
	630	800
	800	1000

Rating [A]	Al	Cu	
160	5,0		
250	5,0	5,2	
400	6,6	6,0	
500	7,1	7,5	Feeder Element Left (Type 2)
630	7,9	7,6	
800	7,9	8,8	
1000		10,1	

The weights indicated in the tables refer to the standard elements (300 + 200 mm)

Special dimensions (not standard) are available on request, please contact Bahra TBS
The weights indicated in the tables refer to the standard elements (300 + 200 mm)

Plug-in Boxes

Plug-in boxes From 16A to 160A

Plug-in box Type 1

Plug-in box Type 2

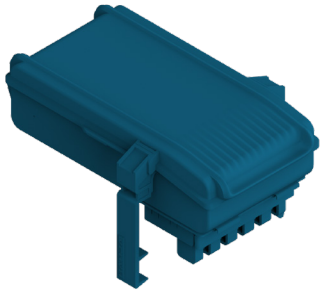
Plug-in box Type 3

Plug-in box Mounting

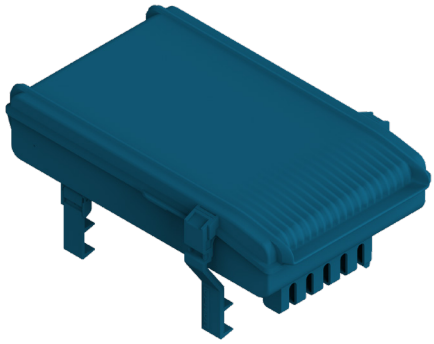
Plug-in boxes From 16A to160A

Specifically designed with high tech insulating structural polymers characterized by simple installation and fast connection thanks to special design of the hooks and outlet's plug that offer safety and speed of installation.
Designed according to IEC 61439-1 and 6, IP55 can be installed and removed also when busway is energized.
All plug-in boxes can be installed in all outlets in any position and any combination up to 5+5 each 3m

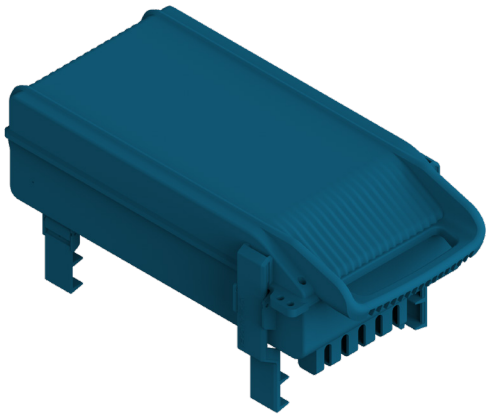
Type 1



Type 2



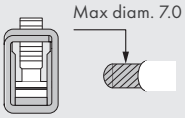
Type 3



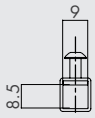
10 - 3P + N + PEcasing
11 - 3P + N + FE + Pe casing

Type 1 & 2

Terminal dimension for L1, L2, L3, N, Fe

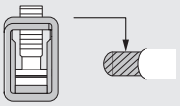


Flexible
1.3 → 33.6 mm²
#16 → #2 AWG
Solid
1.3 → 42.4 mm²
#16 → #1 AWG

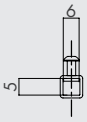


Max diam. 5.0

Terminal dimension for Pe

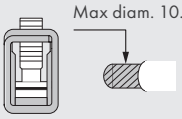


Flexible
0.8 → 13.3 mm²
#18 → #6 AWG
Solid
0.8 → 13.3 mm²
#18 → #6 AWG

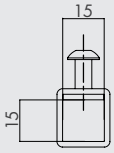


Type 3

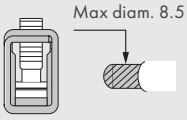
Terminal dimension for L1, L2, L3, N, Fe



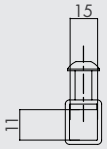
Flexible
1.31 → 67.43 mm²
#16 → #2/0 AWG
Solid
1.31 → 67.43 mm²
#16 → #3/0 AWG



Terminal dimension for Pe

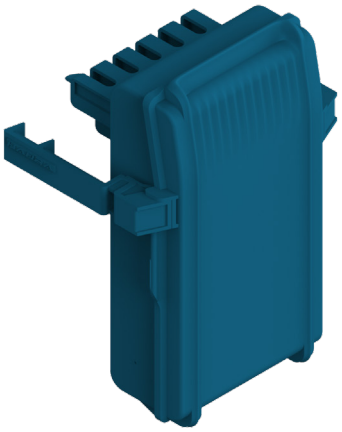


Flexible
1.31 → 42.41 mm²
#16 → #1 AWG
Solid
1.31 → 53.48 mm²
#16 → #1 AWG



AWG	Diametr (mm)	Area (mm²)
4/0	11.684	107,2
3/0	10.404	85,03
2/0	9.266	67,43
1/0	8.252	53,48
1	7.348	42,41
2	6.544	33,63
4	5.189	21,15
6	4.115	13,30
8	3.264	8,37
10	2.588	5,26
12	2.053	3,31
14	1.628	2,08
16	1.291	1,31
18	1024	0,823

Plug-in box Type 1

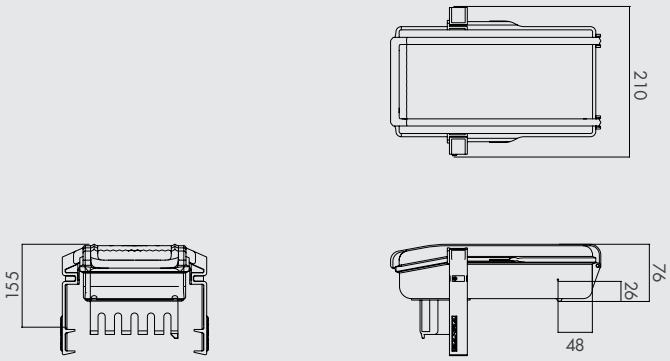


Version	Code	Description
Type 1	51100600	BMR - Plug-in box 16A empty
	51100601	BMR - Plug-in box 16A 4 modules window
	51100602	BMR - Plug-in box 16A with 2 socket 220V
	51100603	BMR - Plug-in box 16A with 4 modules window and socket 220V
	51100604	BMR - Plug-in box 16A 7 1/2 modules window

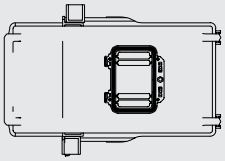
10 - 3P + N + PEcasing
11 - 3P + N + FE + Pe casing

Dimensions

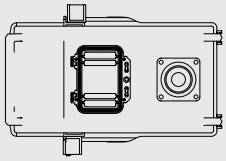
51102600



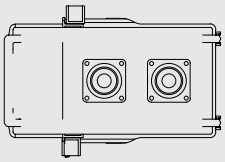
51102601



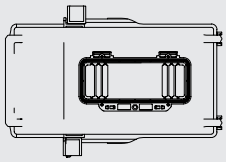
51102603

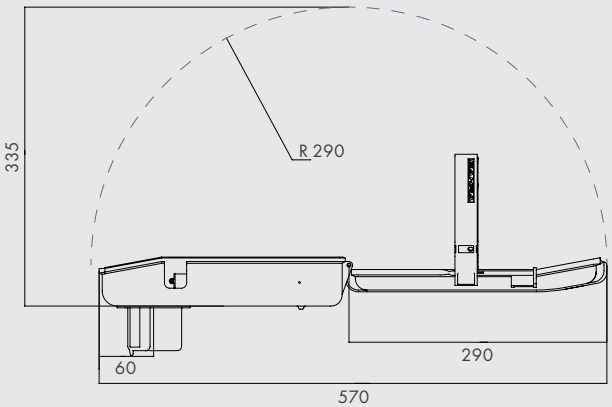


51102602

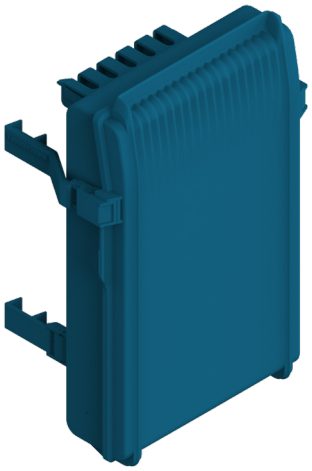


51102604





Plug-in box Type 2

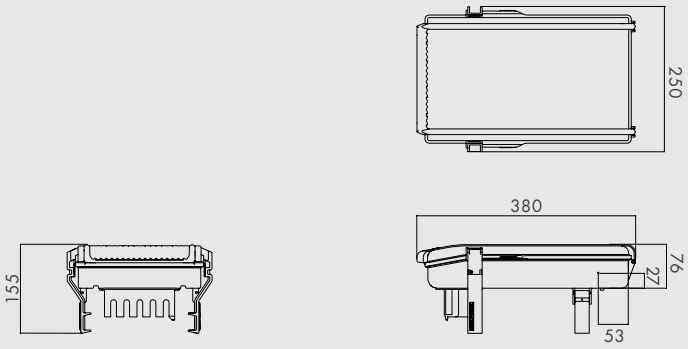


Version	Code	Description
Type 2	51101600	BMR - Plug-in box 32A empty
	51101601	BMR - Plug-in box 32A 4 modules window
	51101602	BMR - Plug-in box 32A with 4 modules window and 2 sockets 220V
	51101603	BMR - Plug-in box 32A with 7 1/2 modules window and 3 sockets 220V
	51101604	BMR - Plug-in box 32A with 7 1/2 modules window and 2 industrial sockets
	51101605	BMR - Plug-in box 32A with 11 modules window and 2 industrial sockets

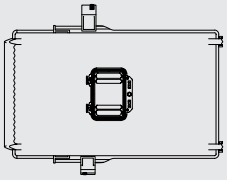
10 - 3P + N + PEcasing
11 - 3P + N + FE + Pe casing

Dimensions

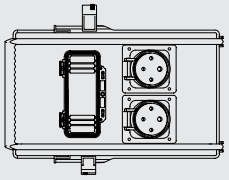
51101600



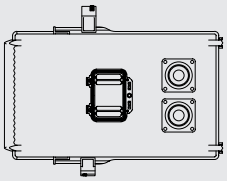
51101601



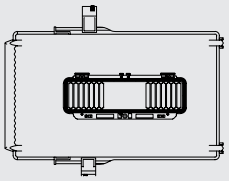
51101604



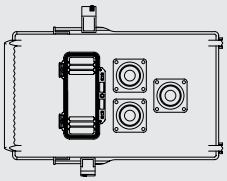
51101602

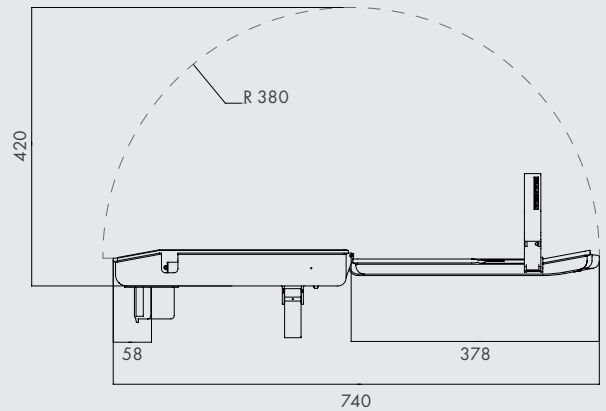


51101605

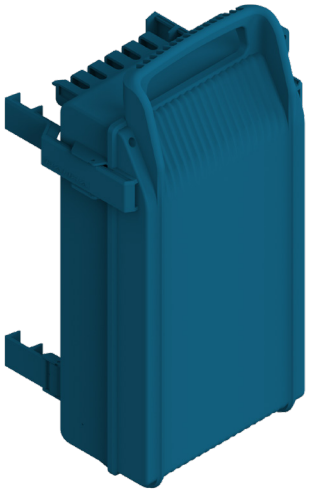


51101603





Plug-in box Type 3



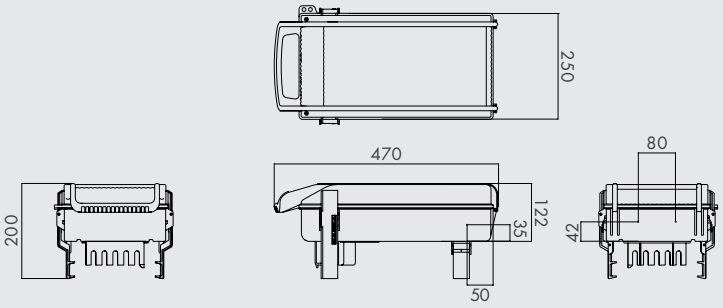
Version	Code	Description
Type 3	51102600	BMR - Plug-in box 63A empty
	51103600	BMR - Plug-in box 125A empty
	51104600	BMR - Plug-in box 160A empty
	51102601	BMR - Plug-in box 63A 4 modules window
	51102602	BMR - Plug-in box 63A 7 1/2 modules window
	51102603	BMR - Plug-in box 63A 9 modules window
	51102604	BMR - Plug-in box 63A with 7 1/2 modules window and 3 sockets 220V
	51102605	BMR - Plug-in box 63A with 7 1/2 modules window and 2 industrial sockets
	51102606	BMR - Plug-in box 63A 9 modules window and 2 sockets 220V
	51103601	BMR - Plug-in box 125A 4 modules window
	51103602	BMR - Plug-in box 125A 7 1/2 modules window
	51103603	BMR - Plug-in box 125A 9 modules window
	51103604	BMR - Plug-in box 125A with 7 1/2 modules window and 3 sockets 220V
	51103605	BMR - Plug-in box 125A with 7 1/2 modules window and 2 industrial sockets
	51103606	BMR - Plug-in box 125A 9 modules window and 2 sockets 220V
	51104601	BMR - Plug-in box 160A 4 modules window
	51104602	BMR - Plug-in box 160A 7 1/2 modules window
	51104603	BMR - Plug-in box 160A 9 modules window
	51104604	BMR - Plug-in box 160A with 7 1/2 modules window and 3 sockets 220V
	51104605	BMR - Plug-in box 160A with 7 1/2 modules window and 2 industrial sockets
	51104606	BMR - Plug-in box 160A 9 modules window and 2 sockets 220V

Select the correct amperage

10 - 3P + N + PEcasing
11 - 3P + N + FE + Pe casing

Dimensions

51102600
51103600
51104600



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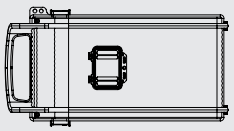

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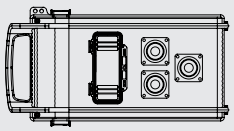

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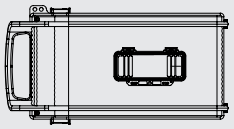

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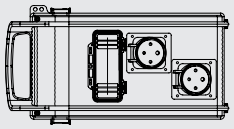

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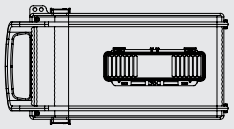

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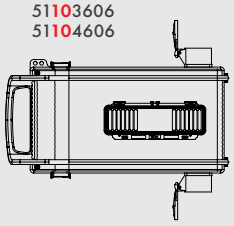
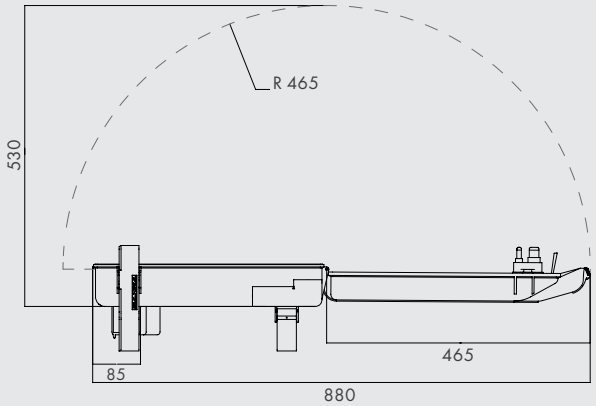
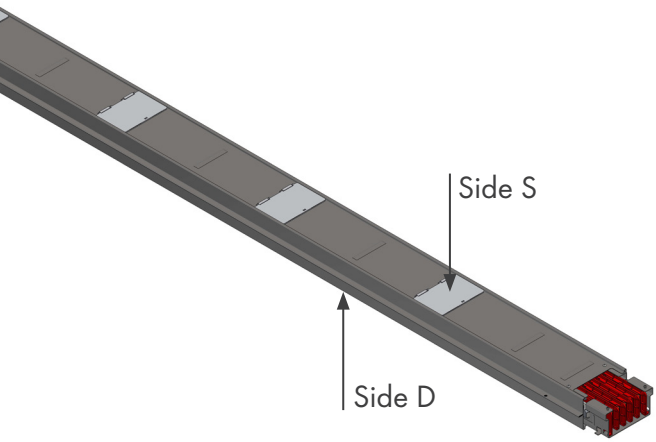
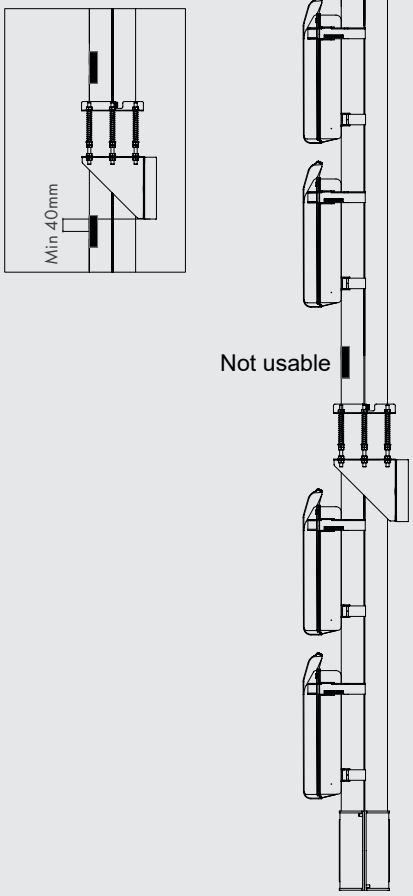




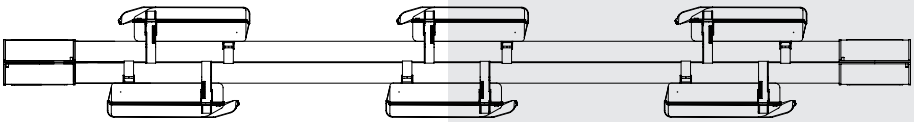
Plug-in box Mounting



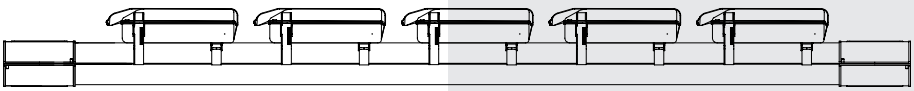
Rising mains



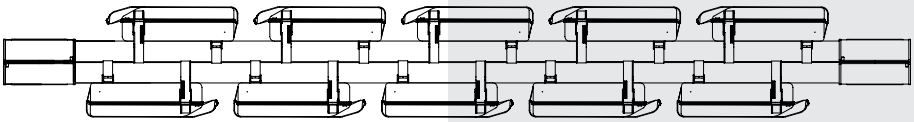
3+3 OUTLET WINDOWS IP55 JUNCTION COVER



5 OUTLET WINDOWS IP55 JUNCTION COVER



5+5 OUTLET WINDOWS IP55 JUNCTION COVER



Support Solution

BMR Bracket

BMR Bracket with springs

BMR Pavement Bracket

BMR Horizontal Bracket

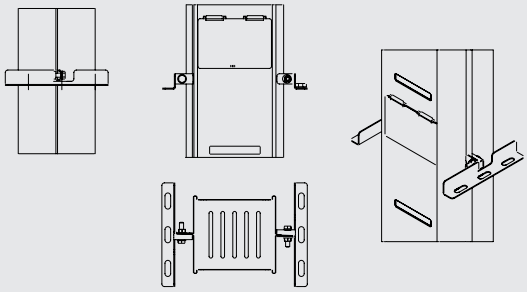
BMR Wall Bracket

BMR Bracket

Brackets for vertical elements

Type 1, 2, 3
1 each 2m

1



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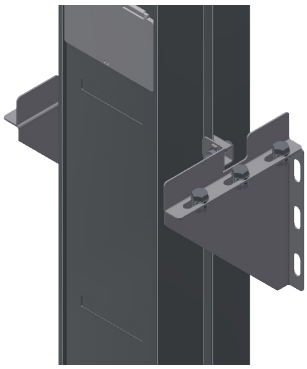

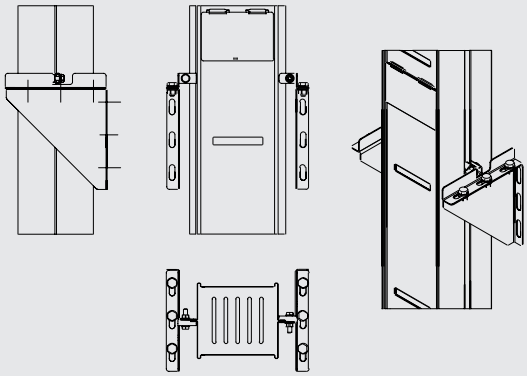

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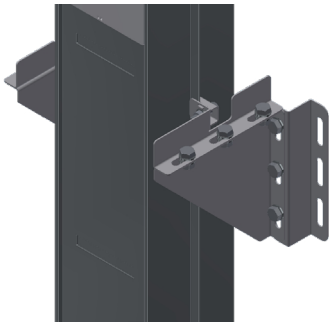
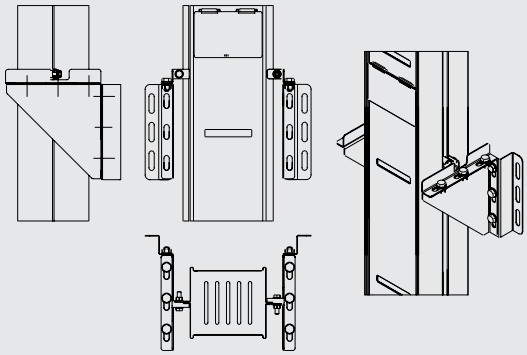




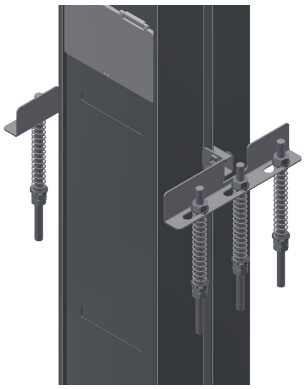
	Suspension brackets		
N. dwg	Code	Description	Q.ty
1	50102520	BMR RISING MAINS BRACKETS	10
2	50102522	BMR VERTICAL WALL BRACKETS	10
3	50102524	BMR VERTICAL WALL BRACKETS WITH SPACER	10

1 bracket for every 1.5 m of line
For more detail see page: How to take measurements

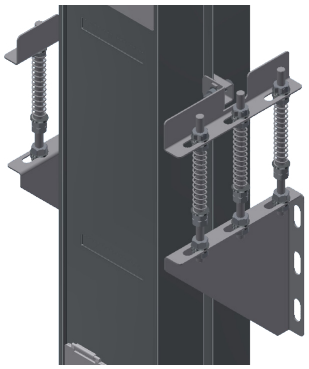
	BMR		BMR-F	
	Distance between two spring hangers (m)			
	Al	Cu	Al	Cu
160	21		17	
250	20	18	17	15
400	18	15	15	13
500	17	13	14	11
630	15	12	13	10
800	14	10	11	8
1000		8		7

BMR Bracket with Springs

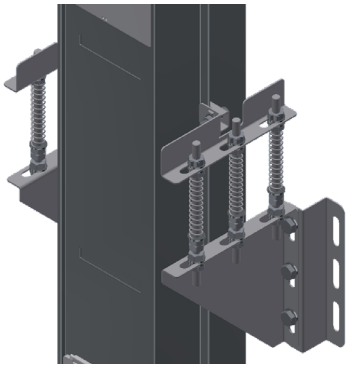
4



5



6



		Suspension brackets	
N. dwg	Code	Description	Q.ty
4	50102521	BMR RISING MAINS BRACKETS WITH SPRINGS	5
5	50102523	BMR VERTICAL WALL BRACKETS WITH SPRINGS	5
6	50102525	BMR VERTICAL WALL BRACKETS WITH SPRINGS AND SPACER	5

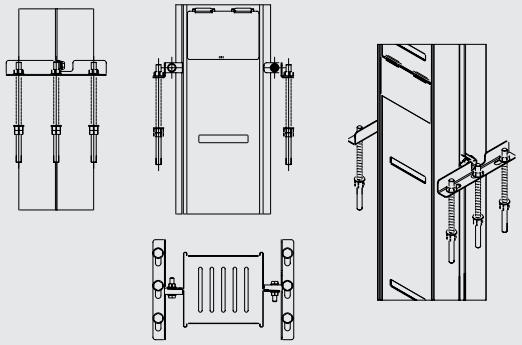
1 bracket for every 1.5 m of line

For more detail see page: How to take measurements

Brackets for vertical elements

Type 4, 5, 6
1 bracket every 300kg

4



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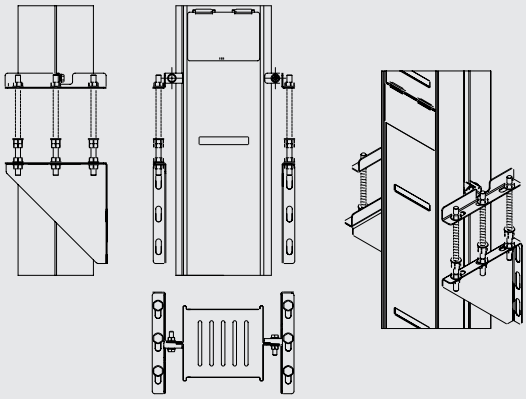

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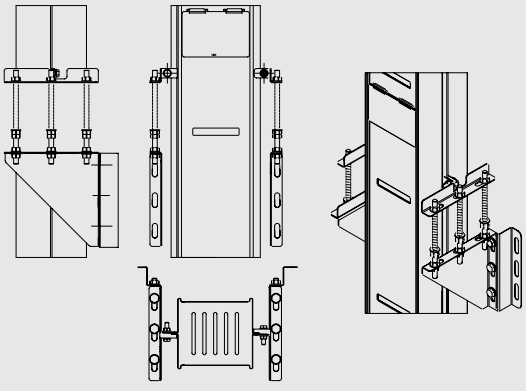


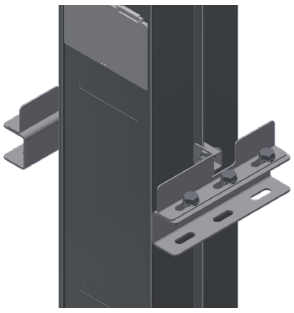
Number of springs		
Rating [A]	Al	Cu
160	4	
250	4	4
400	4	6
500	4	6
630	6	6
800	6	6
1000		6

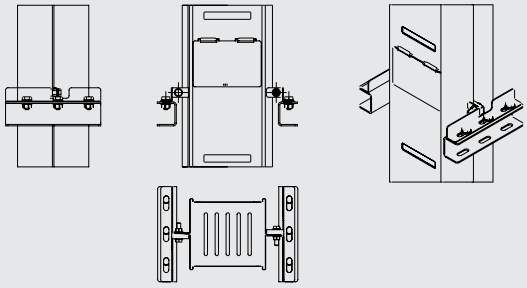
BMR Pavement Bracket

Brackets for Pavement

Type 7, 8
Dedicated to support busway from pavement

7





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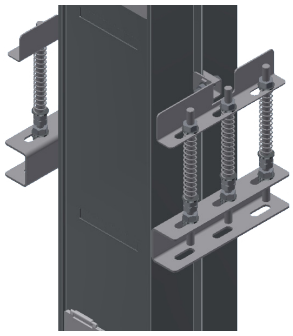
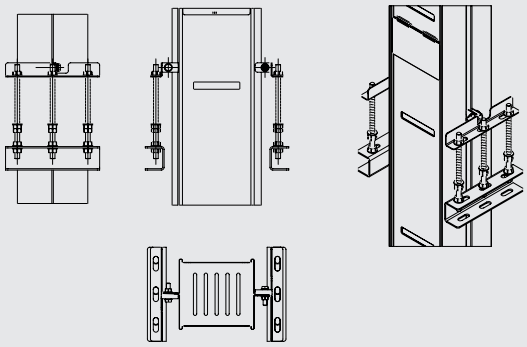
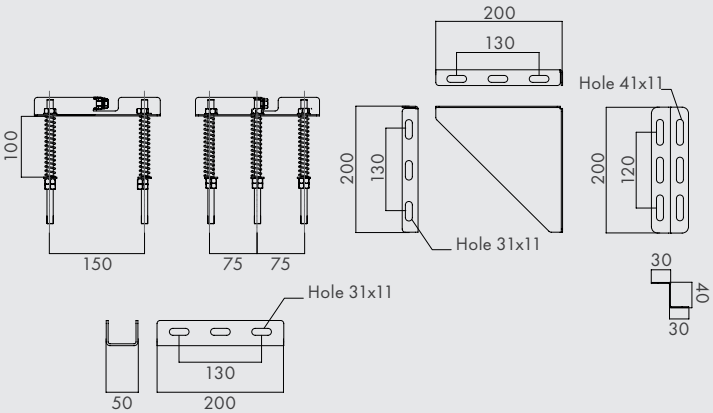




Dimensions



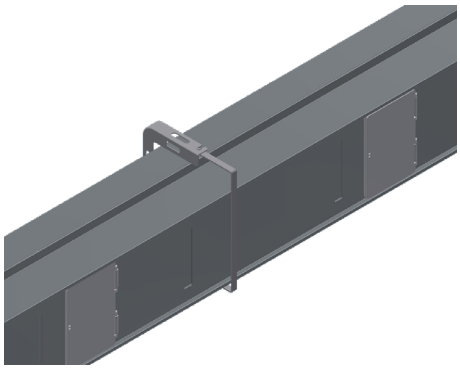
Suspension brackets			
N. dwg	Code	Description	Q.ty
7	50102526	BMR PAVEMENT BRACKETS	5
8	50102527	BMR PAVEMENT BRACKETS WITH SPRINGS	5

1 bracket for every 1.5 m of line
For more detail see page: How to take measurements

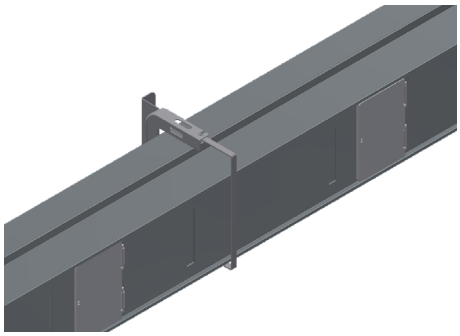
Number of springs		
Rating [A]	Al	Cu
160	4	
250	4	4
400	4	6
500	4	6
630	6	6
800	6	6
1000		6

BMR Horizontal Bracket

9, 10



11, 12



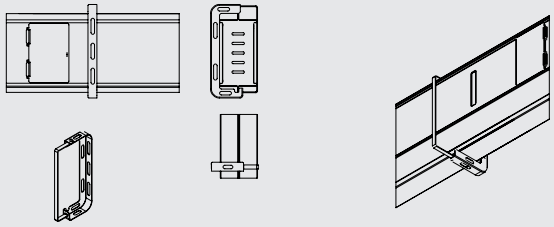
	Suspension brackets		
N. dwg	Code	Description	Q.ty
9	50102528	BMR HORIZONTAL BRAKETS B30	10
10	50102529	BMR HORIZONTAL BRAKETS B90	10
11	50102530	BMR HORIZONTAL BRAKETS WITH SPACER B30	5
12	50102531	BMR HORIZONTAL BRAKETS WITH SPACER B90	5

1 bracket for every 1.5 m of line
For more detail see page: How to take measurements

Brackets for Horizontal Elements

Type 9, 10 , 11, 12

9



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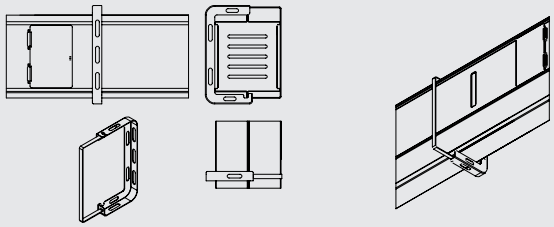

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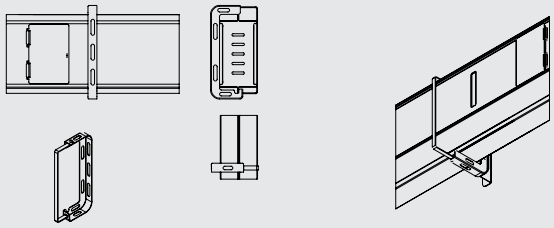

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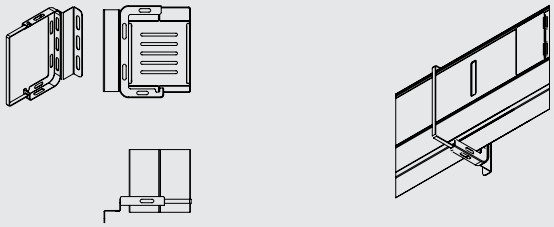
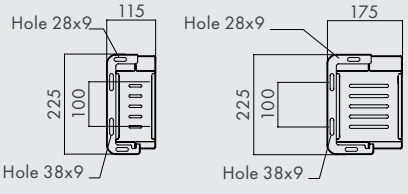
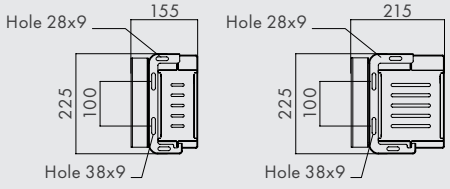
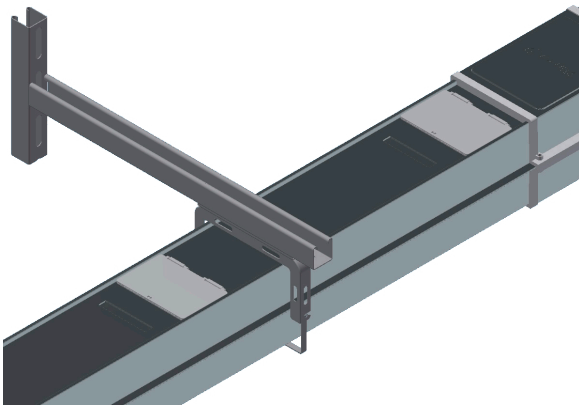


Dimensions

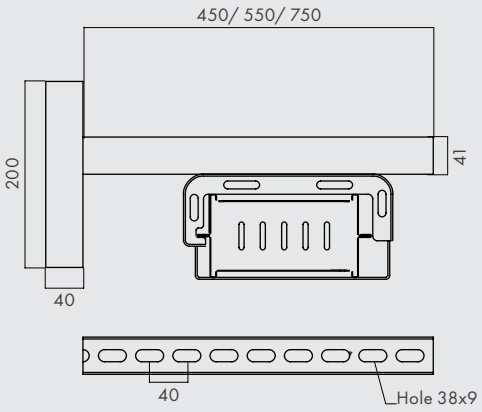




BMR Wall brackets



Dimension



Code	WALL FIXING C-CHANNEL	Q.ty
50102532	BMR WALL FIXING C-CHANNEL 450mm	5
50102533	BMR WALL FIXING C-CHANNEL 550mm	5
50102534	BMR WALL FIXING C-CHANNEL 750mm	5
50102535	BMR BRACKETS SPACER	10

Code	WALL FIXING C-CHANNEL	MAX ALLOWABLE WEIGHT (kg)
1	BMR WALL FIXING C-CHANNEL 450mm	80
2	BMR WALL FIXING C-CHANNEL 550mm	68
3	BMR WALL FIXING C-CHANNEL 750mm	50

Technical Information

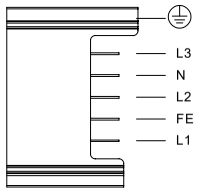
Technical data sheet BMR - 50Hz

Technical data sheet BMR - 60Hz

Technical Info

Technical data sheet BMR - 50Hz

BMR - 50Hz													
Updated on 14/02/2025		Aluminium						Copper					
Rated current	In [A]	160	250	400	500	630	800	250	400	500	630	800	1000
Overall dimension of the busbars	L x H [mm]	90x190	90x190	150x190	150x190	150x190	150x190	90x190	90x190	150x190	150x190	150x190	150x190
Rated operational voltage	Ue [V]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated insulation voltage	Ui [V]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Frequency	f [Hz]	50	50	50	50	50	50	50	50	50	50	50	50
Rated short-time current (1 s)	ICW [kA]rms	15.0*	25.0*	30,0	30,0	36,0	36,0	25.0*	30,0	30,0	36,0	36,0	36,0
Peak current	Ipk [kA]	30,0	52,5	63,0	63,0	75,6	75,6	52,5	63,0	63,0	75,6	75,6	75,6
Rated short-time current of the neutral bar (1 s)	ICW [kA]rms	9,0	15,0	18,0	18,0	21,6	21,6	15,0	18,0	18,0	21,6	21,6	21,6
Peak current of the neutral bar	Ipk [kA]	15,3	30,0	36,0	36,0	45,4	45,4	30,0	36,0	36,0	45,4	45,4	45,4
Rated short-time current of the protective circuit (1 s)	ICW [kA]rms	9,0	15,0	18,0	18,0	21,6	21,6	15,0	18,0	18,0	21,6	21,6	21,6
Peak current of the protective circuit	Ipk [kA]	15,3	30,0	36,0	36,0	45,4	45,4	30,0	36,0	36,0	45,4	45,4	45,4
Average phase resistance at 20°C	R20 [mΩ/m]	0,593	0,301	0,151	0,115	0,073	0,052	0,291	0,135	0,089	0,080	0,051	0,035
Average phase reactance	X [mΩ/m]	0,150	0,150	0,140	0,070	0,070	0,070	0,158	0,119	0,102	0,064	0,064	0,056
Average phase impedance	Z [mΩ/m]	0,612	0,336	0,206	0,135	0,101	0,087	0,331	0,180	0,135	0,102	0,082	0,066
Average phase resistance at thermal conditions	R [mΩ/m]	0,762	0,386	0,194	0,148	0,094	0,066	0,377	0,175	0,115	0,104	0,066	0,045
Average phase impedance at thermal conditions	Z [mΩ/m]	0,777	0,414	0,239	0,164	0,117	0,096	0,409	0,212	0,154	0,122	0,092	0,072
Average Neutral resistance	R20 [mΩ/m]	0,593	0,301	0,151	0,115	0,073	0,052	0,291	0,135	0,089	0,080	0,051	0,035
Average Resistance of the protective bar	RPE [mΩ/m]	0,310	0,310	0,257	0,257	0,257	0,257	0,310	0,310	0,257	0,257	0,257	0,257
Average reactance of the protective bar	XPE [mΩ/m]	0,220	0,220	0,180	0,180	0,180	0,180	0,220	0,220	0,180	0,180	0,180	0,180
Average resistance of the Ph to PE fault loop	Ro [mΩ/m]	0,903	0,611	0,408	0,372	0,330	0,309	0,601	0,445	0,346	0,337	0,308	0,292
Average reactance of the Ph to PE fault loop	Xo [mΩ/m]	0,370	0,370	0,320	0,250	0,250	0,250	0,378	0,339	0,282	0,244	0,244	0,236
Average impedance of the Ph to PE fault loop	Zo [mΩ/m]	0,976	0,714	0,518	0,448	0,414	0,397	0,710	0,560	0,446	0,416	0,393	0,375
Zero-sequence short-circuit average resistance phase - N	Ro [mΩ/m]	0,791	0,401	0,201	0,154	0,097	0,069	0,388	0,180	0,118	0,107	0,068	0,046
Zero-sequence short-circuit average reactance phase - N	Xo [mΩ/m]	0,643	0,200	0,187	0,093	0,093	0,093	0,211	0,159	0,136	0,085	0,085	0,075
Zero-sequence short-circuit average impedance phase - N	Zo [mΩ/m]	1,020	0,448	0,274	0,180	0,135	0,116	0,441	0,240	0,180	0,136	0,109	0,088
Zero-sequence short-circuit average resistance phase - PE	Ro [mΩ/m]	1,101	0,711	0,458	0,411	0,354	0,326	0,698	0,490	0,375	0,364	0,325	0,303
Zero-sequence short-circuit average reactan ce phase - PE	Xo [mΩ/m]	0,270	0,270	0,227	0,203	0,203	0,203	0,273	0,260	0,214	0,201	0,201	0,199
Zero-sequence short-circuit average impedance phase - PE	Zo [mΩ/m]	1,134	0,760	0,511	0,458	0,409	0,384	0,749	0,555	0,432	0,416	0,383	0,362
"Voltage drop with distribuited load ΔV [V/(m*A)]10 ⁶"	cosϕ= 0,70	555,0	327,0	204,1	133,1	100,2	83,4	326,2	179,8	132,8	102,4	79,8	61,8
	cosϕ= 0,75	581,1	336,9	206,1	136,3	101,1	83,1	335,3	182,0	133,1	103,9	79,8	61,2
	cosϕ= 0,80	606,2	345,6	207,0	139,0	101,5	82,2	343,2	183,3	132,7	105,0	79,2	60,2
	cosϕ= 0,85	629,7	352,9	206,5	141,0	101,1	80,6	349,5	183,3	131,2	105,4	78,1	58,6
	cosϕ= 0,90	650,9	357,8	203,9	141,9	99,6	78,0	353,3	181,5	128,1	104,9	75,9	56,1
	cosϕ= 0,95	667,8	358,5	197,3	140,8	96,2	73,4	352,7	176,4	122,2	102,5	71,9	52,0
	cosϕ= 1,00	660,3	334,6	167,8	128,3	81,3	57,3	326,3	151,8	99,6	89,7	57,5	38,8
Total conductors' sizes	[mm²]	59	117	233	304	480	680	74	159	241	268	418	620
Weight	p [kg/m]	6,0	6,6	9,6	8,7	11,7	13,8	8,0	11,2	14,2	15,8	21,4	28,7
Degree of protection	IP	55	55	55	55	55	55	55	55	55	55	55	55
Insulation material thermal resistance class		F	F	F	F	F	F	F	F	F	F	F	F
Losses for the Joule effect at nominal current	P [W/m]	58,6	72,4	93,0	111,1	111,8	127,1	70,7	84,1	86,2	123,3	127,4	134,6
Ambient temperature min/MAX	[°C]	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40

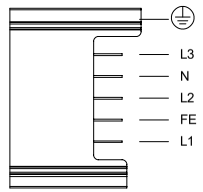


Ambient temperature ('C)	10	15	20	25	30	35	40	45	50	55	60
Factor Kt	1,19	1,16	1,13	1,10	1,07	1,03	1,00	0,97	0,93	0,89	0,86

* Values referred to 0.1s

Technical data sheet BMR - 60Hz

BMR - 60Hz													
Updated on 14/02/2025		Aluminium						Copper					
Rated current	In [A]	160	250	400	500	630	800	250	400	500	630	800	1000
Overall dimension of the busbars	L x H [mm]	90x190	90x190	150x190	150x190	150x190	150x190	90x190	90x190	150x190	150x190	150x190	150x190
Rated operational voltage	Ue [V]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated insulation voltage	Ui [V]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Frequency	f [Hz]	60	60	60	60	60	60	60	60	60	60	60	60
Rated short-time current (1 s)	ICW [kA]rms	15.0*	25.0*	30,0	30,0	36,0	36,0	25.0*	30,0	30,0	36,0	36,0	36,0
Peak current	Ipk [kA]	30,0	52,5	63,0	63,0	75,6	75,6	52,5	63,0	63,0	75,6	75,6	75,6
Rated short-time current of the neutral bar (1 s)	ICW [kA]rms	9,0	15,0	18,0	18,0	21,6	21,6	15,0	18,0	18,0	21,6	21,6	21,6
Peak current of the neutral bar	Ipk [kA]	15,3	30,0	36,0	36,0	45,4	45,4	30,0	36,0	36,0	45,4	45,4	45,4
Rated short-time current of the protective circuit (1 s)	ICW [kA]rms	9,0	15,0	18,0	18,0	21,6	21,6	15,0	18,0	18,0	21,6	21,6	21,6
Peak current of the protective circuit	Ipk [kA]	15,3	30,0	36,0	36,0	45,4	45,4	30,0	36,0	36,0	45,4	45,4	45,4
Average phase resistance at 20°C	R20 [mΩ/m]	0,593	0,301	0,151	0,115	0,073	0,052	0,291	0,135	0,089	0,080	0,051	0,035
Average phase reactance	X [mΩ/m]	0,180	0,180	0,168	0,084	0,084	0,084	0,190	0,143	0,122	0,077	0,077	0,067
Average phase impedance	Z [mΩ/m]	0,620	0,350	0,226	0,143	0,111	0,099	0,347	0,197	0,151	0,111	0,092	0,076
Average phase resistance at thermal conditions	R [mΩ/m]	0,762	0,386	0,194	0,148	0,094	0,066	0,377	0,175	0,115	0,104	0,066	0,045
Average phase impedance at thermal conditions	Z [mΩ/m]	0,783	0,426	0,256	0,170	0,126	0,107	0,422	0,226	0,168	0,129	0,102	0,081
Average Neutral resistance	R20 [mΩ/m]	0,593	0,301	0,151	0,115	0,073	0,052	0,291	0,135	0,089	0,080	0,051	0,035
Average Resistance of the protective bar	RPE [mΩ/m]	0,310	0,310	0,257	0,257	0,257	0,257	0,310	0,310	0,257	0,257	0,257	0,257
Average reactance of the protective bar	XPE [mΩ/m]	0,264	0,264	0,216	0,216	0,216	0,216	0,264	0,264	0,216	0,216	0,216	0,216
Average resistance of the Ph to PE fault loop	Ro [mΩ/m]	0,903	0,611	0,408	0,372	0,330	0,309	0,601	0,445	0,346	0,337	0,308	0,292
Average reactance of the Ph to PE fault loop	Xo [mΩ/m]	0,444	0,444	0,384	0,300	0,300	0,300	0,454	0,407	0,338	0,293	0,293	0,283
Average impedance of the Ph to PE fault loop	Zo [mΩ/m]	1,007	0,755	0,560	0,478	0,446	0,430	0,753	0,603	0,484	0,446	0,425	0,406
Average impedance of the fault loop (PE 2)	Zo [mΩ/m]	0,444	0,444	0,384	0,300	0,300	0,300	0,454	0,407	0,338	0,293	0,293	0,283
Zero-sequence short-circuit average resistance phase - N	Ro [mΩ/m]	0,791	0,401	0,201	0,154	0,097	0,069	0,388	0,180	0,118	0,107	0,068	0,046
Zero-sequence short-circuit average reactance phase - N	Xo [mΩ/m]	0,240	0,240	0,224	0,112	0,112	0,112	0,253	0,190	0,163	0,102	0,102	0,090
Zero-sequence short-circuit average impedance phase - N	Zo [mΩ/m]	0,827	0,467	0,301	0,190	0,148	0,131	0,463	0,262	0,202	0,148	0,123	0,101
Zero-sequence short-circuit average resistance phase - PE	Ro [mΩ/m]	1,101	0,711	0,458	0,411	0,354	0,326	0,698	0,490	0,375	0,364	0,325	0,303
Zero-sequence short-circuit average reactance phase - PE	Xo [mΩ/m]	0,324	0,324	0,272	0,244	0,244	0,244	0,327	0,312	0,257	0,242	0,242	0,238
Zero-sequence short-circuit average impedance phase - PE	Zo [mΩ/m]	1,148	0,781	0,533	0,478	0,430	0,407	0,771	0,581	0,455	0,436	0,405	0,386
"Voltage drop with distribuited load ΔV [V/(m*A)]10 ⁶"	cosϕ= 0,70	573,5	345,6	221,4	141,8	108,9	92,1	345,7	194,6	145,4	110,3	87,7	68,7
	cosϕ= 0,75	598,3	354,1	222,1	144,4	109,1	91,1	353,4	195,6	144,8	111,3	87,1	67,6
	cosϕ= 0,80	621,7	361,2	221,5	146,3	108,7	89,5	359,6	195,6	143,3	111,7	85,9	66,0
	cosϕ= 0,85	643,3	366,6	219,3	147,4	107,5	87,0	363,9	194,2	140,5	111,3	83,9	63,7
	cosϕ= 0,90	662,2	369,1	214,5	147,2	104,9	83,3	365,3	190,5	135,8	109,7	80,7	60,3
	cosϕ= 0,95	675,9	366,6	204,9	144,6	100,0	77,2	361,3	182,8	127,7	106,0	75,4	55,1
	cosϕ= 1,00	660,3	334,6	167,8	128,3	81,3	57,3	326,3	151,8	99,6	89,7	57,5	38,8
Total conductors' sizes	[mm²]	59	117	233	304	480	680	74	159	241	268	418	620
Weight	p [kg/m]	6,0	6,6	9,6	8,7	11,7	13,8	8,0	11,2	14,2	15,8	21,4	28,7
Degree of protection	IP	55	55	55	55	55	55	55	55	55	55	55	55
Insulation material thermal resistance class		F	F	F	F	F	F	F	F	F	F	F	F
Losses for the Joule effect at nominal current	P [W/m]	58,6	72,4	93,0	111,1	111,8	127,1	70,7	84,1	86,2	123,3	127,4	134,6
Ambient temperature min/MAX	[°C]	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40	-5/40



Ambient temperature ('C)	10	15	20	25	30	35	40	45	50	55	60
Factor Kt	1,19	1,16	1,13	1,10	1,07	1,03	1,00	0,97	0,93	0,89	0,86

* Values referred to 0.1s

Technical Info

Straight lengths

The components and the features of the BMR busway are:

- a casing made of galvanized steel used as protective earth (PE);
- overall busbar dimensions: 90x190 and 150x190;
- painted casing available on request (color to be defined by the customer)
- number of conductors: 4 same section (3P+N) with PE casing or 5 same cross section (3P+N+FE) with PE casing, busbars available in tinned aluminum or copper ETP;
- conductors insulators are made by fiberglass reinforced plastic material, V0 class self-extinguishing degree (according to UL94), in compliance with the glow-wire test according to IEC 60695-2-10;
- tap-off outlets with a constant center distance of 1 m on both sides of the busbar (3+3 outlets every 3m) or 530mm on both sides of the busbar (5+5 outlets every 3m), set up for being connected to plug-in type tap-off boxes; These outlets open and close automatically when inserting or pulling out a tap-off box;
- monobloc electric junction system made with copper to connect conductors and PE in a fast and reliable way. The monobloc has self breaking nut with a preset torque setting which ensure good, long lasting electrical continuity
- all components and accessories are IP55
- the whole busbar is fire retardant in compliance with the IEC 60332-3 standard

Feed units

Allows you to electrically power the BMR line through a cable line or directly connected to a distribution panel board. The 160 and 250A feed units have terminals for cables up to 150mm^2; for higher ratings, the cable connection to the feed unit requires cable lugs to be fastened to the provided spreaders.

End cover

The end cover ensures the IP55 protection degree at the end of the line

Fixing supports

Installation of the busways to the structure of the building, directly or with wall / ceiling / beam supports can be made in an easy and reliable way with a complete range of solutions provided by Bahra TBS. For any special need contact Bahra TBS technical department.

Tap-off boxes

Used for energizing three-phase loads from 16A up to 160A
Plug-in type tap-off boxes (from 16A up to 160A) with the following features:

- insertion and disconnection of the device only when cover is closed for the boxes from 16A to 32A
- insertion and disconnection of the device integrated into the cover of the boxes from 63A to 160A, ensuring automatic absence of electric current when the cover is open;
- the supplied PE contact (protective conductor) is the first to make the electrical connection when inserting the box into the outlet and it is the last to disconnect when removing the device;
- all insulating plastic components are in compliance with the IEC 60695-2-1 glow-wire test and rated V2 self-extinguishing according to the UL94;
- standard IP55 degree of protection without using additional accessories.

Product fully in compliance with the following Standards: IEC 61439-1 and 6.
The busbar trunking systems are fire retardant in compliance with IEC 20-22 (IEC 332-3: 1992).

Conductors Case Item code

10 - 3P+N+PE casing	
11 - 3P+N+FE+PE casing	
20 - 3P+N+PE casing (painted version)*	
21 - 3P+N+FE+PE casing (painted version)*	

Installation Guidelines

Rising Mains

How to take measurement

Technical Information

Table of comparison between boxes and cable glands (Bahra TBS)

Joule effect losses in busbars

Overload Protection

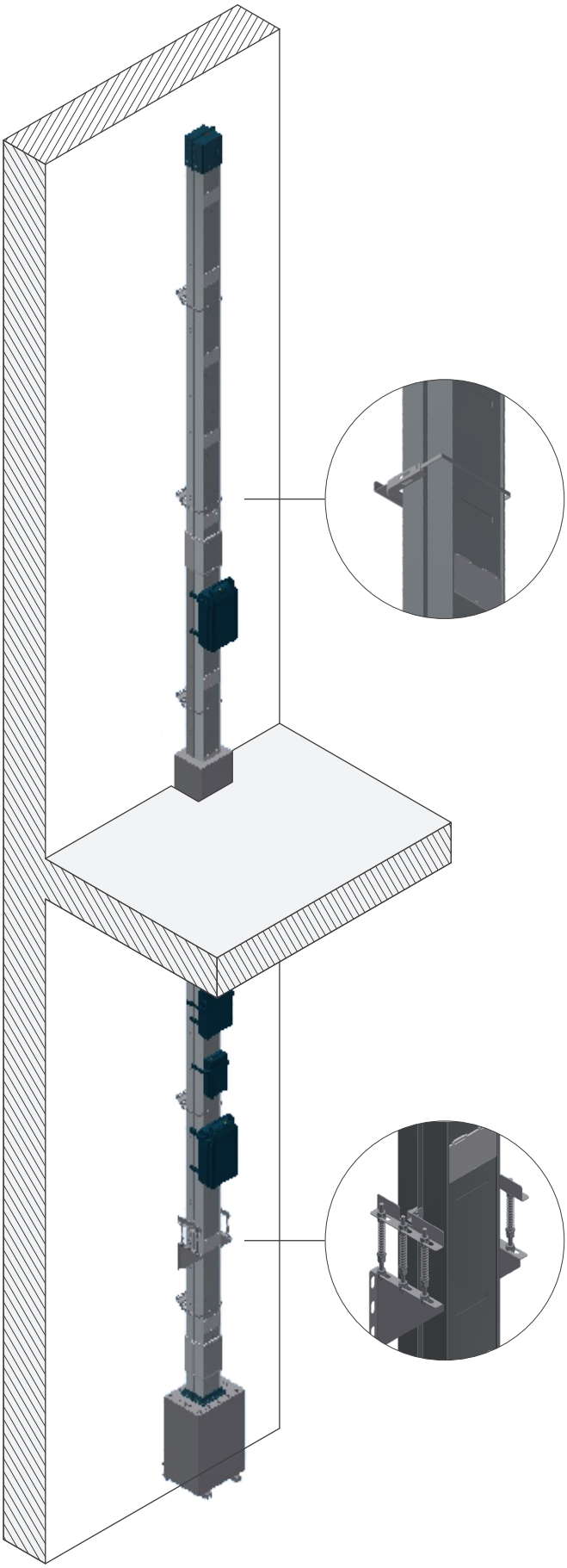
Selection of the busbar trunking system based on voltage drop

Short circuit withstand (continued)

Harmonics

Degree of protection

Rising Mains



General rules for design of rising mains

1 - Use a RH end feed unit. This allows the Neutral bar to be positioned on the left side of the busbar, hence the cable exit of the tap-off boxes is located downwards

2 - Use straight lengths with 5 outlets on one side

3 - Use a straight element with fire barrier for each compartment floor. It is necessary to specify the position of the internal fire barrier before placing an order

4 - The tap-off boxes can be installed in all outlets and near the connection between two elements

5 - At the end of the riser mains, position the IP55 end cover.

A - Use one or more suspension brackets for the vertical elements, according to the weight of the whole rising mains. For risers that are shorter than 4 meters, fix to the base with code 50102520; when longer, use a suspension bracket type 2, 4 or 6 every 300 kg of rising main. Brackets for pavement installation are also available, see corresponding chapter in the catalogue.

B - Use a standard suspension bracket with a 40 mm spacer every 2 meters of rising mains

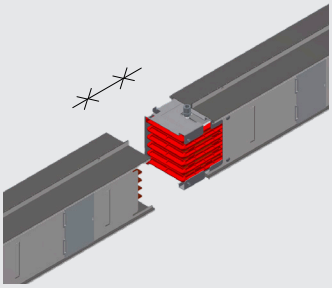
For any special need contact Bahra TBS technical department.

How to take measurements

Straight lengths

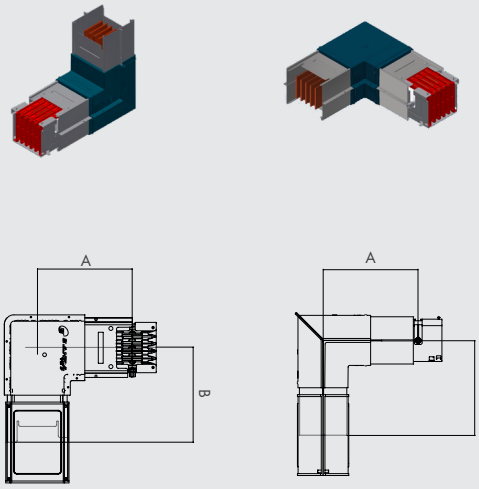
Always take measurements on the long side on the metal casing as shown in the figure.

The dimension of the straight lengths can range from 600 mm to 3000 mm

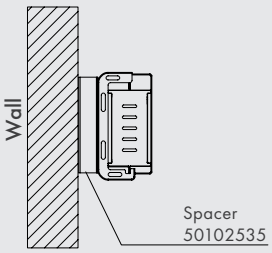


Elbows

When using elbows, the dimension should be measured from the long casing to the axis of the element

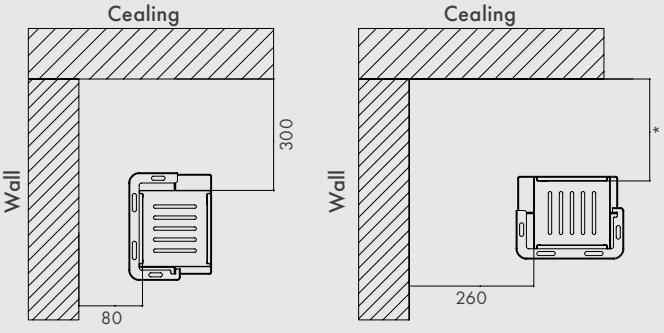


Minimum fixing distances



Do not fix the bracket directly on the wall.
Use the special spacer 50102535

Minimum installation distance with plug-in boxes



* When there is a plug-in box installed above the busbar, check the overall dimension of the open cover of the plug-in unit used in the specific section.

Technical Information

Thanks to the flexibility of BMR busway is possible and simple to customize the solution according to customers' and designers' requirements.
It is therefore possible to request special products such as AC current or any particular frequency.

Possible special requirements:
- 5 conductor version with separate FE
- 3 conductor version
- painting in any customised colour

Route not completely defined
If the route cannot be defined with sufficient degree of precision, some parts may be left out and ordered at a later stage
In order to simplify the process of taking the necessary measurements for the definition of the completion items, it is recommended that the supply of all sections with direction changes is defined from the start, leaving the completion of straight section to a later stage

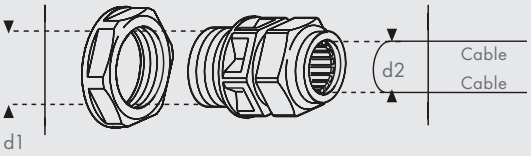
Table of comparison between boxes and cable glands (Bahra TBS)

The following table shows the maximum number of Bahra TBS cable glands that can be installed on Plug-in boxes using the appropriate flanges

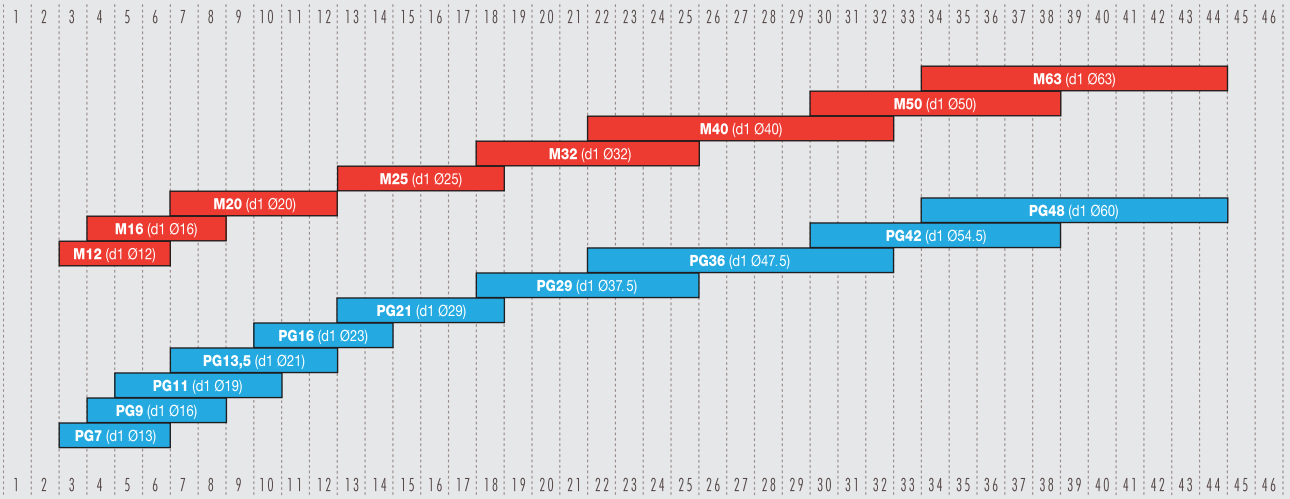
COMPARISON TABLE BETWEEN Plug-in boxes AND CABLE GLANDS (Bahra TBS)						
	Useful dimension for the passage of the cables and flange size	M16-PG9 (63 A cable) 10 mm2 section PVC insulated one-pole cable	M20-PG13.5 (63 A cable) 10 mm2 section PVC insulated one-pole cable	M25-PG21 (250 A cable) 70 mm2 section PVC insulated one-pole cable	M32-PG29 (400 A cable) 150 mm2 section PVC insulated one-pole cable	M40-PG36 (630 A cable) 300 mm2 section PVC insulated one-pole cable
63/160 A Plug-in box with section cover (Type 1)	80 x 70 FL 110 x 100	No. 10	No. 5	-	-	-
250/630 A Plug-in box with section cover (Type 2)	150 x 220 FL 235x 180	No. 66	No. 36	No. 20	No. 13	No. 8
125/400 A Plug-in box on the junction (Type 3/4)	130 x 180 FL 180 x 230	-	No. 30	No. 16	No. 9	
630 A Plug-in box on the junction (Type 3/4)	270 x 160 FL 340 x 230	-	-	No. 28	No. 15	No. 10
800/1250 A Plug-in box on the junction (Type 3/4	380 x 210 FL 430 x 260	-	-	No. 57	No. 32	No. 18

Note: The value shown on the table is the max no. of PG that may be installed in the cable flange
For boxes with section cover the most demanding condition is considered, which means that only one of the two cable flanges is used

Cable glands table



When choosing the cable glands, please refer to the Bahra TBS catalogue



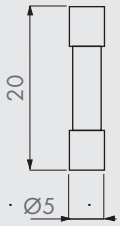
Dimension d2 Ø cable [mm]

Cable glands table

Operating features

In = 6.3	1.5	In 2.1 In	2.75 In	4 In	10 In
Operating time >	1 h	< 30 min	10 ms - 3 s	3 ms - 30 ms	< 20 ms

When choosing all fuses, please refer to the general Bahra TBS catalogue



- In = 6.3A
- Une250V ceramic fuse IEC 127
- Breaking capacity H 1500A
- Voltage drop ΔV = 150 mV
- I 2t = 48A 2s

Joule effect losses in busbars

Technical information
Losses due to the Joule effect are essentially caused by the electrical resistance of the busbar
Lost energy is transformed into heat and contributes to the heating of the conduit of the environment
The calculation of power loss is a useful data for correct sizing of the building air conditioning system

Three-phase regime losses are:

$$P_j = \frac{3R_t I_b^2 L}{1000}$$

In one-phase regime:

$$P_j = \frac{2R_t I_b^2 L}{1000}$$

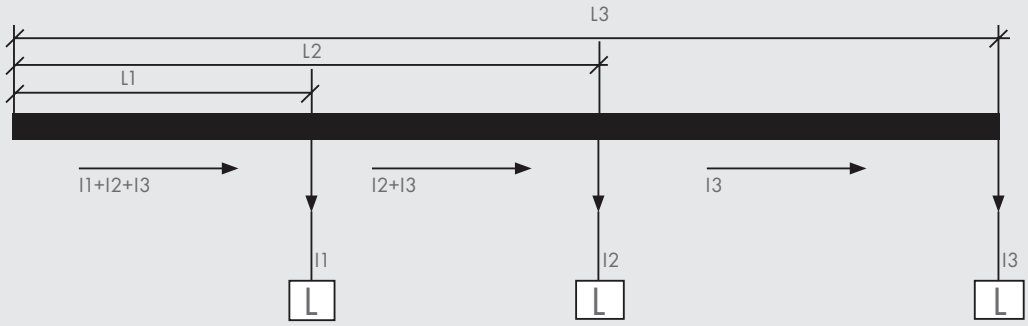
Where:

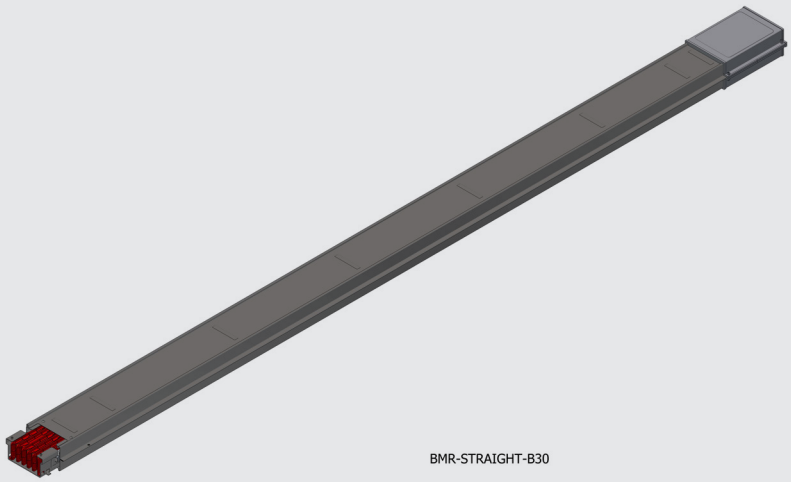
I_b = Actual current (A)
R_t = Phase resistance for unit of length of the busbar trunking system, measured at thermal regime (m Ω/m)
L = Busbar length (m)
P_i = Power losses (kW)

For accurate calculation, losses must be assessed trunk by trunk taking into account the transiting currents; for example, in the case of the distribution of the loads represented in the figure one has:

	Length	Transiting current	Losses
1st trunk	L_1	$I_1 + I_2 + I_3$	$P_1 = 3R_t L_1 (I_1 + I_2 + I_3)^2$
2nd trunk	$L_2 - L_1$	$I_2 + I_3$	$P_2 = 3R_t (L_2 - L_1)(I_2 + I_3)^2$
3rd trunk	$L_3 - L_2$	I_3	$P_3 = 3R_t (L_3 - L_2) I_3^2$

Total losses in the busbar trunking system $P_t = P_1 + P_2 + P_3$




BMR-STRAIGHT-B30

Overload Protection

Technical information
Busbar overload protection is ensured following the same criteria used for cables. It will be necessary to check the relationship:

$$I_b \leq I_n \leq I_z$$

Where:

I_b = Circuit utilisation current
I_n = Switch rated current
I_z = Rating at permanent cable regime

The Ib utilisation current in a tree-phase system is calculated baseon td he following formula:

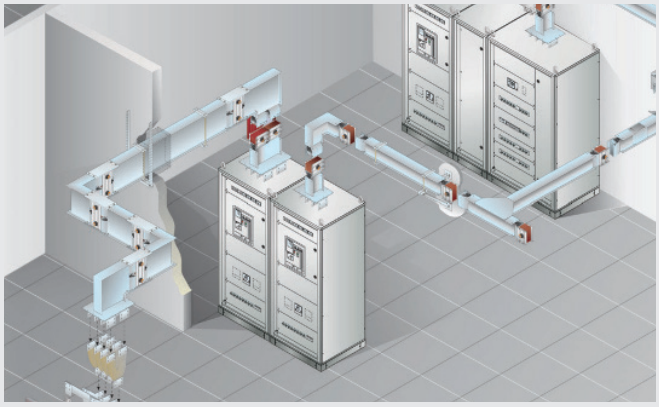
$$I_b = \frac{P_t \alpha \beta d}{\sqrt{3} U_e \cos\varphi} \; [A]$$

Where:

P_t = Sum of the active powers of the loads installed [W]
d = Power supply factor equal to: 1 if the trunking is only powered from one side; if the trunking is powered from the centre or from both ends at the same time

U_e = Operating voltage in [V]
$\cos\varphi$ = Average power factor of the loads
I_b = Operating current [A]
α = Diversity coefficient of the loads [.]
β = Coefficient of utilisation of the loads [.]

OVERLOAD PROTECTION CONDITIONS



The ambient temperature where the busbar trunking system is installed impacts on its rating
During the design stages, it will be necessary to multiply the rating value at the reference temperature by a correction coefficient referred to the final operating temperature

All Bahra TBS products have been sized and tested for an average ambient temperature of 40 °C. For installation in environments with average daily temperatures lower than 35 °C, the rated current of the busbar must be multiplied by a k_t factor, which is higher than the unit for temperatures lower than 35 °C, and lower than the unit if the ambient temperature is higher than 35 °C:

$$I_z = I_{z0} k_t$$

Where:

- I_{z0} is the current that the busbar trunking system can carry for an indefinite time at its reference temperature (40 °C)
- k_t is the correction coefficient for ambient temperature values other than the reference temperature, as shown in the following table

Ambient temperature ('C)	10	15	20	25	30	35	40	45	50	55	60
Factor Kt	1,19	1,16	1,13	1,10	1,07	1,03	1,00	0,97	0,93	0,89	0,86

Selection of the busbar trunking system based on voltage drop

Technical information
If the line is particularly long (> 100 m), it will be necessary to check the value of the voltage drop. For systems with power factor (cos ϕn) not lower than 0.7 the voltage loss can be calculated using the following formulas:

THREE PHASE SYSTEM

$$\Delta V = \frac{b\sqrt{3} I_b L (R_t \cos\varphi + \chi \sin\varphi)}{1000}$$

THREE PHASE SYSTEM

$$\Delta V = \frac{2 b I_b L (R_t \cos\varphi + \chi \sin\varphi)}{1000}$$

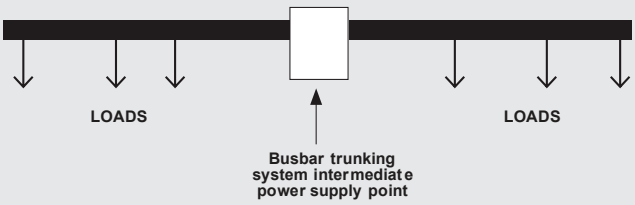
The percentage voltage drop can be obtained from:

$$\Delta v\% = \frac{\Delta v}{V_r} \cdot 100$$

$$\sin\varphi = \sqrt{1 - \cos^2\varphi}$$

Where Vr is the system rated voltage

In order to limit the voltage drop in case of very long busbar trunking systems, it is possible to allow for a power supply at an intermediate position, rather than at the terminal point



Calculation of the voltage drop with loads not evenly distributed

In case the load cannot be considered evenly distributed, the voltage drop may be determined more accurately using the relationships shown below For the distribution of three-phase loads, the voltage drop can be calculated using the following formula, on the assumption (generally verified) that the section of the busbar trunking system is consistent:

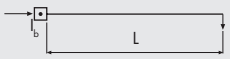
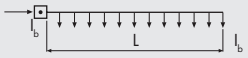
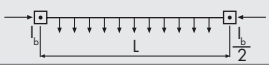
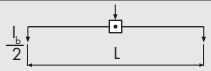
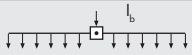
$$\Delta V = \sqrt{3} \frac{\left[R_t \sum_{i=1}^{n} I_i L_1 \cos\varphi_i \right] + \left[\chi \sum_{i=1}^{n} I_i L_1 \sin\varphi_i \right]}{1000}$$

If the three-phase system and the power factor are not lower than cos ϕ = 0.7, the voltage loss may be calculated using the voltage drop coefficient shown in Table 1

$$\Delta V\% = b \cdot \frac{k \cdot I_b \cdot L}{Vn} \cdot 100$$

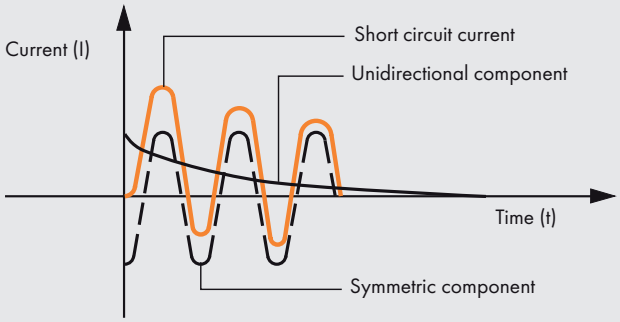
The current distribution factor "b" depends on how the circuit is fed and on the distribution of the electric loads along the busbar:

Table 1 - The distribution factor of the current "b"

b = 1	Supplies at one end and load at the end of the line	
b = 1/2	Supplies at one end and with load evenly distributed	
b = 1/4	Supplies at both ends and with load evenly distributed	
b = 1/4	Central supply with loads at both ends	
b = 1/8	Central supply with load distributed evenly	

Short circuit withstand

Technical information
The CEI 64-8 standard indicates that, for the protection of the circuits of the system, it is necessary to allow for devices aimed at interrupting short circuit currents before these become dangerous due to the thermal and mechanical effects generated in the conductors and the connections
In order to size the electric system and the protection devices correctly, it is necessary to know the value of the estimated short circuit current at the point where this is to be created
This value enables in fact to correctly select protection devices based on their own tripping and closing powers, and to check the resistance to electro-dynamic stress of the busbar supports installed in control panels, or/and of the busbar trunking systems

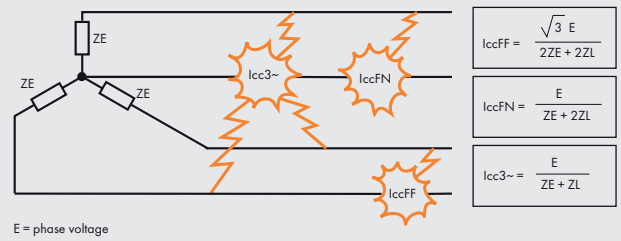


Characterisation of short circuit current
The estimated short circuit current at a point of the user system is the current that would occur if in the considered point a connection of negligible resistance was created between conductors under voltage
The magnitude of this current is an estimated value that represents the worst possible condition (null fault impedance, tripping time long enough to enable the current to reach the maximum theoretical values)
In reality, the short circuit always occurs with significantly lower effective current values
The intensity of the estimated short circuit current essentially depends on the following factors:
- Power of the cabin Transformer, meaning that the higher is the power, the higher is the current;
- length of the line upstream

In three-phase circuits with Neutral it is possible to have three different types of short circuit:
- phase-phase;
- phase-Neutral;
- balanced three-phase (most demanding condition)

The formula for the calculation of the symmetric component is:

$$\overline{Icc} = \frac{\overline{E}}{\overline{ZE}+\overline{ZL}}$$

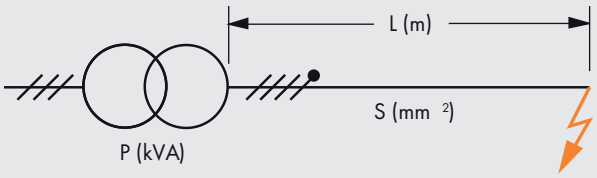


E = phase voltage

Where:
- E is the phase voltage;
- ZE is the secondary equivalent impedance of the TRANSFORMER measured between the phase and the Neutral;
- ZL is the impedance of the phase conductor only

Short circuit withstand (continued)

Analytical determination of short circuit currents
In order to calculate the value of the estimated short circuit current
at any point of the circuit, it is sufficient to apply the formulas shown
below, knowing the impedance calculated at the origin of the system
up to the point being assessed
In the formulas shown below, the value of the short circuit power is
considered infinite and the short circuit impedance is equal to 0.
This makes it possible to define short circuit current values higher than the actual ones, but generally acceptable



Line resistance $RL = r \cdot L$	RL = resistance of the line upstream (m) r = specific line resistance (m/m) L = upstream line length (m)
Line reactance $XL = x \cdot L$	XL = upstream line reactance (m) x = specific line reactance (m/m)
TRANSFORMER resistance $RE = \frac{1000\ Pcu}{3In^2}$	RE = transformer secondary equivalent resistance (m) Pcu = transformer COPPER losses (W) In = transformer Rated current (A)
TRANSFORMER impedance $ZE = \frac{Vcc\%\ V^2c}{100\ P}$	ZE = transformer secondary equivalent impedance (m) Vc = phase voltage (V) Vcc% = percentage short circuit voltage P = transformer power (kVA)
TRANSFORMER reactance $XE = \sqrt{ZE^2 - RE^2}$	XE = transformer secondary equivalent reactance (m)
Short circuit impedance $Zcc = \sqrt{(RL + RE)^2 + (XL + XE)^2}$	Zcc = total short circuit impedance (m)
Estimated short circuit current $Icc = \frac{Vc}{\sqrt{3}} \cdot Zcc$	Icc = symmetric component of the short circuit current (kA)

	Rating [A]	kA three-phases Icw	kA three-phases Ipk	kA one-phases Icw	kA one-phases Ipk
Aluminium	160	15.0*	30,0	9,0	15,3
	250	25.0*	52,5	15,0	30,0
	400	30,0	63,0	18,0	36,0
	500	30,0	63,0	18,0	36,0
	630	36,0	75,6	21,6	45,4
	800	36,0	75,6	21,6	45,4
Copper	250	25.0*	52,5	15,0	30,0
	400	30,0	63,0	18,0	36,0
	500	30,0	63,0	18,0	36,0
	630	36,0	75,6	21,6	45,4
	800	36,0	75,6	21,6	45,4
	1000	36,0	75,6	21,6	45,4

* Values referred to 0.1s

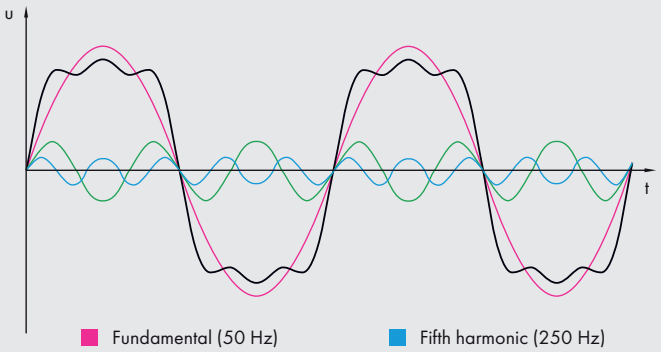
Harmonics

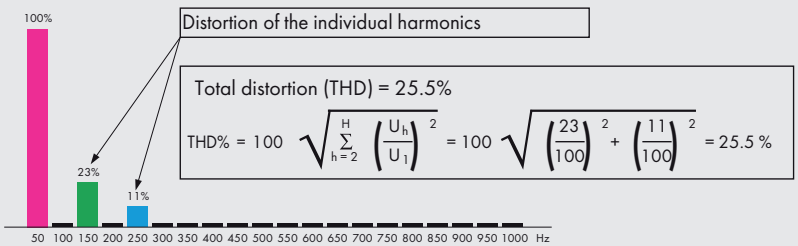
Technical information
In a distribution system, currents and voltages should have a perfectly sinusoidal shape. However, in practice the equipment contains electric devices such as changeover devices or dimmers that make the load not linear
The currents absorbed, although at regular intervals and with frequencies equal to that of the rated voltage, sometime have a non-sinusoidal wave form, which has the following negative effects:

- worsening of the power factor;
- heating of the Neutral;
- additional losses in electric machinery (transformers and motors);
- instable operation of the protection elements (thermal magnetic and earth leakage circuit breakers)

In industrial plants these conditions have been occurring for a long time, However, they are now occurring more and more in service sector distribution systems, where, from backbone distribution (which uses three-phase lines), one-phase loads are often distributed, which contributes to increasing the unbalance of the electric system
Each type of non-sinusoidal periodical wave may be split into a more or less large number of sinusoids (called harmonic components), which frequency a whole multiple of the frequency of the wave shape observed
A deformed current at a frequency of 50 Hz, like for example that represented by the red line on the figure, consists of many sinusoidal currents with frequency of 50 Hz (fundamental), 100 Hz (second harmonic components), 150 Hz (third harmonics), and so on
The presence of current harmonics represents an important problem, causing overload conditions both on phase conductors, and on any Neutral conductor, and results in the reduction of the conductor permitted load

Measurement of harmonic distortion carried out with a network analyser



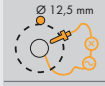
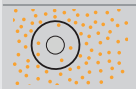
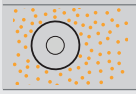


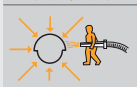
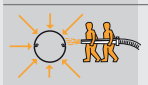
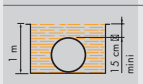
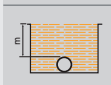
Degrees of protection

IP: degree of protection provided against intrusion

The protection enclosures are classified (IEC 60529) in according to their degree of protection against weather conditions and external agents. The degree of protection is indicated by two digits (protection against solid bodies and liquids) following the symbol IP

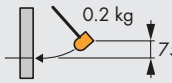
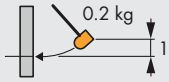
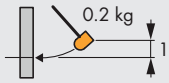
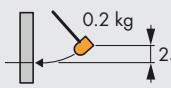
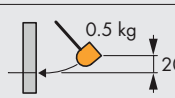
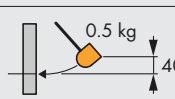
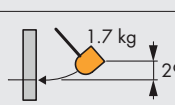
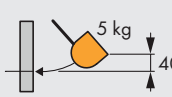
To increase the ease of choice of the most suitable busbar, in according to installation requirements, below there is a summary of their performance, based on the IP degree of protection according to the IEC 60529 standard

1st digit IP	
Protection against penetration of solid bodies	
	0 No protection
	1 Protection against solid bodies larger than 50 mm (e.g.: accidental contact)
	2 Protection against solid bodies larger than 12 mm (e.g.: finger)
	3 Protection against solid bodies larger than 2.5 mm
	4 Protection against solid bodies than 1 mm
	5 Protection against dust
	6 Complete protection against dust

2nd digit IP	
Protection against penetration of liquids	
	2 Protection against drops of water falling up to 15° from the vertical
	3 Protection against drops of water up to 60° from the vertical
	4 Protection against sprays of water from all directions
	5 Protection against jets of water from all directions
	6 Protection against jets of water (similar force to heavy seas)
	7 Protection against the effects of immersion
	8 Protection against effects of immersion under pressure

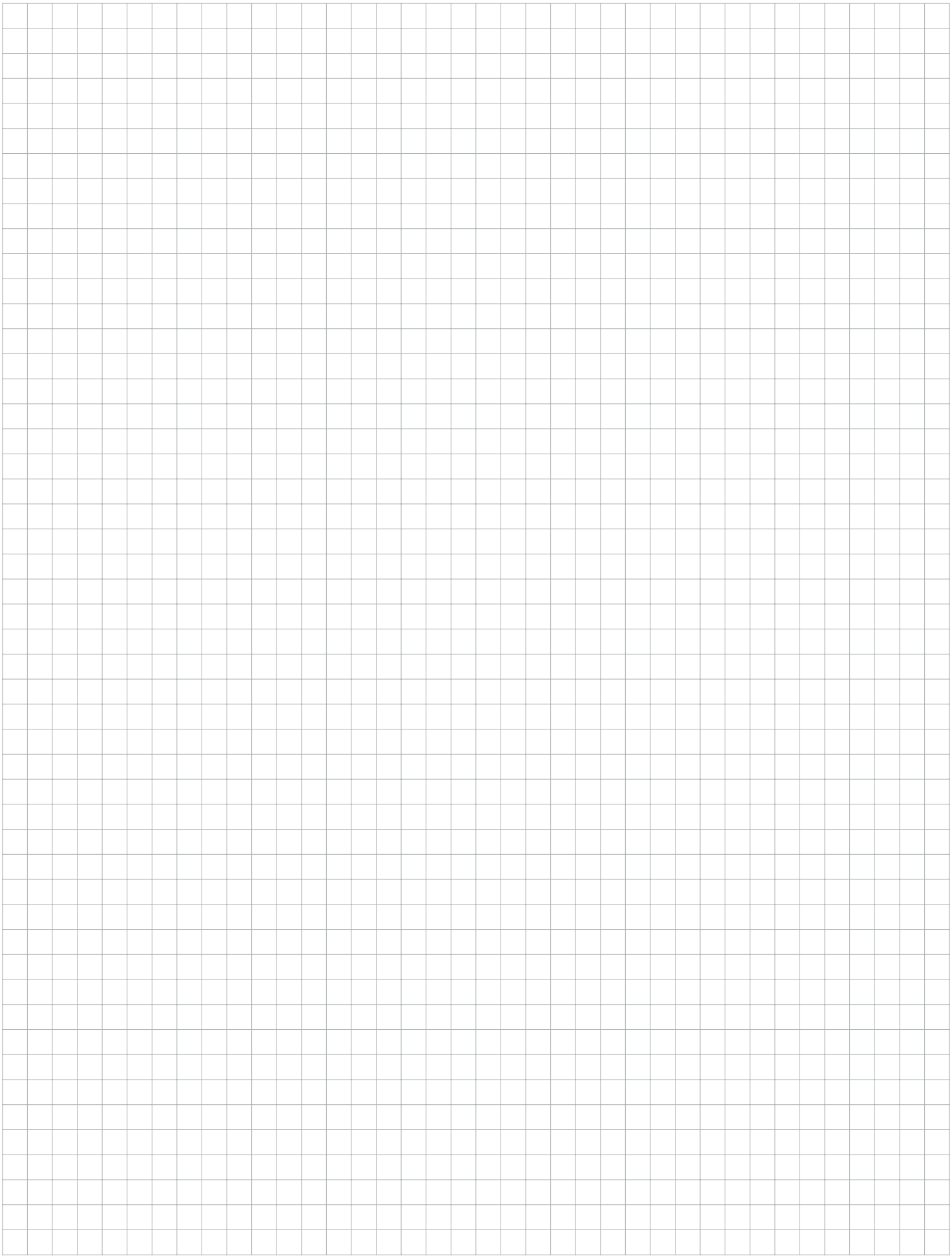
IK: degree of protection of equipment to mechanical impact

Standard IEC 62262 defines an IK code that characterises the aptitude of equipment to resist mechanical impacts on all sides

IK	Test	Impact energy (In joules)
IK 00		0
IK 01		0.15
IK 02		0.2
IK 03		0.35
IK 04		0.5
IK 05		0.7
IK 06		1
IK 07		2
IK 08		5
IK 09		10
IK 10		20

Note

Note



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