MEGADUCT

CAST RESIN BUSDUCT SYSTEMS
(LOW VOLTAGE)

LINKK
BUSWAY SYSTEMS

Content

Foreword

Due to drastic increase in the requirement of safety and stability for power distribution among public engineering, the conventional power cable and metal -enclosed busway can no longer fulfill the requirement stated above. LINKK BUSWAY SYSTEMS (M) SDN BHD was established in 1992 to further develop the cutting edge cast-resin insulated busway systems from Europe to reach its fullest potential.

MEGADUCT product is built with excellent features of electrical characteristic and mechanical strength, fire and water proof, anti-corrosion, compact size, easy installation and most importantly maintenance free. Today, MEGADUCT has become the first choice of power transmission serving broad range of applications from high-rise residential buildings to nuclear power plants.

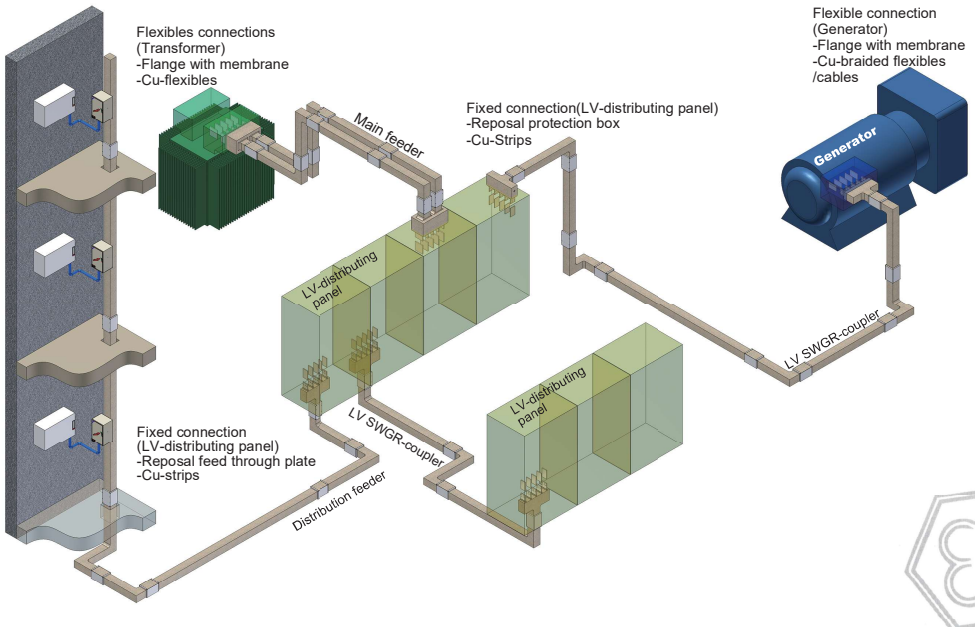
With the reputation based on strong customer orientation, solid engineering support and fast delivery schedule, MEGADUCT cater a complete package of services from conceptual design to commissioning to global clientele.

We will continue to make every effort to further enhance our services in our continuous pursuit for service excellence.

Excellence

1. Low voltage products meet the standard of IEC 61439-6.
2. Compact, easy to install, no emission of toxic gas.
3. The purity of conductor is 99.9% for copper with conductivity above 98% IACS.
4. Low voltage drop / high short-circuit current withstand, carried out overload 20% for 2 hours.
5. Degree of protection tested in accordance with IEC 60529, IP68. Mechanical Impacts IK10.
6. Fire-proof property:
   At 950°C for 3 hours tested in accordance with IEC 60331-21.
   At 840°C for 30 minutes tested in accordance with CNS 14286.
7. Anti-explosion certification meets EN 50028 no. EEx m II .
8. Mixing excellent material such as non-organic volcanic rock with small amount of resin made of busway. With excellent insulation and heat dissipation properties. Temperature rise of busway is no more than 55K at 40°C ambient.
9. Low EMC.
10. Insulation level of class B 130°C .
11. Products have shown excellent results for at least 40 years, and passed aging test with safety operation over 50 years .
12. Maintenance free.

MEGADUCT Busbar Routings



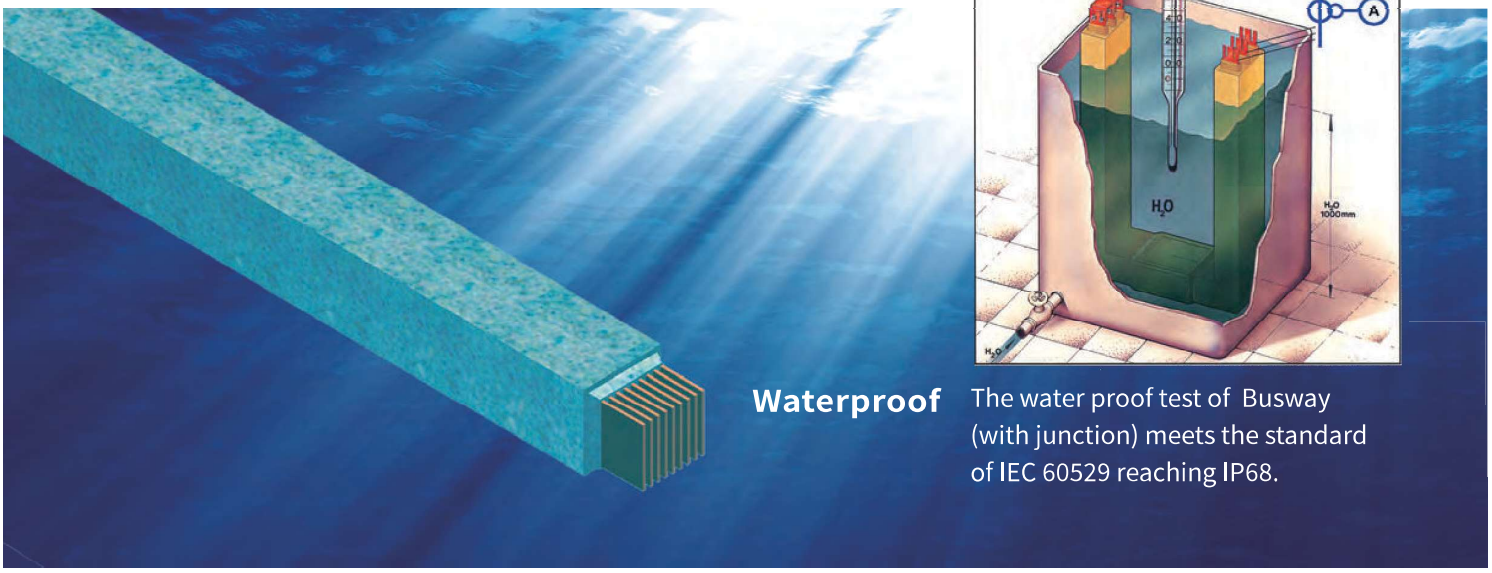
IP68
Degree of protection

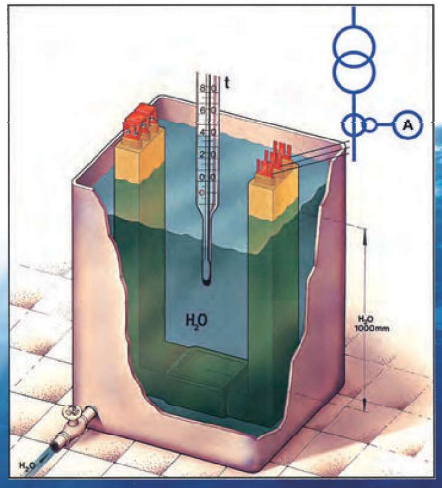
IK10
Mechanical Impacts

IEC 60331-21
Withstand Fire Test

EMC
Electromagnetic compatibility

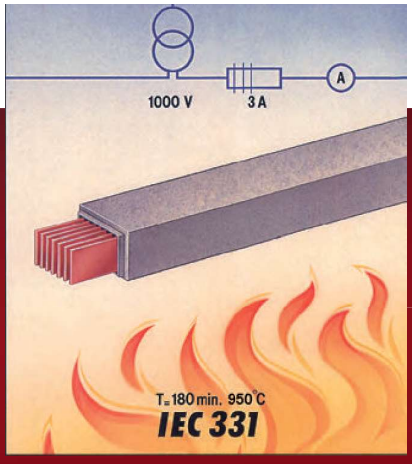
Product Feature





Waterproof

The water proof test of Busway (with junction) meets the standard of IEC 60529 reaching IP68.



Fireproof

The fire proof test of Busway meets the standard of IEC 60331-21 950°C for 3 hours CNS 14286, 840°C for 30 minutes.

Product Certification

Product quality and capability have been assured and certified by international renowned testing authorities including Dekra, KEMA, UL and approved to be environmental friendly.

Technical Advantages

- Whole busway route cast-resin molded (including the junction part between elements)
- Full type tested by Dekra and KEMA; China 3C certified
- Fireproof certified (CNS14286, IEC60331)
- Highest Protecion Level (Waterproof/Dustproof) IP68 : LV /MV
- Best in Class of Mechanical Impact – IK10 (IEC 60068)
- Seismic Restraint certified including the junction – 0.8G passed
- Anti-Explosive certified
- Anti-Corrosive
- Electromagnetic Compatibility certified
- Compact design for easy installation and space saving
- High flexibility and custom design to fit in any condition
- ISO 9001 / ISO 14001 certified

Electrical Characteristics of Low Voltage Busway

1. Title : MEGADUCT Low Voltage Cast-Resin Insulated Non Segregated Phase Busway.

2. Product Description:
MEGADUCT Low Voltage Cast-Resin Insulated Busway is developed for electrical systems below 1kV. The product has features of safety and compact. It is designed to use the insulation material to perform cast resin sealing to the copper (aluminum) conductor. The insulation material is cast resin which contains non-organic volcanic rock with the features of excellent insulation characteristics, mechanical strengh, humidity-proof, non-combustible, and self-extinguishing .

3. Applicable Scope:
MEGADUCT busway is manufactured in accordance with IEC61439-1 and IEC 61439-6 and The elements include as listed below:
3.1 Straight element, elbow elements geometrical shape, phase-switch element, expansion element, transfer elements, split element and terminal elements.
3.2 Distribution boxes: There are fixed type tap-off box and draw-out type plug-in box.
＊Note: The plug-in leads shall be reserved in advance. Therefore, the number of plug-in units shall be confirmed while purchase.

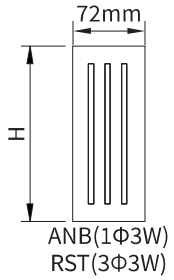
4.Condition of Use:
MEGADUCT busway is composed of the elements listed in item 3.1. The element are connected through junction units on site before cast molding with insulation mix to complete the low voltage busway.
Conditions for MEGADUCT:
4.1 Altitude: below 2000m, indoor and outdoor site.
4.2 Ambient temperature: -45°C~65°C
4.3 Ambient humidity: 0%~100%

5. Technical Specifications:
5.1 Rated Voltage V : AC1000V.
5.2 Rated Current A : 400A~6569A.
5.3 Frequency Hz : 50/60.
5.4 System : 1 ∮ 3w, 1 ∮ 3w+1/2G, 1 ∮ 3w+G, 3 ∮ 3w, 3 ∮ 4w, 3 ∮ 3w+1/2G, 3 ∮ 3w+G, 3 ∮ 4w+1/2G, 3 ∮ 4w+G.
5.5 Conductor Material : Copper conductor (Purity : 99.9% Conductivity : Above 98% IACS)
and Aluminum (Bi-metal).
According to standards : JIS H3140 , DIN1787, DIN1759, DIN40500.
5.6 Electrical characteristics of each MEGADUCT element less than 4m
Insulation capabilities : ◎ AC voltage withstand phase to phase is AC 5kV/1min.
◎ Insulation resistance phase to phase is ≧ 2GΩ/DC 1KV.
Temperature rise limit : ◎ At average ambient temperature of 35°C with daily peak 40°C, temperature rise of busway is ≦55K.
Fireproof : ◎ In accordance with CNS 14286 fire proof regulation of 840°C, 30 minutes for busway.
◎ In accordance with IEC-60331-21 at 950°C for 3 hours.
Protection degree : ◎ In accordance with IEC 60529 IP68.
Mechanical impacts : ◎ In accordance with IEC 60068-2-75 IK10.
Grounding : ◎ Internal grounding (Optional grounding phase with aluminum conductor)

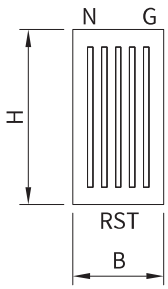
Product Specifications MA

50/60 Hz 1000V IP68 IK10

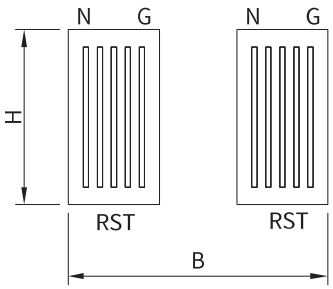
TYPE	B x H mm	I_n(A) norm	I_n(A) 35/40°C	Cond. mm^2	R_{20} μΩ/m	R_{60} μΩ/m	R_{90} μΩ/m	X μΩ/m	Icw kA/1Sec	Ipeak	PLoss90 W/m	Total Weight kg/m
COPPER												
Single Line												
MA02EC	104x 60	400	400	80	158.0	182.2	201.5	147.0	10	22	97	13.8
MA04EC	104x 80	630	630	160	106.0	122.7	135.2	70.2	15	30	161	20.3
		800	800	240	70.3	81.3	89.6	70.5	25	53	172	23.3
MA08EC	104x 120	1000	1000	320	54.2	62.7	69.1	42.4	40	84	207	33.5
		1250	1250	400	42.4	49.1	54.1	41.8	50	105	253	35.7
MA12EC	104x 160	1600	1600	600	28.0	32.4	35.7	32.7	65	143	274	50.2
MA16EC	104x 200	2000	2000	800	18.4	21.3	23.5	20.8	80	176	282	64.4
			2221	960	18.8	21.8	24.0	45.7	80	176	288	71.5
Double Lines												
MA08DC	404x 120	2500	2500	2x480	19.9	23.0	25.4	25.6	80	176	476	78.6
MA12DC	404x 160	3150	3200	2x600	13.2	15.3	16.8	18.2	85	187	501	111.0
MA16DC	404x 200	4000	4000	2x800	13.2	15.3	16.8	14.8	100	220	808	128.8
			4202	2x960	10.2	11.8	13.0	28.2	120	264	624	143.0
ALUMINUM												
Single Line												
MA04EA	104x 80	400	500	160	175.0	202.5	223.0	58.6	12	45	167.4	15.3
		630	630	240	115.0	133.0	146.6	59.2	18	45	174.6	15.8
MA08EA	104x 120	800	810	320	85.7	99.2	109.3	35.2	22	75	215.1	23.3
		1000	1000	480	57.0	66.0	72.7	37.6	33	75	218.0	24.4
MA12EA	104x 160	1250	1375	720	38.5	44.6	49.0	26.7	40	90	278.4	31.1
MA16EA	104x 200	1600	1700	960	27.9	32.2	35.5	23.3	53	120	308.4	41.3
Double Lines												
MA12DA	404x 160	2000	2380	2x600	23.2	26.8	29.5	14.0	67	150	502.7	48.8
		2500	2660	2x720	19.8	22.9	25.2	15.5	80	175	535.9	65.4
MA16DA	404x 200	3150	3250	2x960	14.7	17.0	18.7	13.2	90	200	593.9	82.6



Single Line



Single Line



Double Lines

※ Conductor : 1Φ3W represents single phase, three wires
3Φ3W3Φ3W represents three phases, three wires
3Φ4W represents three phases, four wires.
G represents grounding phase 100% of rated current.
200% N and aluminum grounding conductor optional

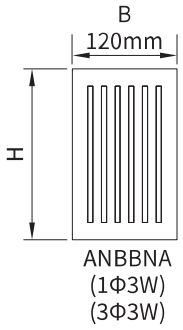
※ Applicable to DC requirement.

※ Please refer to the temperature correction coefficient of rated current on page 24 while ambient temperature exceeds 40°C.

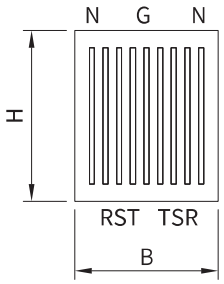
Product Specifications MB

50/60 Hz 1000V IP68 IK10

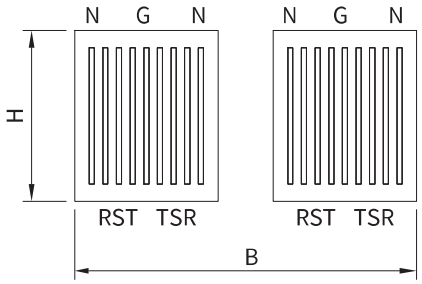
TYPE	B x H mm	I_n(A) norm	I_n(A) 35/40°C	Cond. mm^2	R_{20} μΩ/m	R_{60} μΩ/m	R_{90} μΩ/m	X μΩ/m	Icw kA/1Sec	Ipeak	PLoss90 W/m	Total Weight kg/m
COPPER												
Single Line												
MB08EC	168x 120	2000	2000	2 x 400	19.2	22.2	24.5	23.3	65	143	293.8	55.1
MB12EC	168x 160	2500	2500	2 x 600	17.4	20.1	22.2	19.6	85	187	416.0	86.5
MB16EC	168x 200	3150	3200	2 x 800	10.2	11.8	13.0	17.6	100	220	387.1	111.5
			3443	2 x 960	9.0	10.4	11.5	20.8	100	220	341.6	122.0
Double Lines												
MB08DC	468x 120	4000	4000	4x400	13.1	15.1	16.6	5.5	100	220	798.7	110.2
MB12DC	468x 160	5000	5000	4x600	8.1	9.3	10.3	8.7	120	264	770.8	173.0
MB16DC	468x 200	6300	6300	4x800	6.5	7.5	8.3	8.1	125	275	986.8	223.0
			6569	4x960	4.8	5.6	6.1	16.1	120	264	728.7	244.0
ALUMINUM												
Single Line												
MB12EA	168x 160	2000	2100	2 x 720	20.0	23.1	25.5	18.5	80	175	337.4	53.5
MB16EA	168x 200	2500	2540	2 x 960	14.3	16.5	18.2	13.9	90	200	352.9	63.6
Double Lines												
MB08DA	468x 120	3150	3200	4x480	14.6	16.9	18.6	13.6	100	220	571.9	79.0
MB12DA	468x 160	4000	4250	4x720	10.0	11.6	12.8	10.4	120	260	690.9	101.1
MB16DA	468x 200	5000	5400	4x960	7.9	9.1	10.1	10.2	130	290	881.2	135.0



Single Line



Single Line



Double Lines

※ Conductor : 1Φ3W represents single phase, three wires
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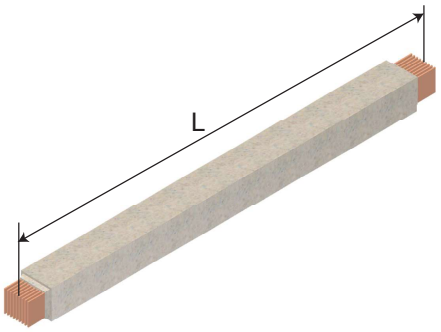
3Φ4W represents three phases, four wires.
G represents grounding phase 100% of rated current.
200% N and aluminum grounding conductor optional

※ Applicable to DC requirement.

※ Please refer to the temperature correction coefficient of rated current on page 24 while ambient temperature exceeds 40°C.

Selection of Standard Parts

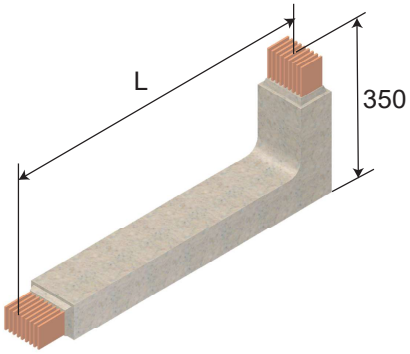
Straight Feeder



Straight Feeder

Model	Length
RE	L=1000mm~4000mm (Max)

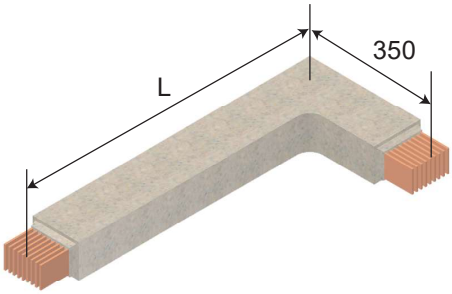
Vertical Elbow



Vertical Elbow

Model	Length
HL1	L=650mm (Max)
HL2	L=1650mm (Max)

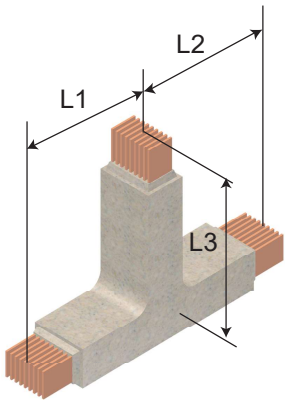
Horizontal Elbow



Horizontal Elbow

Model	Length
HB1	L=650mm (Max)
HB2	L=1650mm (Max)

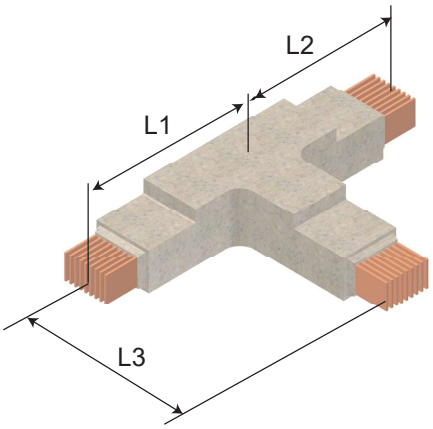
Tee Elbow (Vertical)



Tee Elbow (Vertical)

Model	Length
TL2	L1=L2=L3=350mm

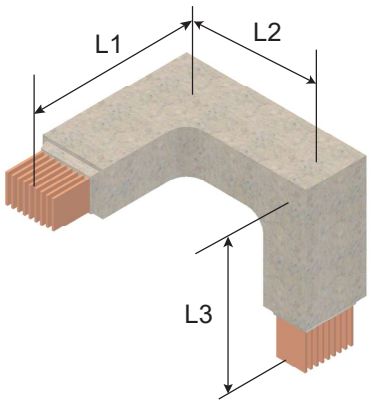
Tee Elbow (Horizontal)



Tee Elbow (Horizontal)

Model	Length
TB2	L1=L2=L3=500mm

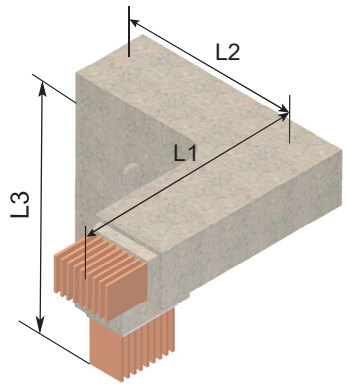
Combination Elbow (Right)



Combination Elbow (Right)

Model	Length
XR1	L1+L2+L3=1000mm
XR2	L1+L2+L3=2000mm

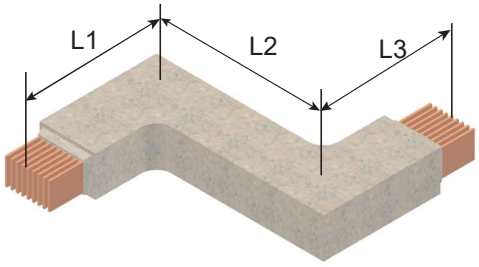
Combination Elbow (Left)



Combination Elbow(Left)

Model	Length
XL1	L1+L2+L3=1000mm
XL2	L1+L2+L3=2000mm

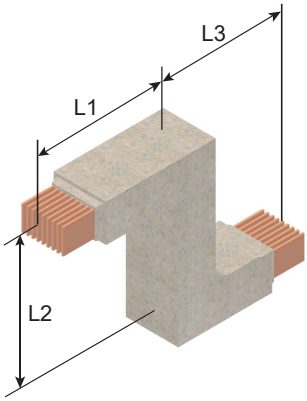
Horizontal Offset



Horizontal Offset

Model	Length
ZB1	L1+L2+L3=1000mm
ZB2	L1+L2+L3=2000mm

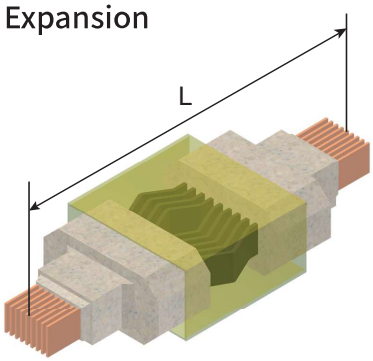
Vertical Offset



Vertical Offset

Model	Length
ZL1	L1+L2+L3=1000mm
ZL2	L1+L2+L3=2000mm

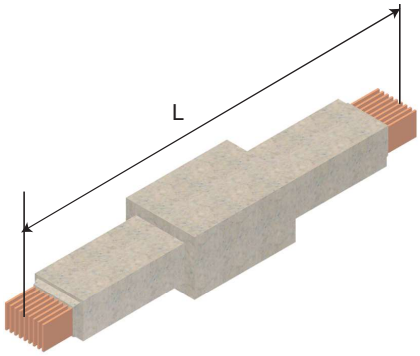
Expansion



Expansion

Model	Length
EX	L=1000mm

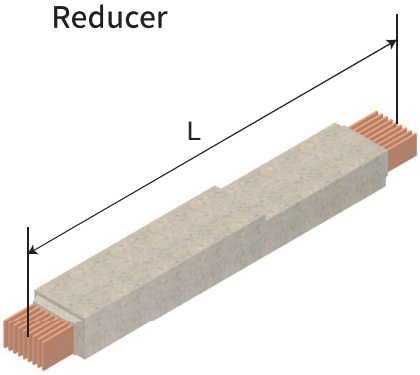
Phase Switch Feeder



Phase Switch Feeder

Model	Length
PC1	L=1200mm

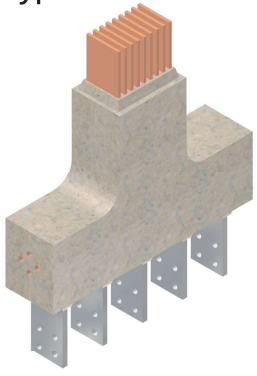
Reducer



Reducer

Model	Length
TF1	L=1200mm

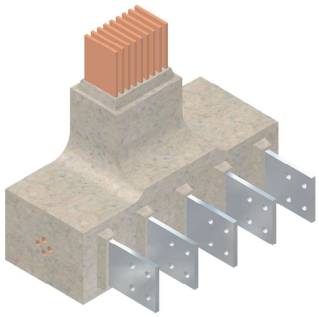
AG Type Terminal



AG Type Terminal

Model	Length
AG1	Refer to Page 15

AO Type Terminal

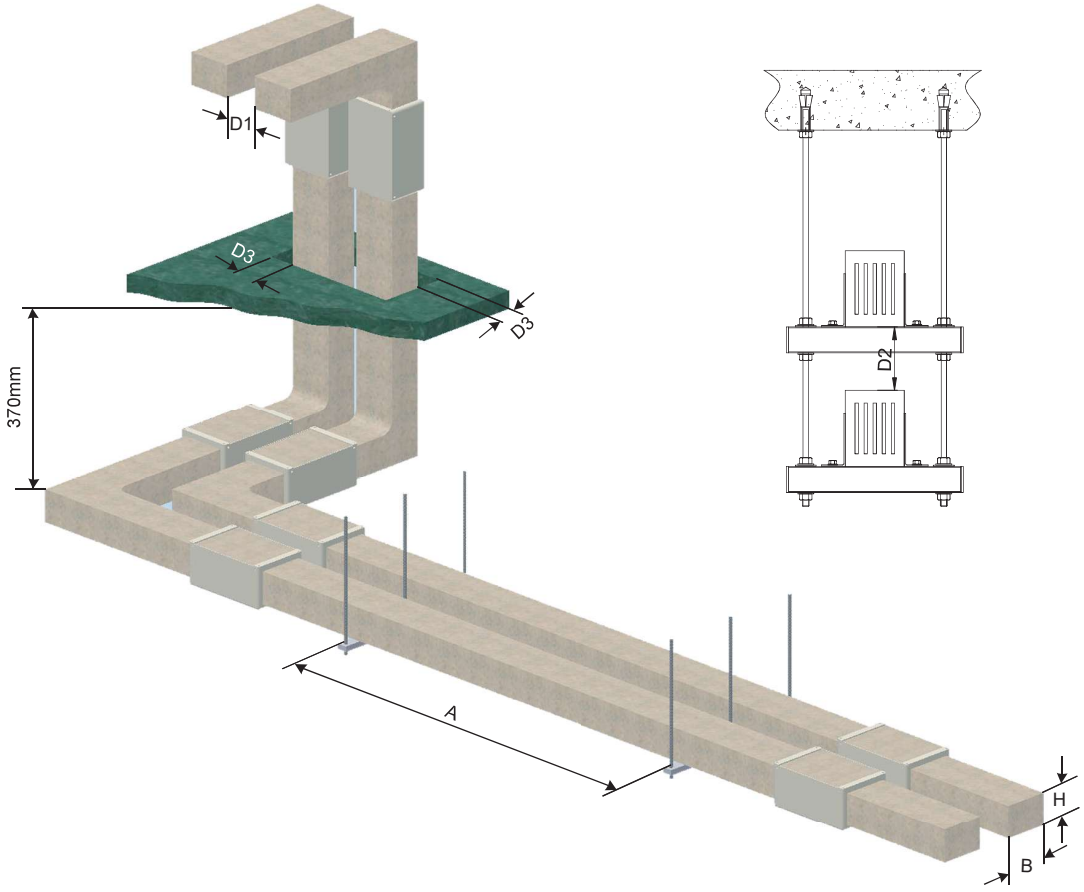


AO Type Terminal

Model	Length
AO1	Refer to Page 16

☐Terminal Conductor: Tin / Silver Plated

Product Installation

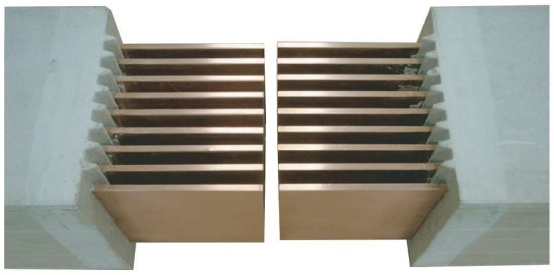


Unit:mm

Type	External Size	Limit of Hanger Installation Pitch A		Minimum pitch between busway		
				Layout of busway arrangement		Distance between wall opening and busway
	B×H	Horizontal Installation	Vertical Installation	D1 D1	D2	D3 D3
MA02	104×60	1500	4000	196	100	50
MA04	104×80					
MA08	104×120					
MA12	104×160					
MA16	104×200					
MB08	168×120			132		
MB12	168×160					
MB16	168×200					

Note:Distance between hangers and busway are allowed to be adjusted on site while required.

Assembly Diagrams of Low Voltage Busway Junction



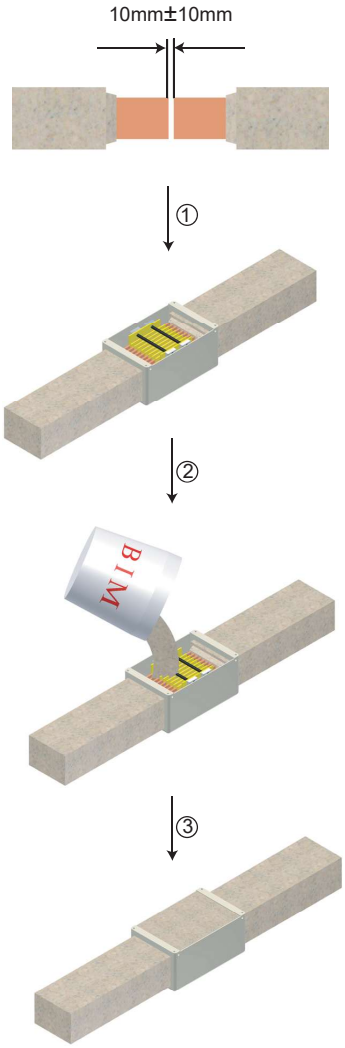
- Distance between two elements are within 10mm±10mm (inclusive). The distance can be flexibly adjusted on site by the requirement of construction.

- Illustration of JUNCTION assembly. (MB series)

- The assembly bolt of Junction must be secured by torque wrench.

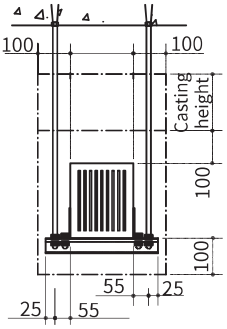
Illustration of cast-resin after completion.

Refer to installation guide for casting method on site

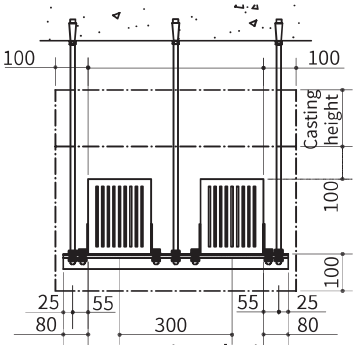


Torque of bolt during work:	
Specs	M10
Torque value (N-m) for Cu	43
Torque value (N-m) for Al	30

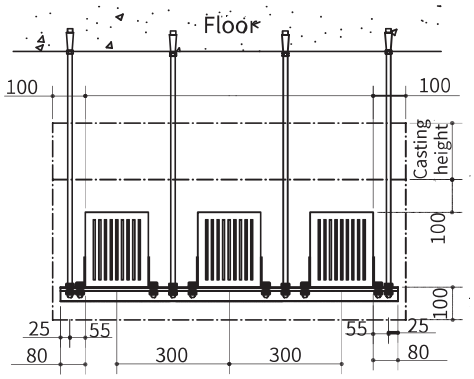
Low Voltage Busway Horizontal Hanger Standard



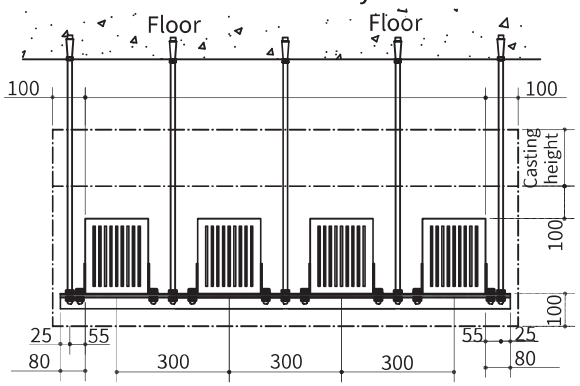
Cross-sectional Diagram of Single-Busway



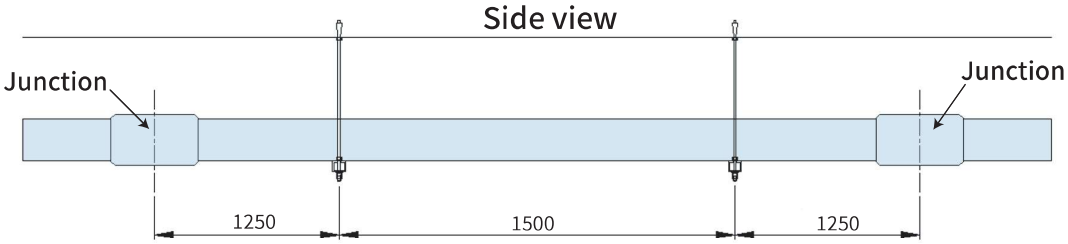
Cross-sectional Diagram of Dual-Busway



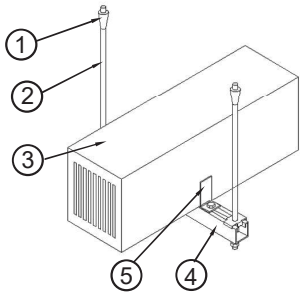
Cross-sectional Diagram of Triple-Busway



Cross-sectional Diagram of Quadruple-Busway

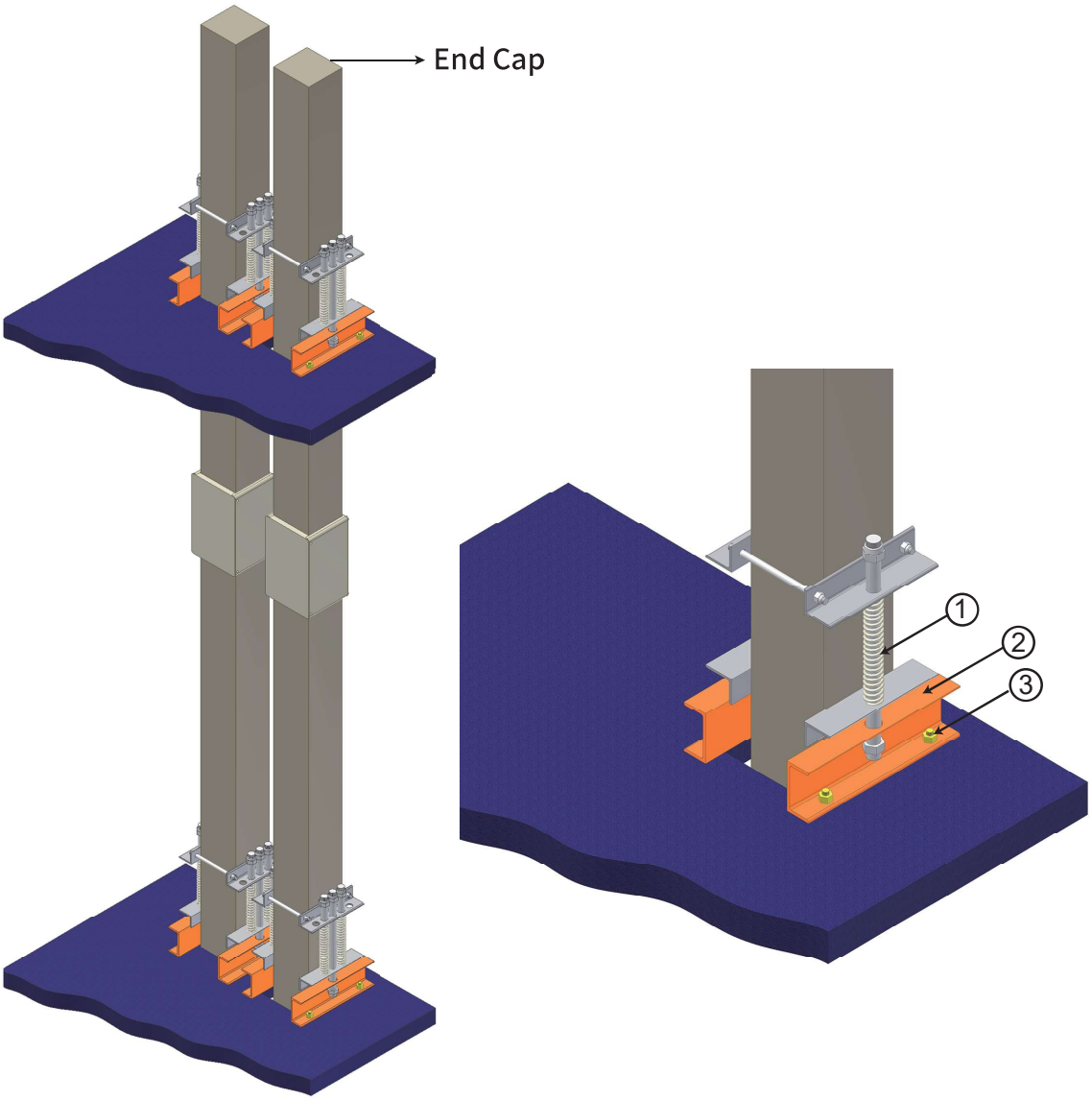


1.The installation pitch between each hanger has to comply with the standard as above. If the work condition can not meet the standard, it may be adjusted according to the condition on site. However, it must meet the requirement described in page 18 of the installation guide: minimum pitch requirement of the busway.
2.The space required for installing busway is shown in the diagram. The safety space above the busway should have 100mm + casting height of 270mm = 370 mm for clearance standard of installation space. In addition, the height of the floor should be within 5m above the ground to allow expansion of bolts, full-thread bolts, and channel, etc. to install at the bottom of the floor.
3.One set of L-shape stopping plate part.



No.	Name of Part	Specs	Remark
1	Inner thread inflated screws	1/2"*2"	Zinc-plated item. (Included in installation work)
2	Full thread bolts	1/2"	Zinc-plated item. (Included in installation work)
3	Busway		MEGADUCT
4	Channel	2t*41*41mm	Zinc-plated item. (Included in installation work)
5	L-shape stopping plate	2.3t*80*40	Zinc-plated item.

Low Voltage Busway Vertical Hanger Standard



Vertical Hanger Units			
No.	Name of Part	Specs	Remark
1	Spring Box Set	–	Zinc-plated item.
2	Channel	75x50x5t	Zinc-plated item. (Included in installation work)
3	Inflated Screws	1/2"	Zinc-plated item. (Included in installation work)

※The selection of spring box is according to different busway type.

Dimensions of Standard Terminal Elements for Low Voltage Busway (Copper Conductor)

AG Type Terminal Elements

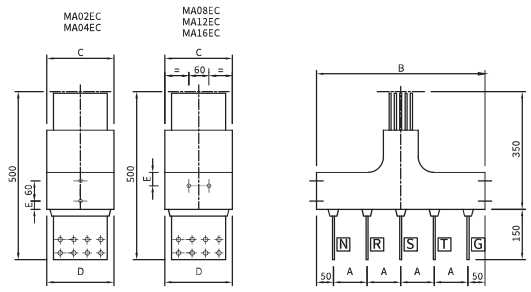


Figure 1

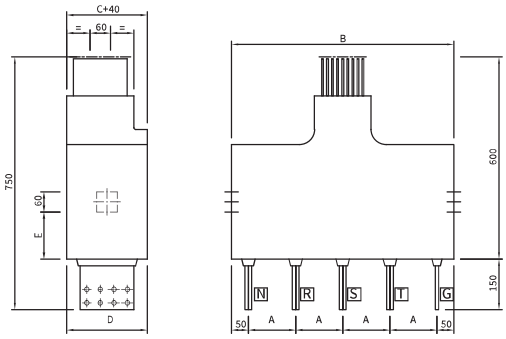


Figure 2

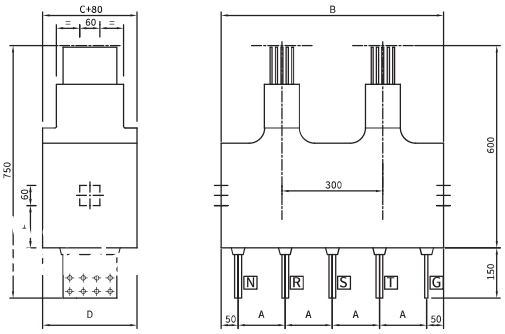


Figure 3

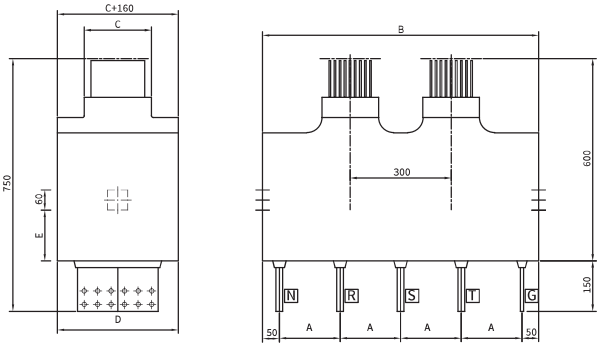


Figure 4

Unit:mm

Figure No.	Type	3Φ4W+G or 3Φ4W+1/2G(NRSTG)					3Φ4W(NRST) or 3Φ3W+1/2G(RSTG)				
		A	B	C	D	E	A	B	C	D	E
Figure 1	MA02EC	100	500	60	60	20	100	400	60	60	20
	MA04EC	100	500	80	80	20	100	400	80	80	20
	MA08EC	100	500	120	120	40	100	400	120	120	40
	MA12EC	100	500	160	160	40	100	400	160	160	40
	MA16EC	100	500	200	200	40	100	400	200	200	40
Figure 2	MB08EC	140	660	120	160	125	140	520	120	160	125
	MB12EC	140	660	160	200	125	140	520	160	200	125
	MB16EC	140	660	200	240	140	140	520	200	240	140
Figure 3	MA08DC	140	660	120	200	95	140	520	120	200	95
	MA12DC	140	660	160	240	95	140	520	160	240	95
	MA16DC	140	660	200	280	95	140	520	200	280	95
Figure 4	MB08DC	140	660	120	280	95	140	560	120	280	95
	MB12DC	140	660	160	320	120	140	560	160	320	120
	MB16DC	180	820	200	360	150	180	640	200	360	150

Note : 1. 1Φ3W、3Φ3W Single line: B=3Φ4W B-A (Figure 1, 2)
2. 1Φ3W、3Φ3W Double lines: B=3Φ4W B (Figure 3, 4)

Dimensions of Standard Terminal Elements for Low Voltage Busway (Copper Conductor)

AO Type Terminal Elements

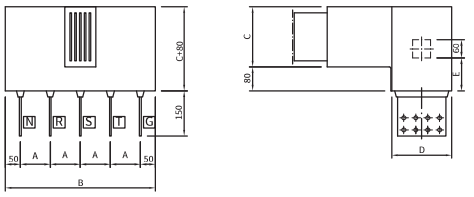


Figure 1

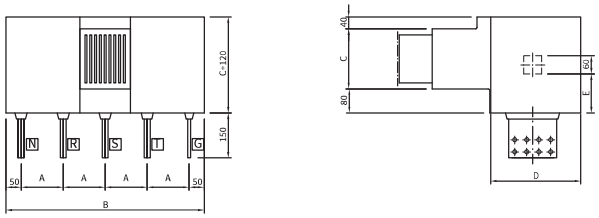


Figure 2

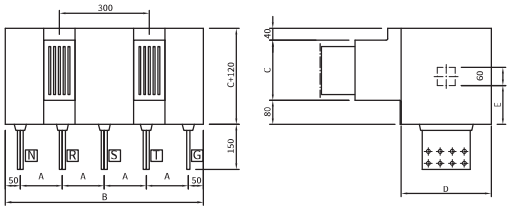


Figure 3

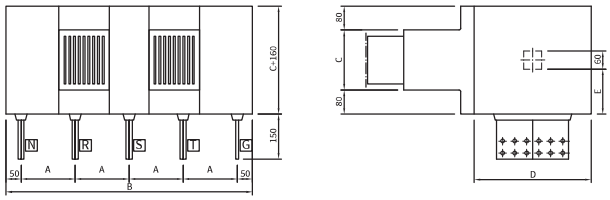


Figure 4

Unit:mm

Figure No.	Type	3Φ4W+G or 3Φ4W+1/2G(NRSTG)					3Φ4W(NRST) or 3Φ3W+1/2G(RSTG)				
		A	B	C	D	E	A	B	C	D	E
Figure 1	MA02EC	100	500	60	60	40	100	400	60	60	40
	MA04EC	100	500	80	80	50	100	400	80	80	50
	MA08EC	100	500	120	120	115	100	400	120	120	115
	MA12EC	100	500	160	160	155	100	400	160	160	155
	MA16EC	100	500	200	200	195	100	400	200	200	195
Figure 2	MB08EC	140	660	120	220	55	140	520	120	220	55
	MB12EC	140	660	160	260	95	140	520	160	260	95
	MB16EC	140	660	200	300	135	140	520	200	300	135
Figure 3	MA08DC	140	660	120	220	120	140	520	120	220	120
	MA12DC	140	660	160	260	110	140	520	160	260	110
	MA16DC	140	660	200	300	130	140	520	200	330	130
Figure 4	MB08DC	140	660	120	310	110	140	560	120	310	110
	MB12DC	140	660	160	350	130	140	560	160	350	130
	MB16DC	180	820	200	390	150	180	640	200	390	150

Note : 1. 1Φ3W、3Φ3W Single line: B=3Φ4W B-A (Figure 1, 2)
2. 1Φ3W、3Φ3W Double lines: B=3Φ4W B (Figure 3, 4)

Dimensions of Standard Terminal Elements for Low Voltage Busway (Aluminum Conductor)

AG Type Terminal Elements

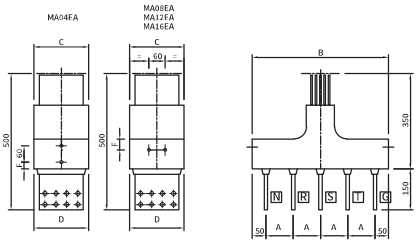


Figure 1

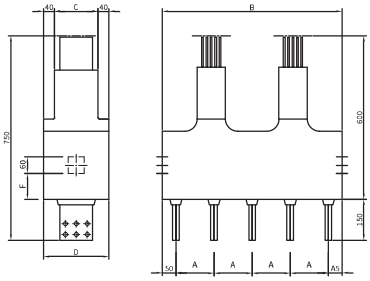


Figure 2

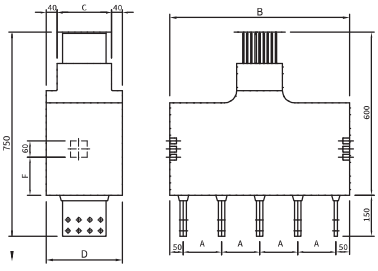


Figure 3

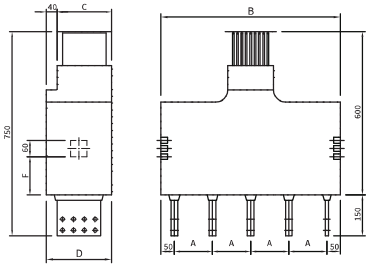


Figure 4

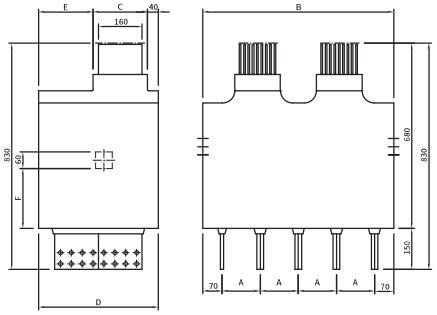


Figure 5

Unit:mm

Figure No.	Type	3P4W+G or 3P4W+1/2G(NRSTG)						3P4W(NRST) or 3P3W+1/2G(RSTG)					
		A	B	C	D	E	F	A	B	C	D	E	F
Figure 1	MA02EA	100	500	60	60	-	20	100	400	60	60	-	20
	MA04EA	100	500	80	80	-	20	100	400	80	80	-	20
	MA08EA	100	500	120	120	-	40	100	400	120	120	-	40
	MA12EA	100	500	160	160	-	40	100	400	160	160	-	40
	MA16EA	100	500	200	200	-	40	100	400	200	200	-	40
Figure 2	MA08DA	140	660	120	200	-	95	140	520	120	200	-	95
	MA12DA	140	660	160	240	-	95	140	520	160	240	-	95
	MA16DA	140	660	200	280	-	95	140	520	200	280	-	95
Figure 3	MB12EA	140	660	160	240	-	140	140	520	160	240	-	140
Figure 4	MB16EA	140	660	200	280	-	140	140	520	200	280	-	140
Figure 5	MB08DA	140	700	120	280	120	220	140	560	120	280	120	220
	MB12DA	140	700	160	360	160	220	140	560	160	360	160	220
	MB16DA	140	700	200	440	200	220	140	640	200	440	200	220

Note : 1. 1Φ3W、3Φ3W Single line: B=3Φ4W B-A (Figure 1, 3, 4)
2. 1Φ3W、3Φ3W Double lines: B=3Φ4W B (Figure 2, 5)

Dimensions of Standard Terminal Elements for Low Voltage Busway (Aluminum Conductor)

AO Type Terminal Elements

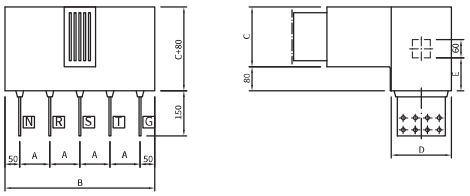


Figure 1

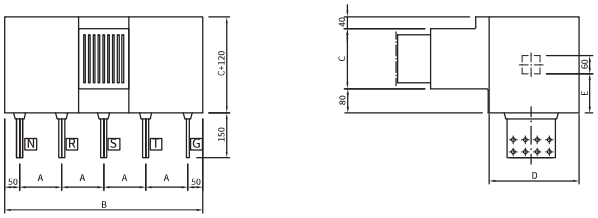


Figure 2

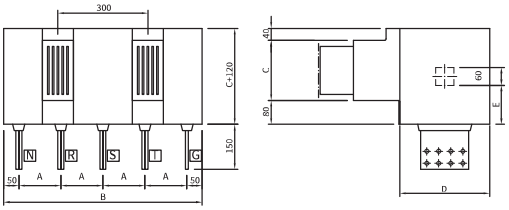


Figure 3

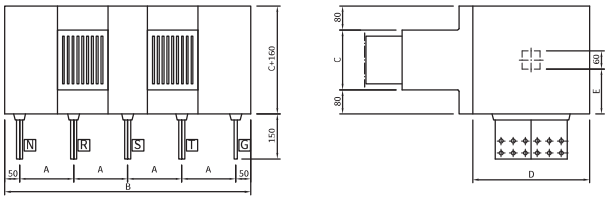


Figure 4

Unit:mm

Figure No.	Type	3P4W+G or 3P4W+1/2G(NRSTG)					3P4W(NRST) or 3P3W+1/2G(RSTG)				
		A	B	C	D	E	A	B	C	D	E
Figure 1	MA04EA	100	500	80	80	50	100	400	80	80	50
	MA08EA	100	500	120	120	115	100	400	120	120	115
	MA12EA	100	500	160	160	155	100	400	160	160	155
	MA16EA	100	500	200	200	195	100	400	200	200	195
Figure 2	MB12EA	140	660	160	280	95	140	520	160	280	95
	MB16EA	140	660	200	320	135	140	520	200	320	135
Figure 3	MA12DA	140	660	160	240	110	140	520	160	240	110
	MA16DA	140	660	200	280	130	140	520	200	280	130
Figure 4	MB08DA	140	660	120	320	110	140	560	120	320	110
	MB12DA	140	660	160	400	130	140	560	160	400	130
	MB16DA	180	820	200	480	150	180	640	200	480	150

Note : 1. 1Φ3W、3Φ3W Single line: B=3Φ4W B-A (Figure 1, 2)
2. 1Φ3W、3Φ3W Double lines: B=3Φ4W B (Figure 3, 4)

Dimensions of Standard Terminal Elements Copper Plate for Low Voltage Busway

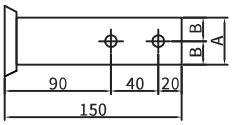


Figure 1

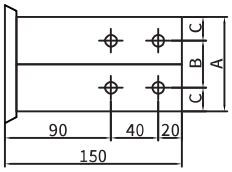


Figure 2

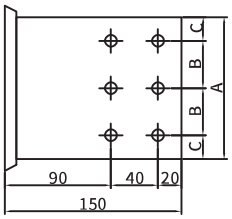


Figure 3

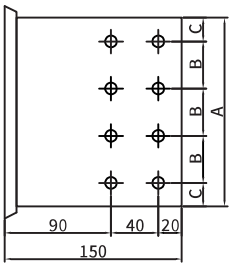


Figure 4

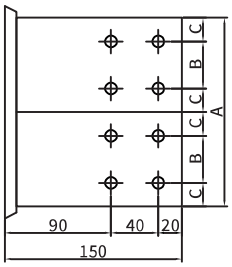


Figure 5

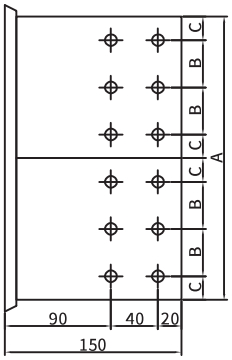


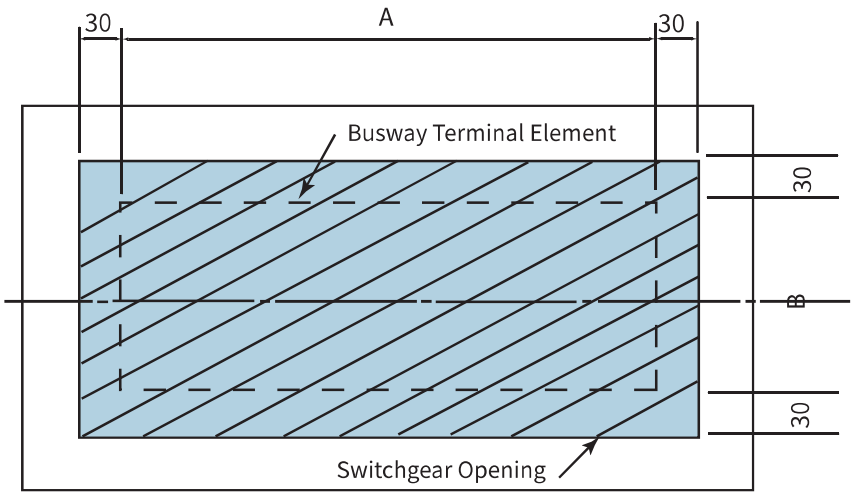
Figure 6

Figure No.	Type	Type of Terminal Elements	Dimensions(unit:mm)		
			A	B	C
Figure 1	MA02	AG/AO	20	10	-
	MA04	AG/AO	40	20	-
Figure 2	MA08	AG/AO	80	40	20
	MB08	AG/AO	80	40	20
	MA08(D)	AG/AO	80	40	20
Figure 3	MA12	AG/AO	120	40	20
	MB12	AG/AO	120	40	20
	MA12	AG/AO	120	40	20
Figure 4	MA16	AG/AO	160	40	20
	MA16(D)	AG/AO	160	40	20
Figure 5	MB16	AG/AO	160	40	20
	MB08(D)	AG/AO	160	40	20
	MB12(D)	AG/AO	200	40	30
Figure 6	MB16	AG/AO	240	40	20
Copper /Aluminum Conductor					

*(D)Double Lines

Opening Requirement of Standard Terminal Elements and Switchgear for Low Voltage Busway

Opening Dimensions of Switchgear Top, Bottom, and Rear Side



Busway Terminial Elements Opening Dimensions (Copper)

No.	Type	3P3W		3P3W+G(1/2G) or 3P4W		3P4W+G(1/2G)	
		A(mm)	B(mm)	A(mm)	B(mm)	A(mm)	B(mm)
1	MA02EC	300	60	400	60	500	60
2	MA04EC	300	80	400	80	500	80
3	MA08EC	300	120	400	120	500	120
4	MA12EC	300	160	400	160	500	160
5	MA16EC	300	200	400	200	500	200
6	MA08DC	520	200	520	200	660	200
7	MA12DC	520	240	520	240	660	240
8	MA16DC	520	280	520	280	660	280
9	MB08EC	380	160	520	160	660	160
10	MB12EC	380	200	520	200	660	200
11	MB16EC	380	240	520	240	660	240
12	MB08DC	560	280	660	280	660	280
13	MB12DC	560	320	660	320	660	320
14	MB16DC	560	360	800	360	800	360

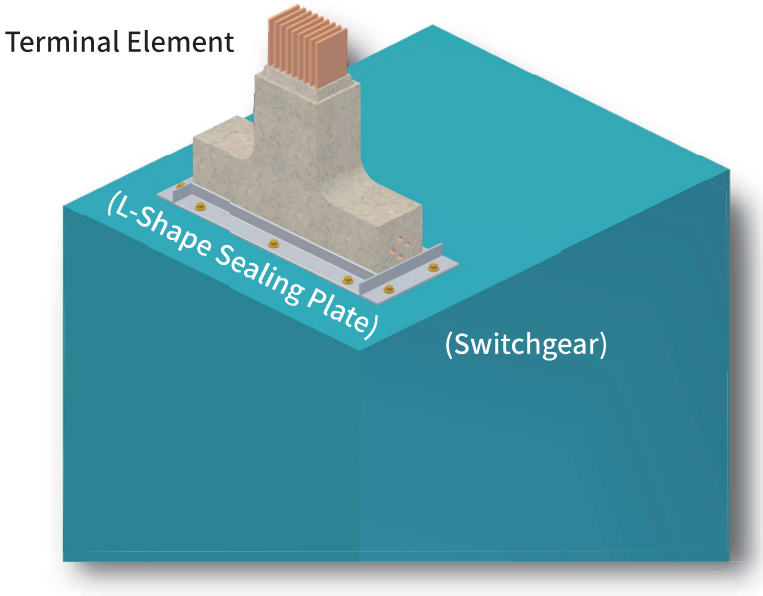
No.	Type	3P3W		3P3W+G(1/2G) or 3P4W		3P4W+G(1/2G)	
		A(mm)	B(mm)	A(mm)	B(mm)	A(mm)	B(mm)
1	MA02EC	300	60	400	80	500	80
2	MA04EC	300	80	400	80	500	80
3	MA08EC	300	120	400	120	500	120
4	MA12EC	300	160	400	160	500	160
5	MA16EC	300	200	400	200	500	200
6	MA08DC	520	220	520	220	660	220
7	MA12DC	520	260	520	260	660	260
8	MA16DC	520	300	520	300	660	300
9	MB08EC	380	220	520	220	660	220
10	MB12EC	380	260	520	260	660	260
11	MB16EC	380	300	520	300	660	300
12	MB08DC	600	310	660	310	660	310
13	MB12DC	600	350	660	350	660	350
14	MB16DC	600	390	800	390	800	390

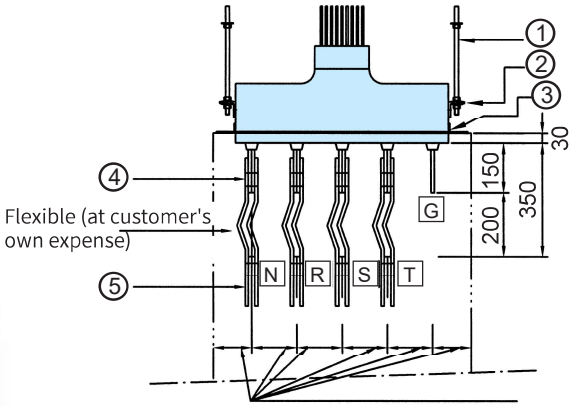
Busway Terminial Elements Opening Dimensions (Aluminum)

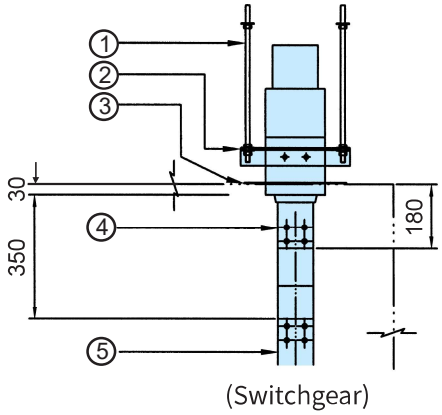
No.	Type	3P3W		3P3W+G(1/2G) or 3P4W		3P4W+G(1/2G)	
		A(mm)	B(mm)	A(mm)	B(mm)	A(mm)	B(mm)
1	MA04EA	300	80	400	80	500	80
2	MA08EA	300	120	400	120	500	120
3	MA12EA	300	160	400	160	500	160
4	MA16EA	300	200	400	200	500	200
5	MA12DA	520	240	520	240	700	240
6	MA16DA	520	280	520	280	700	280
7	MB12EA	380	240	580	240	720	240
8	MB16EA	380	280	580	280	720	280
9	MB08DA	600	280	700	280	700	280
10	MB12DA	600	360	700	360	700	360
11	MB16DA	600	440	700	440	700	440

No.	Type	3P3W		3P3W+G(1/2G) or 3P4W		3P4W+G(1/2G)	
		A(mm)	B(mm)	A(mm)	B(mm)	A(mm)	B(mm)
1	MA04EA	300	80	400	80	500	80
2	MA08EA	300	120	400	120	500	120
3	MA12EA	300	160	400	160	500	160
4	MA16EA	300	200	400	200	500	200
5	MA12DA	520	240	520	240	700	240
6	MA16DA	520	280	520	280	700	280
7	MB12EA	380	280	580	280	720	280
8	MB16EA	380	320	580	320	720	320
9	MB08DA	600	320	700	320	700	320
10	MB12DA	600	400	700	400	700	400
11	MB16DA	600	480	700	480	700	480

Low Voltage Busway Terminal Element and Switchgear Standard Guideline



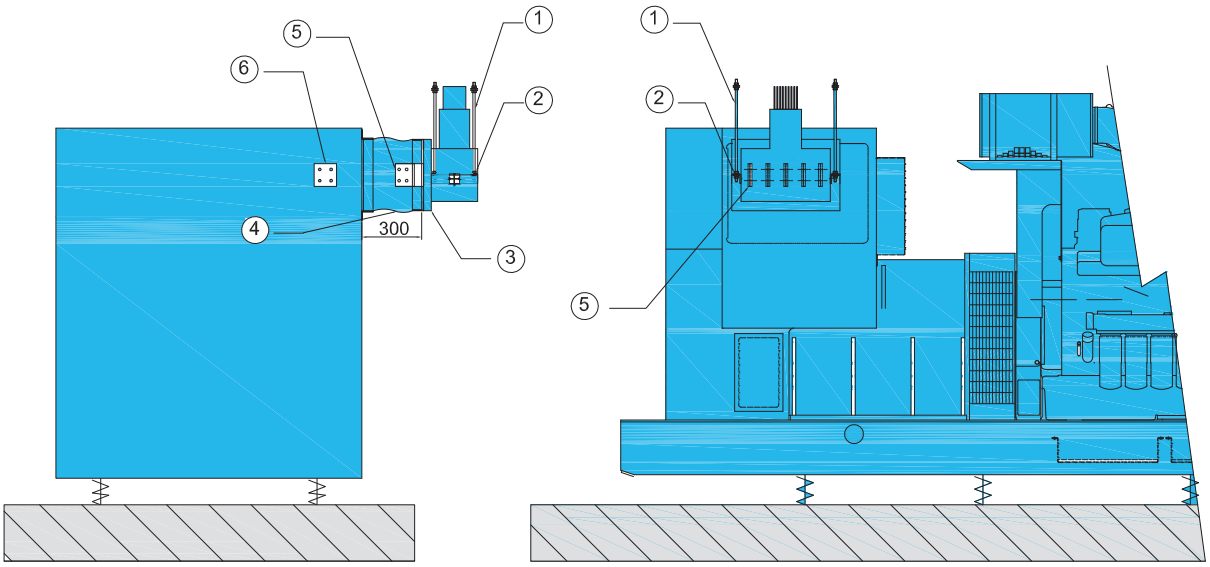




No.	Name	Specs	Remark
1	Full threaded screw	1/2"	Zinc-plated product (Included in installation work)
2	Angle Steel	6t×50×50mm	Zinc-plated product (Included in installation work)
3	Terminal element seal	Steel plate t= 2mm	Painted
4	Flexibles	The 200mm reserved space between terminal element and switchgear are connected by flexibles.	Materials of this portion and connection work does not belong to the busway contractor.
5	Connection copper plate of switchgear	According to Switchgear design.	The drillings on copper plate are designed, processed and connected by switchger cortractor.

Note: This diagram is the standard connection interface.
Actual location of connection is determined case by case.

Low Voltage Busway Terminal Element and Generator Connection Standard Guideline



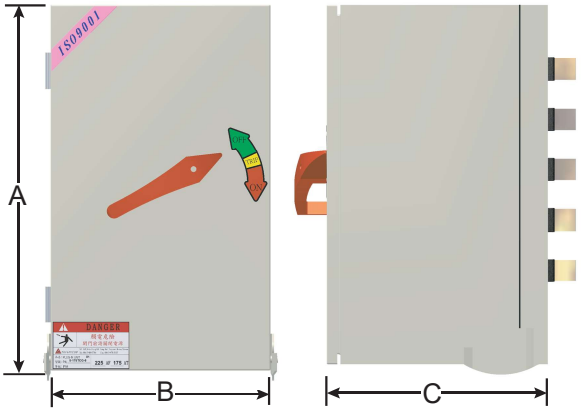
Transformer

Generator

No.	Name	Specs	Remark
1	Full threaded screw	1/2"	Zinc-plated product (Included in installation work)
2	Angle Steel	6tx50×50mm	Zinc-plated product (Included in installation work)
3	Terminal element seal	Steel plate t=2mm	Painted
4	Fire-resistant tarpaulin		Non-Combusion (Included in installation of flange)
5	Flexibles		Materials of this portion and connection work does not belong to the busway contractor.
6	Connection copper plate of generator/ transformer	According to Switchgear design.	The drillings on copper plate are designed, processed and connected by switchgear contrator.

Plug-in Unit

A. The standard length of each section of plug-in unit type busway is 3m and 4m. The plug-in points should be compared with the quantity and position of MCCB from customer's system drawing. Extra points need to be reserved by customer's actual requirement and the price is determined separately.
B. When the plug-in unit is taken off, the opening of the leads is sealed by the insulation cover with the protection level IP65.
C. There is an interlock device between plug-in unit and busway. In order to ensure the safety of operator, the plug-in unit can not be taken off from busway unless MCCB is off.
D. The "ON/OFF "indication is shown on the cover for operation of plug-in unit. There has an interlock between the cover of plug-in unit and MCCB to make sure when MCCB is turned ON that the cover of plug-in unit can not be opened.(Unlock the cover from outside when MCCB is turned ON, which is another option for customer. The price differs from general type.)
E. The design of plug-in unit meets the requirement of IEC60529 IP54/IP55.(IP55 is optional, the price is determined separately.)
F. For minimum distance between busway, please refer to the horizontal/vertical pitch of "Product Installation Description". If the different rated current plug-in unit is installed, the maximum unit size should be used as basis.
G. The design of plug-in unit fingers and flange connection are patented with M328135, low contact resistance is the major advantage for the design.
H. The standard colour of plug-in unit is white N-9.5.(The colour is optional.)

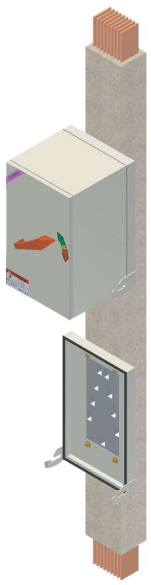


BUSWAY TYPE	CURRENT RATING (A)	DIMENSION(mm) (AxBxC)
3Φ4W+G(5P)	125AF,15~125AT	350x260x282
3Φ4W+1/2G(9P)	125AF,15~125AT	500x300x302
3Φ4W+G 3Φ4W+1/2G	250AF,125~250AT	
3Φ4W+G 3Φ4W+1/2G	400AF,250~400AT	600x300x302
3Φ4W+G 3Φ4W+1/2G	630AF,500~630AT 800AF,700~800AT	900x350x375
3Φ4W+G 3Φ4W+1/2G	1000~1600AF 1000~1600AT	1350x500x495

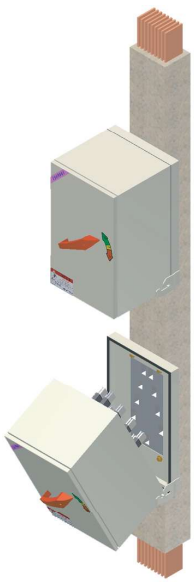
Note:1.Design is based on TO/TG series MCCB of MEGADUCT.
2.MCCB other than MEGADUCT is selected, the price is discussed separately.

1. When the plug-in unit is taken off, the opening of the leads must be placed by the insluation cover.

2. Install the basement of plug-in unit.



3. Insert the plug-in unit onto the support plate of basement.



4. Installation completed.

Product Design Theory

1. Temperature correction coefficient for rated current

Maximum ambient temperature °C	20	25	30	35	40	45	50	55	60
Daily average ambient temperature °C	15	20	25	30	35	40	45	50	55
Correction coefficient	1.18	1.14	1.09	1.05	1.00	0.94	0.88	0.82	0.75

2. Voltage drop calculation

(1) 1Φ2w

$\Delta U = 2 \times Is \times L \times (R\cos\theta + X\sin\theta) \times 10^{-6}$

(2) 1Φ3w / 3Φ4w (Line to neutral)

$\Delta U = Is \times L (R\cos\theta + X\sin\theta) \times 10^{-6}$

(3) 3Φ3w

$\Delta U = \sqrt{3} \times Is \times L \times (R\cos\theta + X\sin\theta) \times 10^{-6}$

ΔU = Voltage grop (Line to line) (Volts)

Is = Load current (Amps)

L = Line length (m)

R = Resistance (μΩ/m)

X = Reactance (μΩ/m)

$\cos\theta$ = Power factor

$\sin\theta = \sqrt{(1-\cos^2\theta)}$

Product Model Identification

MA 08 E C 5 - 400

MA	Product series code	MA : MA Series 1kV MB : MB Series 1kV
08	Copper bar width	04 w=40mm , 08 w=80mm , 12 w=120mm , 16 w=160mm,
E	Sing/Double conductor of each phase	E : Single Line D : Double Lines
C	Conductor type	C : Copper conductor A : Aluminum conductor
5	No. of conductors	
400	Cross sectional area of conductor	400mm^2

For calculation of general product data or technical information, please contact with manufacturer or local agency.

Low Voltage Busway Routine Test Items

A.Low voltage busway dieletric tests: Insulation resistance test and power frequency voltage withstand test

Electrical tests	Insulation resistance test	Power frequency voltage withstand
Standards	MEGADUCT	IEC 61439-6
Ur at 60Hz V	R at 1kV DC M Ω	U at 60 Hz 1min V
1000	2000	5000

B. Appearance inspection

The appearance of each element must be inspected. Result to be mentioned in final inspection report.

C. Dimension inspection

All dimensions are to be compared with customer's order sheet. Result to be mentioned in final inspection report.

D. Outgoing test report

Low voltage parts shall be tested prior to shipment and attached with outgoing test report.

MEGADUCT

Projects Reference List

OFFICE BUILDING
- FUSIONPOLIS FIT-OUT AT ASTAR (SINGAPORE)
- NANGANG SOFTWARE PARK (TAIWAN)
- PFIZEER INC. (TAIWAN)
- UC-BANILAD (PHILIPPINES)
- UC-MED MEDICAL CLINIC BUILDING (PHILIPPINES)

RESIDENTIAL
- PLAM RANGSIT PROJECT (THAILAND)
- YCK PARAGON RESIDENCE (SINGAPORE)

HOTEL & RESORT
- CEBU REEF II RESORT (PHILIPPINES)
- CEBU REEF RESORT (PHILIPPINES)
- CROWNE PLAZA HOTEL (TAIWAN)
- DURACON HOTEL (PHILIPPINES)
- FULON HOTEL (TAIWAN)
- HALONG BAY HOTEL (VIETNAM)
- KODAK HOTEL (TAIWAN)
- NOVETEL (TAIWAN)
- SHANGRI LA (CAMBODIA)
- SHERATON (TAIWAN)
- SOLEA 2 HOTEL (PHILIPPINES)

MUSEUM
- GRAND PRIX MUSEUM (MACAU)
- NATIONAL MESEUM OF PREHISTORY (TAIWAN)

DATA CENTER
- GLOBAL SWITCH (SINGAPORE)
- GOOGLE WEN I (SINGAPORE)
- TELSTRA-PACNET PHASEZ 2 (SINGAPORE)

HOSPITAL
- APMWCI PROJECT HOSPITAL (PHILIPPINES)
- CATHAY GENERAL HOSPITAL (TAIWAN)
- CHANG-HUA CHRISTIANITY HOSPITAL (TAIWAN)
- CHI MEI MEDICAL CENTER (TAIWAN)
- LOSHEN SANATORIUM (TAIWAN)
- TAIWAN UNIVERSITY MEDICAL (TAIWAN

AIRPORT
- AERO THAI (THAILAND)
- AERONAUTICAL RADIO (THAILAND)
- FAR GLORY AIR CARGO TERMINAL (TAIWAN)
- JAKARTA SOEKARNO-HATTA INTERNATIONAL AIRPORT (INDONESIA)
- PEMASANGGAN PIPA FUEL TERMINAL 3 (INDONESIA)
- SHANGHAI HON QIAO AIRPORT (CHINA)
- SHANGHAI HONGQIAO AIRPORT (TAIWAN)
- TAIPEI SONGSHAN AIRPORT (TAIWAN)
- TAOYUAN INTERNATION AIRPORT

EXPRESSWAY & TUNNEL
- MARINA COASTAL EXPRESSWAY-C463&C461 (SINGAPORE)
- SYUESHAN TUNNEL (TAIWAN)

ELECTRONIC & SEMICONDUCTOR
- AGC DISPLAY GLASS (TAIWAN)
- AU OPTRONICS CORP (TAIWAN)
- CORNING (TAIWAN)
- FORMOSA EPITAXY (TAIWAN)
- HTC CORP (TAIWAN)
- OPTO TECH CORPORATION (TAIWAN)
- SEMILEDS OPTOELECTRONICS (TAIWAN)
- SOLARCITY COMPANY (TAIWAN)
- TSMC (TAIWAN)
- UNITED MICOELECTRONICS CORPORATION (TAIWAN)

Projects Reference List

CLEANROOM
- JTC CLEANROOM (SINGAPORE)

METRO & HIGH SPEED RAIL
- KAOHSIUNG MRT (TAIWAN)
- KAOHSIUNG RAPID TRANSIT CORPORATION (TAIWAN)
- TAIPEI CITY HALL MRT (TAIWAN)
- TAIPEI RAPID TRANSIT CORPORATION (TAIWAN)
- TAIWAN HIGH SPEED RAIL (TAIWAN)

ENERGY & INFRASTRUCTURE
- ABB PNG LNG (SINGAPORE)
- CHAOZHOU SANBAIMEN POWER STATION (CHINA)
- EGAT MAE MOH POWER PLANT (THAILAND)
- FUJIAN XIANYOU PUMPED STORAGE HYDROPOWER EXCITATION SYSTEMS (CHINA)
- GLOW IMPROVEMENT - EC PLANT P5 (THAILAND)
- GUANGDON QINGYUAN PUMPED STORAGE POWER STATION (CHINA)
- GUANGDONG SHAOGUAN #1 #2 (CHINA)
- GUANGDONG SHAOGUAN THERMAL POWER STATION (CHINA)
- HSIN YUAN POWER PLANT (TAIWAN)
- MALAYSIA FAST TRACK3A (MALAYSIA)
- MALAYSIA FAST TRACK4A (MALAYSIA)
- QINGYUAN PUMPED STORAGE POWER STATION (CHINA)
- SHANGHAI JINQIAO EXPORT PROCESSING ZONE (CHINA)
- XIANJU HYDRO POWER #1 #2 (CHINA)

IRON & STEEL
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - 0601) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - 0602) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - 0635) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - 06B5) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - BRANCH) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (WATER TREAMENT PLANT - 2) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (WATER TREAMENT PLANT) (VIETNAM)

SHIPYARD
- CHANGXING ISLAND #1#2 SHIPYARD (CHINA)
- CHANGXING ISLAND FACILITY (CHINA)
- CHANGXING ISLAND SHIPBUILDING (CHINA)
- SHANGHAI WAIGAOQIAO SHIPBUILDING CO., LTD. (CHINA)
- SHIPYARD AT PANDAN ROAD (SINGAPORE)

PHARMACEUTICAL
- NOVARTIS (SINGAPORE)

CHEMICAL PLANT
- AEROSIL (THAILAND)
- AMMONIA AND UREA PLANT IN MARY (TURKMENISTAN)
- ASAHI CHEMICAL (THAILAND)
- BINTULU PROJECT (MALAYSIA)
- KRABI (THAILAND)

MEGADUCT

Projects Reference List

PETROCHEMICAL

- AMMONIA AND UREA PLANTS IN MARY-MERV (TURKMENISTAN)
- FORMOSA CHEMICALS & FIBRE CORPORATION (NINGPO FACTORY DEVELOPMENT PROJECT) (CHINA)
- FORMOSA PALNT VN2 (VIETNAM)
- FORMOSA PALNT WATER SOURCE (VIETNAM)
- FORMOSA PLANT-FIRST PHASE (VIETNAM)
- FORMOSA PLANT-SCOND PHASE (VIETNAM)
- NCC SIDE CRACKER (KOREA)
- SHANGHAI ORIENTAL PETROCHEMICAL CORPL (CHINA)
- SHANGHAI XIAO HUA (CHINA)
- SHANGHAI YADONG PETROCHEMICAL PLANT (CHINA)
- YIAN XION PETROCHEMICAL PLANT (CHINA)

OIL & GAS

- FUEL TANK FIRM CONSTRUCTION (MYANMAR)
- HUHHOT OIL & GAS PROJECT (CHINA)
- TAIYO NIPPON SANSO ENGINEERING (INDIA)

OFF-SHORE OIL DRILLING

- YANTAI RAFFLES OFFSHORE LTD,F&G MILLENIUM SA SEMI-SUBMERSIBLE DRILLING UNIT BAERFIELD HULL NO:YRO2006-193.

E-HOUSE

- HELANG FPSO (MALAYSIA)
- TAN BURRUP (AUSTRALIA)

INCINERATOR

- TUAS TUAS SOUTH INCINERATION PLANT (SINGAPORE)

PULP & PAPER

- TJIWI KIMIA PAPER MILL (INDONESIA)
- CHENG LOONG (VIETNAM)
- MONDI RICHARD BAY (SOUTH AFRICA)

FACTORY

- CHENG SHIN TYRE (INDONESIA)
- FAR EASTERN NEW CNETURY CORPORATION (VIETNAM)
- FORMOSA CHEMICALS & FIBER CORPORATION (NINGBO FACTORY - IIR) (CHINA)
- FORMOSA CHEMICALS & FIBER CORPORATION (NINGBO FACTORY) (CHINA)
- FORMOSA TAFFETA (DONG NAI) CO., LTD. (VIETNAM)"
- FUJIANG TECO FACTORY FIRST PERIOD (CHINA)
- JIANGXI TECO FACTORY RELOCATION (CHINA)
- KALLANG PAYA LEBAR KPE (SINGAPORE)
- POU CHEN MYANMAR PHASE III PROJECT (VIETNAM)
- POUSUNG VIETNAM (POU CHEN GROUP) EXTENSION (VIETNAM)
- QINGDAO TECO COMPRESSOR FACTORY (CHINA)
- QINGDAO TECO COMPRESSOR FACTORY-ADDITIONAL FEEDER (CHINA)
- RAHEJA MINDSPACE (INDIA)
- SANFAN CHEMICAL (VIETNAM)
- TECO WUXI FACTORY (CHINA)

Projects Reference List

Data Center-Tech Industry

Petrochemical

Airport

MEGADUCT

Industry

High Rise Building

Oil & Gas

Power Plant

MANUFACTURING BY:

Headoffice: LINKK BUSWAY SYSTEMS (M) SDN BHD
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CAST RESIN BUSDUCT SYSTEMS
(MEDIUM VOLTAGE)

MEGADUCT

LINKK
BUSWAY SYSTEMS

Content

Foreword

Due to drastic increase in the requirement of safety and stability for power distribution among public engineering, the conventional power cable and metal -enclosed busway can no longer fulfill the requirement stated above. LINKK Busway Systems (M) Sdn. Bhd. was established in 1992 to further develop the cutting edge cast-resin insulated busway systems from Europe to reach its fullest potential.

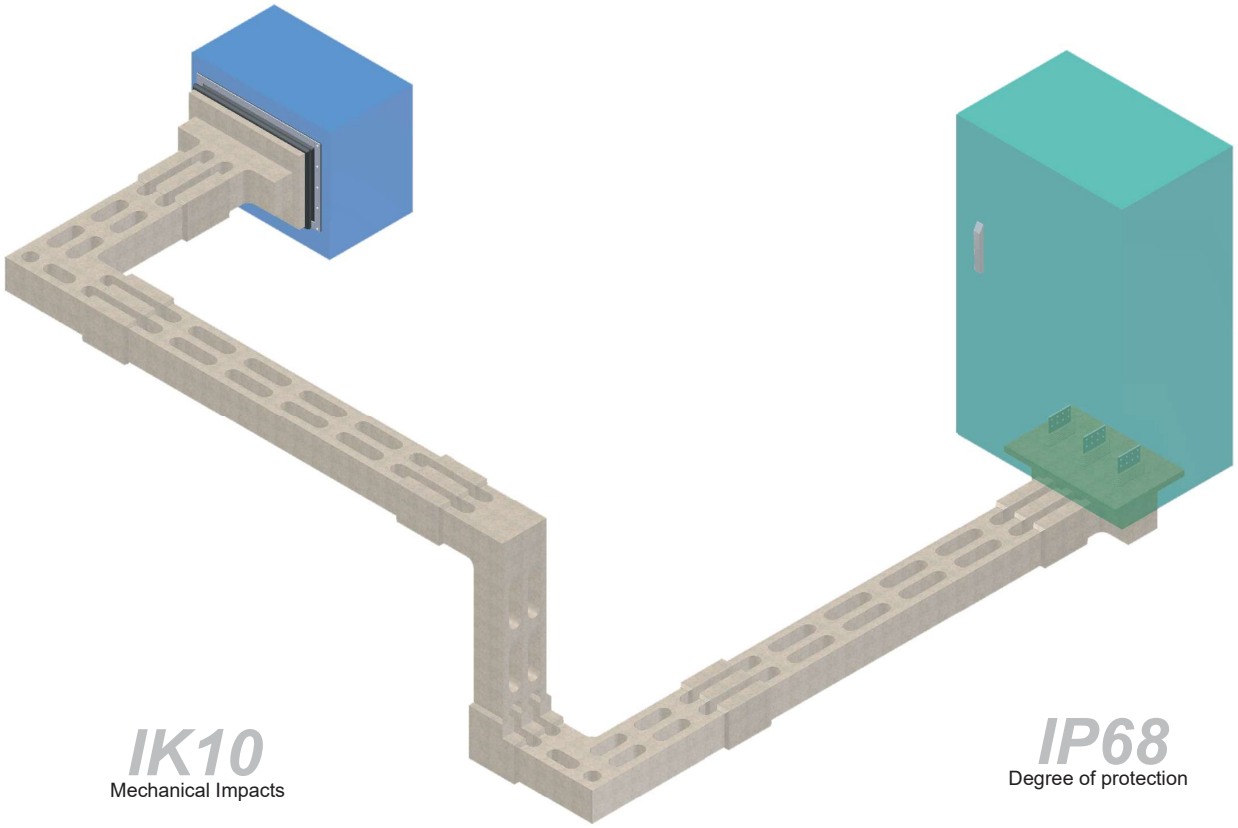
MEGADUCT product is built with excellent features of electrical characteristic and mechanical strength, fire and water proof, anti-corrosion, compact size, easy installation and most importantly maintenance free. Today, MEGADUCT has become the first choice of power transmission serving broad range of applications from high-rise residential buildings to nuclear power plants.

With the reputation based on strong customer orientation, solid engineering support and fast delivery schedule, MEGADUCT cater a complete package of services from conceptual design to commissioning to global clientele.

We will continue to make every effort to further enhance our services in our continuous pursuit for service excellence.

Excellence

1. Medium voltage products meet the standard of IEC 60694, IEC 62271-200, IEC 62771-201 IEC 62271-202 and IEEE C 37.23.
2. Compact, easy to install, no emission of toxic gas.
3. The purity of conductor is 99.9% for copper with conductivity above 98% IACS.
4. Low voltage drop, high short circuit current withstand, carried out overload + 20% for 2 hours.
5. Degree of protection tested in accordance with IEC-60529, IP68. Mechanical Impacts IK10.
6. Mixing excellent material such as non-organic volcanic rock with small amount of resin made of busway. With excellent insulation and heat dissipation properties.
7. Low EMC
8. Insulation level of class B 130°C.
9. Products have shown excellent results for at least 40 years, and passed aging test with safety operation over 50 years.
10. Maintenance free.



Product Certification

Product quality and capability have been assured and certified by international renowned testing authorities including Dekra, KEMA, UL and approved to be environmental friendly.

Technical Advantages

- Whole busway route cast-resin molded (including the junction part between elements)
- Full type tested by Dekra and KEMA; China 3C certified
- Fireproof certified (CNS14286, IEC60331)
- Highest Protecion Level (Waterproof/Dustproof) IP68 : LV /MV
- Best in Class of Mechanical Impact – IK10 (IEC 60068)
- Seismic Restraint certified including the junction – 0.8G passed
- Anti-Explosive certified
- Anti-Corrosive
- Electromagnetic Compatibility certified
- Compact design for easy installation and space saving
- High flexibility and custom design to fit in any condition
- ISO 9001 / ISO 14001 certified

Electrical Characteristics of Medium Voltage Busway

1. Title: MEGADUCT Medium Voltage Cast-Resin Insulated Non Segregated Phase Busway.

2. Product Description:
MEGADUCT Medium Voltage Cast-Resin Insulated Busway is developed for power systems between 3.6kV~24kV. The product has features of safety and compact. It is designed to using insulation material to perform cast resin sealing to the copper (aluminum) conductor. The insulation material is cast resin containing non-organic volcanic rock and has excellent insulation characteristics and mechanical strengh, humidity-proof, non-combustible, and self-extinguishing features.

3. Applicable Scope:
MEGADUCT medium voltage busway is manufactured in accordance with, IEC 60694, IEC 62271-200, IEC 62271-201, IEC 62271-202 and IEEE C37.23 standards. The elements included as below:
3.1 Straight elements, Elbow elements, T-elements and Terminal elements, etc.

4.Condition of Use:
MEGADUCT medium voltage busway is composed of the parts listed in item 3.1. The elements are connected through junction units on site before cast molding with insulation mix to complete the medium voltage busway. Conditions for MEGADUCT:
4.1 Altitude: below 1000m, indoor or outdoor site.
4.2 Ambient temperature: -45°C~65°C
4.3 Ambient humidity: 0%~100%

5. Technical Specifications:
5.1 Rated Voltage

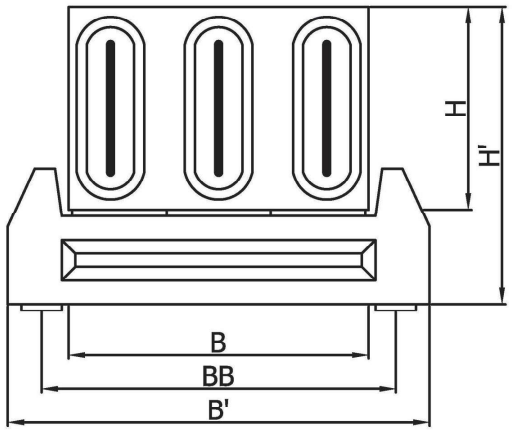
Model	MSH	MPH	MPE
Voltage	7.2kV	17.5kV	24kV

5.2 Frequency Hz: 50/60
5.3 System Type: 3Φ3w.
5.4 Conductor Material : Copper (Purity : 99.9% Conductivity : Above 98% IACS) and Aluminum.
According to standards : JIS H3140 , DIN 1787, DIN 1759, DIN 40500.
5.5 Electrical characteristics of each MEGADUCT element:
Partial discharge : ◎ Partial discharge coulomb value less than 20pC.
Protection degree : ◎ In accordance with IEC 60529 IP68.
Mechanical impacts : ◎ In accordance with IEC 60068-2-75 IK10.
Insulation capabilities : ◎ Max 50kV/1min. (PE Type).
Tempreature rise limit : ◎ At average ambient temperature of 35°C with daily peak 40°C temperature rise of conductor ≦50K.

Product Specifications MSH

50/60 Hz 1kV~7.2kV IP68 IK10

TYPE	B x H mm	BB mm	B` x H` mm	I_n(A) norm	I_n(A) 35/40°C	Cond. mm^2	R_{20} μΩ	R_{60} μΩ	R_{85} μΩ	X μΩ	I_{CW} kA/1Sec	Ipeak	P_{Loss90} W/m	Total Weight kg/m
COPPER														
Single Line														
MSH1	160 x 100	200	250 x 155	1000	1040	300	53.6	62.0	67.3	122	25	65	205.1	48
				1250	1295	480	31.6	36.5	39.7	117	30	78	188.6	51
					1500	720	21.5	24.9	27.0	112	45	117	184.8	56

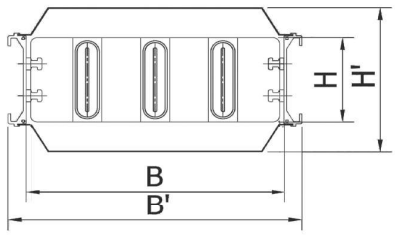


※Please contact us for specific layouts and connection details.
※Please refer to the temperature correction coefficient of rated current on page 19 while ambient temperature exceeds 40°C.

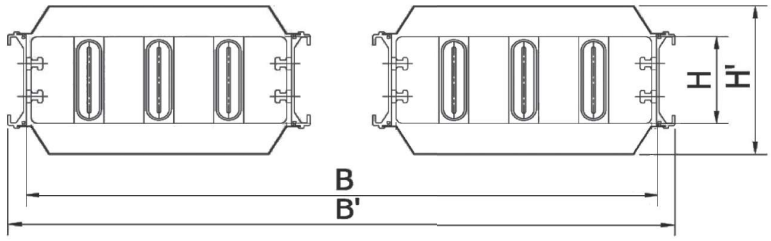
Product Specifications MPH

50/60 Hz 7.2kV~17.5kV IP68 IK10

TYPE	B x H mm	B` x H` mm	I_n(A) norm	I_n(A) 35/40°C	Cond. mm^2	R_{20} μΩ	R_{60} μΩ	R_{85} μΩ	X μΩ	I_{CW} kA/1Sec	Ipeak	P_{Loss90} W/m	Total Weight kg/m
COPPER													
Single Line													
MPH10	492 x 170	572 x 318	1600	1650	400	28.1	32.5	35.3	151	38	98.8	292.7	80
			2000	2070	600	26.6	30.7	33.4	149	55	143	406.3	95
				2308	800	20.5	23.7	25.7	147	75	195	390.2	97
			2500	2560	1000	15.8	18.3	19.8	145	95	247	377.0	100
				2800	1200	17.9	20.7	22.5	143	100	255	535.6	107
MPH16	492 x 230	572 x 378	3150	3215	1280	12.9	14.9	16.2	116	100	260	477.0	132
				3525	1600	10.2	11.8	12.8	114	100	260	477.0	139
				3711	1920	11.9	13.8	14.9	113	100	255	623.5	147
MPH20	492 x 280	572 x 428	4000	4208	2000	8.0	9.3	10.0	98	105	273	540.0	172
				4535	2400	6.6	7.6	8.3	97	105	273	510.4	182
			5000	5000	3000	5.5	6.3	6.9	95	105	273	524.2	196
Double Lines													
MPH16	800 x 230	880 x 378	6300	6300	2 x 1600	7.0	8.1	8.8	51.3	120	312	1064.7	278
ALUMINUM													
Single Line													
MPH10	492 x 170	572 x 318	1600	1607	600	46.6	54.0	58.5	150	85	216	456.7	84
				1815	800	35.7	41.3	44.8	148	85	216	442.7	86
			2000	2030	1000	29.8	34.4	37.4	146	85	216	455.4	88
				2223	1200	25.8	29.9	32.4	144	85	216	477.6	91
MPH16	492 x 230	572 x 378	2500	2502	1280	23.8	27.6	29.9	117	100	255	569.3	124
				2736	1600	19.8	23.0	24.9	115	100	255	553.4	129
				2897	1920	16.9	19.5	21.2	114	100	255	524.1	135
MPH20	492 x 280	572 x 428	3150	3332	2000	15.9	18.4	19.9	99	100	255	661.3	166
				3580	2400	12.9	14.9	16.2	98	100	255	604.4	175
			4000	4005	3000	11.9	13.8	14.9	96	100	255	728.7	187



Single Line



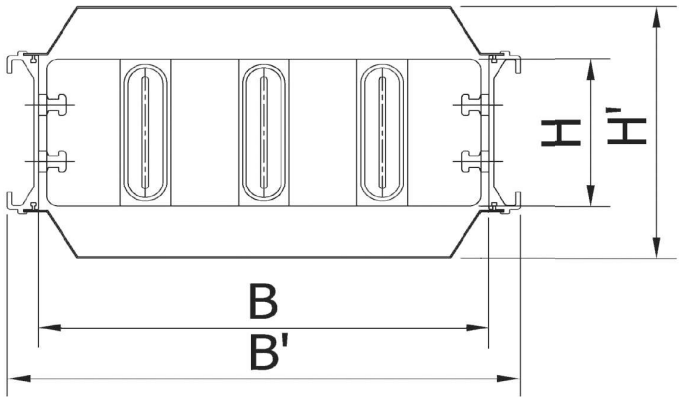
Double Lines

※Please contact us for specific layouts and connection details.
※Please refer to the temperature correction coefficient of rated current on page 19 while ambient temperature exceeds 40°C.

Product Specifications MPE

50/60 Hz 24kV IP68 IK10

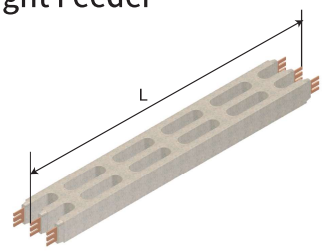
TYPE	B x H mm	B` x H` mm	In(A) norm	In(A) 35/40°C	Cond. mm^2	R_{20} μΩ	R_{60} μΩ	R_{85} μΩ	X μΩ	ICW kA/1Sec	Ipeak	PLoss90 W/m	Total Weight kg/m
COPPER													
Single Line													
MPE10	570 x 150	650 x 378	2000	1950	600	31.8	36.7	39.9	156	100	255	461.8	100
				2174	800	24.8	28.7	31.1	153	100	255	438.6	105
			2500	2637	1200	17.9	20.7	22.4	149	100	255	461.8	110
MPE16	570 x 210	650 x 438	3150	3203	1600	13.9	16.1	17.4	121	100	255	544.1	145
				3500	1920	11.9	13.8	14.9	119	100	255	557.9	148
			4000	4019	2400	10.9	12.6	13.7	117	100	255	668.0	153
ALUMINUM													
Single Line													
MPE10	550 x 150	650 x 378	1250	1438	600	46.6	54.0	58.5	157	65	165	349.6	89
			1600	1660	800	35.7	41.3	44.8	155	80	204	349.8	91
			2000	2004	1200	25.8	29.9	32.4	151	100	255	394.7	94
MPE16	550 x 210	650 x 438	2500	2667	1600	19.8	23.0	24.9	122	100	255	513.1	115
MPE20			3150	3210	2400	13.9	16.1	17.4	118	100	255	544.1	122



※Please contact us for specific layouts and connection details.
※Please refer to the temperature correction coefficient of rated current on page 19 while ambient temperature exceeds 40°C.

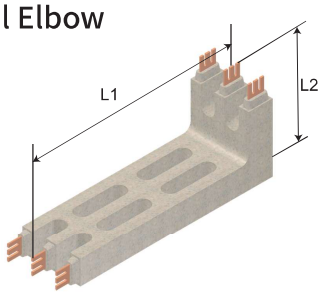
Selection of Standard Parts

Straight Feeder



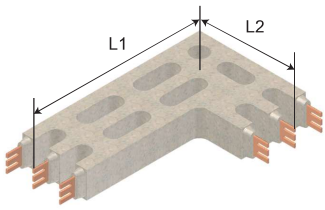
Model	Length
RE	L=1000mm、2000mm
	3000mm、4000mm (Max)

Vertical Elbow



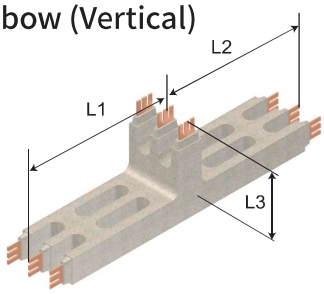
Model	Length
HL1	L1+L2=1000mm
HL2	L1+L2=2000mm
HL1	L1=550mm L2=450mm

Horizontal Elbow



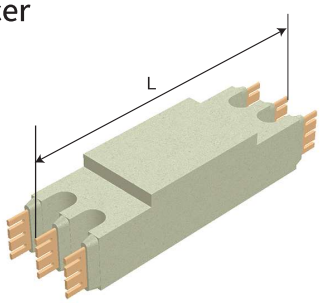
Model	Length
HB1	L1+L2=1000mm
HB2	L1+L2=2000mm
HB1	L1=550mm L2=450mm

Tee Elbow (Vertical)



Model	Length
TL2	L1=L2=L3=500mm

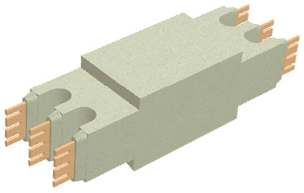
Reducer



Model	Length
TF	L=1200mm

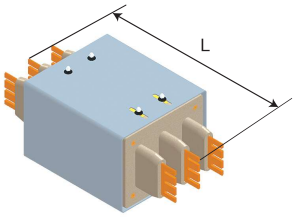
Selection of Standard Parts

Phase Switch Feeder



Model	Length
PC1	L=1200mm

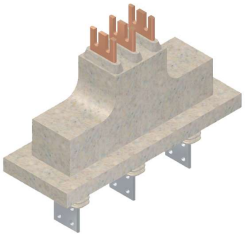
Expansion



MSH/MPH/MPE series
(7.2kV/17.5kV/24kV)

Model	Length
EX	L=1000mm

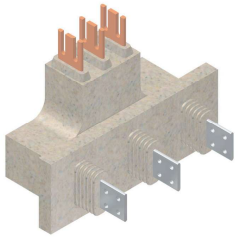
AG Type Terminal



MSH/MPH/MPE series
(7.2kV/17.5kV/24kV)

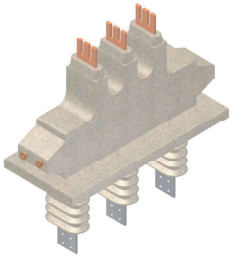
Model	Length
AG1	Refer to Page 14

AO Type Terminal



Model	Length
AO1	Refer to Page 15

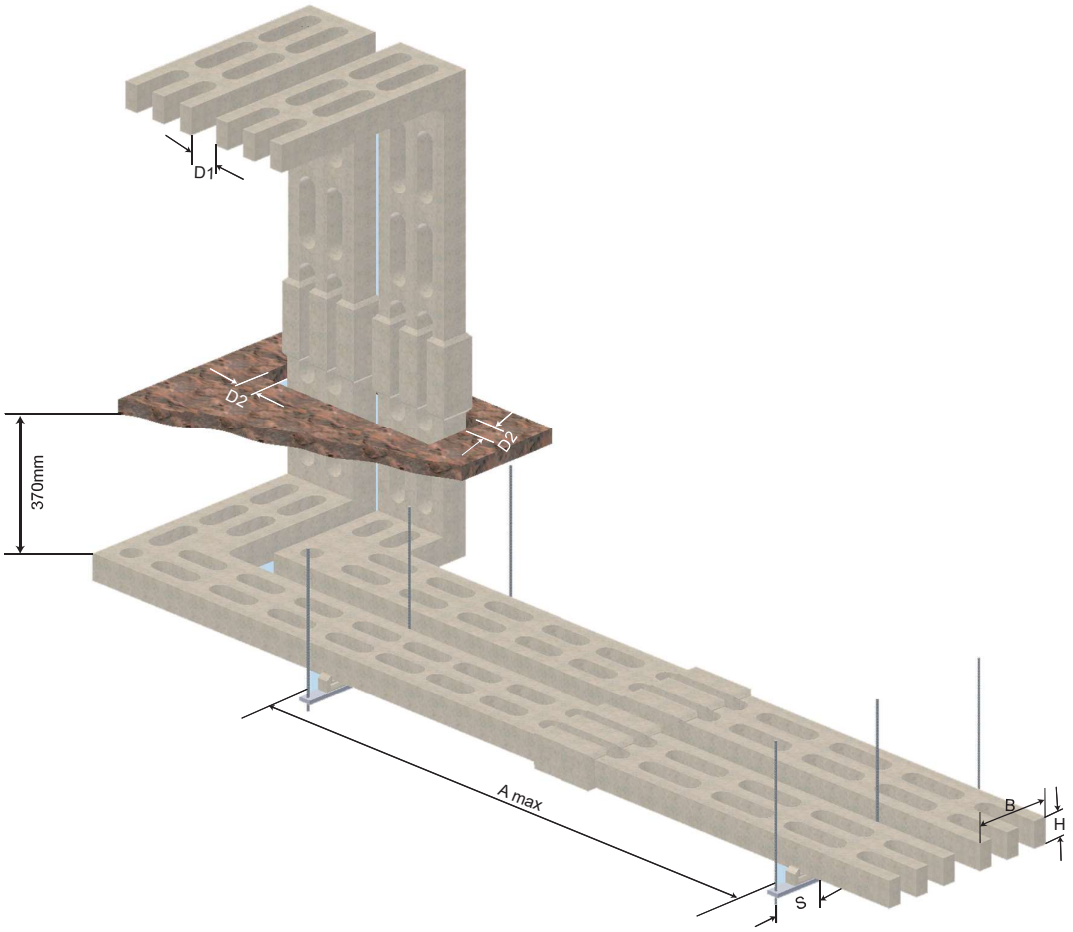
AG Type Terminal



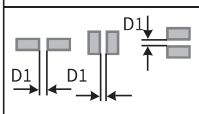
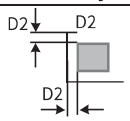
MPH/MPE series
(17.5/24kV)

Model	Length
AG1	Refer to Page 14

Product Installation

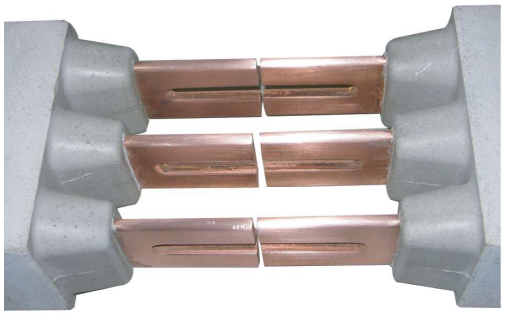


Unit: mm

Type	External Size	Limit of Hanger Installation Pitch A		Minimum pitch between busway		S: Distance between Hanger and Busway
	B×H	Horizontal Installation	Vertical Installation	Layout of busway arrangement 	Distance between wall opening and busway 	
MSH1	160×100	1500	4000	150	60	55
MPH10	322×150			250	100	75
MPH16	322×210					
MPH20	322×260					
MPE10	570×150			150 (Enclosure)	120	75
MPE16	570×210					

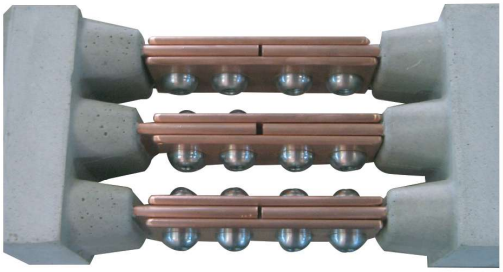
Note : Distance between hangers and busway are allowed to be adjusted on site while required.

Assembly Diagrams of Medium Voltage Busway Junction



- Distance between two elements are within 10mm±10mm (inclusive). The distance can be flexibly adjustedon site by the requirement of construction.

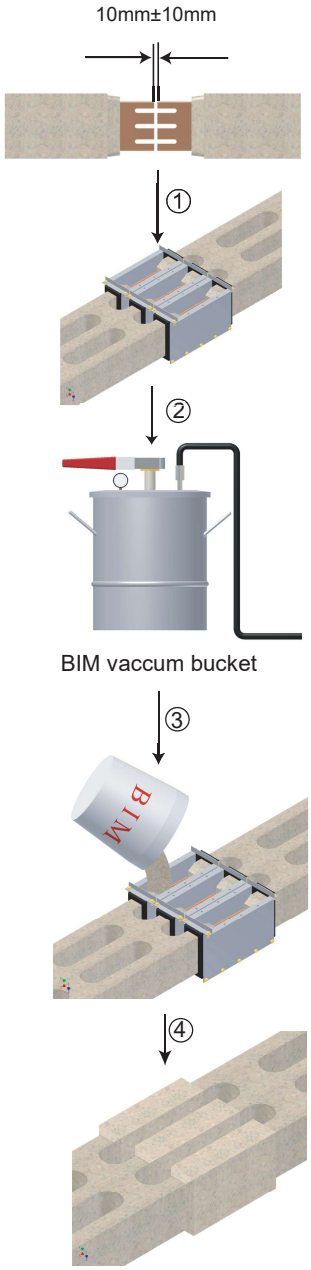
- Illustration of JUNCTION assembly.



- The assembly bolt of Junction must be secured by torque wrench.

Illustration of cast-resin after completion.

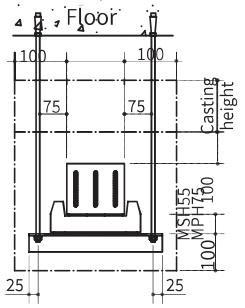
Method of cast-resin work on-site.
Refer to installation guide for casting method on site



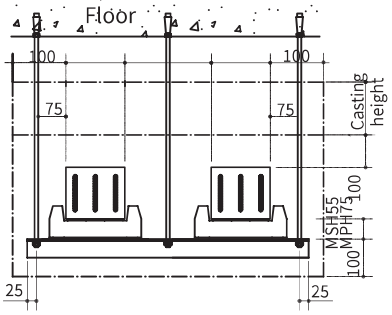
Torque of bolt during work:	
Specs	M12
Torque value (N-m) for Cu	74
Torque value (N-m) for Al	60

Medium Voltage Busway
Horizontal Hanger Standard

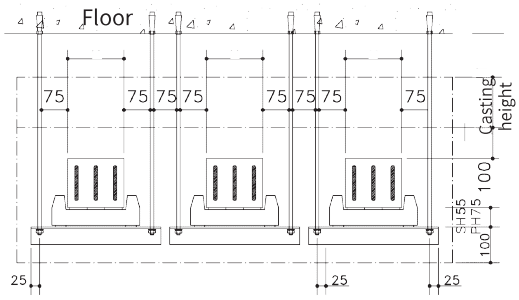
Unit:mm



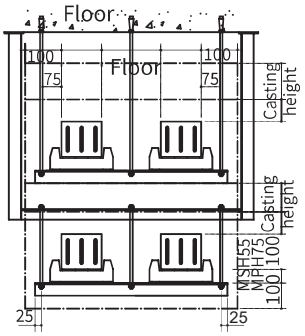
Cross-sectional Diagram of Single-Busway



Cross-sectional Diagram of Dual-Busway

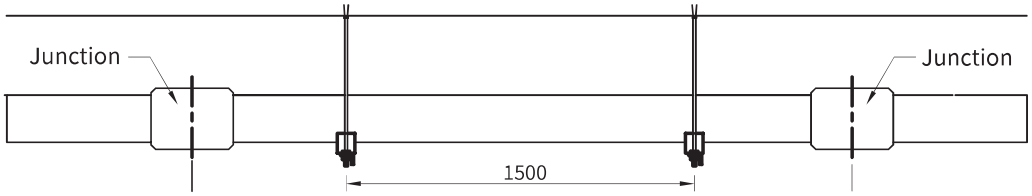


Cross-sectional Diagram of Triple-Busway

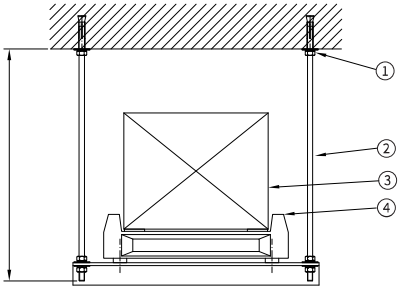


Cross-sectional Diagram of Quadruple-Busway

Side view



1.The installation pitch between each hanger has to comply with the standard as above. If the work condition can not meet the standard, it may be adjusted according to the condition on site. However, it must meet the requirement described in page 18 of the installation guide: minimum pitch requirement of the busway.
2.The space required for installing busway is shown in the diagram. The safety space above the busway should have 100mm + casting height of 270mm = 370 mm for clearance standard of installation space. In addition, the height of the floor should be within 5m above the ground to allow expansion of bolts, full-thread bolts, and channel, etc. to install at the bottom of the floor.
3.One set of L-shape stopping plate part.



No.	Name of Part	Specs	Remark
1	Inner thread inflated screws	1/2"*2"	Zinc-plated item.
2	Full thread bolts	1/2"	Zinc-plated item.
3	Busway		MEGADUCT
4	Insulation support	BIM (Refer to Product Specifications)	MEGADUCT

Dimensions of Standard Terminal Elements for Medium Voltage Busway

AG Type Terminal Elements

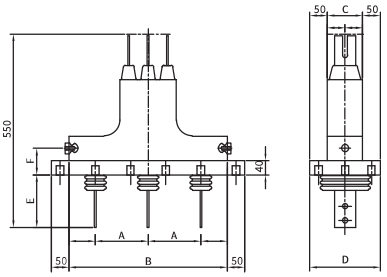


Figure 1

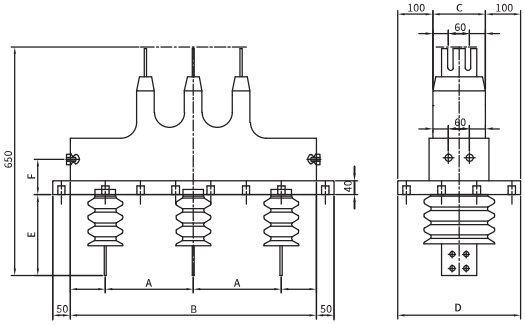


Figure 2

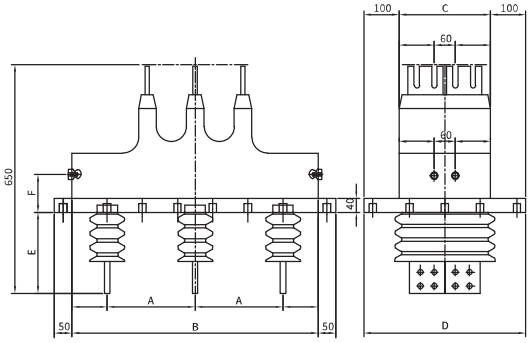


Figure 3

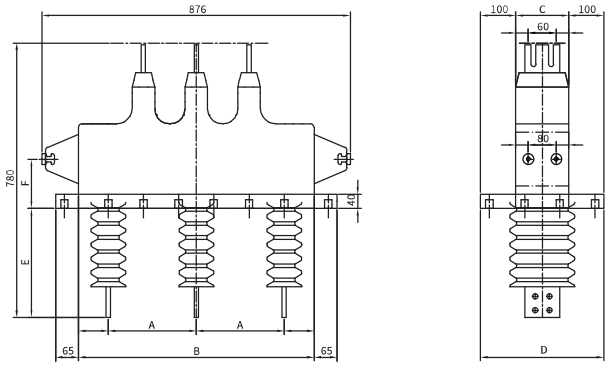


Figure 4

Unit : mm

Figure No.	Type	3Φ3w					
		A	B	C	D	E	F
Figure 1	MSH1	150	450	100	200	150	75
Figure 2	MPH10	250	700	150	350	230	90
	MPH16	250	700	210	410	230	100
Figure 3	MPH20	250	700	260	460	230	100
Figure 4	MPE10	250	700	150	350	315	100
	MPE16	250	700	210	410	315	100

Note 1 : The design is in accordance with IEC-815 standard, pollution class is classified as class II .
Note 2 : The design needs to be revised if require pollution class is greater than II .

Dimensions of Standard Terminal Elements for Medium Voltage Busway

AO Type Terminal Elements

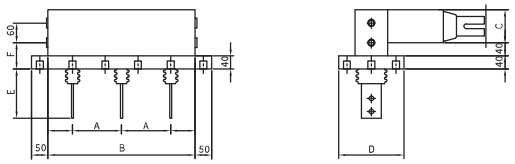


Figure 1

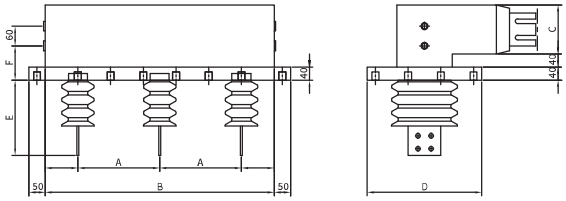


Figure 2

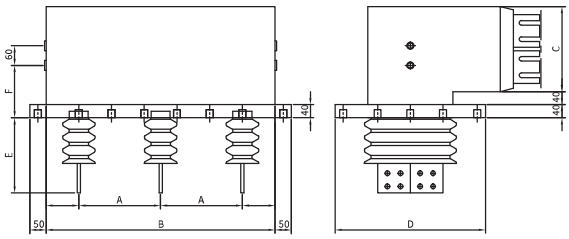


Figure 3

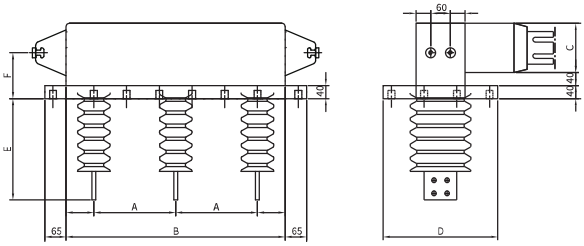


Figure 4

Unit : mm

Figure No.	Type	3Φ3w					
		A	B	C	D	E	F
Figure 1	MSH1	150	450	100	200	150	80
Figure 2	MPH10	250	700	150	350	230	105
	MPH16	250	700	210	410	230	105
Figure 3	MPH20	250	700	260	460	230	160
Figure 4	MPE10	250	700	150	350	315	90
	MPE16	250	700	210	410	315	90

Note 1 : The design is in accordance with IEC-815 standard, pollution class is classified as class II .
Note 2 : The design needs to be revised if require pollution class is greater than II .

Dimensions of Standard Terminal Elements
Copper Plate for Medium Voltage Busway

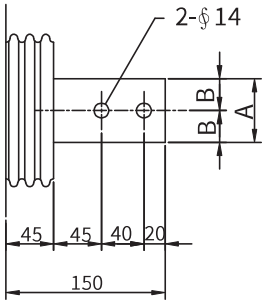


Figure 1

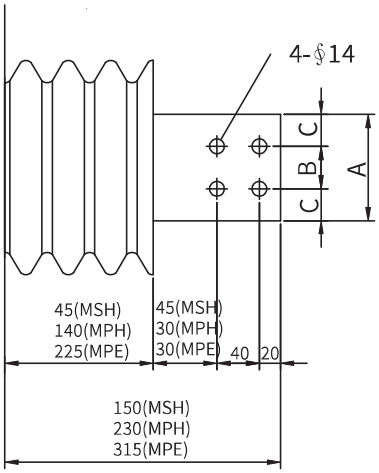


Figure 2

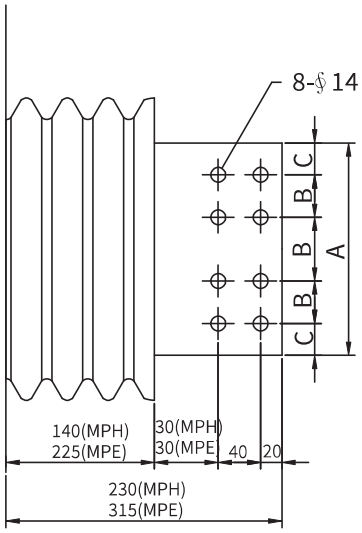


Figure 3

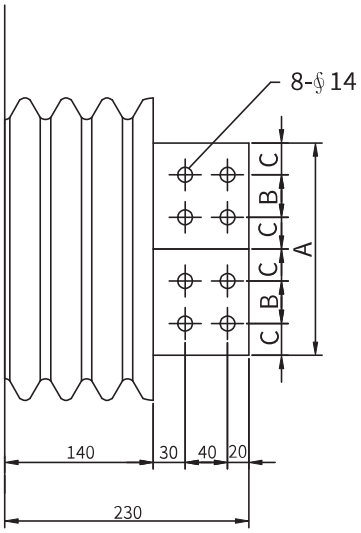
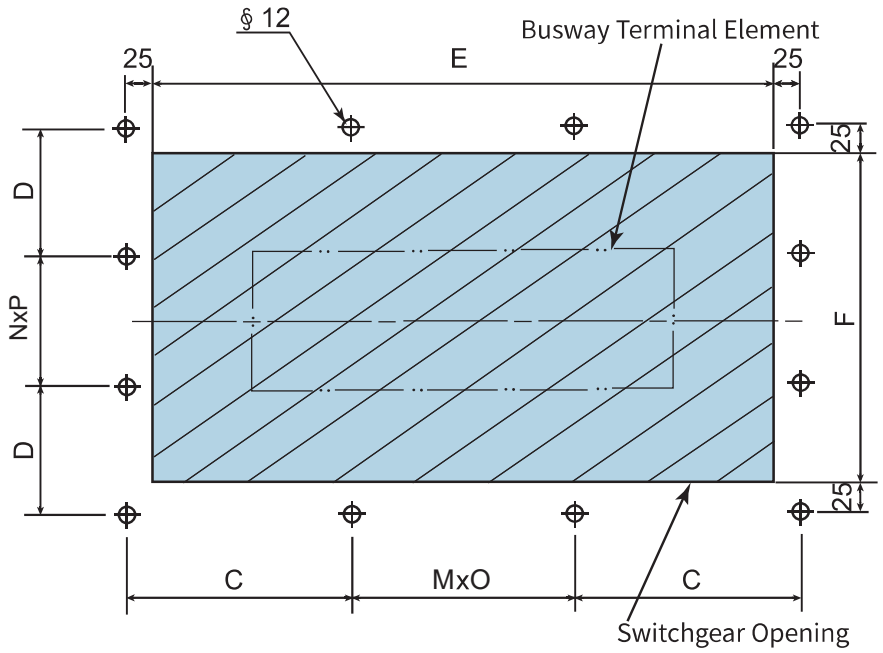


Figure 4

Figure No.	Type	Type of Terminal Elements	Dimensions (unit : mm)		
			A	B	C
Figure 1	MSH1	AG/AO	60	30	-
Figure 2	MPH10 MPE10	AG/AO	100	40	30
Figure 3	MPH16 MPE16	AG/AO	160	40	20
Figure 4	MPH20	AG/AO	200	40	30

Opening Requirement of Standard Terminal Elements and Switchgear for Medium Voltage Busway



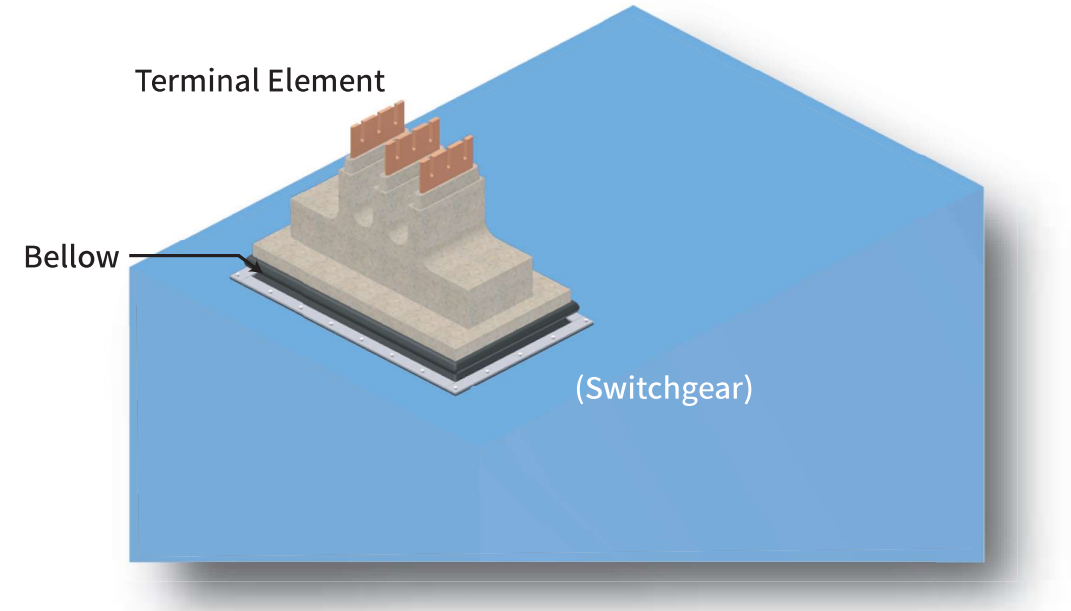
Busway Terminal Elements Opening Dimensions

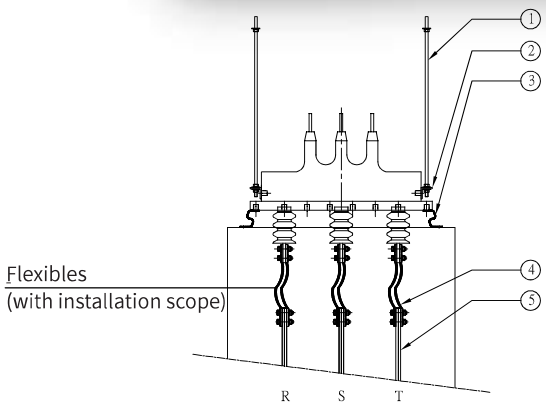
Unit: mm

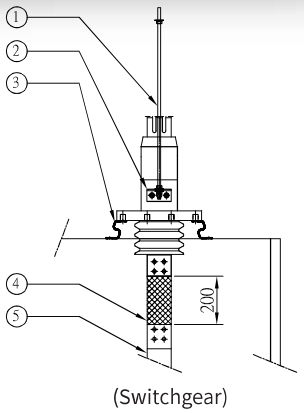
Type	AG Type Terminal Elements								AO Type Terminal Elements								Remark
	P	C	D	E	F	M	N	O	C	D	E	F	M	N	P	O	
MSH1	-	100	75	450	100	3	-	100	100	75	450	100	3	-	-	100	with flange
	-	-	-	510	160	-	-	100	-	-	510	160	-	-	-	100	without flange
	-	125	130	560	210	5	-	120	70	130	560	210	5	-	-	120	with bellow
MPH10/ MPE10	-	125	100	700	150	5	1	100	125	100	700	150	5	1	100	100	with flange
	130	130	75	810	360	5	2	120	130	75	810	360	5	-	130	120	with bellow
MPH16/ MPE16	-	125	130	700	210	5	1	100	125	130	700	210	5	1	100	100	with flange
	130	130	105	810	420	5	2	120	130	105	810	420	5	2	130	120	with bellow
MPH20	-	125	105	700	260	5	2	100	125	105	700	260	5	2	100	100	with flange
	130	130	130	810	470	5	2	120	130	130	810	470	5	2	130	120	with bellow

Note ：M›N=No. of Intervals among drillings.

Medium Voltage Busway Terminal Element and Switchgear Standard Guideline







No.	Name	Specs	Remark
1	Full threaded screw	1/2"	Zinc-plated product (Included in installation work)
2	Angle Steel	6t×50×50mm	Zinc-plated product (Included in installation work)
3	Terminal element seal	t=5mm	M10 screws (Outdoor type)
4	Flexibles	The 200mm reserved space between terminal element and switchgear are connected by flexibles.	Materials of this portion and connection work does not belong to the busway contractor.
5	Connection copper plate of switchgear	Depends on Switchgear design.	The drillings on copper plate are designed, processed and connected by switchgear cortractor.

Note: This diagram is the standard connection interface.
Actual location of connection is determined case by case.

Product Design Theory

1. Temperature correction coefficient for rated current

Maximum ambient temperature °C	20	25	30	35	40	45	50	55	60
Daily average ambient temperature °C	15	20	25	30	35	40	45	50	55
Correction coefficient	1.18	1.14	1.09	1.05	1.00	0.94	0.88	0.82	0.75

2. Voltage drop calculation

$\Delta U = \sqrt{3} \times Is \times L \times (R \cdot \cos\theta + X \cdot \sin\theta) \times 10^{-6}$

ΔU =Voltage drop (Volts)

Is =Load current (Amps)

L =Line length (m)

R =Resistance (μΩ/m)

X =Reactance (μΩ/m)

cosθ =Power factor

sinθ $= \sqrt{(1-\cos\theta)^2}$

Product Model Identification

MPH 10 E C 3 - 1000

MPH	Product series code	MSH: 7.2kV MPH: 17.5kV MPE: 24kV
10	Copper bar width	10 w=100mm , 16 w=160mm , 20 w=200mm
E	Single/Double conductor of each phase	E Single line D Double line
C	Conductor material	C Copper conductor A Aluminium conductor
3	No. of conductors	
1000	Cross sectional area of conductor	1000mm^2

Medium Voltage Busway Routine Test Items

A. Medium voltage busway dieletric tests: Insulation resistance test and power frequency voltage withstand test

	Electrical tests	Power frequency voltage withstand	Insulation resistance test
	Standards	IEC 60060	IEC 60270
Type	Ur	Ud at 60 Hz	q at 1.1 Ur
	kV	kV /1min	pC
MSH series	7.2	20	≦ 20
MPH series	17.5	38	≦ 20
MPE series	24	50	≦ 20

Ur : Rated voltage Ud : Power frequency voltage
q : Volume of partial discharge (pico-Coulomb)

B. Appearance inspection
The appearance of each element must be inspected. Result to be mentioned in final inspection report.

C. Dimension inspection
All dimensions are to be compared with customer's order sheet. Result to be mentioned in final inspection report.

D. Outgoing test report
Medium voltage parts shall be tested prior to shipment and attached with outgoing test report.

Projects Reference List

Energy & Infrastructure

- ABB PNG LNG (SINGAPORE)
- BYELORUSSIAN STEEL WORKS SUBSTATION (BELARUS)
- CHANG HU HYDRO POWER PLANT (CHINA)
- EGAT MAE MOH POWER PLANT (THAILAND)
- GUANGDONG SHAOGUAN #1 #2 V
- GUANGDONG TAISHAN NUCLEAR POWER PLANT PHASE I LOT11K 12KV (CHINA)
- GUANGDONG TAISHAN NUCLEAR POWERT (UNIT #1EXPANSION) (CHINA)
- GUANGDONG YANGJIANG NUCLEAR POWER PLANT #5&6 (CHINA)
- GUANGDONG YANGJIANG NUCLEAR POWER PLANT (CHINA)
- GUANGDONG YANGJIANG NUCLEAR POWER PLANT (UNIT #3&4 LOT73C BUSDUCT) (CHINA)
- GUANGDONG YANGJIANG NUCLEAR POWER PLANT 220KV AUXILIARY TRANSFORMER 6.6KV (CHINA)
- GUANGXI FANGCHENGGANG NUCLEAR POWER PLANT (220KV TRANSFORMER - 10KV BUSDUCT) (CHINA)
- GUANGXI FANGCHENGGANG NUCLEAR POWER PLANT (UNIT #1&2 LOT73C BUSDUCT) (CHINA)
- GUANGZHOU ZDLX POWER CO.,LTD (CHP 2×300MW PROJECT) (CHINA)
- HSIN YUAN POWER PLANT (TAIWAN)
- HUBEI XINGFA CHEMICALS GROUP CO.,LTD (ENERGY MANAGEMENT PLATFORM) (CHINA)
- KIMANIS 300MW CCPP PROJECT (MALAYSIA)
- LINKOU POWER STATION (TAIWAN)
- LURGI AL-YER HYDROGEN PLANT (SAUDI ARABIA)
- MALAYSIA FAST TRACK3A (MALAYSIA)
- MALAYSIA FAST TRACK4A (MALAYSIA)
- MARAFIQ (SAUDI ARABIA)
- MEGA MV (THAILAND)
- MINGTAN POWER STATION (TAIWAN)
- PT PLN MPP NIAS (INDONESIA)
- QINGYUAN PUMPED STORAGE POWER STATION (CHINA)
- SEM-CALACA (PHILIPPINES)

- SHANGHAI JINQIAO EXPORT PROCESSING ZONE (CHINA)
- SUZHOU POWER PLANT (CHINA)
- TAISHAN NUCLEAR POWER PLANT PHASE I LOT11K 12KV CAST-RESIN BUSDUCT (AUXILIARY POWER TRANSFORMER SECTION) (CHINA)
- TAIZHOU POWER PLANT (CHINA)
- TAIZHOU POWER PLANT/QUANTITY ADDITION (CHINA)
- TALIN POWER STATION (TAIWAN)
- TATAN POWER STATION (TAIWAN)
- THAI BINH 2 THERMAL POWER PLANT (VIETNAM)
- TUNG HSIAO POWER STATION (TAIWAN)
- XIANJU HYDRO POWER #1 #2 (CHINA)
- YINGXIUWAN GENERAL HYDRO POWER PLANT (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT #03A (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT #03B 6KV PROJECT (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT #4 6KV FEEDER NEW BUILT (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT (PHASE II) (CHINA)
- ZHENENG WENZHOU COAL-FIRED POWER PLANT UNIT #5 (CHINA)

Iron & Steel

- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT - 2) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (COKING PLANT) (VIETNAM)
- FORMOSA HA TINH STEEL CORPORATION (WATER TREAMENT PLANT - 3) (CHINA)

Pharmaceutical

- NOVARTIS (SINGAPORE)

Projects Reference List

Chemical Plant

- AEROSIL (THAILAND)
- AMMONIA AND UREA PLANT IN MARY (TURKMENISTAN)
- ASAHI CHEMICAL (THAILAND)
- BINTULU PROJECT (MALAYSIA)
- KRABI (THAILAND)
- SIBIRSKY CHEMICAL (RUSSIA)
- PT. ASAHIMAS CHEMICAL (INDONESIA)

Factory

- MONSANTO (THAILAND)
- FORMOSA CHEMICALS & FIBER CORPORATION - NINGBO (CHINA)
- SAMSUNG ASSEMBLY FACTORY (CHINA)
- SSANGYONG E&C (SOUTH KOREA)

Petrochemical

- FU SHUN 6.3KV (CHINA)
- FU SHUN ETHYLENE (CHINA)
- HANWHA TOTAL ADL (SOUTH KOREA)
- NINGBO-CHEMICAL PLANT (CHINA)
- SAMSUNG TOTAL DAESAN (SOUTH KOREA)
- SHANGHAI ORIENTAL PETROCHEMICAL CORPL (CHINA)
- SHANGHAI XIAO HUA ADDITIONAL FEEDER (CHINA)
- SHANGHAI-YADONG PETROCHEMICAL PLANT (CHINA)
- SHENHUA NINGXIA COAL LIQUEFACTION PLANT (CHINA)
- SK ENERGY (SOUTH KOREA)

E-house

- TAN BURRUP (AUSTRALIA)

Oil & Gas

- S-Oil RUC (SOUTH KOREA)
- SK ENERGY (SOUTH KOREA)
- SHAANXI YANCHANG PETROLEUM (CHINA)

Pulp & Paper

- TJIWI KIMIA SURABAYA PAPER MILL(INDONESIA)
- MONDI RICHARDS BAY 3RD STEAM TURBINE (SOUTH AFRICA)
- TJIWI KIMIA TK4 PROJECT (INDONESIA)
- CHENG LOONG CORP. VIETNAM CLVP PAPER MILL (VIETNAM)

Textile

- FEPV CHEMICAL FIBER POWER DISTRIBUTION STATION (VIETNAM)
- LEALEA ENTERPRISE CHUNGHWA PLANT (TAIWAN)

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