LS Cable & System
Leading Solution

LS C&S Bus Way System

[Ex/Ez/Ef-Way™ / Mini-Way™]


Energy Cables & Systems
LS Cable & System-setting the standards in power solution business
Industrial Materials
Realizing a convenient future with cutting-edge materials
Telecommunications
Providing cutting-edge, innovative technologies for a ubiquitous network
Integrated Modules & Cable Systems
Providing the best customized cable solutions for all environments

Total Solution Provider for Electric Power and Telecommunication Industries

LS Cable & System, the longtime de facto holding company of LS Group, officially transformed into a holding company in July of 2008. The company's operations now encompass a total solution for electric power and telecommunication industries.

The latest change in corporate structure comes as the company is accelerating efforts to improve management efficiency in rapidly expanding markets. The move also results from efforts to effect a more responsible and transparent management structure. Management is now prepared to take more aggressive action to enhance our businesses and to identify new growth engines. The holding company will take the lead in fostering new growth engines and in identifying lucrative investment opportunities, while the company's other business units will focus on improving management and on making operations more efficient. With the continued support of the holding company, LS Cable & System will spearhead efforts to strengthen our business expertise, corporate competitiveness and management.

Toward the Global Leading Cable Company

In August of 2008 LS Cable & System acquired Superior Essex, North America's largest cable company, making LS Cable & System the third-largest player in the global cable industry. Superior Essex's flagship line of magnet wires and telecommunication cables further strengthened LS Cable & System's product lineup, which had focused on power cables, fiber optic cables and industrial materials. Superior Essex's extensive North America and European production and distribution networks will help LS Cable & System cement a presence in the region and bring the company one step closer to becoming a full-fledged global enterprise.

Superior Essex

Superior Essex Inc., a FORTUNE 1,000 company, is one of the largest wire and cable manufacturers in the world. The company manufactures and supplies a broad portfolio of wire and cable products for the communications, energy, automotive, industrial, and commercial & residential end-markets. It is a leading manufacturer of magnet wire, fabricated insulation products, and copper and fiber optic communications wire and cable. It is also a leading distributor of magnet wire, insulation and related products.

The enterprise that is together with human beings through the information and energy transmission technology

LS C&S Bus Way System

[Ex/Ez/Ef-Way™ / Mini-Way™]

Commitment to Our Customers

As an extra high voltage cable and accessories manufacturer and a division of LS Cable & System we never stop researching, designing, developing, and manufacturing products with the higher level of quality to address the ever-changing demands in everyday life as well as in the industry. Our quality control meets the most delicate requirements of international standards and the high level of quality is recognized both by local and international clients.

Our commitment to develop and deliver solutions to address our customers' needs and challenges keep our technology on the cutting edge and our know-how in the field more valuable, which our customers highly appreciate.

We are looking forward to working with you.

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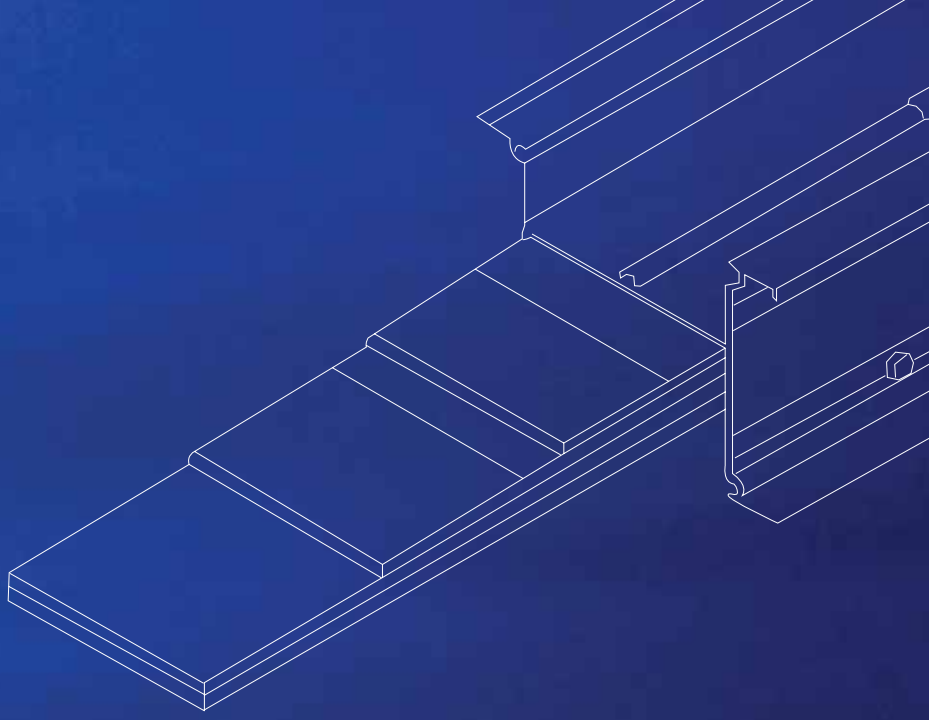
The enterprise that is together with human beings through the information and energy transmission technology

LS C&S Bus Duct



LS C&S Bus Way System

[Ex/Ez/Ef-Way™]

- Introduction
- General Specifications
- Physical Data
- Technical Data
- Temperature Monitoring System(Optional)
- Installation Procedure

1.1 High Quality & Reliable Power Distribution System

The demand for the economical and efficient distribution of electric power for business and industrial applications continues to grow.

LS C&S Bus Duct has been designed and manufactured to provide the following features:

High Current Density

LS C&S Bus Duct can carry up to 7500A with reduced loss. It is ideal for both high-rise buildings and industrial applications, and performs with a safe, flexible, reliable and economical efficiency.

The simplified design of the LS C&S Bus Duct system allows for easy routing, extension, relocation, replacement and maintenance of power loads.

These features are well suited to the needs modern architecture.

Service Conditions

Ambient temperature : -15°C ~ 55°C
Relative humidity : 95% or below
※No condensing by NEMA Bu 1.1.

Bus Bar

Copper bus bars have a conductivity of 99% or more.
Aluminum bus bars have a conductivity of 61% or more.
Electrical contact surfaces are tin plated in order to reduce contact resistance and prevents contact surface corrosion.

Temperature Rise Stability

Temperature rise limits are within 55°C or less on the external duct surface, as specified in IEC 60439-1, -2.

Insulation Properties

Class B (130°C) is applied to the conductors. Epoxy, PET and mica (1200°C, for fire resistance) are available options.

FRP (fiber reinforced plastic) is used as a spacer between conductors or between the conductor and the duct housing. These insulating materials have very high dielectric properties.

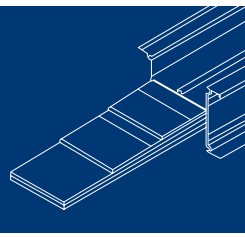
LS C&S Bus Duct systems are rated up to 1000V service capacity.

Lower Voltage Drop & High Short-Circuit Ratings

Because of the extremely low impedance, the resultant voltage drop is also low.
The effective design allows power to be delivered with the greatest possible efficiency.
LS C&S Bus Duct also has a very high shortcircuit with stand strength.

This ensures LS C&S Bus Duct can be safely applied in commercial and industrial environments.

1.2 Easy Maintenance & Intelligent Monitoring System



LS C&S Bus Duct has a very compact design, and uses an effective heat-radiating aluminum housing profile to protect the conductors from the environment. The light weight construction allows for easier installation and maintenance.

LS C&S Bus Duct offers an optional intelligent temperature monitoring system. An optical fiber is attached to the bus duct housing and is used to measure real time temperature conditions along the length of the installed bus duct system.

Compact Size

The efficient heat radiating design allows the use of smaller bus bars. The aluminum housing makes the system lighter than other conventional duct.
LS C&S Bus Duct requires less space than wire or conduit for a given application.

Economical and Easy Installation

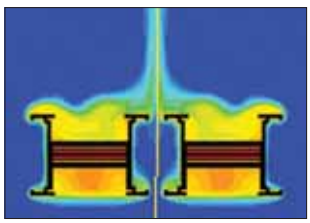
LS C&S Bus Duct uses an extruded aluminum housing and an efficient joint kit.
Reduced weight and simple joint connections make the installation process faster and less costly.

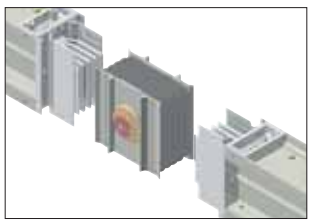
Temperature Monitoring of Bus Duct Line(optional)

A real-time integrated monitoring system of the bus duct distribution line senses temperature, fire, vibration, etc. and issues an alarm when abnormal conditions are detected.

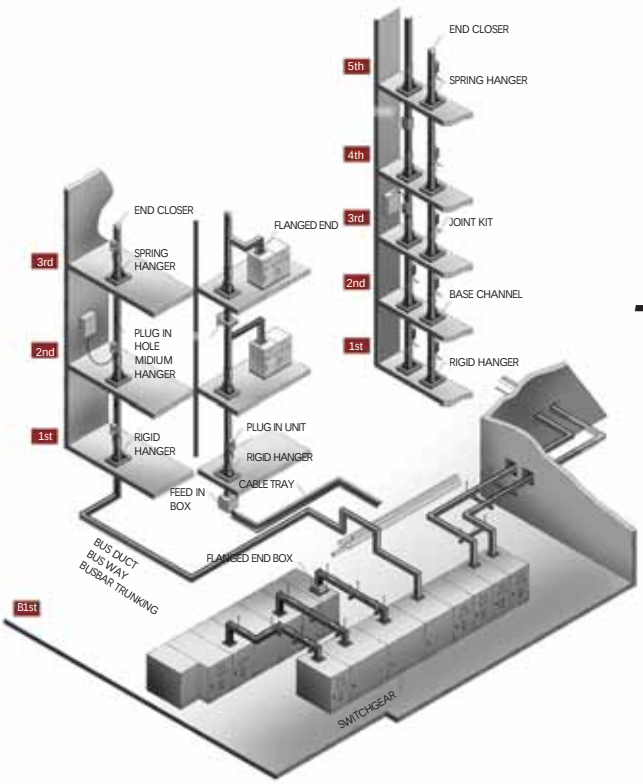
Standards

IEC 60439-1	:	Low-voltage Switchgear and Controlgear Assemblies
IEC 60439-2	:	Particular Requirement for Busbar Trunking Systems(Busways)
UL 857	:	Busways In case of UL mark, it will be discussed with manufacturer in advance.
BSEN 60439	:	Busways
NEMA BU 1.1	:	Busways
KSC IEC 60439-2		



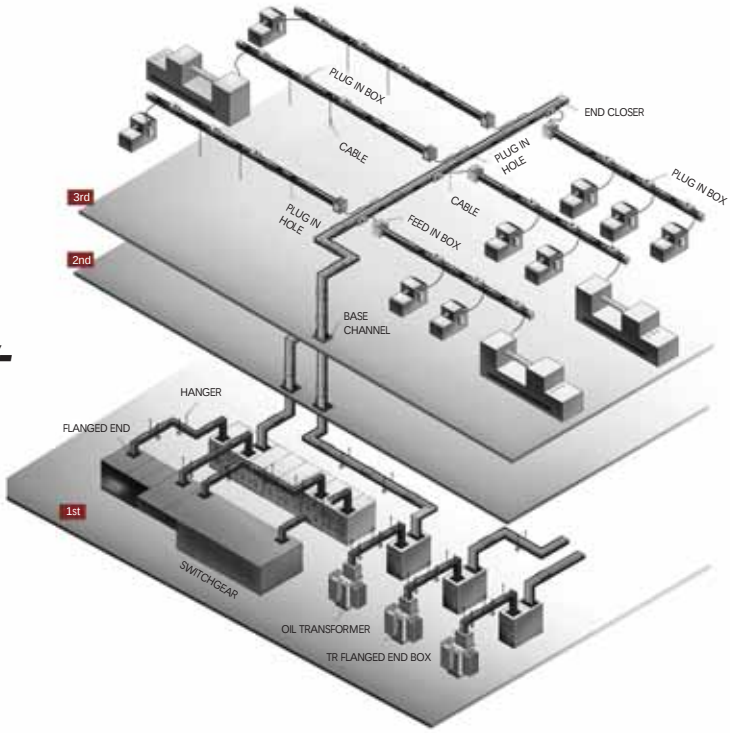


1.3 Bus Way System in Building

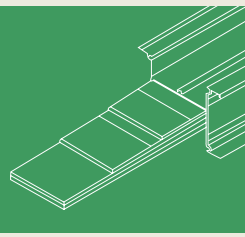


-Installation in Building-

-Installation in Factory-

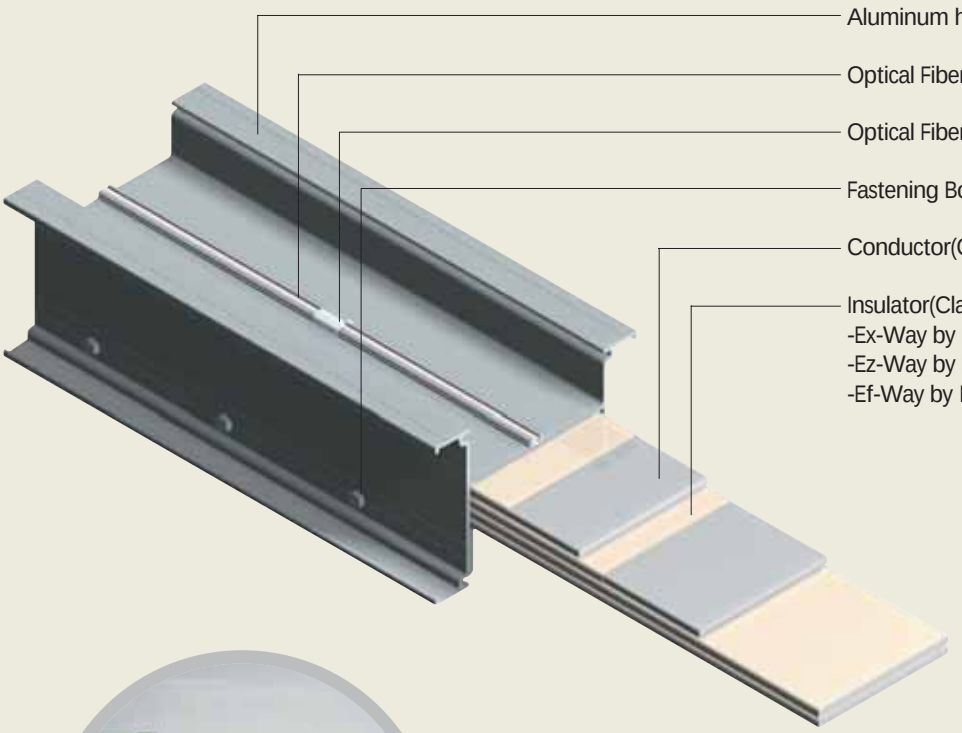


2.1 LS C&S Bus Duct Series



LS C&S Bus Duct offers a wide range of distribution capacities for buildings and factories, from 630A up to 7500A.
Since LS C&S Bus Duct is very compact and light weight, it can be easily installed using the low contact resistance joint kits.

LS C&S Bus Duct comes with a standard IP54 rating and can be upgraded to an IP65 rating on request. An optional temperature monitoring system is also available.



2.2 Grounding and Harmonics

LS C&S Bus Duct can provide large grounding capacities depending on the type of end flange configuration. The housing alone provides over 100% of the internal conductor area at the 2500A ampacity rating. The housing acts both as a low impedance ground path as well as an efficient thermal radiator.

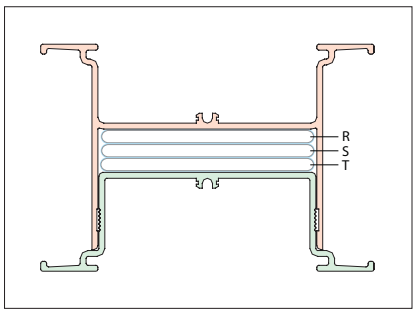
If increased ground capacity is required, additional internal ground bus bars can be added to the assembly, providing a 50% or 100% increase in ground path.

Where non-linear loads are anticipated, LS C&S Bus Duct offers an additional neutral bus option that can handle 100% or 200% of the harmonic currents.

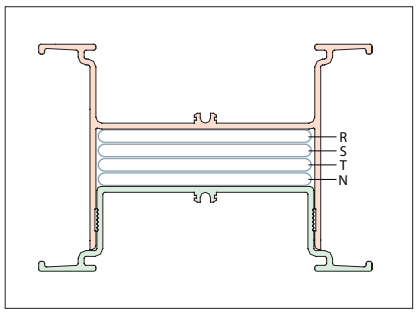
As modern industrial and commercial non-linear applications increase, the induced harmonic currents in the bus duct system require an increase in the ampacity of the neutral bus bar.

Even in a balanced 3-phase system, these harmonics still exist, and can lead to the reduced performance of the distribution system and operating equipment.

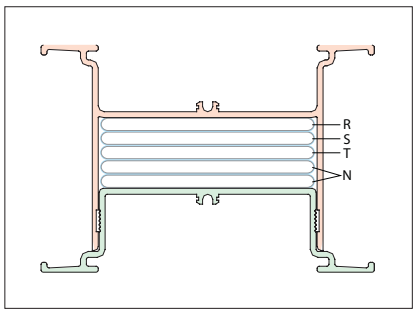
This added neutral bus bar minimizes harmonic effects and helps ensure safe operating conditions within rated heat limits.



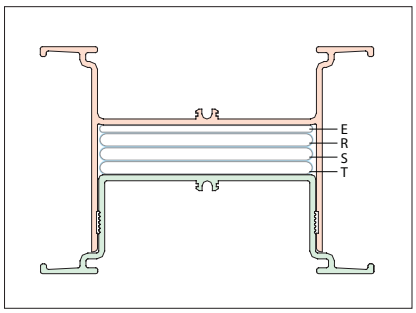
3W+GE [Fig. 12-1]



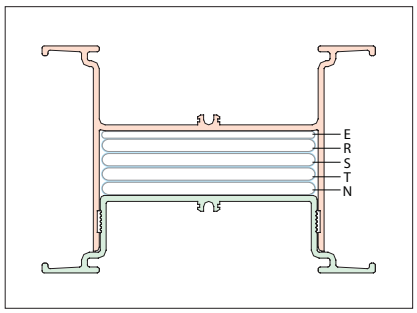
4W+GE [Fig. 12-2]



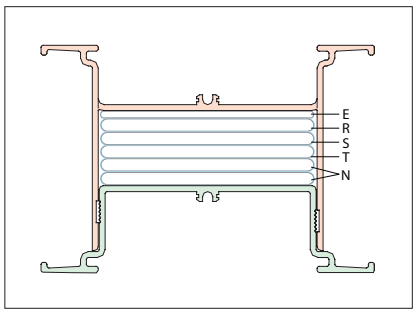
4W(200%N)+GE [Fig. 12-3]



3W+50%E, 100%E [Fig. 12-4]

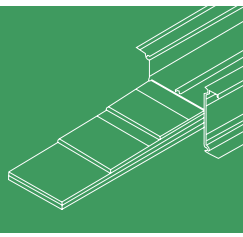


4W+50%E, 100%E [Fig. 12-5]



4W(200%N) + 50%E [Fig. 12-6]

2.3 Special Bolt / Nut used for Maintenance Free Installation



Construction Options

Table 13

No.of DH bolt	Ampere (A)		No.of DH bolt	Ampere (A)	
	Cu	Al		Cu	Al
1	630, 800, 1000,1250,1600, 2000	630, 800, 1000, 1250	4	5000	3200, 3600, 4000
2	2500, 3200, 3600, 4000	1600, 2000, 2500	6	7500	5000, 6000
3	6000	-			

Double-headed bolts are used to ensure proper torque levels when installing the joint kit. A long-handled wrench applied to the outer bolt head will shear off the head of the bolt when the proper torque has been applied(700 ~ 1000kgf ·cm)

The remaining bolt head can be re-used when tightened to 800kgf ·cm using a torque wrench.

Top [Fig. 13-1]

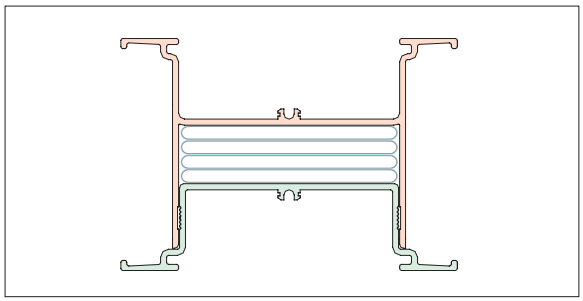
Bottom [Fig. 13-2]

2.4 IP Degree

**LS C&S Bus Duct is designed with a standard IP54 rating, and can be upgraded to IP65 for service in adverse conditions.
The addition of a sealant between the extruded housing sections allows LS C&S Bus Duct to provide optimum performance in the most demanding applications.
Through superior design and applied materials technology, system uptime and reliability are ensured even in the most severe-duty environments.**

Protection Degree IP54

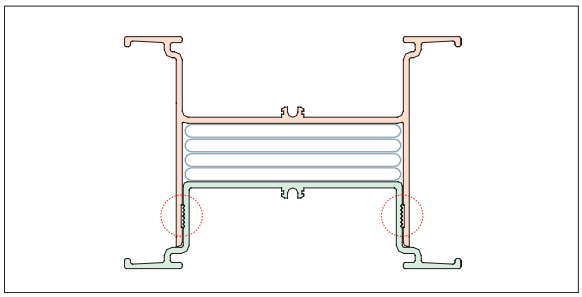
Feeder, plug-in and tap-off bus duct are available in either drip-proof or splash-proof construction.
Here the special sealing design between the housing sections is used.



[Fig. 14-1]

Protection Degree IP65

With an IP65 rating, the bus duct is ideal for use in corrosive environments. Here the special sealing design between the housing sections is upgraded to seal off water, dust and gasses with the addition of a polymer barrier.



[Fig. 14-2]

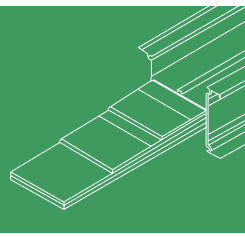
Construction Options

Table 14

Protection Degree	Available Bus Duct	Construction Type
IP54/IP55	Feeder, Plug-in, Riser	Drip-proof / Splash-proof
IP65/IP66	Feeder	Water Jet-proof

※ Additional sealant treatment is required for Joint-Part over IP55 indoor
※ Outdoor applications for horizontal edge-wise, riser, plug-in and joint applications require advance discussion with the manufacturer.

2.5 Temperature Monitoring(Optional)



One of the unique features of LS C&S Bus Duct is the ability to monitor the bus duct system performance under actual load conditions. The installation of the temperature monitoring system in buildings and factories permits an early warning of any potentially unsafe conditions.

The temperature monitoring function uses an optical fiber mounted to the bus duct housing as the temperature sensor.

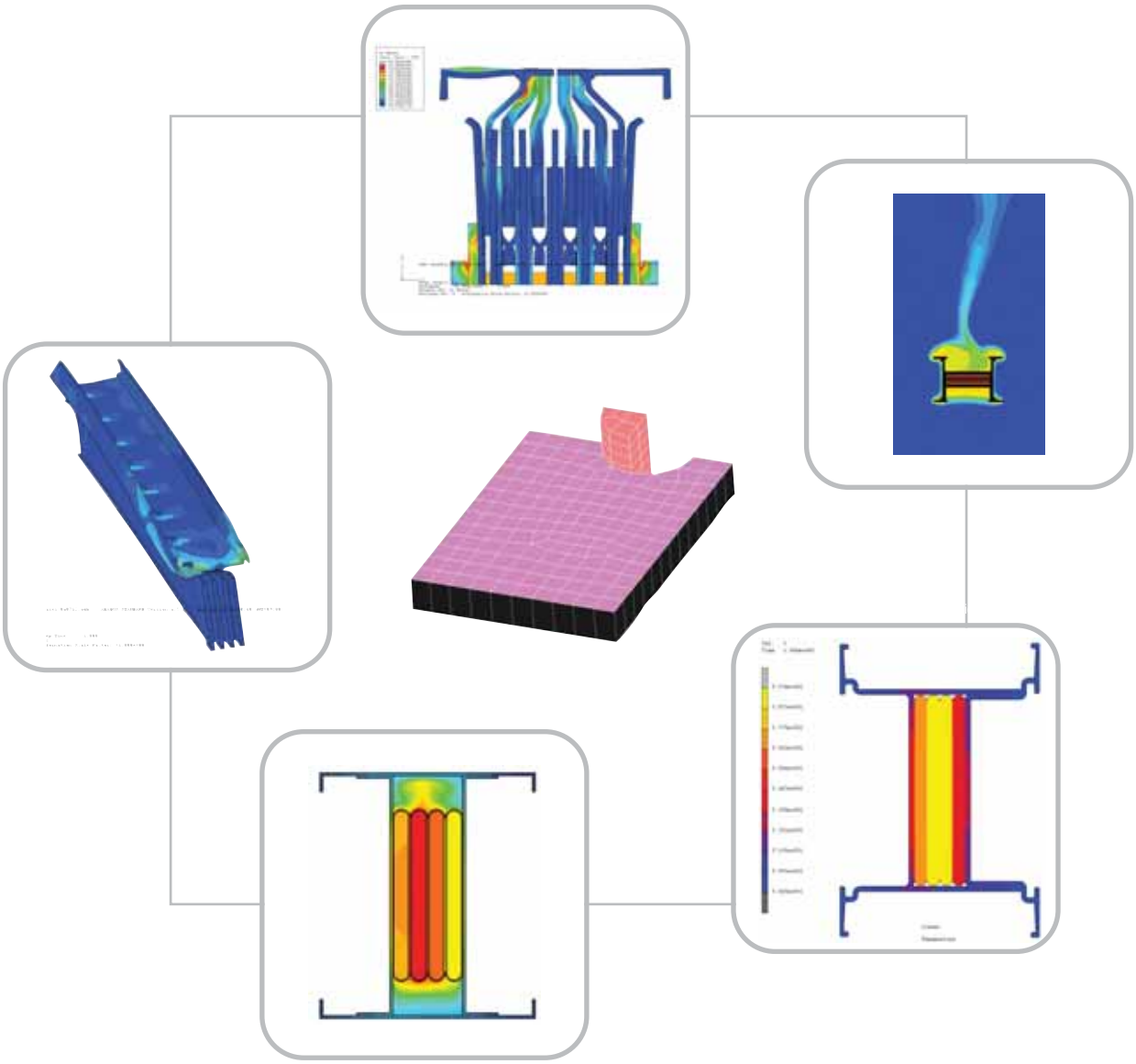
Using a single fiber, the system can measure distributed temperatures over several kilometers.

ABF (Air Blown Fiber) enables easy integration and installation where access is difficult, and can be added to a previously installed bus duct line.

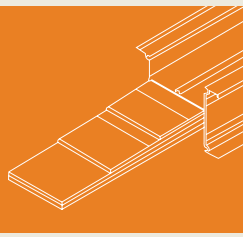
Simple operation & user-friendly GUI (Graphic User Interface) software.

2.6 Design Simulations

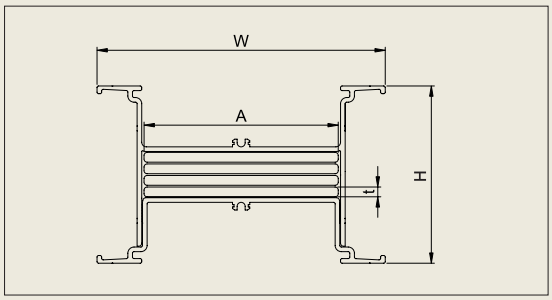
**The design of LS C&S Bus Duct is carried out under detailed CAE (Computer Aided Engineering) simulation processes.
Dynamic analysis of mechanical, thermal and electrical simulations greatly increases the quality and performance of the LS C&S Bus Duct product line.**



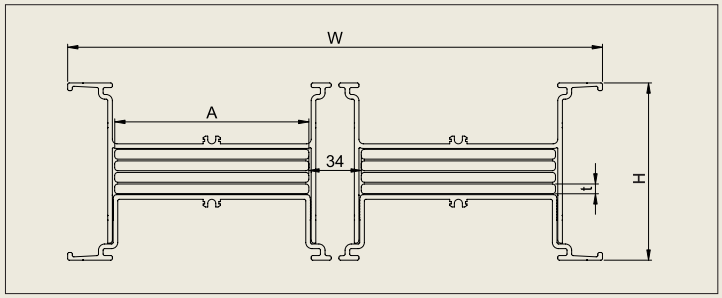
3.1 Straight Feeders



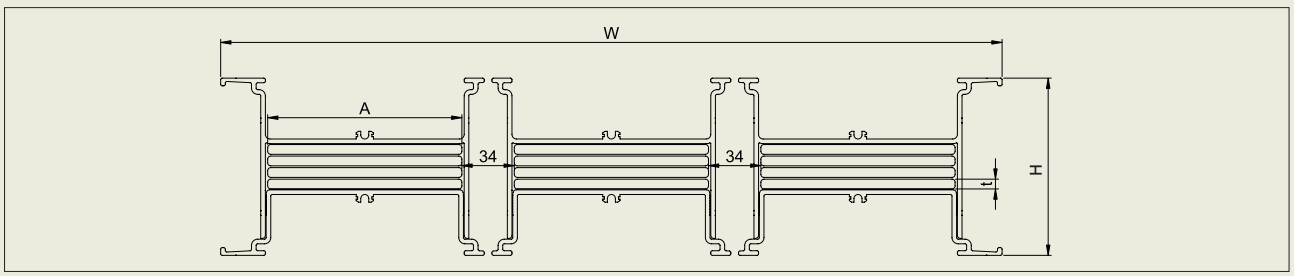
Construction Options



[Fig. 17-1]



[Fig. 17-2]



[Fig. 17-3]

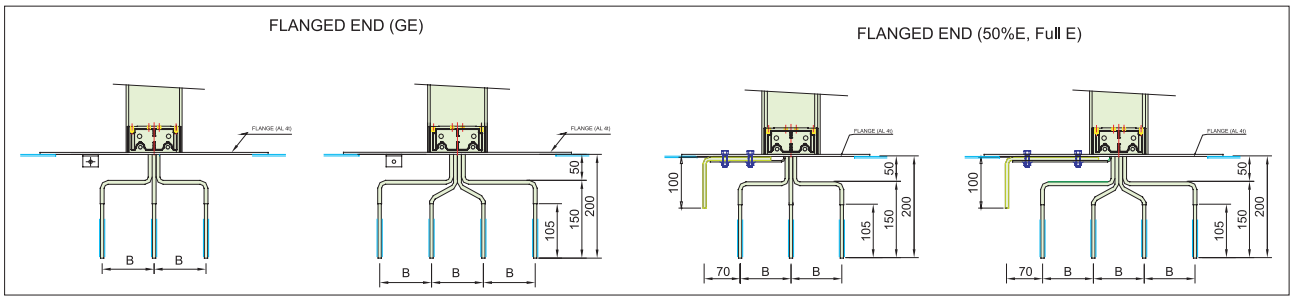
Table 17

Ampere (A)		Dimension(mm)			Weight(kg/m)				Fig.
		t	A	W	3W	4W	4W+50%E	4W+100%E	
AL	630	6.35	41	107	7.58	8.43	8.79	9.15	17-1
	800		62	128	8.83	10.09	10.63	11.17	
	1,000		86	152	10.92	12.14	12.89	13.64	
	1,250		108	174	13.40	15.42	16.36	17.30	
	1,600		164	230	19.57	20.61	22.08	23.55	
	2,000		210	276	23.08	26.23	28.14	30.09	
	2,500		(2)126	352	28.94	33.18	35.38	37.58	17-2
	3,200		(2)164	428	34.86	42.44	45.29	48.14	
	3,600		(2)184	468	38.31	45.40	48.59	51.78	
	4,000		(2)210	520	41.81	50.10	53.75	57.40	
	5,000		(3)184	686	57.74	68.43	73.22	78.01	17-3
	6,000		(3)210	764	64.03	73.61	81.51	89.41	
CU	630	6.35	41	107	11.91	14.44	15.65	16.86	17-.1
	800		41	107	11.91	14.44	15.65	16.86	
	1,000		57	123	14.65	18.25	20.58	22.91	
	1,250		73	139	17.65	22.04	24.60	27.16	
	1,600		108	174	26.74	31.00	36.47	41.94	
	2,000		145	211	31.69	37.39	44.76	52.13	
	2,500		195	261	42.69	54.59	60.25	65.91	
	3,200		(2)108	316	50.16	63.60	69.87	76.14	17-2
	3,600		(2)126	352	57.55	73.16	80.41	87.66	
	4,000		(2)145	390	64.82	82.72	91.17	99.62	
	5,000		(2)195	490	85.26	109.14	121.08	133.02	
	6,000		(3)145	569	97.88	124.83	137.59	150.35	17-3
	7,500		(3)195	719	126.89	162.81	179.83	196.85	

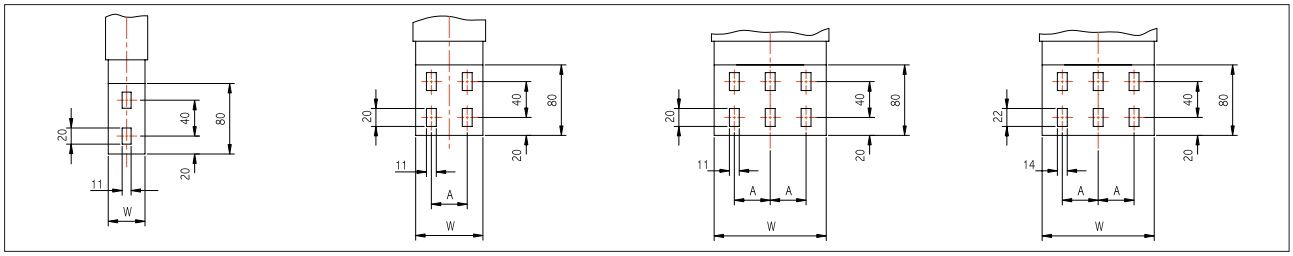
※ H : 107.5(3W+GE, 3W+50%E) / 115(4W+GE, 4W+50%E) / 130(4W+100%E)

3.1 Straight Feeders

Flanged End



[Fig. 18-1]



BAR WIDTH 41~62mm
[Fig. 18-2]

BAR WIDTH 73~108mm
[Fig. 18-3]

BAR WIDTH 126~145mm
[Fig. 18-4]

BAR WIDTH 164~210mm
[Fig. 18-5]

Table 18-1

AMP		Dimension(mm)				Fig.
		t	W	A	B	
AL	630	6.35	41	~	100	18-2
	800		62	~		
	1,000		86	40		18-3
	1,250		108	50		
	1,600		164	60		18-5
	2,000		210	70		
	2,500		(2)126	40	130	18-4
	3,200		(2)164	60		18-5
	3,600		(2)184	60		
	4,000		(2)210	70		
	5,000		(3)184	60		
	6,000		(3)210	70		

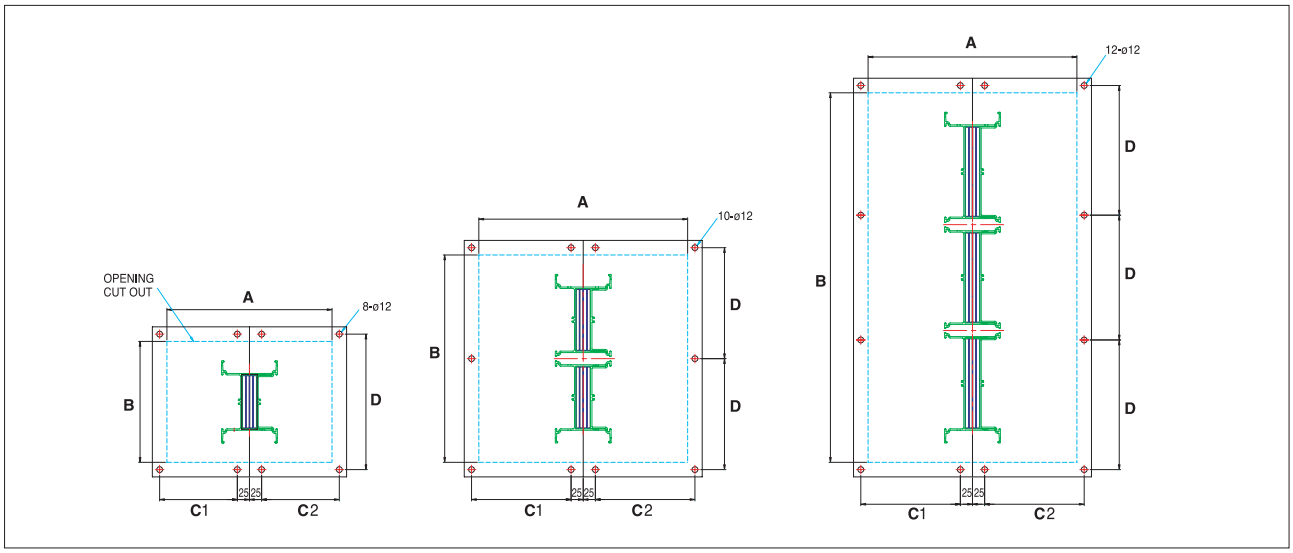
※ t : Conductor Thickness / A : Hole Pitch

Table 18-2

AMP		Dimension(mm)				Fig.
		t	W	A	B	
CU	630	6.35	41	~	100	18-2
	800		41	~		
	1,000		57	~		
	1,250		73	40		18-3
	1,600		108	50		
	2,000		145	50		18-4
	2,500		195	70		18-5
	3,200		(2)108	50	130	18-3
	3,600		(2)126	40		18-4
	4,000		(2)145	50		
	5,000		(2)195	70		18-5
	6,000		(3)145	50		18-4
	7,500		(3)195	70		18-5

※ t : Conductor Thickness / A : Hole Pitch

Cutout and Drilling Pattern for Flanged End



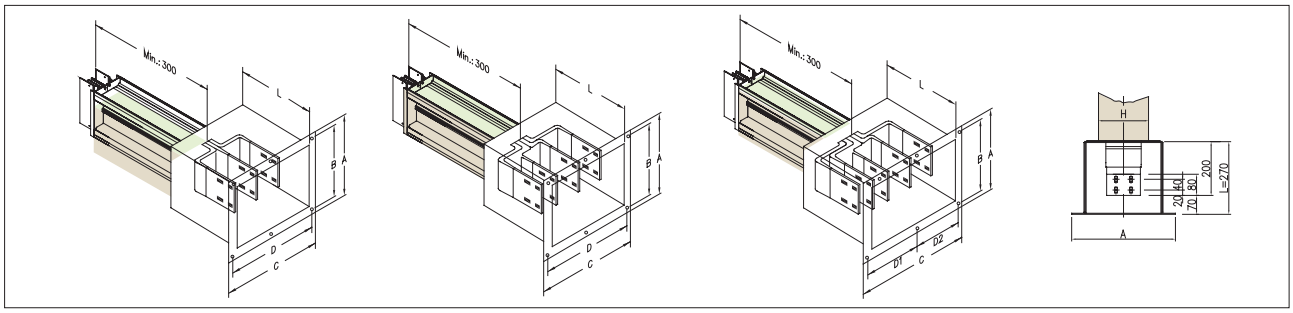
[Fig. 19]

Table 19

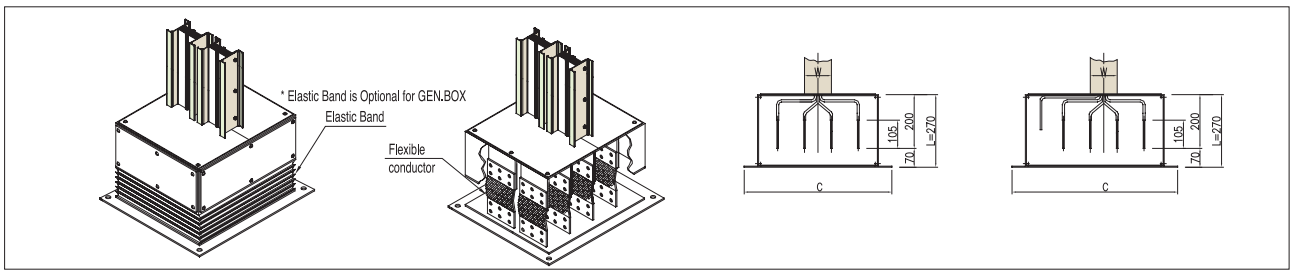
AMPS		Stacks	3W Dimension(mm)				4W Dimension(mm)				4W+50%E, 100% E Dimenison(mm)				
			A	B	C1, C2	D	A	B	C1, C2	D	A	B	C1	C2	D
AL	630	1	240	122	110	152	340	122	160	152	410	122	230	160	152
	800	1	240	143	110	173	340	143	160	173	410	143	230	160	173
	1,000	1	240	167	110	197	340	167	160	197	410	167	230	160	197
	1,250	1	240	189	110	219	340	189	160	219	410	189	230	160	219
	1,600	1	240	245	110	275	340	245	160	275	410	245	230	160	275
	2,000	1	240	291	110	321	340	291	160	321	410	291	230	160	321
	2,500	2	300	367	140	199	430	367	205	199	500	367	275	205	199
	3,200	2	300	443	140	237	430	443	205	237	500	443	275	205	237
	3,600	2	300	483	140	257	430	483	205	257	500	483	275	205	257
	4,000	2	300	535	140	283	430	535	205	283	500	555	275	205	283
	5,000	3	300	701	140	244	430	701	205	244	500	701	275	205	244
	6,000	3	300	779	140	270	430	779	205	270	500	779	275	205	270
CU	630	1	240	122	110	152	340	122	160	152	410	122	230	160	152
	800	1	240	122	110	152	340	122	160	152	410	122	230	160	152
	1,000	1	240	138	110	168	340	138	160	168	410	138	230	160	168
	1,250	1	240	154	110	184	340	154	160	184	410	154	230	160	184
	1,600	1	240	189	110	219	340	189	160	219	410	189	230	160	219
	2,000	1	240	226	110	256	340	226	160	256	410	226	230	160	256
	2,500	1	240	276	110	306	340	276	160	306	410	276	230	160	306
	3,200	2	300	331	140	181	430	331	205	181	500	331	275	205	181
	3,600	2	300	367	140	199	430	367	205	199	500	367	275	205	199
	4,000	2	300	405	140	218	430	405	205	218	500	405	275	205	218
	5,000	2	300	505	140	268	430	505	205	268	500	505	275	205	268
	6,000	3	300	584	140	205	430	584	205	205	500	584	275	205	205
	7,500	3	300	734	140	255	430	734	205	255	500	734	275	205	255

3.1 Straight Feeders

Flanged End Box / Feed in Box



[Fig. 20-1]

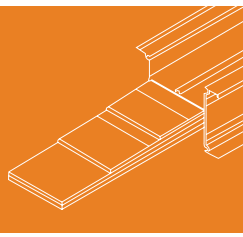


[Fig. 20-2]

Table 20

AMPS		No.of Stacks	3W(mm)					4W(mm)					4W+50%E, 100% E(mm)					
			A	B	C	D	L	A	B	C	D	L	A	B	C	D1	D2	L
AL	630	1	347	297	410	180X2	270	347	297	510	230X2	270	340	297	580	300	230	270
	800	1	379	329	410	180X2	270	379	329	510	230X2	270	379	329	580	300	230	270
	1,000	1	392	342	410	180X2	270	392	342	510	230X2	270	392	342	580	300	230	270
	1,250	1	414	364	410	180X2	270	414	364	510	230X2	270	414	364	580	300	230	270
	1,600	1	470	420	410	180X2	270	470	420	510	230X2	270	470	420	580	300	230	270
	2,000	1	516	466	410	180X2	270	516	466	510	230X2	270	516	466	580	300	230	270
	2,500	2	592	542	470	210X2	270	592	542	600	275X2	270	592	542	670	345	275	270
	3,200	2	668	618	470	210X2	270	668	618	600	275X2	270	668	618	670	345	275	270
	3,600	2	708	658	470	210X2	270	708	658	600	275X2	270	708	658	670	345	275	270
	4,000	2	760	710	470	210X2	270	760	710	600	275X2	270	760	710	670	345	275	270
	5,000	3	926	876	470	210X2	270	926	876	600	275X2	270	926	876	670	345	275	270
	6,000	3	1004	954	470	210X2	270	1004	954	600	275X2	270	1004	954	670	345	275	270
CU	630	1	347	297	410	180X2	270	347	297	510	230X2	270	347	297	580	300	230	270
	800	1	347	297	410	180X2	270	347	297	510	230X2	270	347	297	580	300	230	270
	1,000	1	363	313	410	180X2	270	363	313	510	230X2	270	363	313	580	300	230	270
	1,250	1	379	329	410	180X2	270	379	329	510	230X2	270	379	329	580	300	230	270
	1,600	1	414	364	410	180X2	270	414	364	510	230X2	270	414	364	580	300	230	270
	2,000	1	451	401	410	180X2	270	451	401	510	230X2	270	451	401	580	300	230	270
	2,500	1	501	451	410	180X2	270	501	451	510	230X2	270	501	451	580	300	230	270
	3,200	1	556	506	470	210X2	270	556	506	600	275X2	270	556	506	670	345	275	270
	3,600	2	592	542	470	210X2	270	592	542	600	275X2	270	592	542	670	345	275	270
	4,000	2	630	580	470	210X2	270	630	580	600	275X2	270	630	580	670	345	275	270
	5,000	2	730	680	470	210X2	270	730	680	600	275X2	270	730	680	670	345	275	270
	6,000	3	809	759	470	210X2	270	809	759	600	275X2	270	809	759	670	345	275	270
	7,500	3	959	909	470	210X2	270	959	909	600	275X2	270	959	909	670	345	275	270

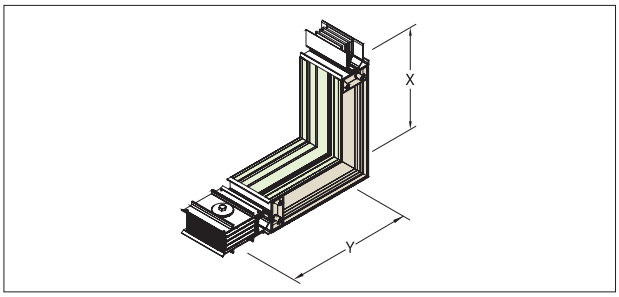
3.2 Fittings



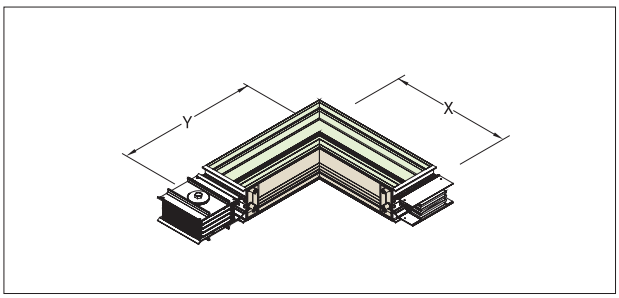
LS C&S Bus Duct has a complete range of fittings to satisfy all lay-out conditions. Angles other than 90° are available.

Fittings designations are shown in the following figures and are based on the source-side and the load-side of the device.
Offset and combination elbows are used where standard elbows are not feasible.

Elbow-Fittings

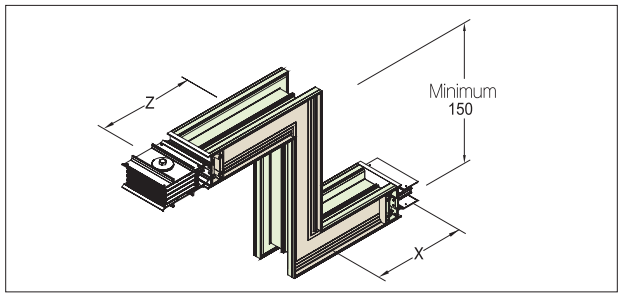


Horizontal Elbow [Fig. 21-1]

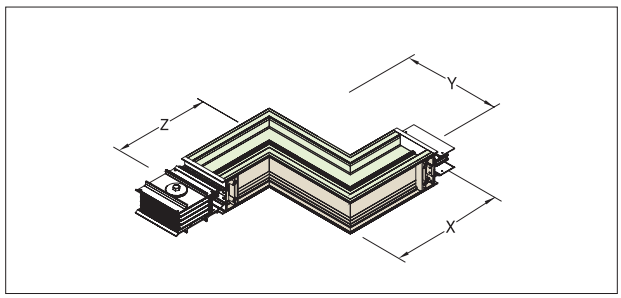


Vertical Elbow [Fig. 21-2]

Offset



Horizontal Offset [Fig. 21-3]



Vertical Offset [Fig. 21-4]

Ver. Elbow

Table 21-1

AMPS		Standard Dimension Ver.Elbows X (mm)	Y (mm)
AL	630~1,250	500	500
	1,600~3,200	600	600
	3,600~4,000	700	700
	5,000~6,000	800	800
CU	630~2,000	500	500
	2,500~4,000	600	600
	5,000~6,000	700	700
	7,500	800	800

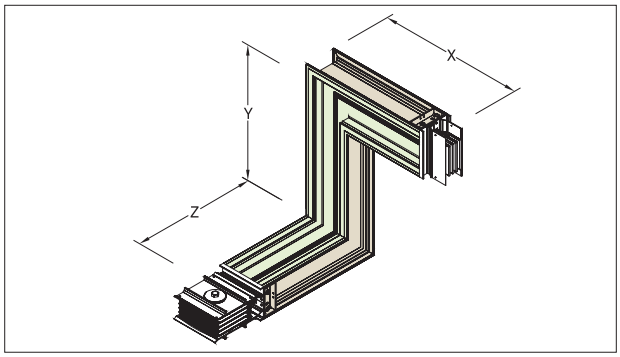
Ver. Offset

Table 21-2

AMPS		Standard Dimension Ver.Elbows X (mm)	Y (mm)	Z (mm)
AL	630~1,250	500	150	500
	1,600~3,200	600	150	600
	3,600~4,000	700	150	700
	5,000~6,000	800	150	800
CU	630~2,000	500	150	500
	3,000~4,000	600	150	600
	5,000~6,000	700	150	700
	7,500	800	150	800

3.2 Fittings

Combination

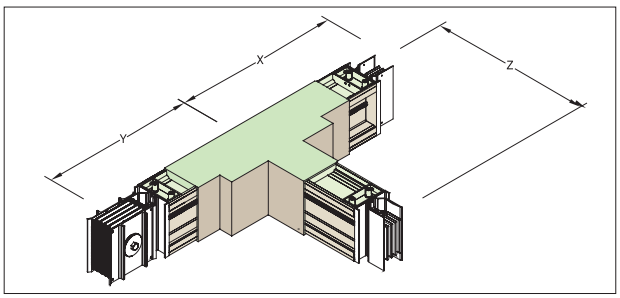


[Fig. 22-1]

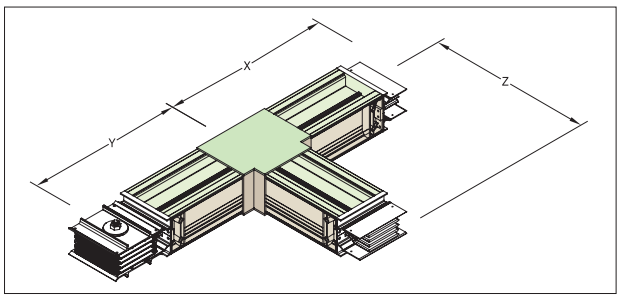
Table 22-1

AMPS		Standard Dimension Combination Elbow X (mm)	Y (mm)	Z (mm)
AL	630~1,250	500	500	500
	1,600~3,200	600	600	600
	3,600~4,000	700	700	700
	5,000~6,000	800	800	800
CU	630~2,000	500	500	500
	3,000~4,000	600	600	600
	5,000~6,000	700	700	700
	7,500	800	800	800

Tee



Horizontal Tee [Fig. 22-.2]



Vertical Tee [Fig. 22-3]

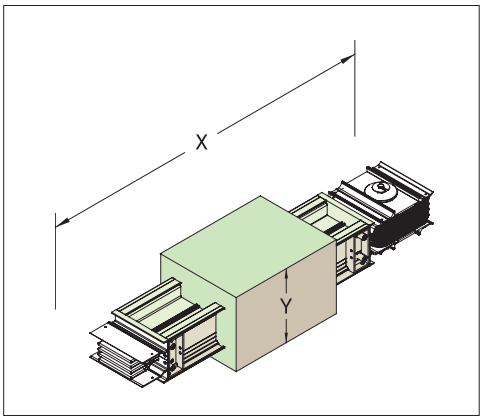
Ver. Tee

Table 22-2

AMPS		Standard Dimension Ver. Tee X (mm)	Y (mm)	Z (mm)
AL	630~1,250	500	500	500
	1,600~3,200	600	600	600
	3,600~4,000	700	700	700
	5,000~6,000	800	800	800
CU	630~2,000	500	500	500
	3,000~4,000	600	600	600
	5,000~6,000	700	700	700
	7,500	800	800	800

Expansion(if needed)

This fitting is designed to allow for up to 60mm of linear expansion.



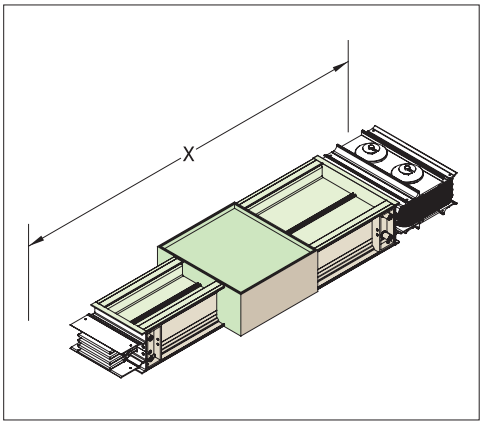
[Fig. 23-1]

Table 23-1

AMP.Rating(A)	Standard Dimension	
	X	Y
	(mm)	(mm)
630~7,500	1,500	360

Reducer

This fitting offers an economical way to distribute reduced current from a higher ampacity feeder.



[Fig. 23-2]

Table 23-2

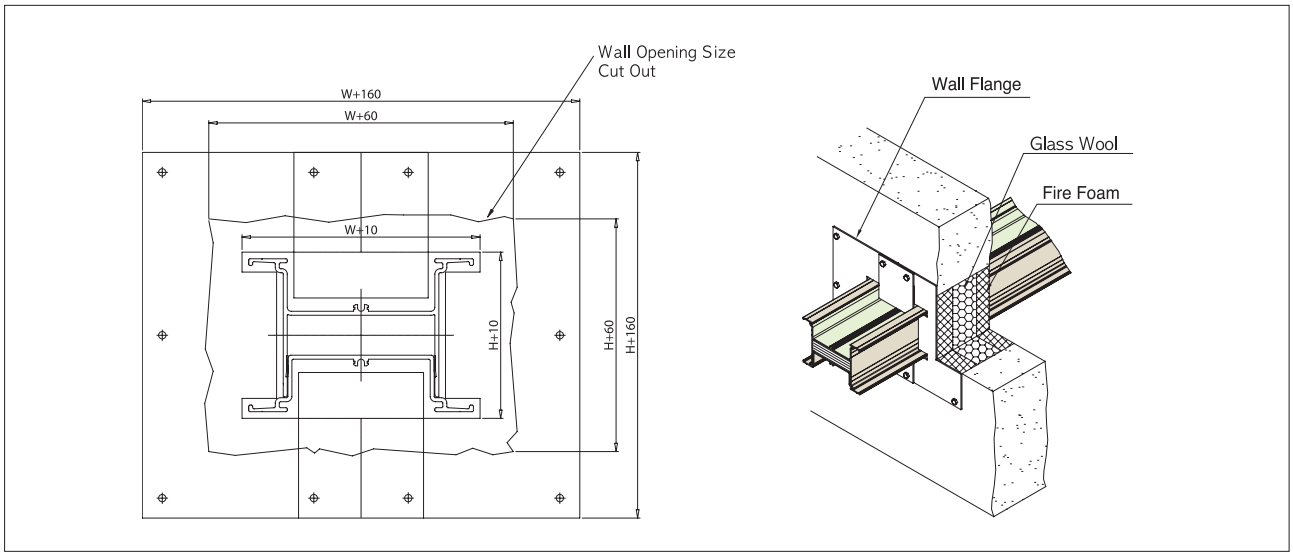
Ampere (A)		Standard Dimension
Primary	Secondary	X(mm)
1,000	630~800	1,000
1,250	800~1,000	
1,600	1,000~1,250	
2,000	1,250~1,600	
2,500	1,600~2,000	
3,200	2,000~2,500	
4,000	2,500~3,200	
5,000	3,200~4,000	
6,000	4,000~5,000	
7,500	5,000~6,000	

3.2 Fittings

Wall Flange

A flange is used to seal the wall, ceiling and floor openings through which the bus duct passes.

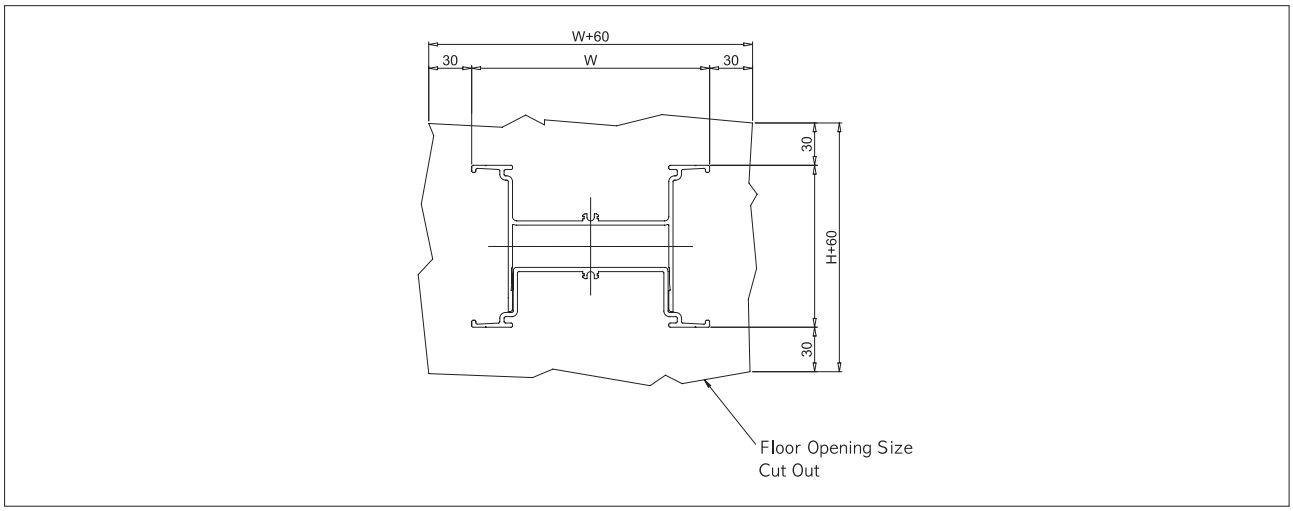
The dimensions of a wall opening (cutout) should be 30mm larger than the external dimensions of the LS C&S Bus Duct.



[Fig. 24-1]

Floor Openings

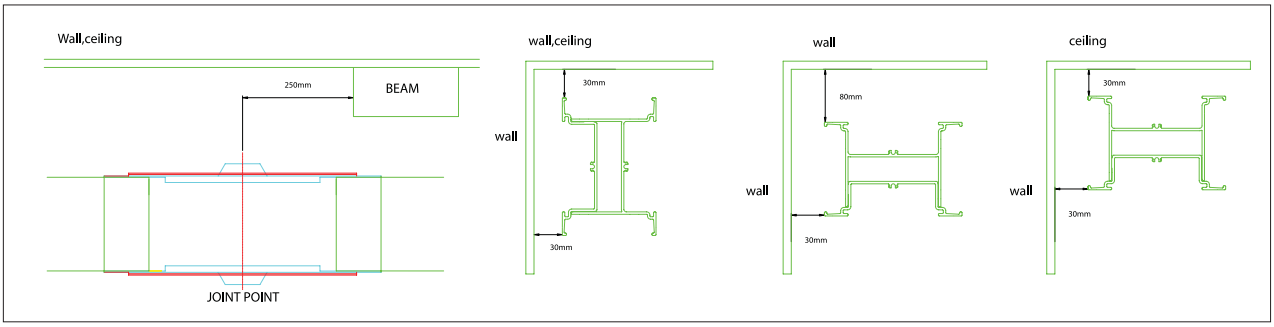
The dimensions of a floor opening (cutout) should be 30mm larger than the external dimensions of the LS C&S Bus Duct.



[Fig. 24-2]

Minimum Clearances for Heat Dissipation

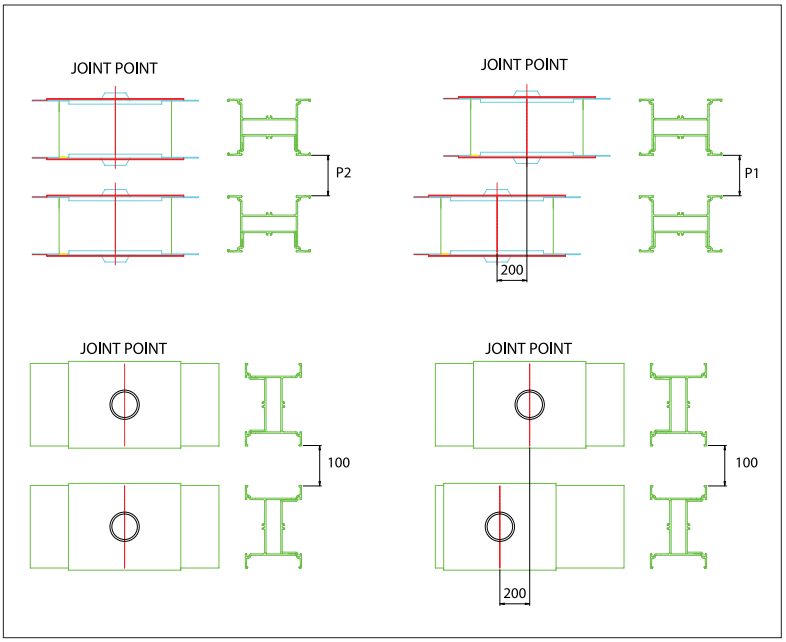
Minimum clearances between the bus duct and walls, ceiling or beams are shown.



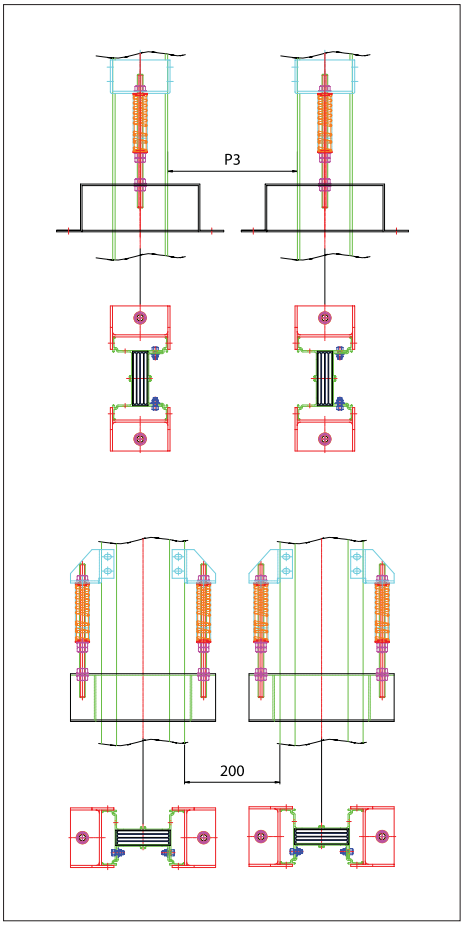
[Fig. 25-1]

Minimum Distances

Examples of minimum distances between parallel runs of bus duct are shown in the figures below.



[Fig. 25-2]



[Fig. 25-3]

Table 25

	3W AND 3W(mm)	3W AND 4W(mm)	4W AND 4W(mm)
P1	110	135	130
P2	150	175	180
P3	190	215	230

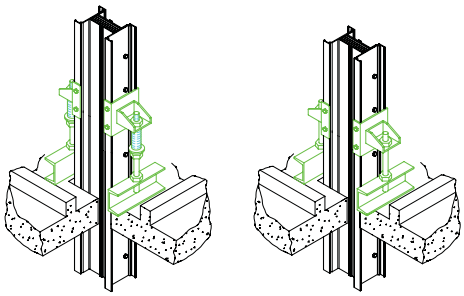
※Outdoor applications for horizontal edge-wise, riser, plug-in and joint applications require advance discussion with the manufacturer.

3.4 Hangers

Vertical Mounting Hangers

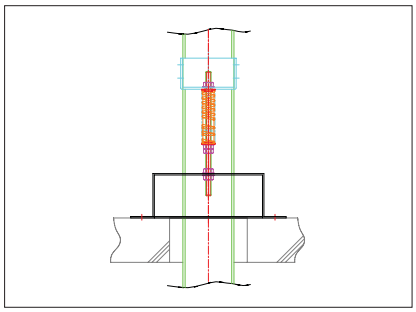
Spring hangers are used to support the bus duct between floors. The number of springs (rods) per hanger depends on the weight of the installed duct. When the distance between floors exceeds 4.5 m, a center support is required. Mounting locations correspond with floor flanges and are easily adjusted.

Rigid hangers (no spring) are also available, and are used for support at the center and ends of a bus duct run.

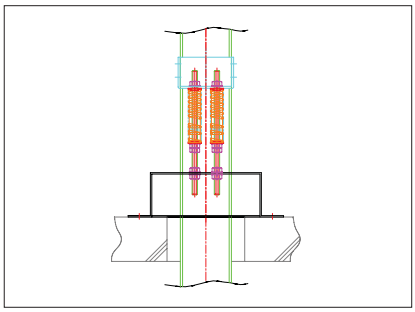


[Fig. 26-1]

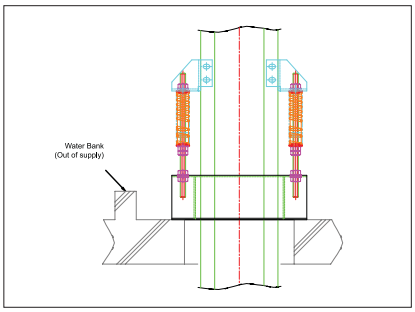
Spring Vertical Hanger



[Fig. 26-2]

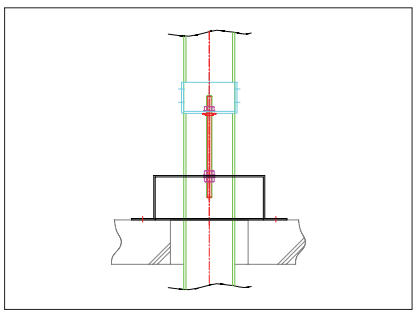


[Fig. 26-3]

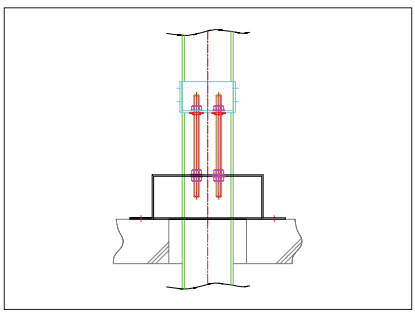


[Fig. 26-4]

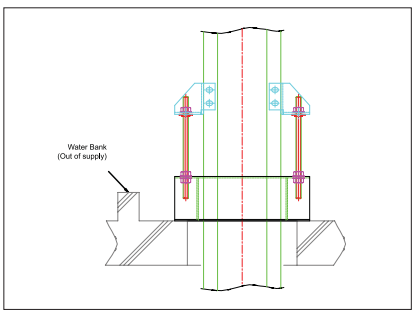
Rigid Vertical Hanger



[Fig. 26-5]



[Fig. 26-6]

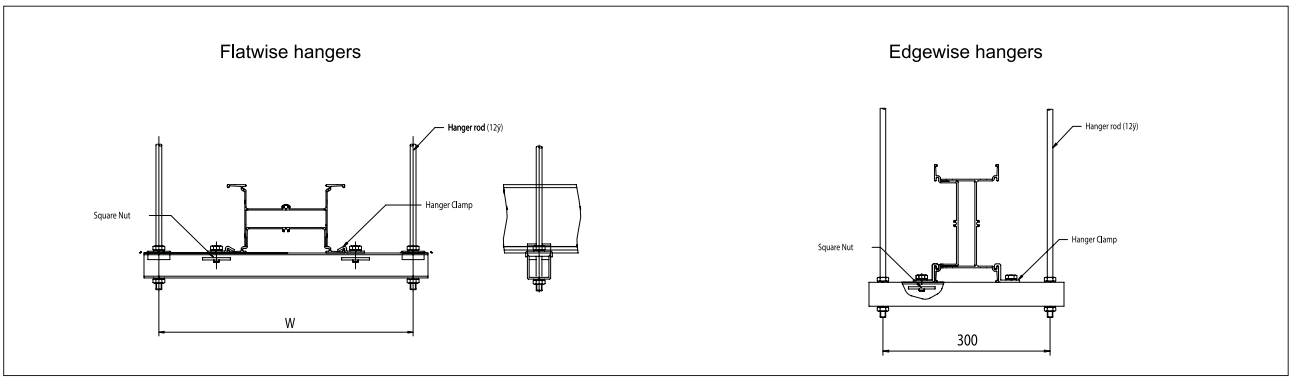


[Fig. 26-7]

Horizontal Hangers

1. Trapeze Hangers & Single Drop Rod Hangers

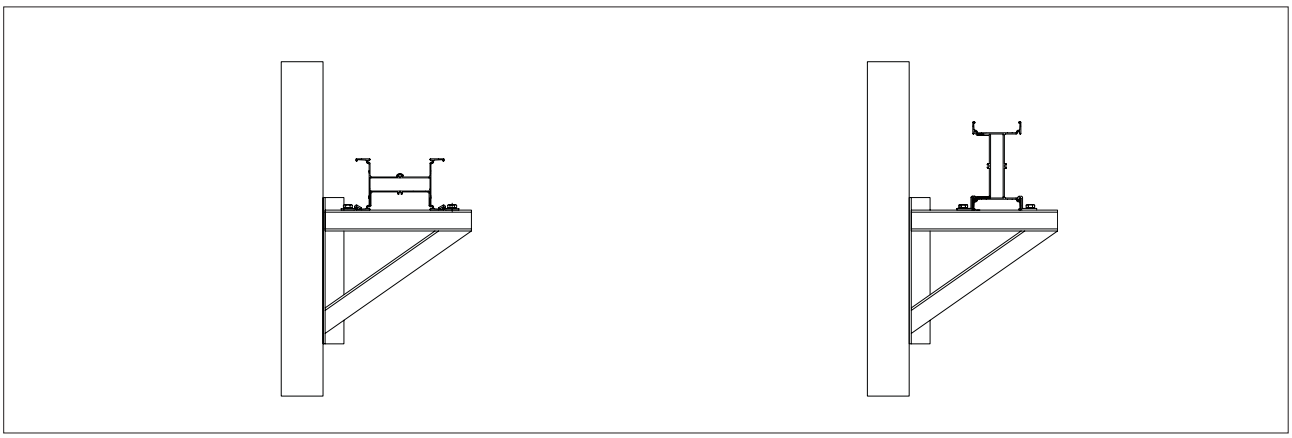
These hangers are intended for support at 1.5 m intervals. They are designed to be used with 12mm diameter drop rods.



[Fig. 27-1]

2. Wall Hangers

When trapeze or single drop rod hangers are not feasible, wall hangers can be used as shown below.



[Fig. 27-2]

3.5 Plug-in Feeders

Straight Lengths: Plug-in and Tap-off

The length of plug-in, tap-off and feeder bus duct, and the position of plug-in and tap-off locations can be made to order.
Standard bus duct length is 3000mm.
For plug-in feeder, the maximum rating per plug-in unit is 800A.
Maximum tap-off rating is 1200A.

Plug-in Feeder

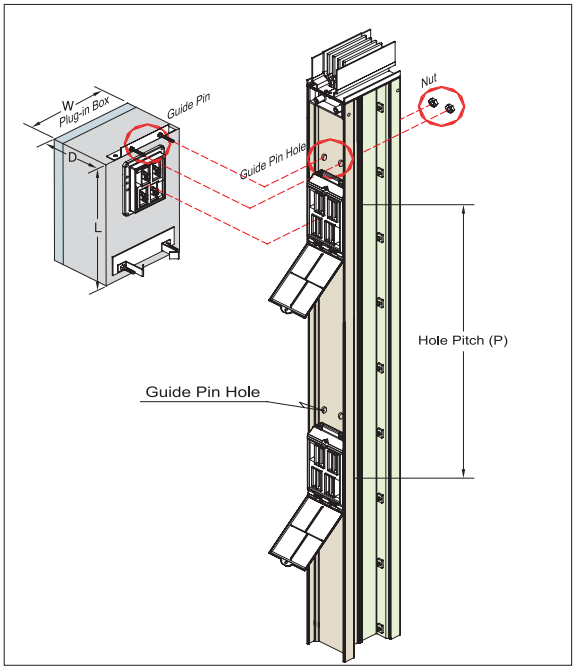
Table 28-1

MCCB FRAME (AF)	"Minimun required Plug-in Hole Pitch (P)" (mm)
50, 60, 100	650
200	650
400	900
600, 800	1000
1000, 1200	1300

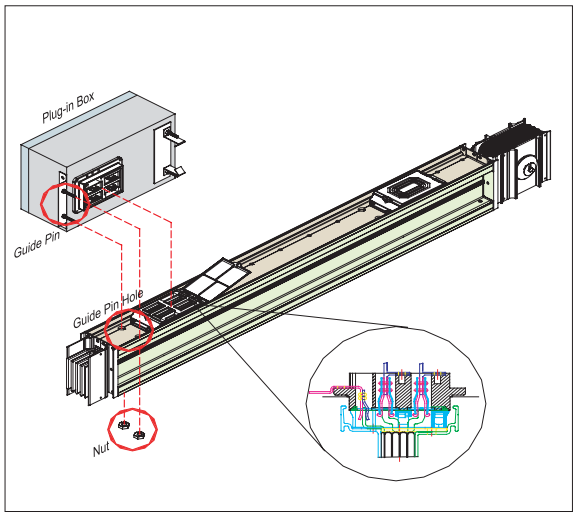
Plug-in Box

Table 28-2

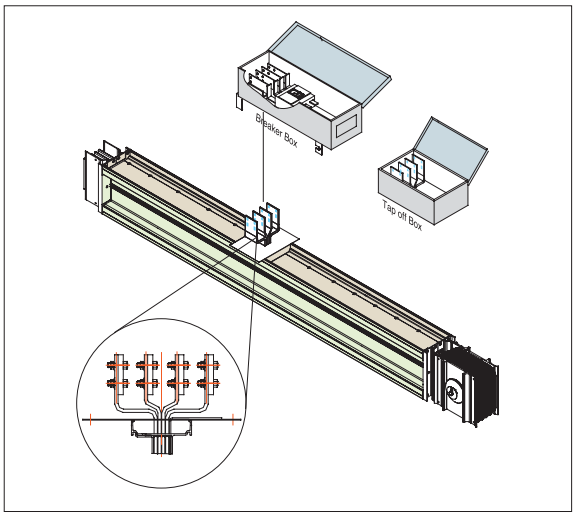
MCCB FRAME (AF)	Dimension (mm)				Fig.
	W		H	D	
	3W	4W			
50, 60, 100	200	250	450	220	28-2
225	200	250	450	220	
400	250	300	750	220	
600, 800	350	400	800	220	
1000,1200	400	450	1200	220	28-3



[Fig. 28-1]



[Fig. 28-2]



[Fig. 28-3]

3.6 MCCB (Molded Case Circuit Breaker)

Molded case circuit breakers are available ranging from 15A to 1200A, 220V to 600V.
Type ABS is standard.
Type ABH is high capacity, and type ABL is current limiting.
All models comply with KS C 8321, JIS C8370 and IEC 60157-1.

[Fig. 29-1]

Table 29

MCCB Ratings							
Model	Frame (AF)	Poles	Trip Range (AT)	Interrupting Ratings RMS Symmetrical (kA)			
				220V	380V	460V	600V
ABS	50	3, 4	5, 10, 15, 20, 30, 40, 50	25	14	10	5
	100	3, 4	15, 20, 30, 40, 50, 60, 75, 100	50	25	25	10
	225	3, 4	100, 125, 150, 175, 200, 225	50	25	25	10
	400	3, 4	250, 300, 350, 400	50	42	35	22
	600	3, 4	500, 600	100	65	50	25
	800	3, 4	700, 800	100	65	50	25
	1,000	3, 4	1,000	100	65	65	45
	1,200	3, 4	1,200	100	65	65	45
ABH	50	3, 4	15, 20, 30, 40, 50	50	25	25	10
	100	3, 4	15, 20, 30, 40, 50, 60, 75, 100	65	35	35	18
	225	3, 4	125, 150, 175, 200, 225	65	35	35	18
	400	3, 4	250, 300, 350, 400	85	65	50	25
ABL	50	3, 4	15, 20, 30, 40, 50	100	65	65	35
	100	3, 4	125, 150, 175, 200, 225	125	65	65	35
	225	3, 4	250, 300, 350, 400	125	100	85	30
	400	3, 4	250, 300, 350, 400	125	100	85	30
	600	3, 4	500, 600	125	100	85	30
	800	3, 4	700, 800	125	100	85	30
	1,000	3, 4	1,000	125	85	85	65
	1,200	3, 4	1,200	125	85	85	65

※ Note: Other brands of MCCB are on request.

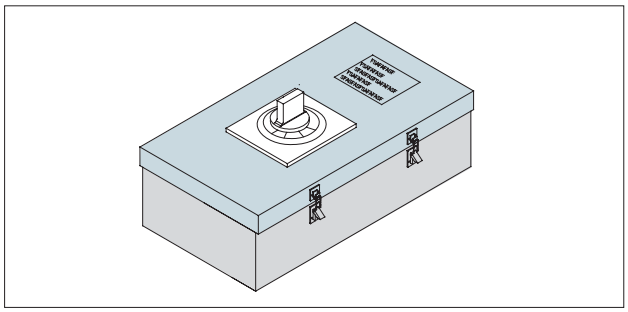
3.7 Additional Attachments

Determine Additional Attachments, etc.

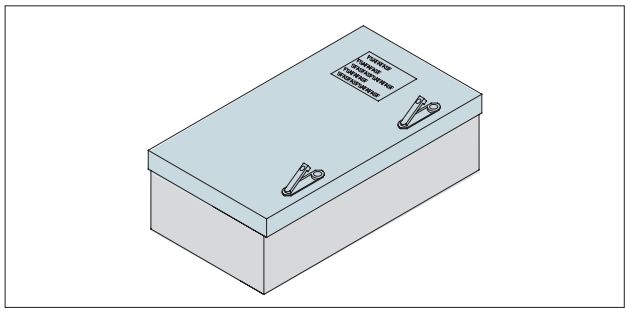
CT(current transformer), TD(transducer) and auxiliary devices can be incorporated in the branch unit or breaker to permit monitoring of the system. Customer must provide branch circuit specifics.

Determine Operating Method: External Door Type

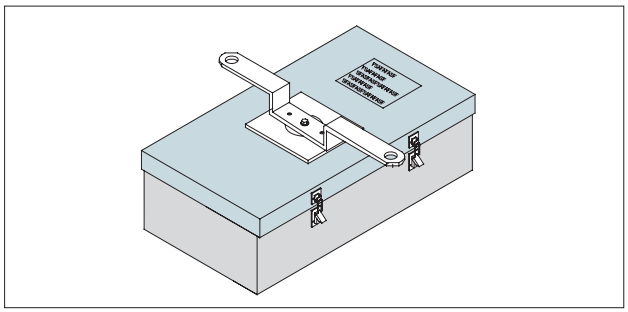
Various door types are available for the branch unit. Examples are shown below.



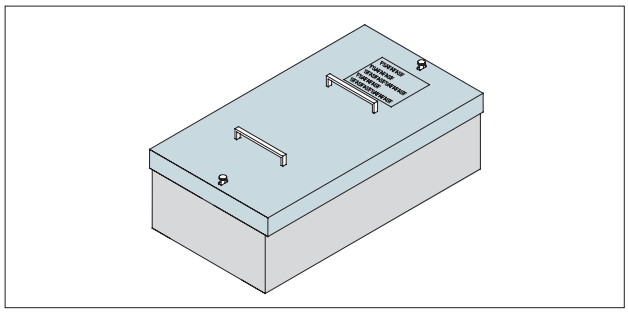
External handle [Fig. 30-1]



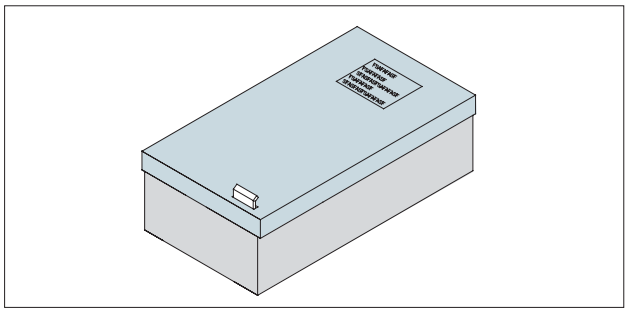
Push Button [Fig. 30-2]



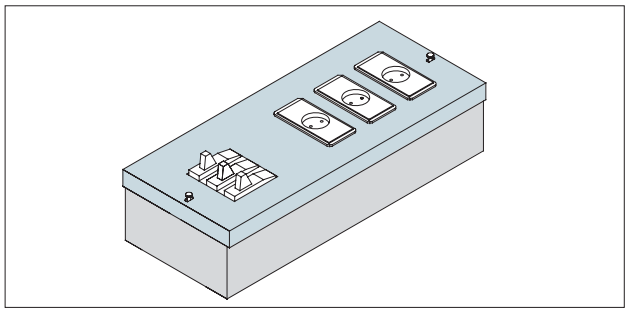
External lever interlock [Fig. 30-3]



Bolt Fastening [Fig. 30-4]

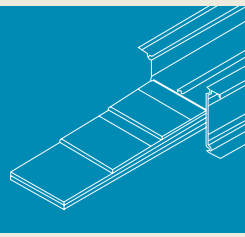


Button [Fig. 30-5]



Outlet [Fig. 30-6]

4.1 Impedance and Voltage Drop



The impedance and voltage drop values for aluminum and copper conductors are shown in the tables below.
The values listed are measured between line and neutral phases at 60 Hz. For a 50 Hz installation, multiply the reactance (X) by 0.83.
The resistance (R) remains unchanged due to the negligible difference in frequency.

Calculate voltage drop of line to line as following equation. $\cos\theta$ is power factor.
Voltage Drop (Vd) = rated load amperes x $\sqrt{3}$ (R $\cos\theta$ + X $\sin\theta$)

Aluminum Bus Bar

Table 31-1

AMP Rating	Impedance x 10^{-3} Ω/100m, 60 Hz			Voltage Drop(/100m)							
	R	X	Z	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
630	13.98	4.07	14.56	8.82	10.17	11.48	12.71	13.85	14.87	15.66	15.25
800	7.97	2.62	8.39	6.77	7.74	8.66	9.53	10.32	11.01	11.52	11.04
1,000	6.83	2.21	7.18	7.21	8.25	9.24	10.17	11.02	11.77	12.32	11.84
1,250	5.55	1.82	5.84	7.36	8.41	9.41	10.35	11.22	11.97	12.52	12.01
1,600	3.82	1.23	4.02	6.43	7.36	8.25	9.09	9.85	10.52	11.02	10.60
2,000	3.08	1.00	3.24	6.52	7.46	8.35	9.19	9.96	10.63	11.12	10.67
2,500	2.40	0.80	2.53	6.41	7.32	8.18	9.00	9.74	10.39	10.86	10.40
3,200	1.91	0.61	2.00	6.41	7.34	8.22	9.05	9.82	10.48	10.98	10.56
3,600	1.72	0.55	1.81	6.52	7.46	8.36	9.21	9.99	10.67	11.18	10.74
4,000	1.54	0.50	1.62	6.50	7.43	8.32	9.16	9.93	10.60	11.10	10.64
5,000	1.15	0.37	1.21	6.03	6.90	7.74	8.52	9.24	9.87	10.34	9.94
6,000	1.02	0.33	1.08	6.49	7.43	8.32	9.15	9.92	10.58	11.08	10.63

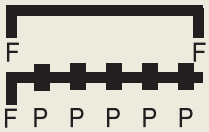
Copper Bus Bar

Table 31-2

AMP Rating	Impedance x 10^{-3} Ω/100m, 60 Hz			Voltage Drop(/100m)							
	R	X	Z	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
630	7.49	4.07	8.53	6.69	7.34	7.94	8.46	8.90	9.21	9.30	8.18
800	7.49	3.84	8.42	8.20	9.04	9.80	10.49	11.07	11.50	11.67	10.38
1,000	5.49	2.99	6.25	7.79	8.55	9.24	9.85	10.35	10.72	10.82	9.52
1,250	4.39	2.45	5.03	7.91	8.66	9.34	9.94	10.44	10.78	10.86	9.50
1,600	3.10	1.71	3.54	7.09	7.77	8.39	8.94	9.40	9.72	9.80	8.60
2,000	2.40	1.35	2.76	6.96	7.61	8.21	8.73	9.17	9.46	9.53	8.32
2,500	1.86	1.05	2.13	6.73	7.37	7.95	8.45	8.87	9.16	9.22	8.06
3,200	1.54	0.85	1.76	7.05	7.73	8.35	8.89	9.34	9.66	9.75	8.55
3,600	1.35	0.74	1.54	6.94	7.61	8.22	8.75	9.20	9.51	9.60	8.42
4,000	1.20	0.67	1.37	6.93	7.58	8.18	8.70	9.13	9.42	9.49	8.29
5,000	0.93	0.52	1.06	6.71	7.35	7.92	8.43	8.84	9.13	9.19	8.03
6,000	0.80	0.45	0.91	6.92	7.57	8.17	8.69	9.11	9.41	9.48	8.23
7,500	0.62	0.35	0.71	6.71	7.34	7.91	8.42	8.83	9.12	9.18	8.02

1) Actual Voltage Drop = α x Vd x $\frac{\text{Actual load current}}{\text{Rated load current}}$ x $\frac{\text{Actual distance(m)}}{100\text{m}}$

2) α (Load Distribution Constant i) α = 1, Concentrated load
ii) α = 0.5, Distributed load



F : Flanged End(Panel Connection)
P : Plug-in Unit

4.2 Short-Circuit Withstand Characteristics

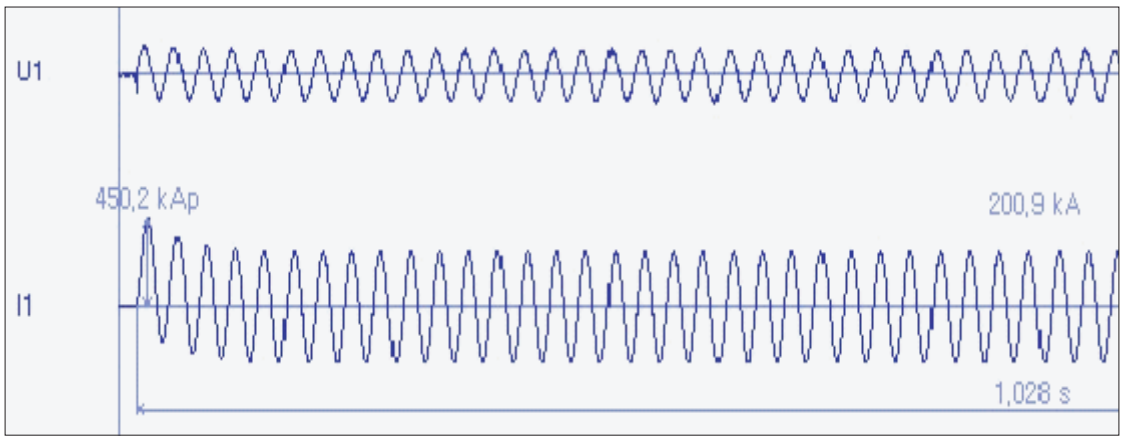
LS C&S Bus Duct has been tested under actual short-circuit conditions according to IEC 60439 1 & 2 as witnessed by ASTA and KEMA. The above figure shows 4000A bus duct under test, and includes the associated phase-to-phase oscillogram.

LS C&S Bus Duct has been confirmed to have high short-circuit strength because of its reinforced housing design.
The 4000A bus duct has a 200kA short-circuit rating.

Short Circuit Ratings of Phase to Phase

Table 32

AMP Rating	Aluminum(kA)		Copper(kA)	
	1 sec	3 sec	1 sec	3 sec
630	24	14	40	21
800	42	24	40	21
1,000	50	29	51	29
1,250	62	36	65	37
1,600	95	55	95	55
2,000	121	70	129	75
2,500	132	76	150	107
3,200	169	97	191	110
4,000	200	140	200	149
5,000	200	150	200	200
6,000	200	150	200	200
7,500	-	-	200	200

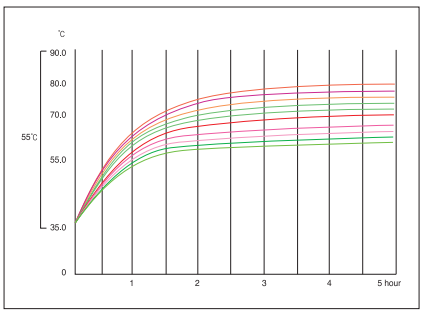


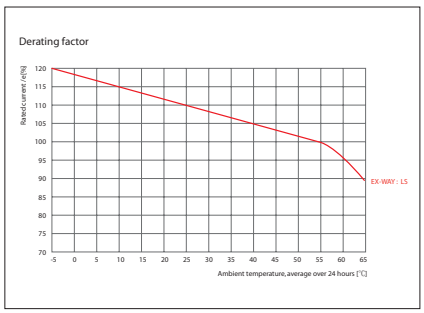
[Fig. 32]

4.3 Temperature Rise Test

The temperature rise values for LS C&S Bus Duct shall not exceed 70°C at connectors and the duct exterior shall not exceed 55°C.

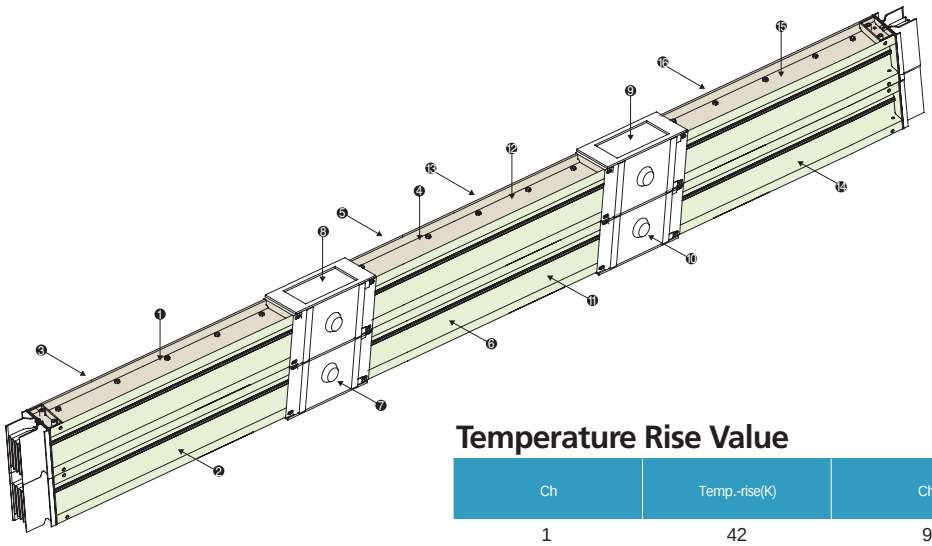
The profile and thermal properties of the housing prevent the overheating of the bus bars, the joint area and the duct exterior when LS C&S Bus Duct is operated within rated current limits according to IEC 60439 1 & 2.





[Fig. 33]

Remarks : This derating diagram is based on indoor use.
In condition of outdoor, a consultation with LS C&S is required.



Temperature Rise Value

Table 33

Ch	Temp.-rise(K)	Ch	Temp.-rise(K)
1	42	9	27
2	43	10	28
3	42	11	42
4	41	12	43
5	41	13	43
6	43	14	41
7	26	15	44
8	30	16	45

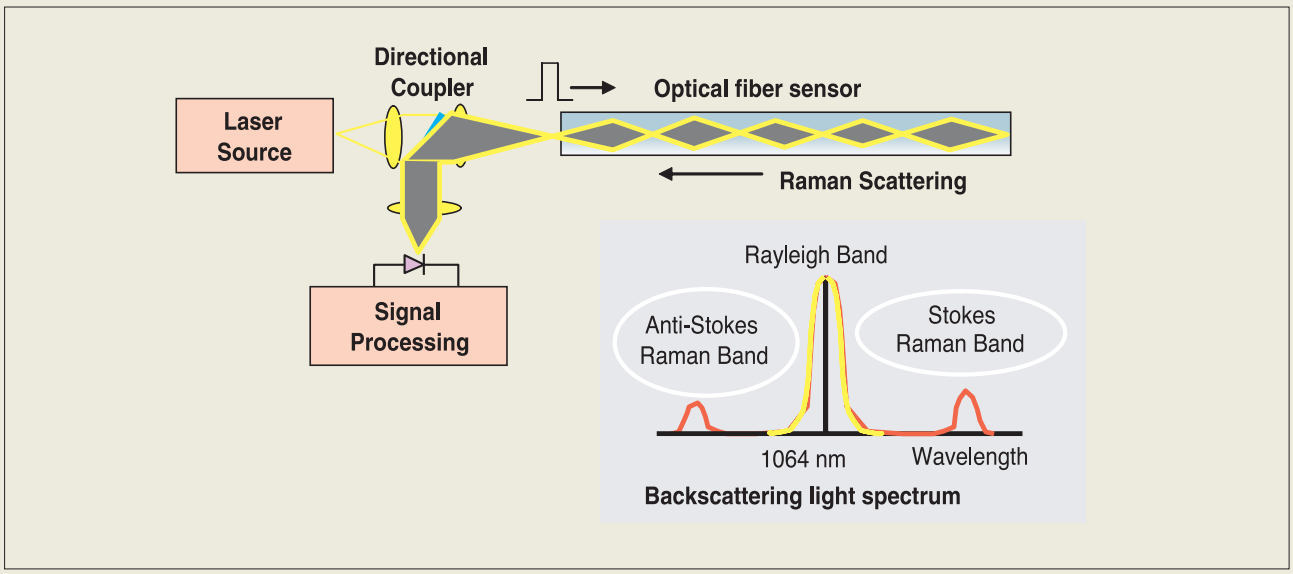
Remarks : Ch 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 15, 16 are surface of housing
Ch 7, 8, 9, 10 are surface of joint cover.
Normal test condition is under 35°C by IEC60439-1,2

5.1 Overview
5.2 Principle of Operation

The bus duct temperature monitoring system uses an optical fiber as the sensor, and can measure distributed temperatures over several thousand meters with an accuracy of +/- 0.5°C.

ABF(air blown fiber) technology enables easy integration and installation of the system.

Easy operation & user-friendly GUI(Graphic User Interface)



Principle of Operation [Fig. 34]

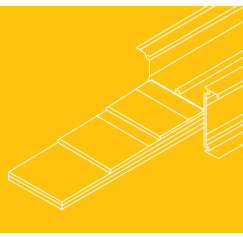
Temperature Measurement

When the laser pulse passes through the optical fiber, backscattered reflections are returned to the input. The intensity of the Raman scattering is temperature dependent, giving an accuracy of +/- 0.5 °C.

Distance Measurement

The location of a temperature measurement is determined by calculating the length of time for the backscattered light to return to the input. This is similar to an OTDR (Optical Time Domain Reflectometer). Distance resolution is within 1 m.

5.3 Bus Duct Application
5.4 Temperature Monitoring System Profile



Bus duct / transformer temperature

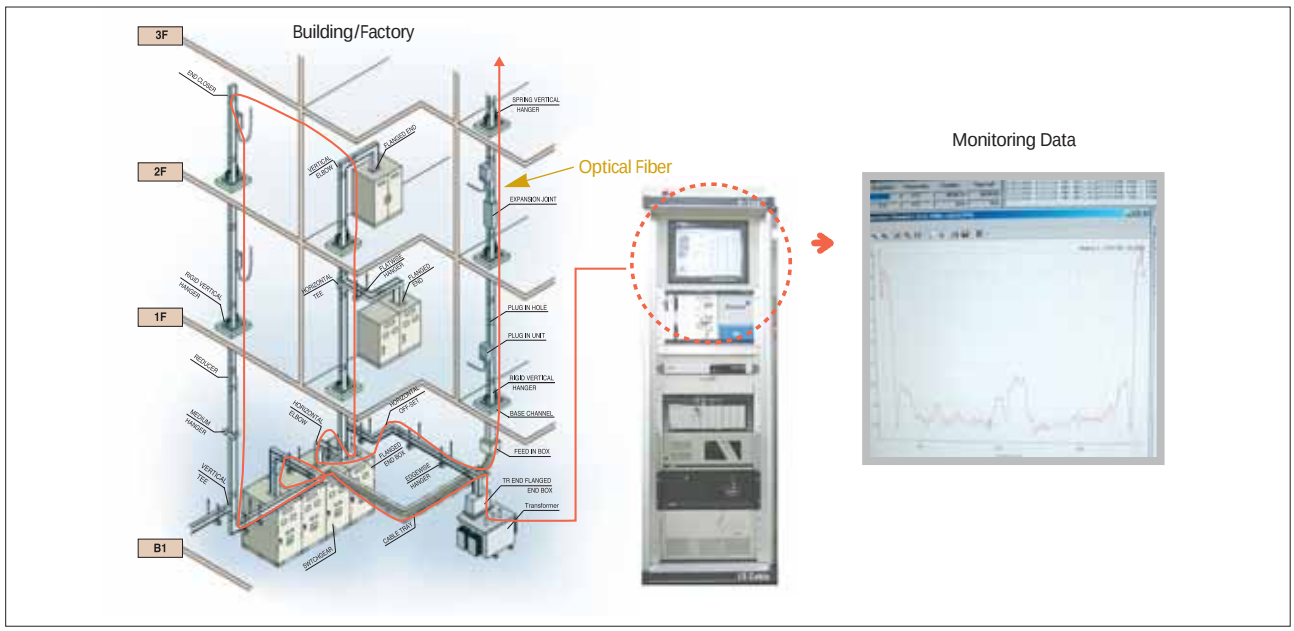
Fire alarm for building and factory

Bus duct / transformer vibration & noise

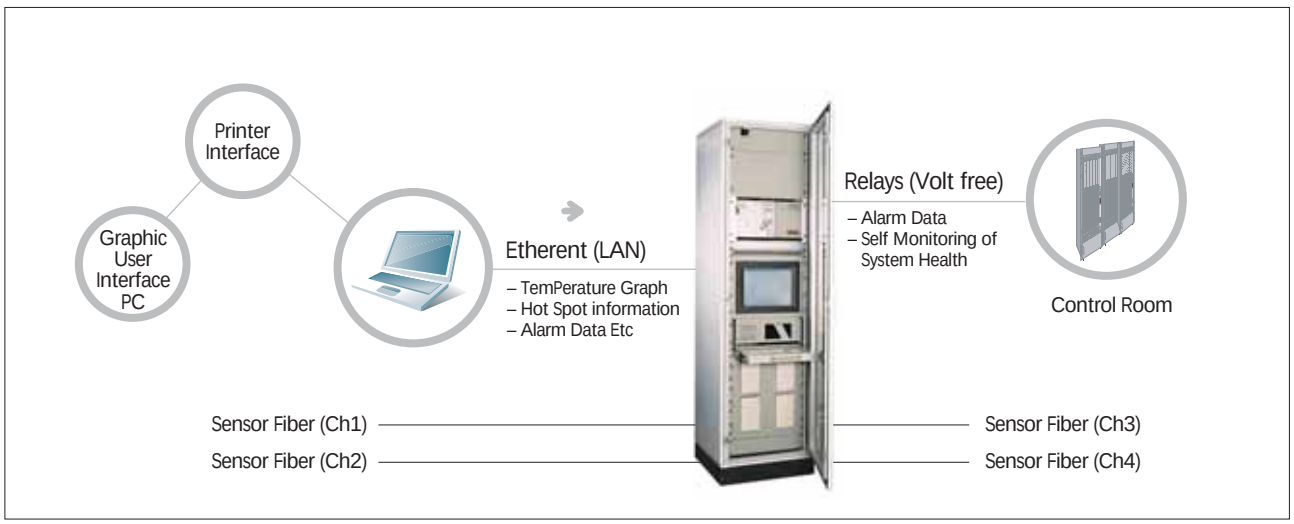
Video image transmission

Safety

Early detection and warning of abnormal conditions



Bus Duct Application [Fig. 35-1]

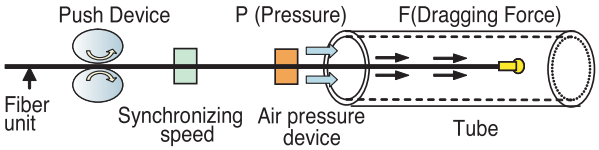


Temperature Monitoring System Profile [Fig. 35-2]

5.5 Fast & Easy Installation in Bus Duct line
5.6 System Products

ABF(Air Blown Fiber) Technology

After the installation of the flexible tube, the optical fiber is blown into the tube with compressed air.
The use of various tube connectors allows for easy installation in narrow and curved locations.
Reduced installation time, minimal optical joints and uncomplicated replacement.



Fast & Easy Installation in Bus Duct line [Fig. 36-1]

The LS C&S Bus Duct Temperature Monitoring System can be configured for various operating modes according to the customer's requirements.

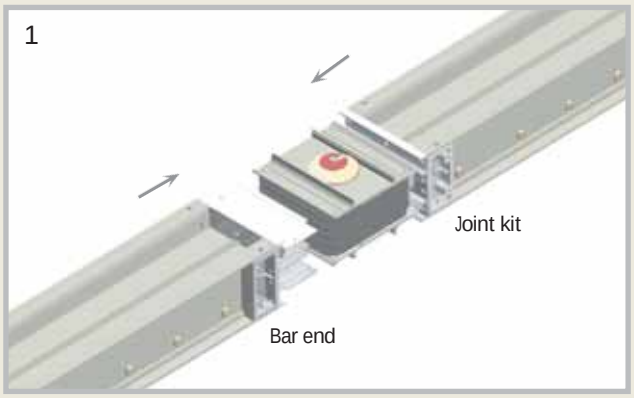
Table 36

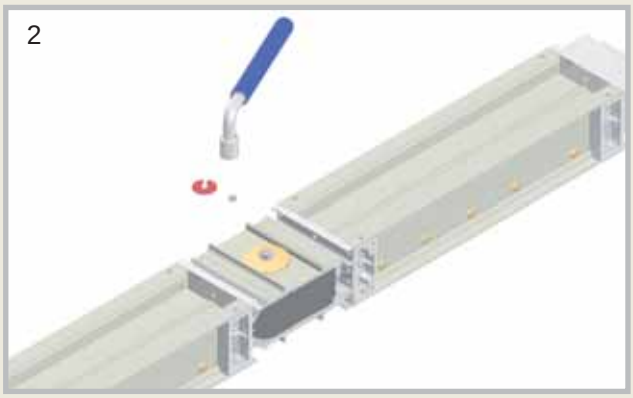
Fiber Type	Model	Range[km]	Channels	Sampling Resolution [m]	Accuracy [°C]
Multi mode	M2	2	2, 4, 6	1	0.5
	M4	4			
	M8	8			
	M10	10			1
	M12	12			
Single mode	S15	15	1, 2, 4	2	2
	S20	20			
	S30	30			

System Products [Fig. 36-2]

Installation Procedure

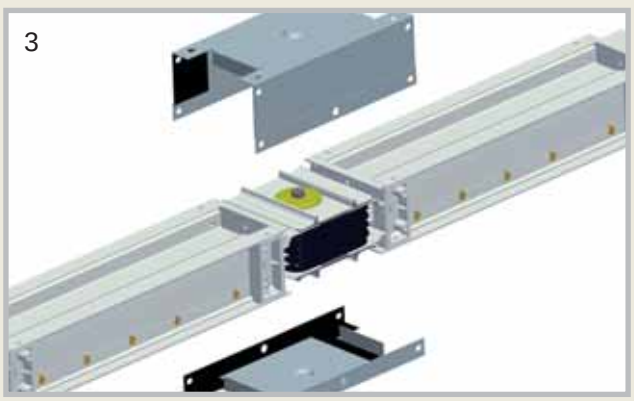
Joint Assembly Instructions

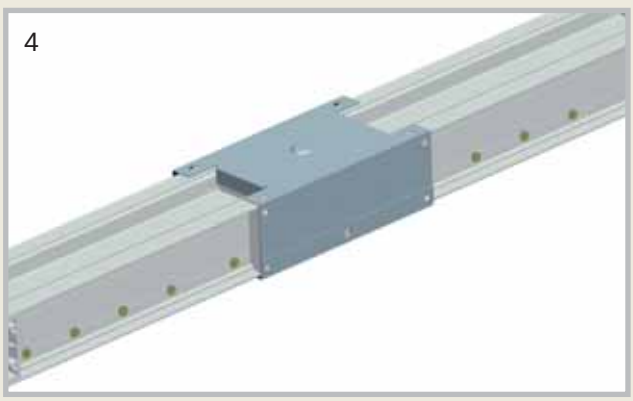


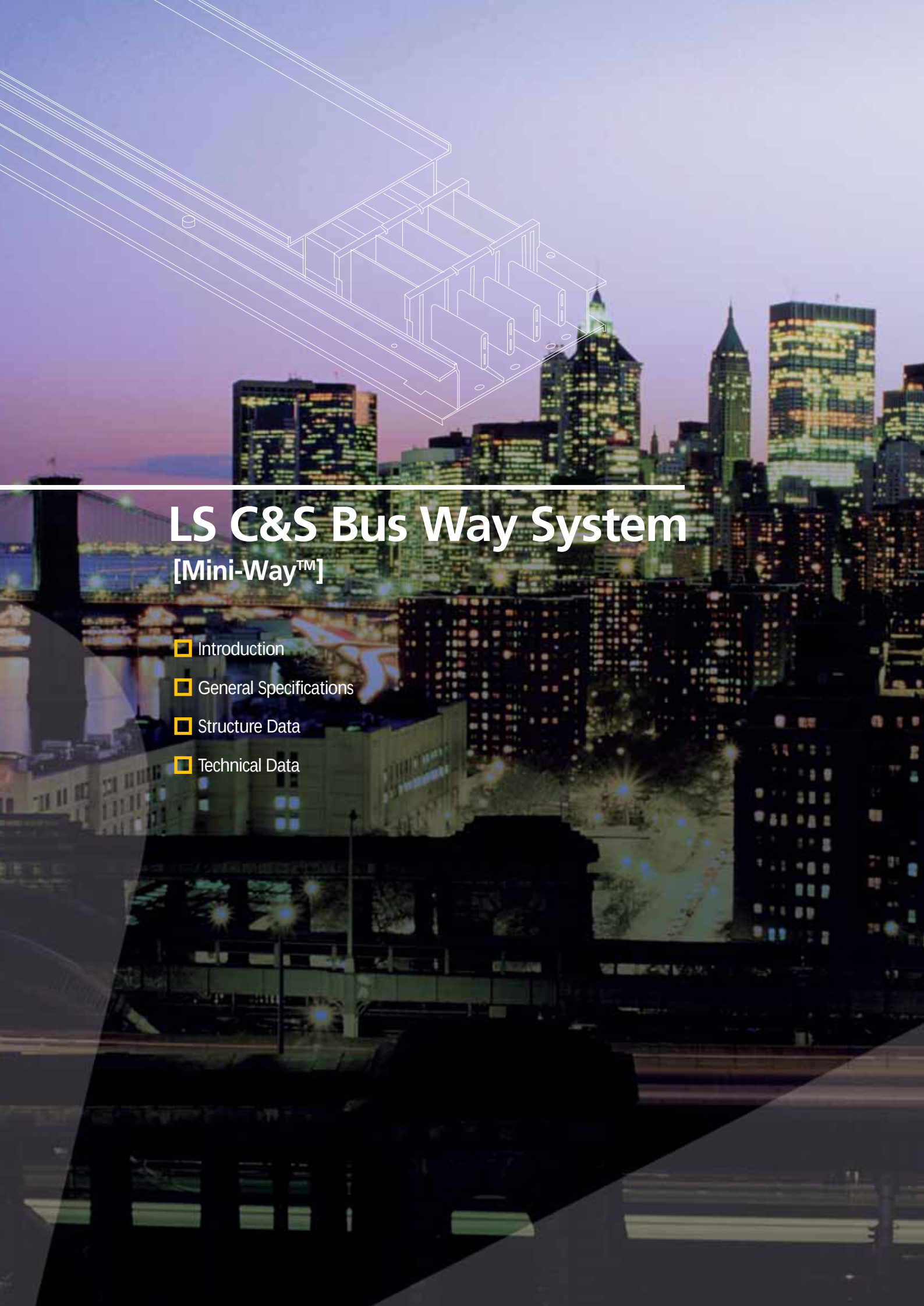


- Check contact surfaces for damage or contamination
- Ensure proper alignment in all planes
- Slowly insert the bar ends into the joint kit

Using a torque wrench, tighten the outer bolt head until it breaks off (shear force = 700~1,000 kgf.cm)





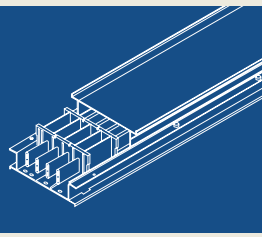


LS C&S Bus Way System

[Mini-Way™]

- Introduction
- General Specifications
- Structure Data
- Technical Data

Mini-Way, NSPB busduct is designed for low current (160A~400A). The insulation between each bus bar is Class B (130°C).



Safe and Efficient Distribution System

Mini-Way is suitable for modern structures like high-rise buildings, hospitals, shopping malls, residential buildings and factories because of easy installation, extension and load distribution.
Also, experienced engineers in R&D,
Designing and Installation can service all your needs from system design to after energization.

Performance

Mini-Way is the optimum optimized concept in cross-section, conductor support and housing shape.
Mini-Way follows IEC standard, therefore it has high performance in thermal,
voltage-drop and short-circuit strength characteristics.

Temperature Rising Stability

Temperature rising limits shall be within 55K or less on the external surface of the duct, as specified IEC 60439-1 & 2.

Conductor Supporting

Conductor support points were determined by computer simulation, resulting in stable installation and electrical performance.
The insulation material is a highly polymerized compound with Class B ratings.

Short-Circuit Strength

For short-circuit strength, CAE (Computer Aided Engineering)
applied the best insulator shape and location to endure mechanical and thermal stress.

Weight

Weight is the most important factor contributing to the cost and time when busduct is installed.
Mini-Way uses an aluminum housing, optimized conductor profile and other features specially designed for reduced weight.

Easy Installation

Ease of installation because of light weight and (Joint Brush) system is another benefit of Mini-Way.

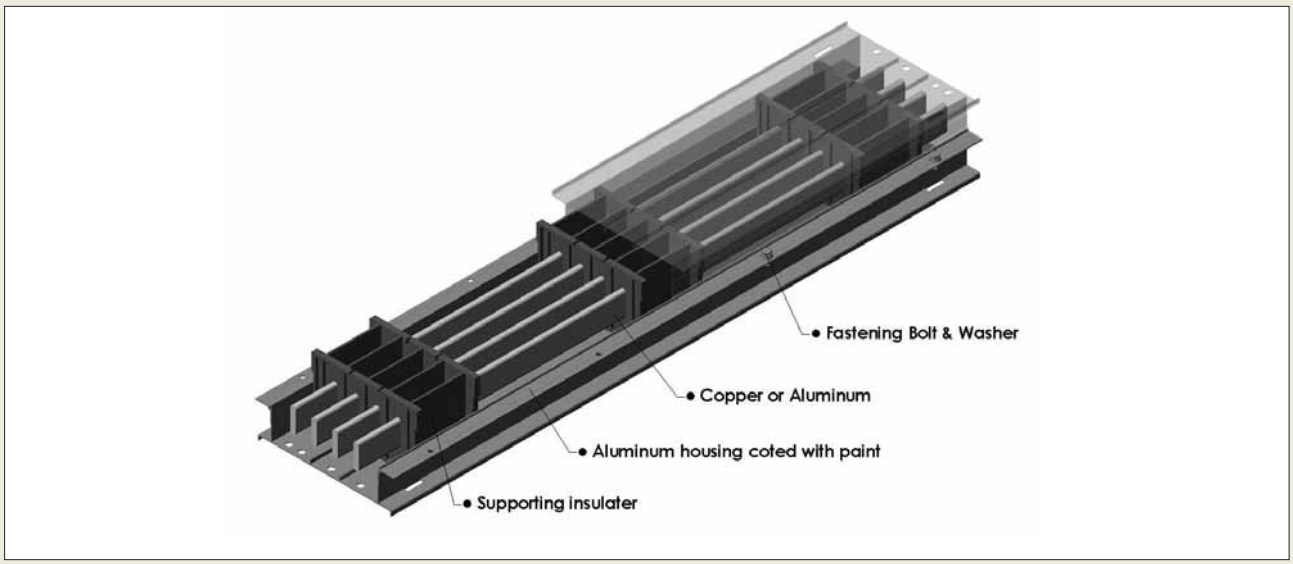
Applied Standards

IEC 60439-1 : Low-voltage switchgear and controlgear assemblies
IEC 60439-2 : Particular requirement for busbar trunking systems(busways)
BSEN 60439 : Busways
NEMA BU 1.1 : Busways

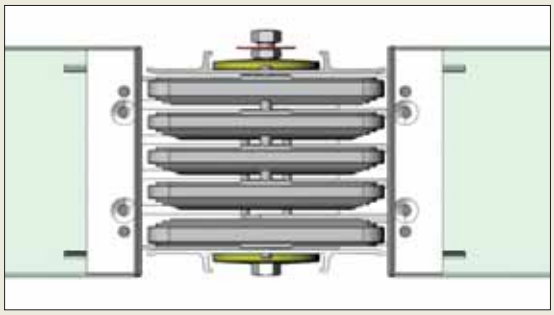
2.1 Basic Concept

Mini-Way Bus Duct is designed for the distribution of electricity in residential areas, factories and shopping malls.
The easy connection between feeders by using the 'Joint Brush' fand the availability of IP54(Ingress Protection) rated housing reduces the risk of water penetration.
Reduced weight by optimized aluminum housing design provides convenience during installation.

Detail Construction

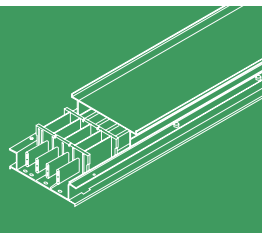


Joint Kit



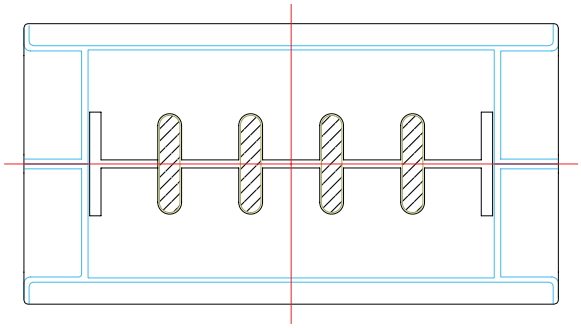
Mini Way 160~400A

2.2 Grounding

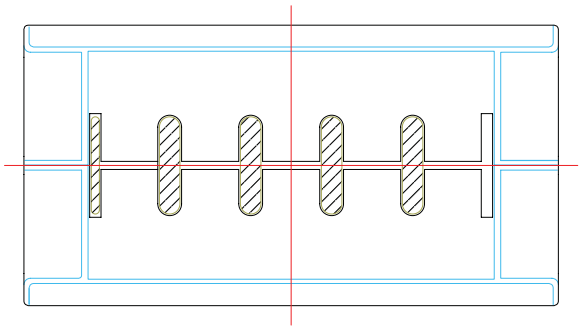


Mini-Way Bus Duct provides excess grounding capacity because of its flanged end terminal design. The cross section of our aluminum housing has over 100% of the internal bus bar conductor's area. Therefore the housing itself acts as a grounding conductor with low impedance as well as excellent heat radiation at the same time.

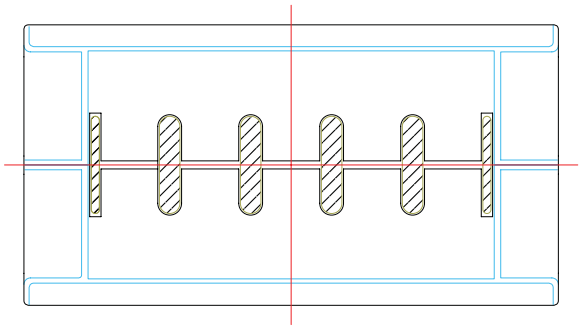
In case more grounding capacity is need, an internal bus bar is built in to the system, providing either an internal 50% or 100% current capacity for ground path.



4W+GE



4W+50%E



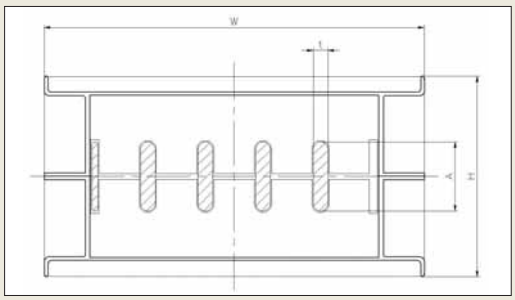
4W+100%E

3.1 Straight Feeders

Dimensions

Conductor	Current(A)	Dimension(mm)				Weight(kg/m)		
		t	W	A	H	4W	4W+HE	4W+FE
Aluminum	160	6.35	165	20	87	4	4.2	4.4
	250			30	87	4.7	4.2	3.7
	400			50	107	7	7.3	7.6
Copper	160	6.35	165	20	87	4.5	5.16	5.8
	250			30	87	5.86	6.5	7.2
	400			50	107	9	10.1	11.3

※ Weight = 3m feeder + 1 joint brush

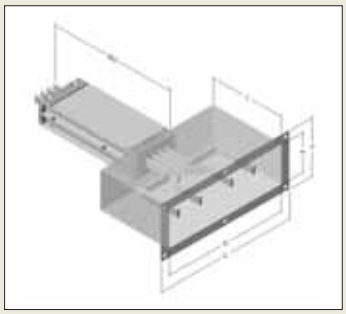


Flanged End

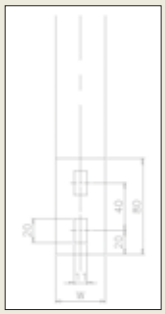
Flanged end is connected to either a transfomer or a panel. Elbow-type is also available.

Conductor	Current(A)	Dimension(mm)						
		t	W	L	A	B	C	D
Aluminum	160	6.35	20	270	190	130	510	450
	250		30	270	200	140	510	450
	400		50	270	220	160	510	450
Copper	160	6.35	20	270	190	130	510	450
	250		30	270	200	140	510	450
	400		50	270	220	160	510	450

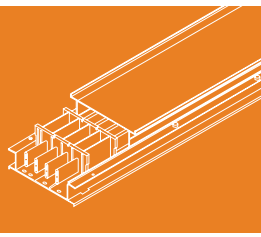
※ Conductor thickness, W : conductor width



Flanged end

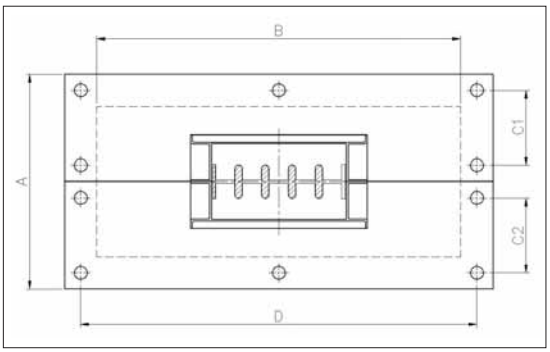


Hole Drilling



Panel Cut-Out Dimension

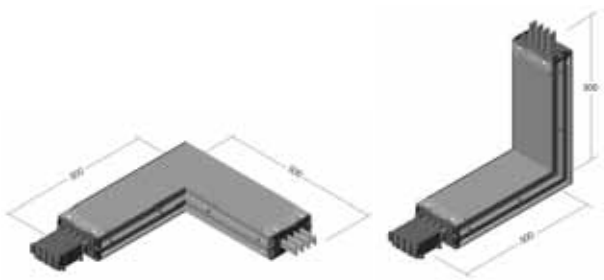
Conductor	Current(A)	Dimension(mm)			
		A	B	D	C1, C2
Aluminum	160	200	340	370	70
	250	200			70
	400	220			80
Copper	160	200	340	370	70
	250	200			70
	400	220			80



3.2 Fittings

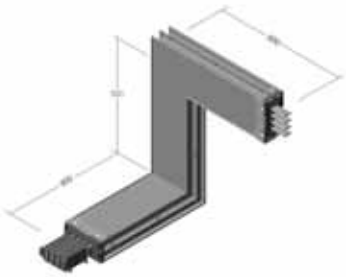
Mini-Way Bus Duct has complete line of standard fittings to suit the lay-out conditions.
Custom fittings are also available.
Designation methods related to turning are specified in the figures below on the basis of 'source side' and 'load side'.

Elbow

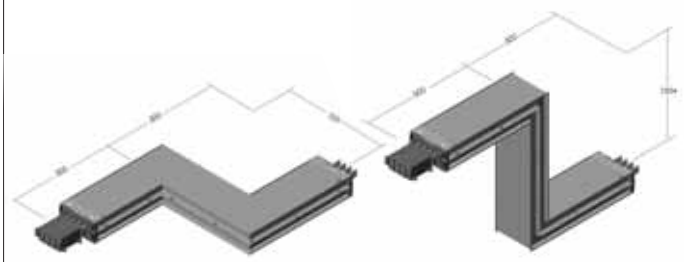


Horizontal Elbow　　Vertical Elbow

Combination Elbow

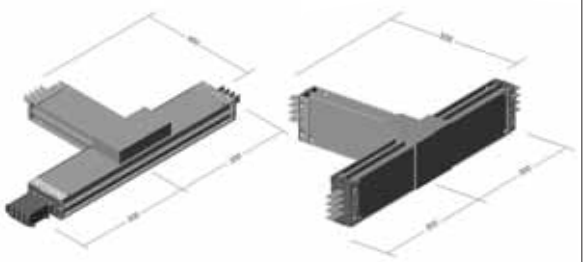


Offset



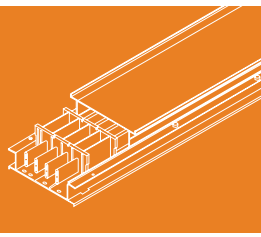
Horizontal Offset　　Vertical Offset

Tee

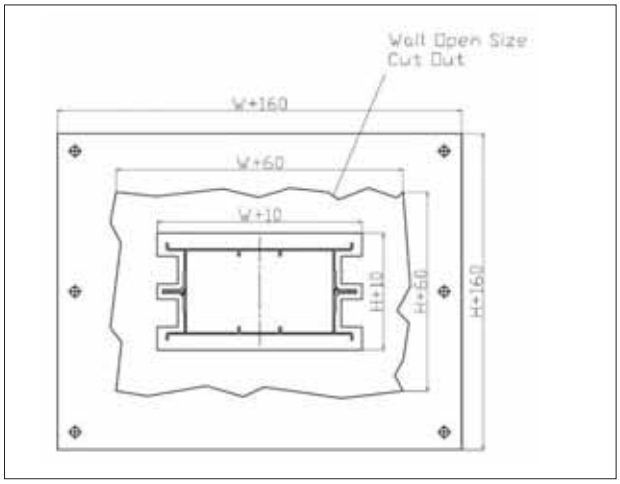


Horizontal Tee　　Vertical Tee

Current(A)	Height of Horizontal Tee(mm)	
	Al	Cu
160	134	134
250	144	144
400	164	164

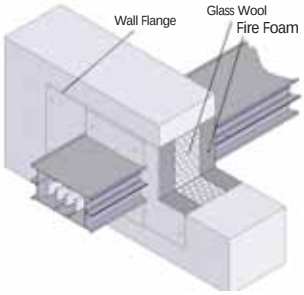


Wall Flange

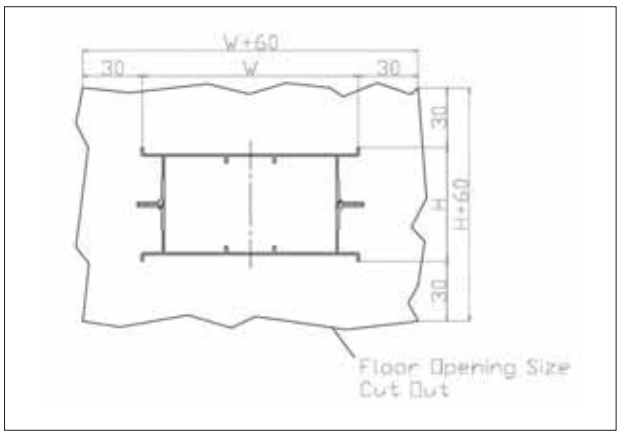


Glass wool and Fire foam don't supply from Manufacturer.

- W : width(depending on Current)
- H : height(depending on Current)



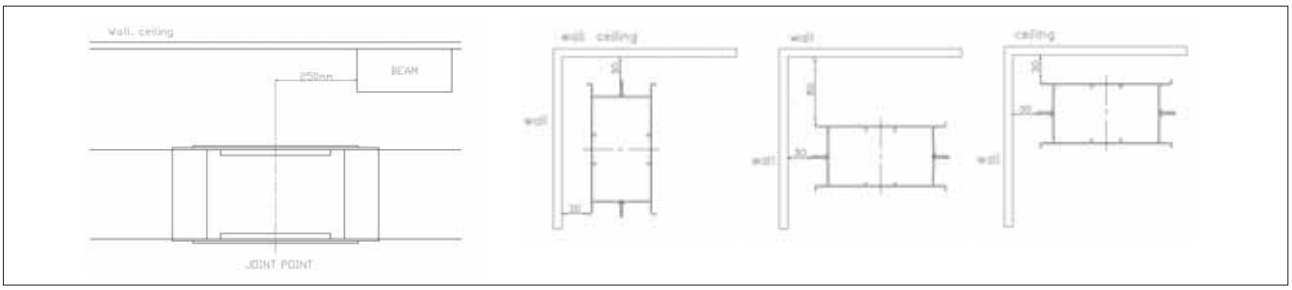
Floor Openings



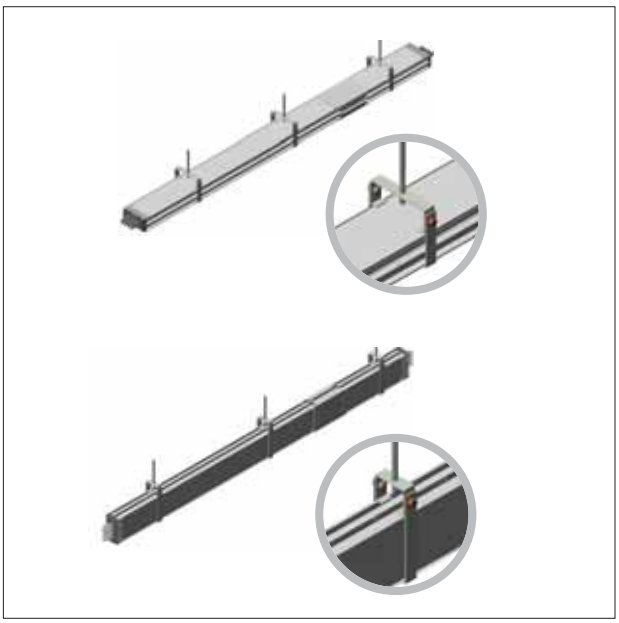
- W : width(depending on Current)
- H : height(depending on Current)

3.3 Installation Condition / 3.4 Hangers
3.5 Plug-In Feeder

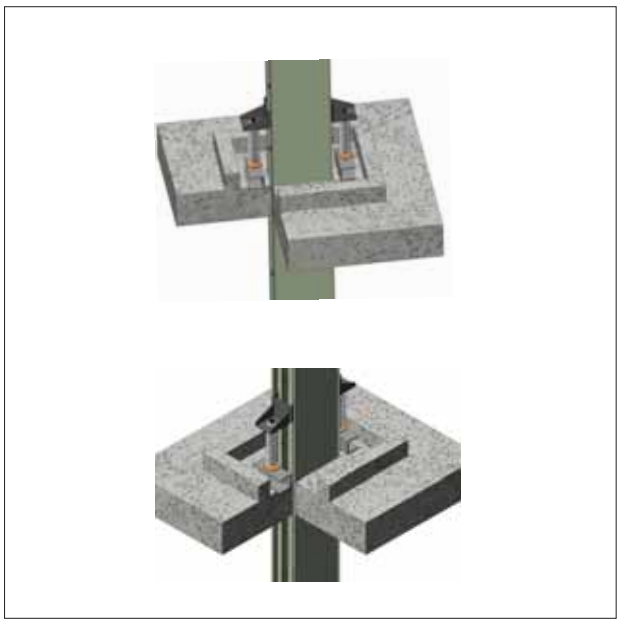
Minimum Clearance



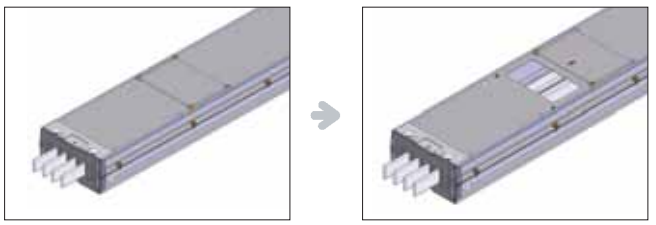
Horizontal Hangers

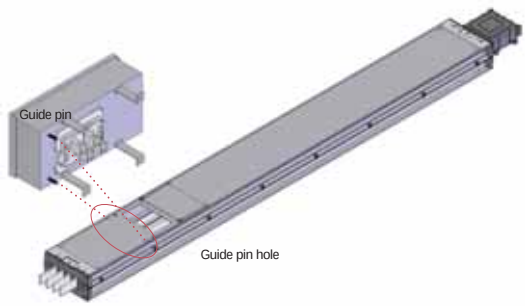


Vertical Hangers

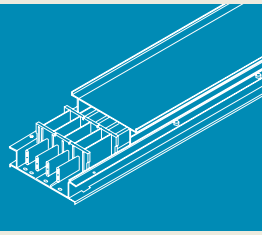


The lengths of plug-in feeder and the positions of plug-in hole will be provided in order to be convenient for maintenance of user.
All the standard lengths of plug-in feeder are 3,000mm.
Also, the guide pin ensures accurate and safe connection between plug-in brush and bus bar.





4.1 Voltage Drop Characteristic
4.2 Short Circuit Withstand Characteristics



The values of impedance of an aluminum and copper conductors are shown as follows.
There are identical values per meter for line to neutral at 60Hz.
In case of 50Hz, multiply Reactance(X) by 0.83, Resistance(R) does not change due to very small frequency effect.

$V_d = I_L \times \sqrt{3} (R \cos\theta + X \sin\theta)$

- V_d : Voltage Drop
- I_L : rated load current
- $\cos\theta$: power factor
- R : resistance
- X : reactance
- $\sin\theta$: reactive factor

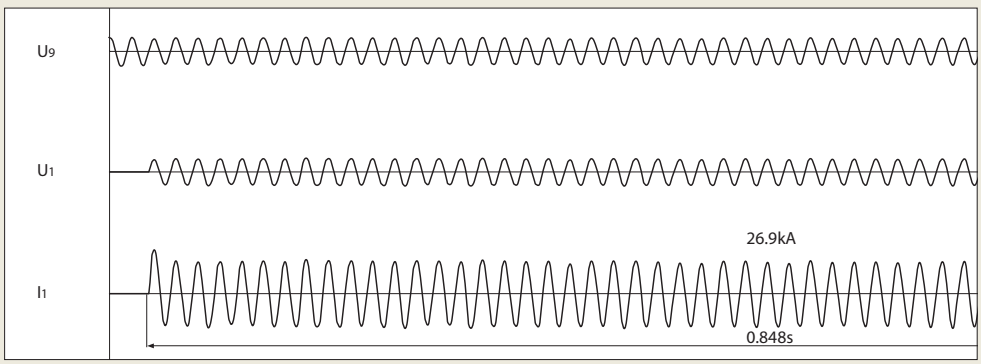
Conductor	Current(A)	(10^{-3} Ω/100m, 60 Hz)			Voltage Drop (V/100m)								
		Resistance	Reactance	Impedance	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
Aluminum	160	31.1	13.6	33.9	8.18	8.46	8.72	8.95	9.15	9.31	9.40	9.38	8.82
	250	18.8	11.2	21.9	8.77	8.98	9.15	9.31	9.42	9.47	9.44	9.24	8.13
	400	11.8	10.1	15.6	10.52	10.65	10.74	10.78	10.76	10.65	10.42	9.97	8.19
Copper	160	31.6	15.4	35.1	8.65	8.93	9.17	9.38	9.56	9.68	9.73	9.64	8.75
	250	18.6	13.0	22.7	9.32	9.50	9.64	9.75	9.80	9.79	9.68	9.39	8.04
	400	12.9	10.0	16.4	10.94	11.11	11.24	11.32	11.34	11.28	11.10	10.68	8.96

1) Actual Voltage Drop = $\alpha \times Vd \times \frac{\text{Actual load current}}{\text{Rated load current}} \times \frac{\text{Actual distance(m)}}{100m}$

2) α (Load Distribution Constant
- i) α = 1, Concentrated load
- ii) α = 0.5, Distributed load

F : Flanged End(Panel Connection)
P : Plug-in Unit

Short circuit rating test of Mini-Way Bus Duct has been tested considering real short circuit conditions according to IEC 60439-1&2 under the KEMA and ASTA.



Short-Circuit Strength

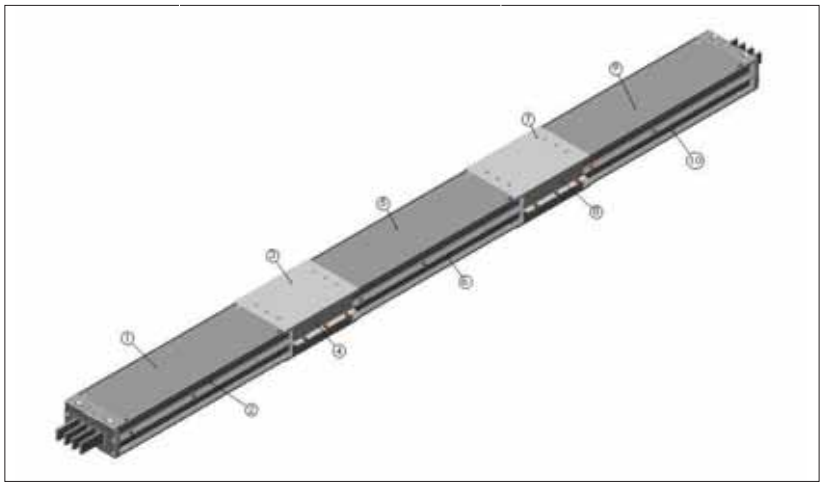
Current(A)	Aluminum(kA)		Copper(kA)	
	1sec.	3sec.	1sec.	3sec.
160	10	6	10	6
250	10	6	10	6
400	25	15	25	15

Current(A)	Aluminum(kA)		Copper(kA)	
	Irms(1sec.)	Ipeak	Irms(1sec.)	Ipeak
160	10	22	10	22
250	10	22	16	35
400	25	55	30	66

Technical Data

4.3 Temperature Rising

The temperature rising limit values of Mini-Way Bus Duct shall not be exceeded for specified value as the conductor by 95K or less and outside duct by 55K or less from the ambient temperature.



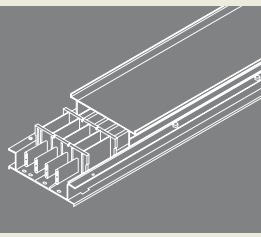
Sensor No.	Sensor Position	Temperature Rising(K)
1	Surface of Top Cover (No.1 Length Cover)	17.5
2	Surface of Right Cover (No.1 Length Cover)	16.9
3	Surface of Top Cover (Primary Joint Cover)	16.1
4	Surface of Right Cover (Primary Joint Cover)	16.3
5	Surface of Top Cover (No.2 Length Cover)	20.2

※ - In case of 400A
- Ambient temperature : 22°C

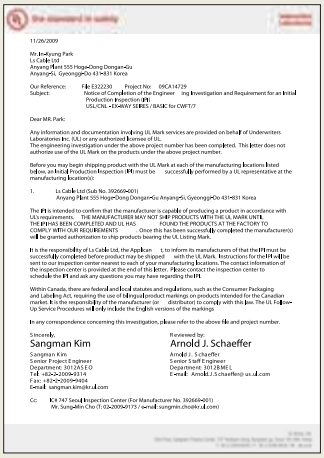
Sensor No.	Sensor Position	Temperature Rising(K)
6	Surface of Right Cover (No.2 Length Cover)	18.4
7	Surface of Top Cover (Secondary Joint Cover)	22.3
8	Surface of Right Cover (Secondary Joint Cover)	19.6
9	Surface of Top Cover (No.3 Length Cover)	16.3
10	Surface of Right Cover (No.3 Length Cover)	20.3

※ - In case of 400A
- Ambient temperature : 22°C

Certificates



UL



11/26/2009

Mr. Jin-Young Park
Ls Cable Ltd
Anyang Plant 555 Hogye-Dong Dongan-Gu
Anyang-Si, Gyeonggi-Do 43-831 Korea

Our Reference: File E322230 Project No 09CA14729
Subject: Notice of Completion of the Engineering Investigation and Requirement for an Initial Production Inspection (IPI)
UL/CNL <EnMAY SERIES / BASIC for CWT/7

Dear MR. Park:

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.
The engineering investigation under the above project number has been completed. This letter does not authorize use of the UL Mark on the products under the above project number.

Before you may begin shipping product with the UL Mark at each of the manufacturing locations listed below, an Initial Production Inspection (IPI) must be successfully performed by a UL representative at the manufacturing location(s):

1. Ls Cable Ltd (Sub No. 392669-4001)
Anyang Plant 555 Hogye-Dong Dongan-Gu Anyang-Si, Gyeonggi-Do 431-831 Korea

The IPI is intended to confirm that the manufacturer is capable of producing a product in accordance with UL's requirements. THE MANUFACTURER MAY NOT SHIP PRODUCTS WITH THE UL MARK UNTIL THE IPI HAS BEEN COMPLETED AND UL HAS FOUND THE PRODUCTS AT THE FACTORY TO COMPLY WITH OUR REQUIREMENTS. Once this has been successfully completed the manufacturer(s) will be granted authorization to ship products bearing the UL Listing Mark.

It is the responsibility of Ls Cable Ltd, the Applicant, to inform its manufacturers of that the IPI must be successfully completed before product may be shipped with the UL Mark. Instructions for the IPI will be sent to our inspection center nearest to each of your manufacturing locations. The contact information of the inspection center is provided at the end of this letter. Please contact the inspection center to schedule the IPI and ask any questions you may have regarding the IPI.

Within Canada, there are federal and local statutes and regulations, such as the Consumer Packaging and Labeling Act, requiring the use of bilingual product markings on products intended for the Canadian market. It is the responsibility of the manufacturer (or distributor) to comply with this law. The UL Follow-Up Service Procedures will only include the English versions of the markings.

In any correspondence concerning this investigation, please refer to the above file and project number.

Sincerely,
Sangman Kim
Sangman Kim
Senior Project Engineer
Department: 3012 ASEO
Tel: +82-2-2009-4214
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E-mail: sangman.kim@kr.ul.com

Reviewed by:
Arnold J. Schaeffer
Arnold J. Schaeffer
Senior Staff Engineer
Department: 3012 BMEL
E-mail: Arnold.J.Schaeffer@us.ul.com

Cc: ICR 747 Seoul Inspection Center (For Manufacturer No. 392669-4001)
Mr. Sung-Min Cho (T: 02-2009-4173 / e-mail: sungmin.cho@kr.ul.com)

ASTA

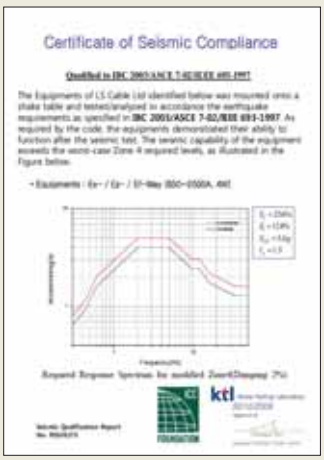
ASTA CERTIFICATE

KEMA

KEMA

ATTESTATION OF CONFORMITY

SEISMIC (ZONE4)



Certificate of Seismic Compliance

ELECTRICAL SAFETY

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

GREEN ENVIRONMENT

Attestation of Conformity

CE

TÜV NORD

Certificate

ISO9001

CERTIFICATE

ISO 9001 : 2008

ISO14001

CERTIFICATE

ISO 14001 : 2004

※ In case of UL mark, it will be discussed with manufacturer in advance.

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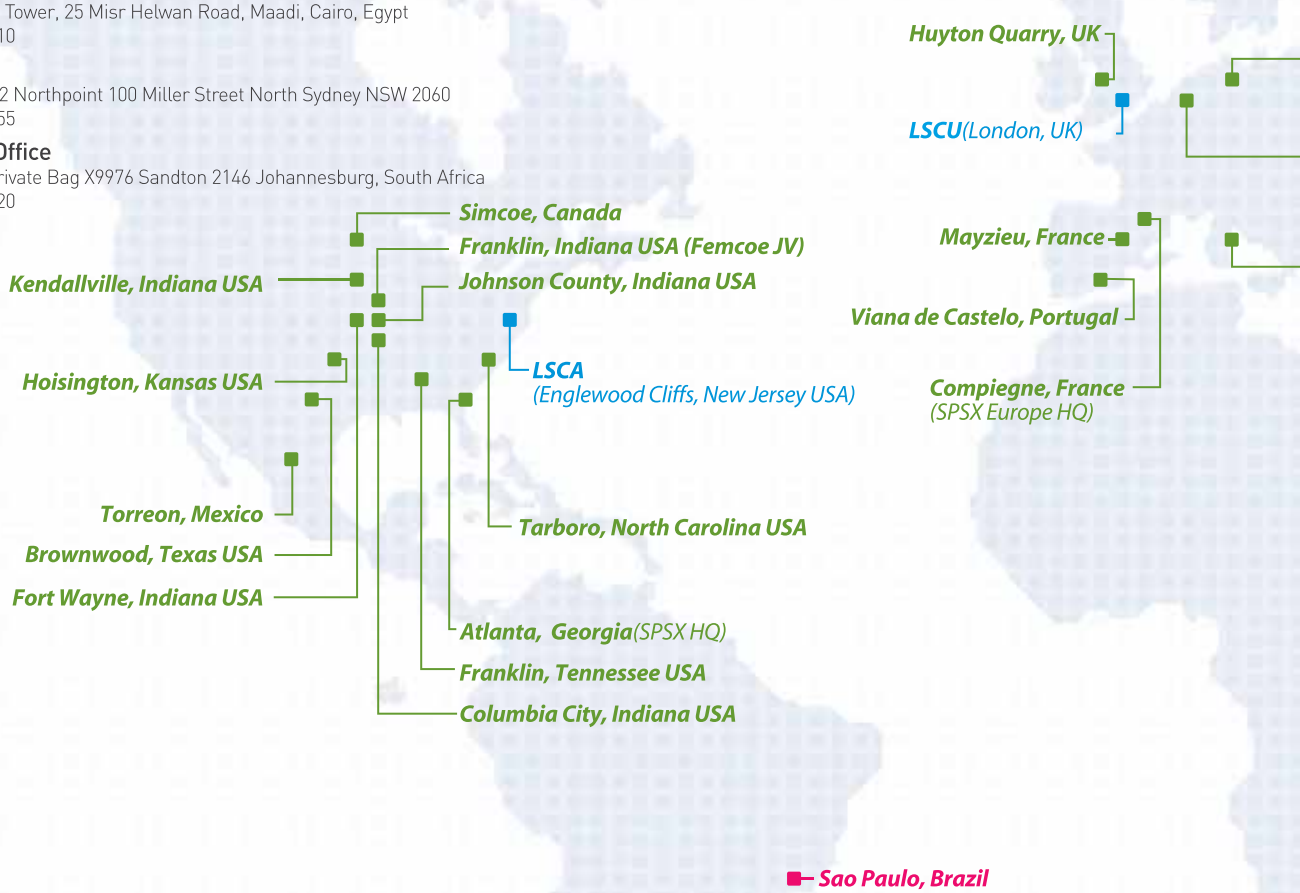

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