



ELEKTRİK

E-LINEKOLİ

Busbar Systems 160...800 A

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IEC 60439-2

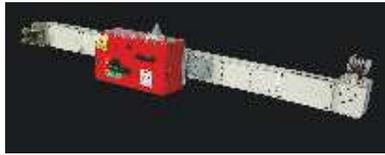


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PRODUCT TYPES



E-LINE KX

Compact Busbar Distribution System
630...6300 A



E-LINE KB

Compact Busbar Distribution System
800...6300 A



E-LINE KO

Plug-in Busbar Distribution System
160...800A



E-LINE MK

Small Power Plug-in Busbar Distribution System
100-160-225A



E-LINE KAP

Plug-in Busbar Distribution System
40-63A



E-LINE DL

Multi-Conductor Lighting Busbar System
25-32-40A



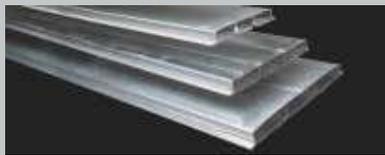
E-LINE KAM

Lighting Busbar System
25-32-40A



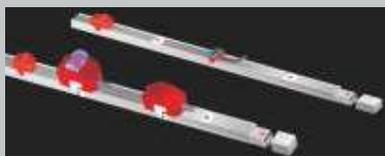
E-LINE TB

Multi Conductor Trolley Busbar System
35...250A



E-LINE DK

Underfloor Ducting Systems



E-LINE DKY

Raised Floor Energy Distribution Systems
25...63A



E-LINE UK

Cable
Tray Systems

►► Introduction

E-Line KO-II Busbar System distributes electrical energy, both vertically and horizontally at premises where there is a need of electricity between 160 A and 800 A.

It provides a prefabricated and flexible electrical distribution system for all factories engaged in mass production, like automobile plants, textile plants, furniture factories and for buildings where there is a need for frequent energy supply like business centers, hotels, hospitals, warehouses and all high rise buildings.

● Fast, Flexible Engineering

The large number tap-off points makes it possible to engineer the power supply systems at an early stage, even before the final disposition of loads is known.

● Fast and Easy Mounting

Energy is easily supplied to machines by E-Line KO-II. The erection of the system does not require any expertise. Supports and accessories are available for mounting the system either to the ceiling or to the wall.

● Safe Energy Distribution and Transportation

E-Line Busbar Systems increase personnel safety by their special structures.

● Lower Total Installed Cost

Busbar Material costs are often equal or less than wire and conduit.

● Flexible Power Supply

Tap-off points at short intervals make electrical power available in all locations, the power supply can be adapted to different production processes simply by relocating the tap-off units. Being built up of basic elements, it can at any time be extended, modified, dismantled and re-used.

● Modern Outlook

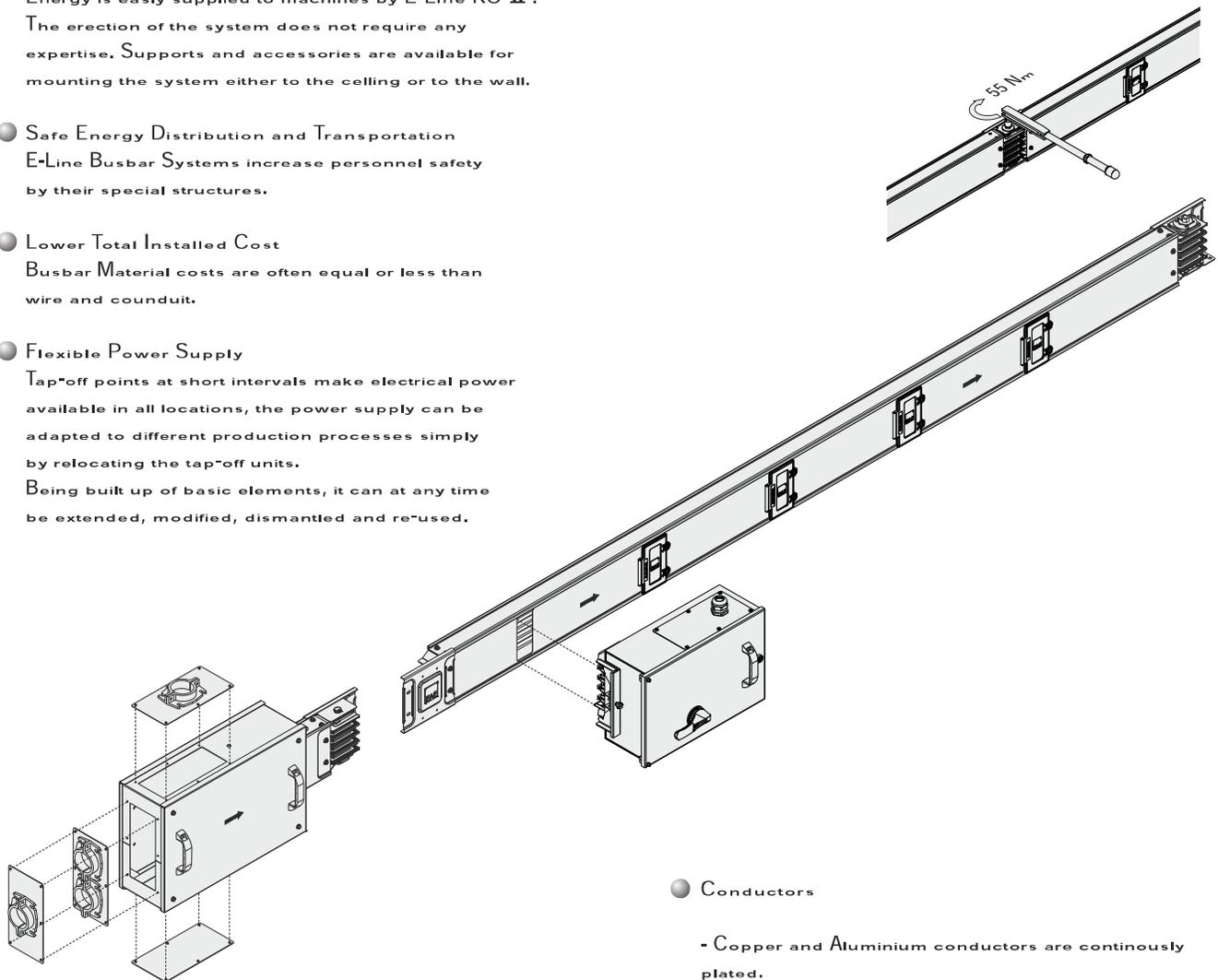
Other than its functional advantages E-Line KO-II busbar system also creates a modern outlook at buildings where it is used.

● Lower Life Cycle Cost

Busbar components can be added, deleted or relocated after the initial installation, saving time and money.

● Tap-off Points

Energy can only be supplied by E-Line KO-II tap-off boxes. Where necessary the use tap-off points can be limited by sealing. Dust covers protect the system from any accidental contacts and also prevents the access of pollution from the environment.



● Conductors

- Copper and Aluminium conductors are continuously plated.

- Cross-section of neutral conductor is the same as phase conductor.

- Upon request KO-II group of busbars can be manufactured also with 5 conductors.

● Secured Energy Take Off

The earth of the tap-off box first contacts the busbar and ensures the safety, of the box and the system that's been fed.

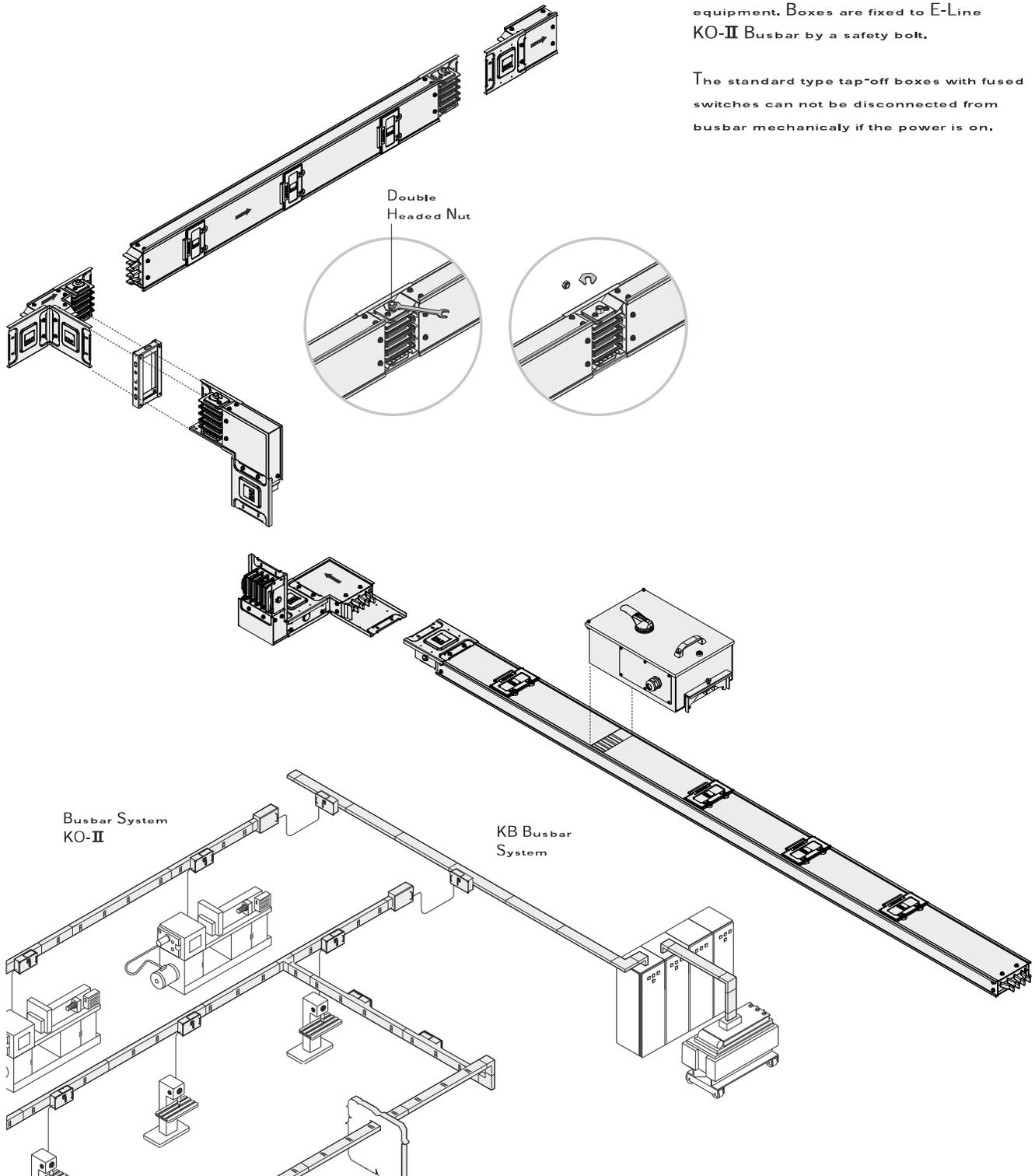
● "One Bolt Joint"

E-Line KO-II Busbars are easily installed by tightening the "one bolt joint". Belleville spring washers on both ends of the bolt retains the original contact pressure ensuring a more secure and reliable joint.

● Tap-off Boxes

Energy upto 400A can be supplied by tap-off boxes. Standard tap-off boxes are equipped with interlock mechanism which prevents the cover of tap-off boxes to be opened before the energy is turned off. Tap-off boxes are easily mounted to the busbar without any additional mounting equipment. Boxes are fixed to E-Line KO-II Busbar by a safety bolt.

The standard type tap-off boxes with fused switches can not be disconnected from busbar mechanically if the power is on.



►► Design

While designing an electrical distribution system with E-Line KO-II a few approximate details will be necessary.

- Location, number, type and approximate ratings of loads,
- Transformer rates and short-circuit capacities,
- Utilization factor = α
- System co-ordination with other distribution systems (heat, water, etc.)
- Determining the route of E-Line KO-II on layouts, Deciding on suitable supports,
- If necessary, co-ordination of E-Line KB and E-Line MK-KAP with E-Line KO-II runs.

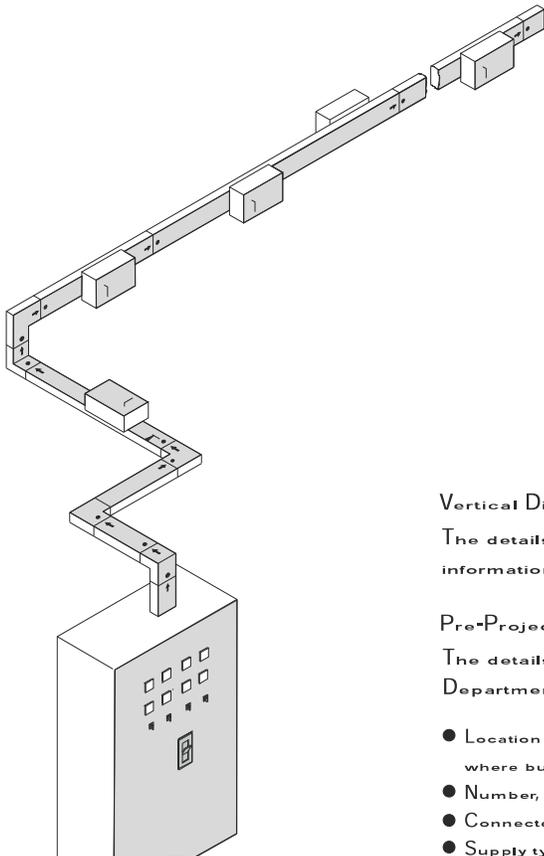
Rated Current

The current is calculated using the following equation.

$$I_B = \frac{P \cdot \alpha}{\sqrt{3} \cdot U \cdot \cos \varphi}$$

- I_B = Operating Current (A)
- P = Installed Load (W)
- α = Utilization Factor
- U = Supply Voltage

- Busbar Current rating is chosen as equal to or higher than the calculated I_B current.
- After the voltage drop calculation if the chosen current rate is not convenient, a higher rating is chosen.



Utilization Factor (α)

Utilization factor (α) depends on the type and number of loads. It is usually around 0.7 or lower. The utilization factor of a line that supplies electricity to motors and lighting systems is usually 0.6 It is as low as 0.5 in weld shops of car factories, (α) can be 1 in lines where only one big load is supplied.

Applications

As each building's structure is different than the other for vertical and horizontal applications special projects has to be designed.

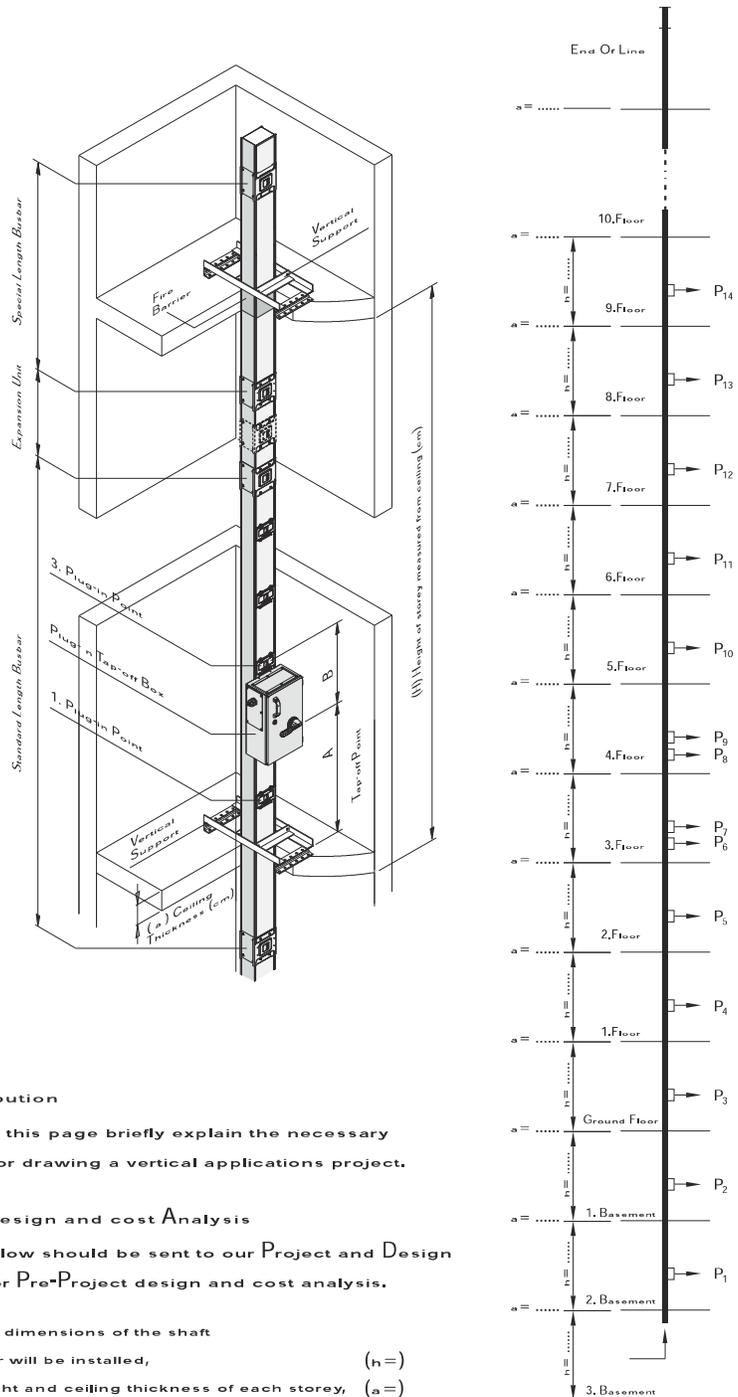


Figure 1

Vertical Distribution

The details on this page briefly explain the necessary informations for drawing a vertical applications project.

Pre-Project Design and cost Analysis

The details below should be sent to our Project and Design Department for Pre-Project design and cost analysis.

- Location and dimensions of the shaft where busbar will be installed, (h)
- Number, height and ceiling thickness of each storey, (a)
- Connected load for each storey, (p)
- Supply type of the vertical line (Busbar or Cable).

BUSBAR TYPE
 CONDUCTOR TYPE
 BUSBAR CODE
 PROTECTION DEGREE
 CONDUCTOR CONFIGURATION
 UNPAINTED / PAINTED
 COMPONENT

KO A 06 5 5 - II - B - DDT

Busbar Type

Aluminium A
 Copper C

	Busbar Rated Current	Busbar Code	
Aluminium	160	01	6x20
	250	02	6x25
	315	03	6x30
	400	04	6x50
	500	05	6x62,5
	600	06	6x75
Copper	250	02	6x20
	315	03	6x25
	400	04	6x30
	600	06	6x50
	800	08	6x75

IP 55 5

Conductor Type

Busbar Code

Protection Degree

Conductor Configuration

Number of Conductors	Code	Configuration									
		L1	L2	L3	N	PE	½ PE	CPE	½ CPE	PE (Housing)	
4 wire	4	✓	✓	✓	✓					✓	
5 wire	5	✓	✓	✓	✓	✓				✓	
4 ½ wire	6	✓	✓	✓	✓		✓			✓	
5 wire (CPE)	7	✓	✓	✓	✓			✓		✓	
4 ½ wire (CPE)	9	✓	✓	✓	✓				✓	✓	

Components

Plug-in Standard Length	STD
Plug-in Special Length	X
Feeder Standard Length	FTD
Feeder Special Length	FX
Right Elbow	R
Left Elbow	L
Downwards Elbow	A
Upwards Elbow	Y
Right Upwards Combined	KRU
Left Upwards Combined	KLU
Right Downwards Combined	KRD
Left Downwards Combined	KLD
Upwards Right Combined	KUR
Upwards Left Combined	KUL
Downwards Right Combined	KDR
Downwards Left Combined	KDL
Upwards Vertical Offset	UV
Downwards Vertical Offset	DV
Right Horizontal Offset	RH
Left Horizontal Offset	LH
"T" Component	T
Cross	D
Reductions	RD
End Closer	S
Horizontal Expansion	YDT
Vertical Expansion	DDT
Flexible	F
Feeder Box 1	B1
Feeder Box 2	B2
Central Feeder Box 1	BO1
Central Feeder Box 2	BO2
Panel Connections	P10
Panel Connections	P11

Paint

UNPAINTED -
 PAINTED B

Aluminium Conductor (KOA)

Copper Conductor (KOC)

Rated Current	I _n	A	160	250	315	400	500	600	250	315	400	600	800
Busbar Code			01	02	03	04	05	06	02	03	04	06	08
Standards	IEC 60439-2												
Rated Insulation Voltage	U _i	V	1000										
Rated Operational Voltage	U _e	V	1000										
Rated Frequency	f	Hz	50 / 60										
Measures For Protection Against Electric Shock	Basic protection (HD 60364-4-41, clause A1)												
Pollution Degree	III												
Protection Degree	IP 55												
Housing Material	Pregalvanized sheet metal or epoxy polyester painted pregalvanized sheet metal RAL 7038												
Rated Short-time Withstand Current (1 sec)	I _{cw}	kA _{rms}	10	15	15	30	30	35	36	36	52,5	73,5	73,5
Rated Peak Withstand Current	I _{pk}	kA	17	30	30	63,5	63,5	73,5	18	18	25	35	35
Rated Short-time withstand Current (N)	I _{cw}	kA	6	9	9	18	18	21	21,6	21,6	30	44,1	44,1
Rated Peak Withstand Current (N)	I _{pk}	kA	10,2	15,3	15,3	36	36	44,1	10,8	10,8	15	21	21
Rated Short-time Withstand Current (PE)	I _{cw}	kA	6	9	9	18	18	21	21,6	21,6	30	44,1	44,1
Rated Peak Withstand Current (PE)	I _{pk}	kA	10,2	15,3	15,3	36	36	44,1	10,8	10,8	15	21	21
PHASE CONDUCTORS													
The Mean Ohmic Resistance at 20°C and at I _n	R ₂₀	mΩ/m	0,242	0,193	0,161	0,097	0,077	0,064	0,150	0,120	0,100	0,060	0,040
Mean Ohmic Resistance at the Steady State Operation Temp. (q1) and at I _n	R ₁	mΩ/m	0,286	0,246	0,204	0,125	0,109	0,094	0,180	0,164	0,144	0,078	0,068
Mean Ohmic Reactance at the Steady State Operation Temp. (q1) and at I _n	X ₁	mΩ/m	0,205	0,183	0,165	0,118	0,103	0,088	0,173	0,154	0,144	0,117	0,083
Mean Ohmic Impedance at the Steady State Operation Temp. (q1) and at I _n	Z ₁	mΩ/m	0,333	0,319	0,270	0,182	0,157	0,135	0,254	0,235	0,207	0,144	0,110
Power loss at rated current	3I ² R ₁	W/m	23,58	48,75	64,05	62,08	84,41	104,68	35,36	50,33	70,92	86,19	133,56
SECTIONS													
L1, L2, L3, N		mm ²	120	150	180	300	375	450	120	150	180	300	450
PE (for 5 conductors)		mm ²	120	150	180	300	375	450	120	150	180	300	450
PE (for 4 1/2 conductors)		mm ²	60	75	90	150	187,5	225	60	75	90	150	225
Housing Cross Section (Steel Sheet)		mm ²	583	593	603	643	668	693	583	593	603	643	693
Conductor Size		mmxmm	6x20	6x25	6x30	6x50	6x62,5	6x75	6x20	6x25	6x30	6x50	6x75
Weight - 4 Conductors		kg/m	7,0	7,5	8,0	10,0	11,0	12,0	10,0	11,0	12,5	16,0	18,0
Weight - 5 Conductors		kg/m	7,3	8,0	8,7	11,0	12,0	13,0	11,0	12,5	14,0	19,0	21,0
Fault condition (1);													
Zero impedance at 20°C	Z _{0-ph-N}	mΩ/m	0,965	0,901	0,847	0,614	0,572	0,516	0,954	0,915	0,793	0,597	0,453
Zero impedance at 20°C (Housing)	Z _{0-ph-PE}	mΩ/m	1,100	1,030	0,961	0,825	0,709	0,687	1,042	0,959	0,911	0,779	0,691

⁽¹⁾Measurements and calculations of fault-loop circuit is done according to EN 60439-2 appendix N2a.



S = Supply Point

Voltage Drop Calculation

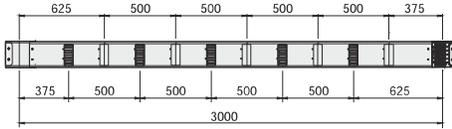
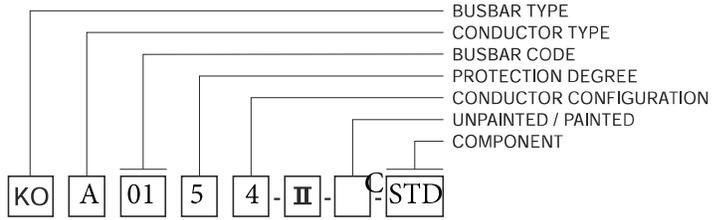
Voltage drop of a busbar system can be calculated with the following formula taking into account the "α" load distribution constant.

$$\Delta U = 3 \cdot L \cdot I \cdot (R_1 \cdot \cos\phi + X_1 \cdot \sin\phi) \cdot 10^{-3} [V]$$

- ΔU = Voltage Drop (V)
- L = Load Distribution Constant
- I = Line Length (m)
- I = Line Current (A)
- R₁ = Resistance (mΩ/m)
- X₁ = Inductive Reactance (mΩ/m)
- cosφ = Load Factor

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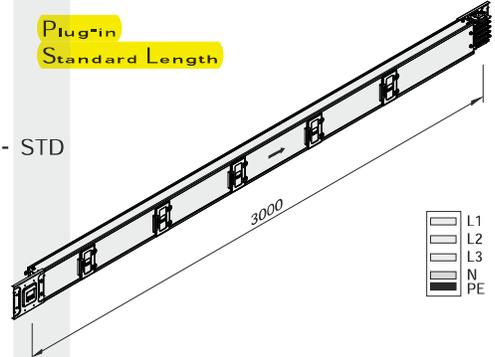
Standard Components



Electrical Energy up to 400A can be supplied from the busbar by Tap-off boxes.

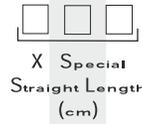
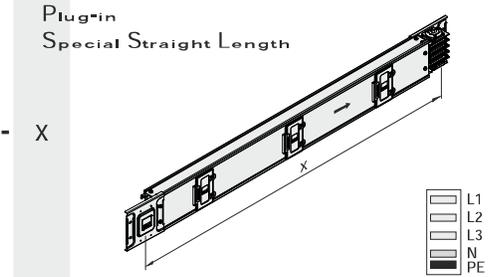
E-Line KO-II Busbar is manufactured in 3m as standard, special lengths can be manufactured on request.

Sample Order:
250 A, Aluminium, Plug-in,
IP 55, 4 Conductors
KOA 0254-II-STD

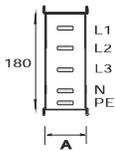
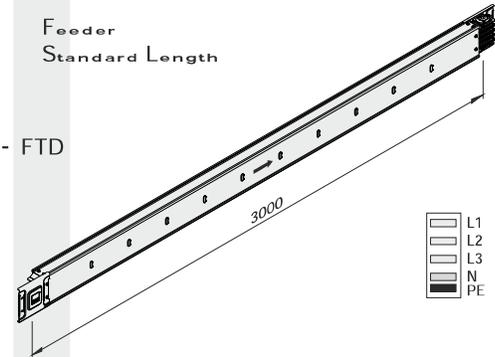


Sample Order:
400 A, Copper, Plug-in,
IP 55, 85 cm, 5 Conductors
KOC 0455-II-85

Minimum special length that can be manufactured is 35 cm.



Sample Order:
315 A, Aluminium, Feeder,
IP 55, 5 Conductors
KOA 0355-II-FTD

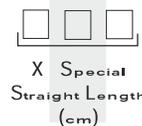
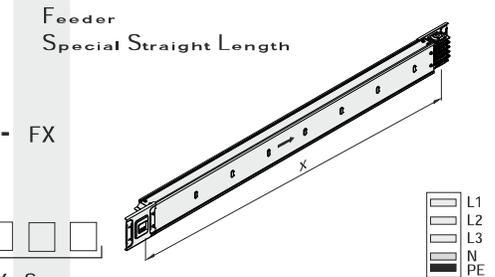


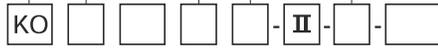
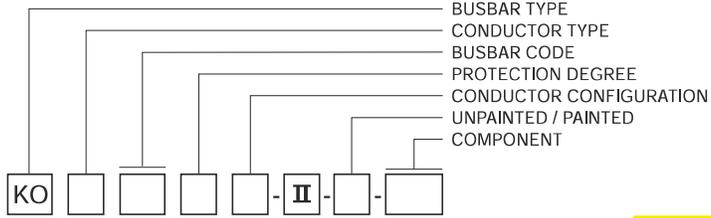
Current (A)	Aluminium (A) mm	Copper (A) mm
160	70	-
250	75	70
315	80	75
400	100	80
500	112	-
600	125	100
800	-	125

Busbar cross-section dimensions

Please call us for non-standard components.

Sample Order:
160 A, Aluminium, Feeder,
IP 55, 60 cm, 4 Conductors
KOA 0154-II-60





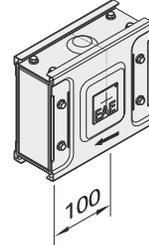
End Closer

Is used to close the end of busbar run.

Sample Order:
250 A, Copper, IP 55, 5 Conductors
KOC 0255 - II - S

End Closer

EA42468

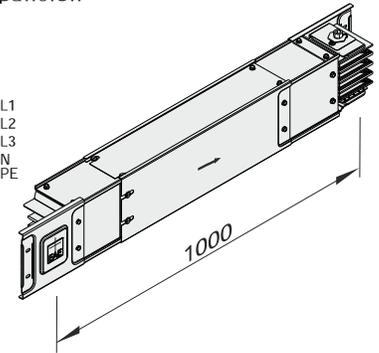


Horizontal Expansion

For long horizontal runs and for crossing the building expansions.
(See page no.25 for application)

Sample Order:
250 A, Aluminium, IP 55, 4 Conductors
KOA 0254 - II - YDT

Horizontal Expansion

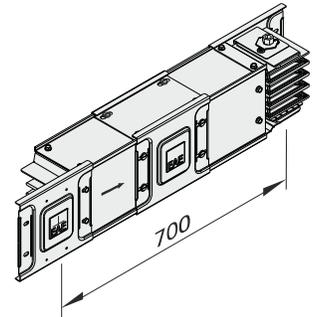


Vertical Expansion

For vertical applications in many storey buildings.
(See page no.25 for application)

Sample Order:
250 A, Copper, IP 55, 5 Conductors
KOC 0255 - II - DDT

Vertical Expansion

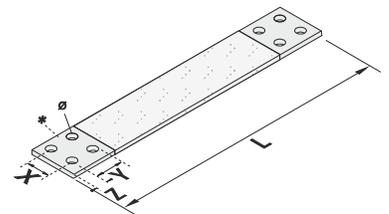


Flexibles

Are used for panel-busbar connections.

Sample Order:
400 A, Aluminium, 4 Conductors 55 cm.
KOA 0454 - II - F55

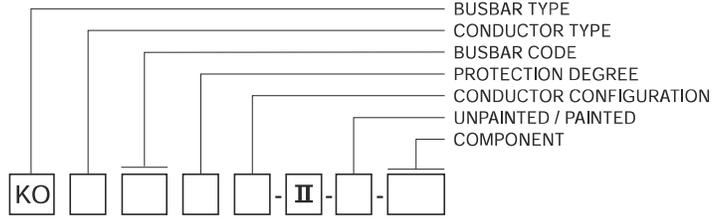
Flexibles



* Please indicate X, Y, Z and a measurement on order.

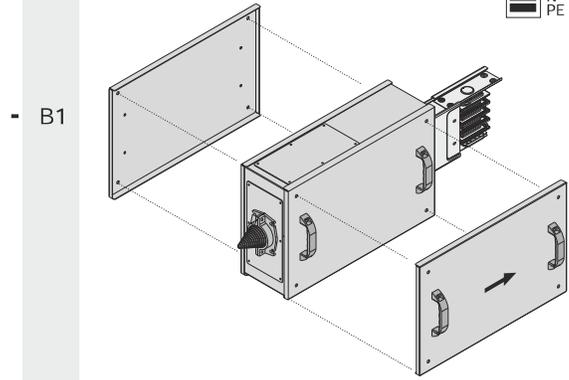
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►► Feeder Boxes

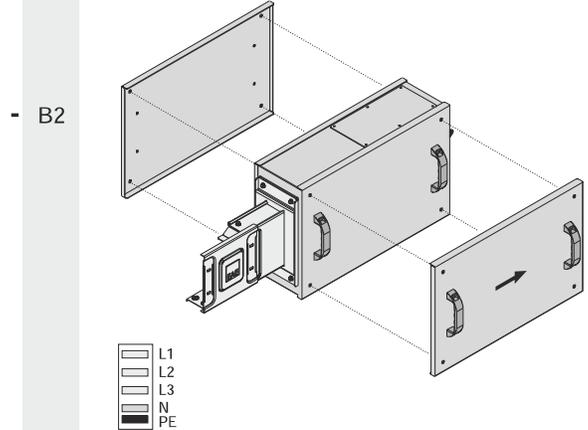


Sample Order:
250 A, Copper, IP 55,
5 Conductors
KOC 0255 - II - B1

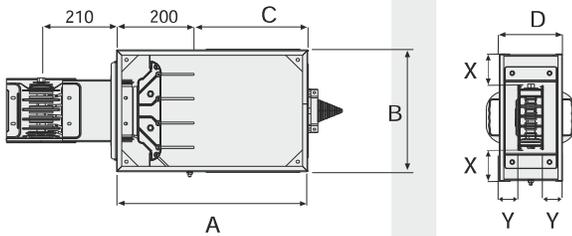
Feeder Box 1 EA40935



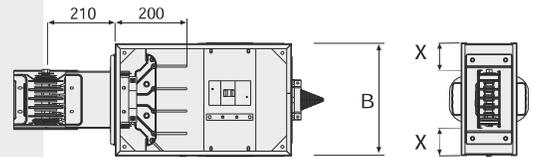
Feeder Box 2 EA40990



Sample Order:
250 A, Aluminium IP 55,
4 Conductors
KOA 0254 - II - B2

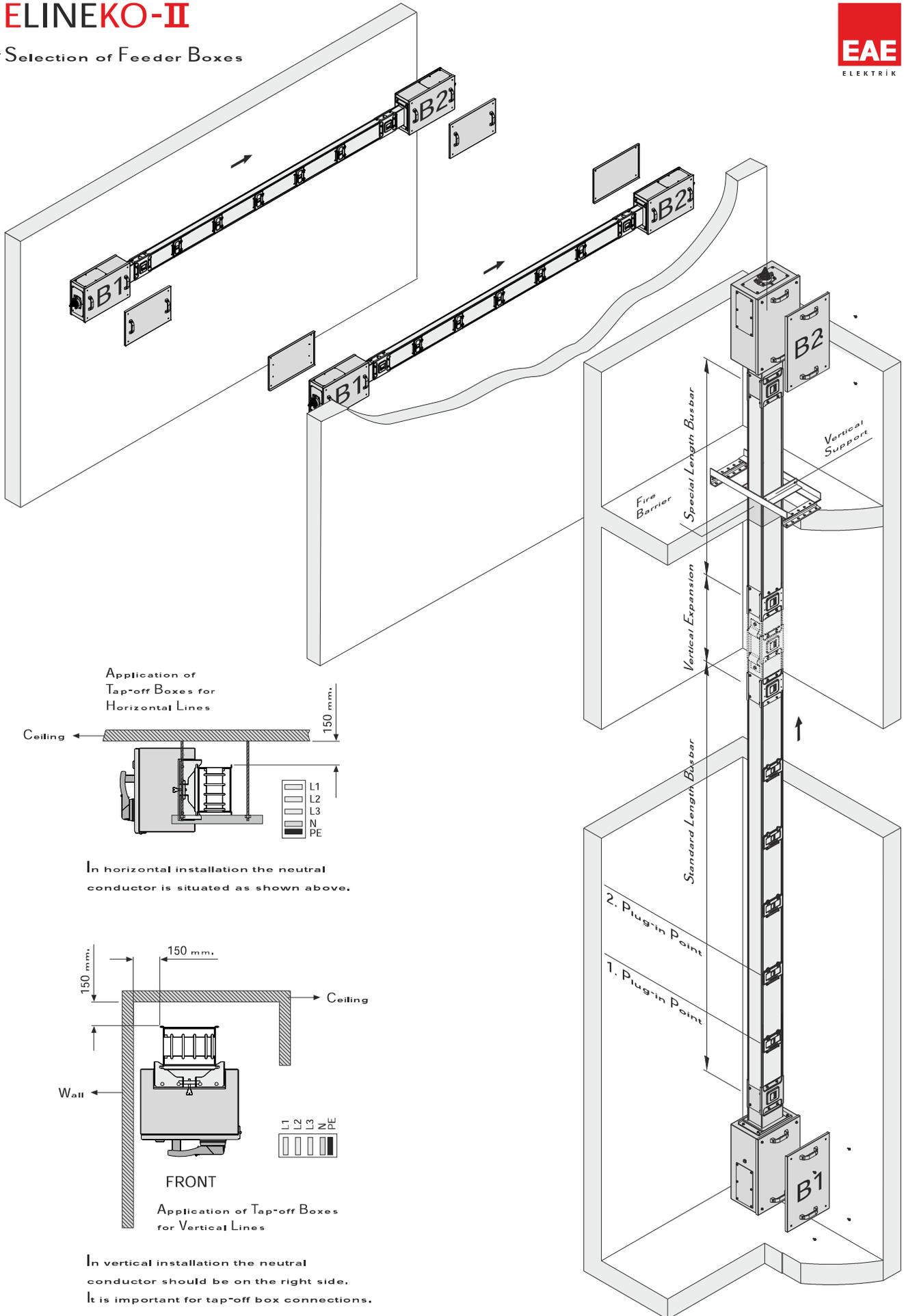


	Current	A	B	C	D	X	Y
Aluminium	160	550	350	350	180	85	55
	250	550	350	350	180	85	52,5
	315	550	350	350	180	85	50
	400	550	350	350	180	85	40
	500	550	350	350	240	85	65
	600	550	350	350	240	85	57,5
Copper	250	550	350	350	180	85	55
	315	550	350	350	180	85	52,5
	400	550	350	350	180	85	50
	600	550	350	350	180	85	40
	800	550	350	350	240	85	57,5



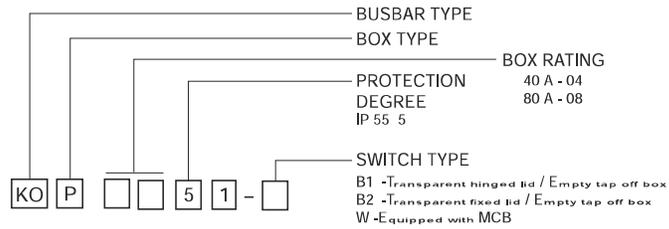
Feeder Box sample equipped with MCCB

Please call us for special applications or for applications with MCCB's



ELINEKO-II

▶▶ Tap-Off Boxes

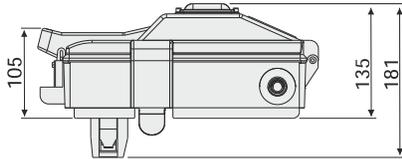
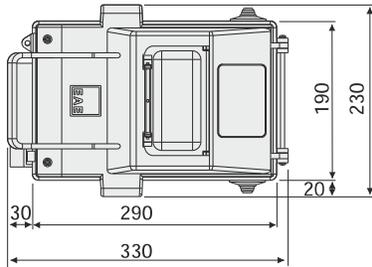
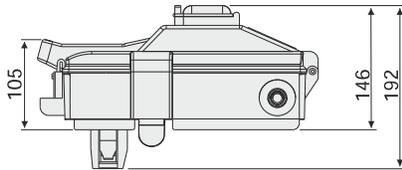
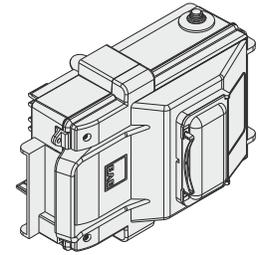


- 3x6 A
- 3x10 A
- 3x16 A
- 3x20 A
- 3x25 A
- 3x32 A
- 3x40 A
- 3x50 A
- 3x63 A
- 3x80 A

KOP 0451-B1 KOP 0851-B1

Sample Order:
 40 A, IP 55, 5 wire, transparent
 hinged lid, suitable for MCB,
 empty tap off box

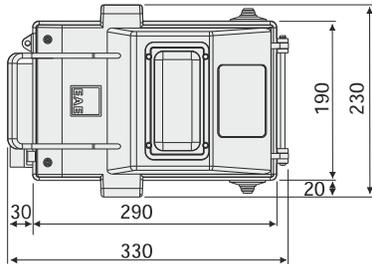
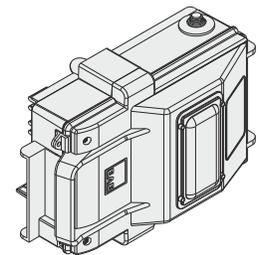
KOP 0451 - B1



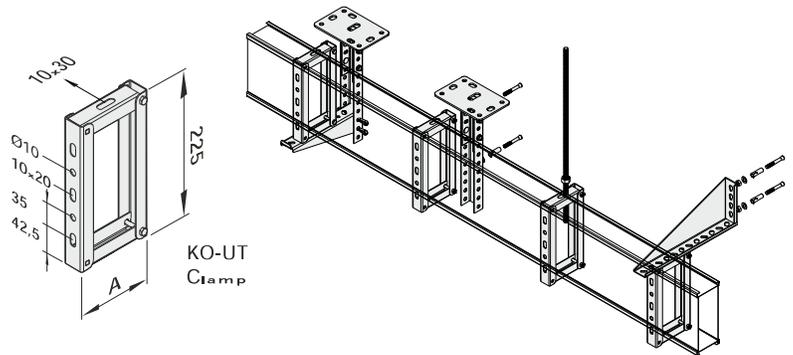
KOP 0451-B2 KOP 0851-B2

Sample Order:
 40 A, IP 55, 5 wire, transparent
 fixed lid, suitable for MCB,
 empty tap off box

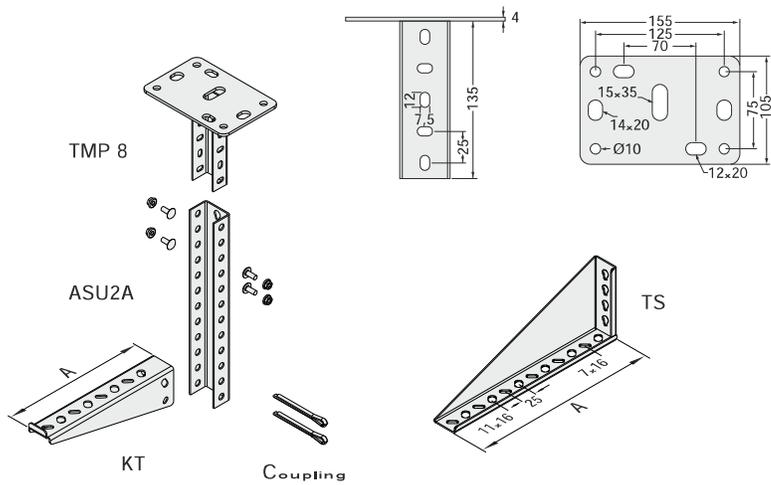
KOP 0451 - B2



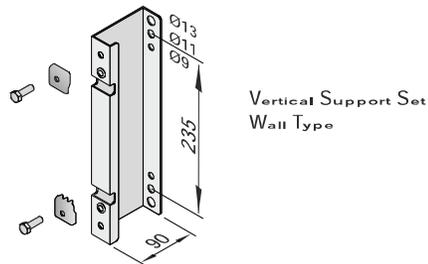
Description	Current	A (mm)	Code
KOA - 1 UT Clamp	160	115	97524
KOA - 2 UT Clamp	250	120	97527
KOA - 3 UT Clamp	315	125	97523
KOA - 4 UT Clamp	400	145	97526
KOA - 5 UT Clamp	500	157	97385
KOA - 6 UT Clamp	600	170	97525
KOC - 2 UT Clamp	250	115	97524
KOC - 4 UT Clamp	400	125	97523
KOC - 6 UT Clamp	600	145	97526
KOC - 8 UT Clamp	800	170	97525



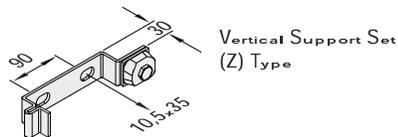
Description	A (mm)	Code
KT 200 Tray Support	235	99525S
KT 250 Tray Support	285	99524S
KT 300 Tray Support	335	99523S
KT 400 Tray Support	435	99522S
KT 500 Tray Support	535	99521S
KT 600 Tray Support	635	98715S
TS 200 Tray Support	205	99517S
TS 200 Tray Support	255	99516S
TS 200 Tray Support	305	99515S
TS 200 Tray Support	405	99514S
TS 200 Tray Support	505	99513S
TS 200 Tray Support	605	67876S
TMP 8 Ceiling Support Unit	-	99196S
Coupling	-	98869



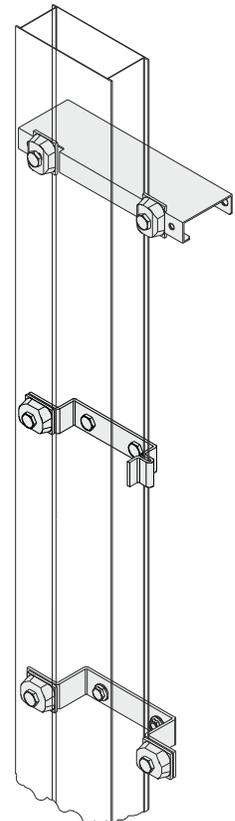
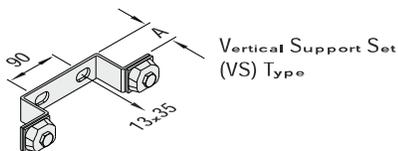
Description	Code
Vertical Support Set Wall Type	66916

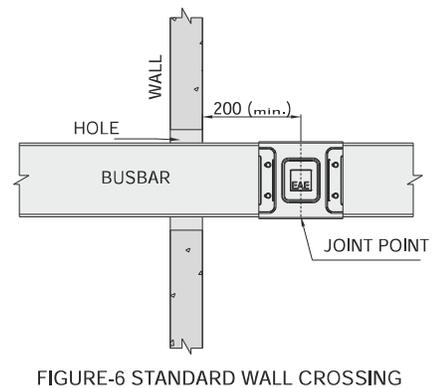
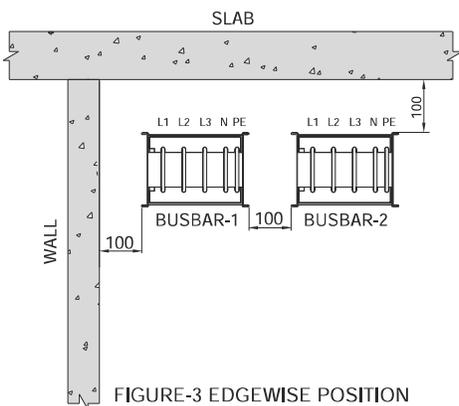
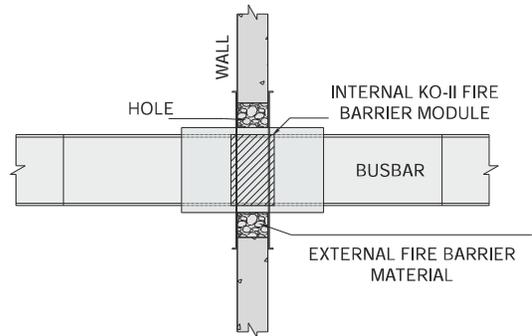
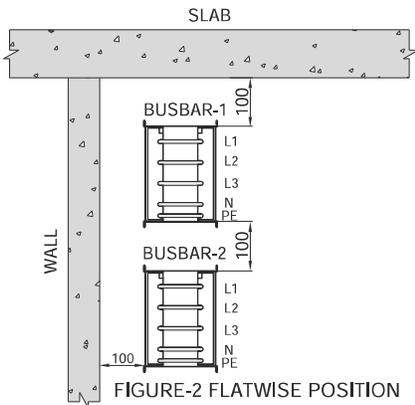
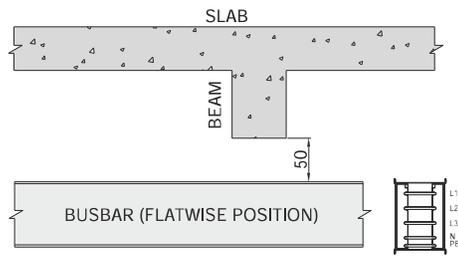
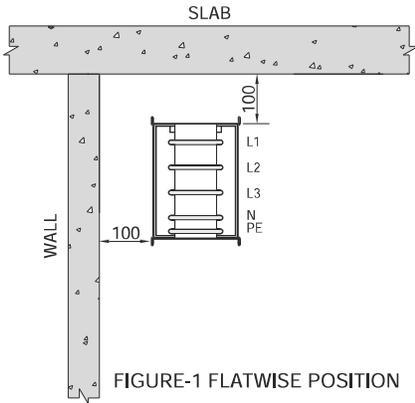


Description	Code
Vertical Support Set (Z) Type	91202



Description	A (mm)	Code
Vertical Support Set (VS)-40	40	96017
Vertical Support Set (VS)-60	60	95996





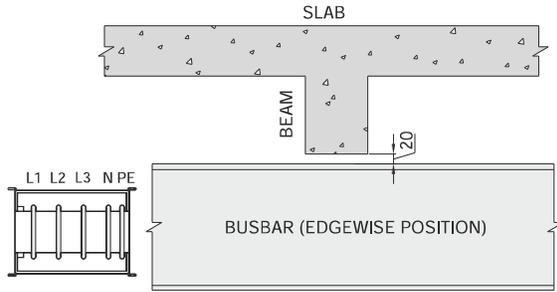


FIGURE-7 CROSSING UNDER A BEAM EDGEWISE POSITION

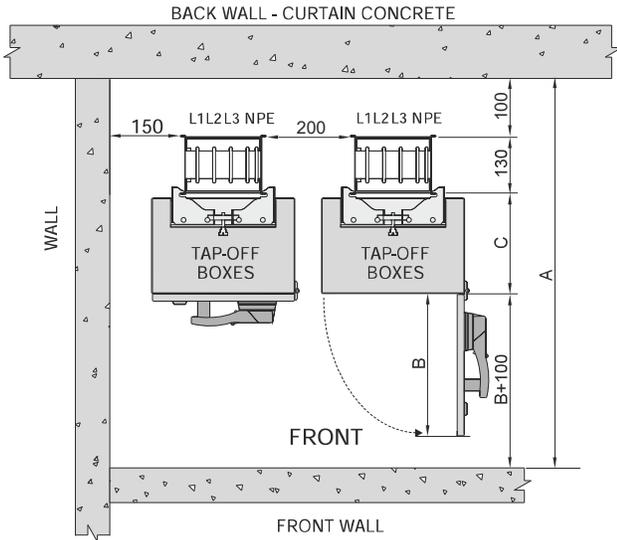


FIGURE-8 MINIMUM DIMENSIONS BETWEEN 2 TAP-OFF BOXES



NOTE : To determine the busbar layout in correct shaft measurement

$$A = B + C + 330$$

- A = Min distance from front wall
- B = Distance to open the cover of Tap off box
- C = Width of Tap off box

Application of Tap off box on vertical lines

Neutral conductor position in housing should be on rightside from front view at vertical lines.

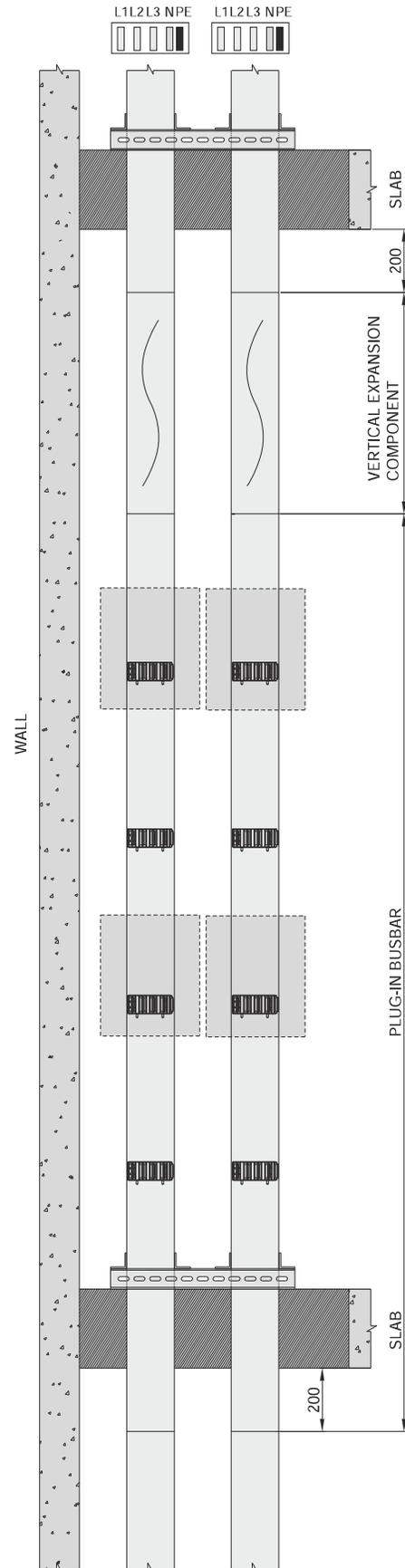


FIGURE-9 MINIMUM DIMENSIONS BETWEEN 2 RISERS

►► Horizontal And Vertical Expansion Modules Application

Horizontal expansion module (YDT) application

It is used for longer horizontal lines as per below pictures shown (Picture-1)

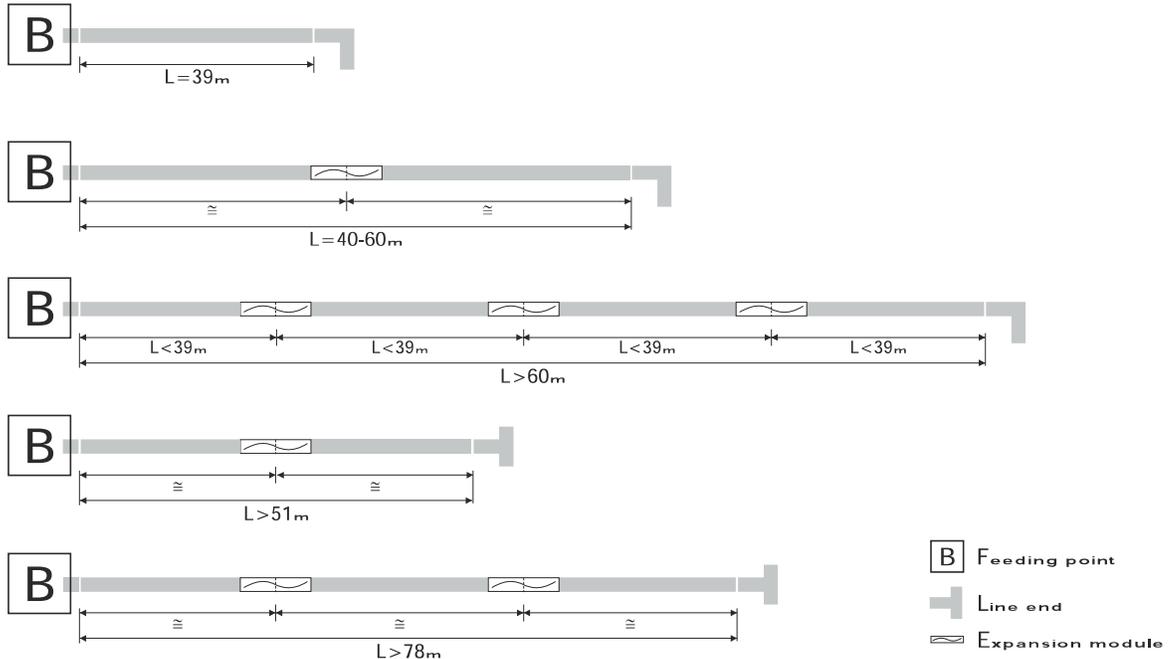


FIGURE-1 YDT APPLICATION

YDT should be used absolutely if busbar lines run from adjacent buildings joints

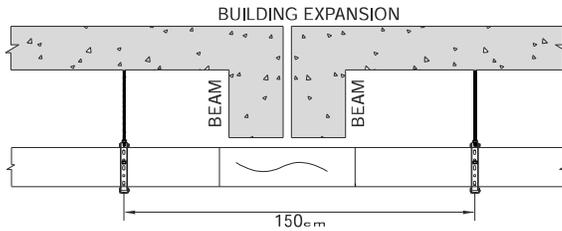


FIGURE-2 YDT BUILDING EXPANSION APPLICATION

Vertical expansion module (DDT) application

- 1-) DDT is used for vertical lines of multistorey buildings .
- 2-) DDT is used between two fixed supports at every floor crossing.

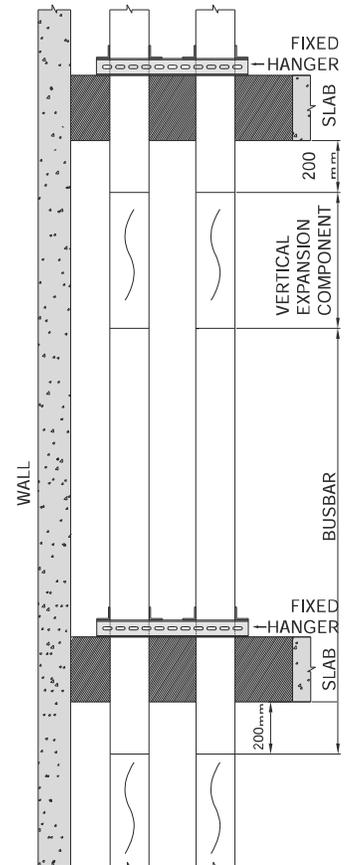
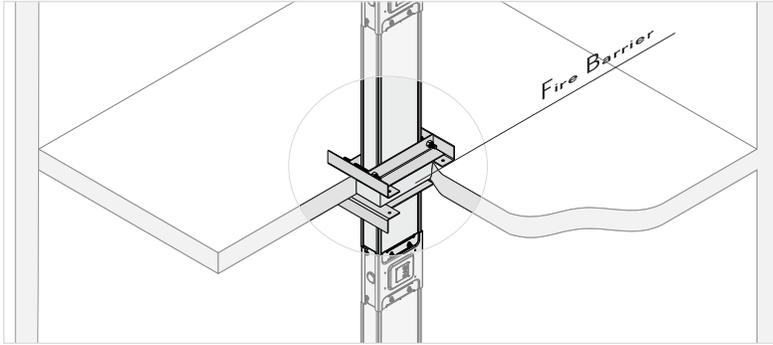
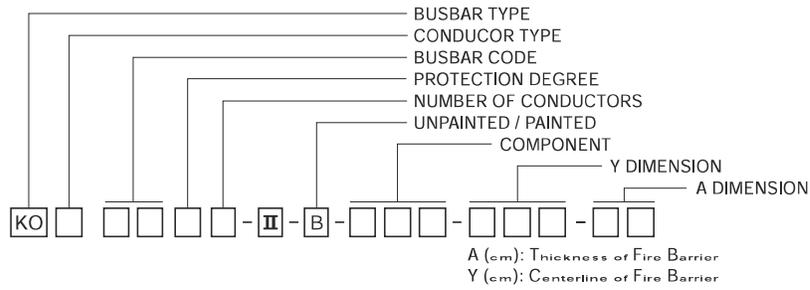
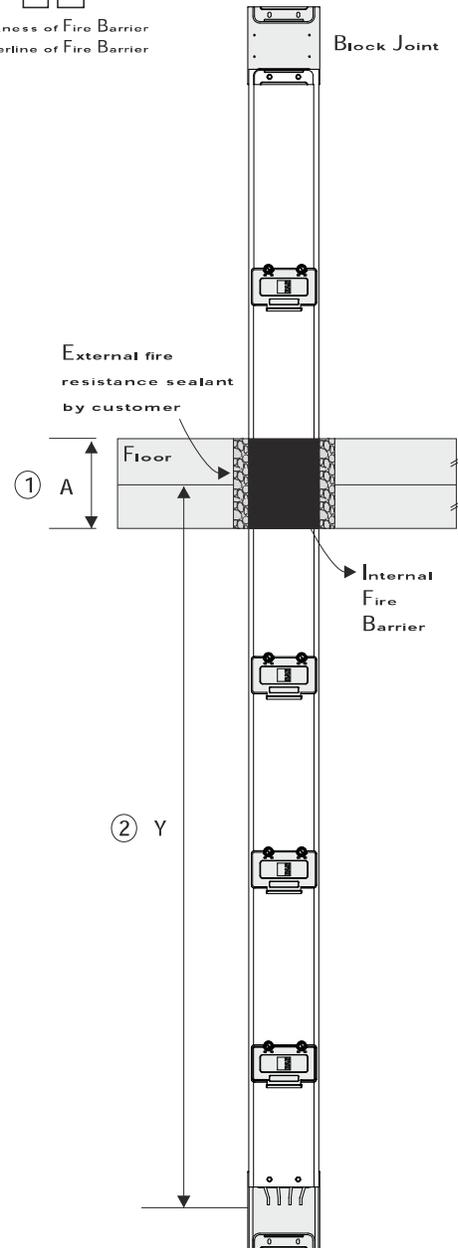


FIGURE-3 DDT APPLICATION



Sample Order:
 250 A, Copper, IP 55, 5 Conductors
 Fire Barrier
 KOC 0255-II-STD-150-40



Fire Barriers

Fire barriers are used to prevent the transition of flame and smoke from one zone to another in case of fire. Chimney effect of air insulated busbars are diminished.

Dimensioning of Fire Barrier

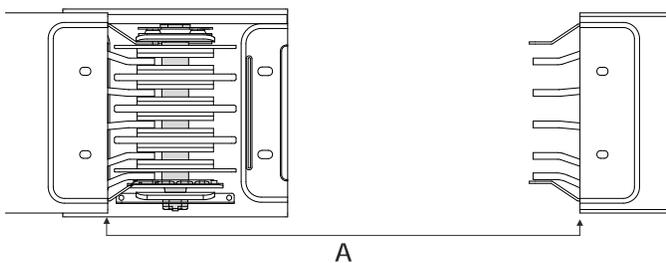
While placing an order for fire barriers that will be installed into KO-II Busbar below listed information should be given:

- 1- Thickness of floor or wall in cm. (A cm)
- 2- Centerline dimension of the fire barrier should be measured from the side without the block joint. (Y cm)
- 3- There will be no plug-in points at fire barrier location.
- 4- EAE Supplies 30 cm thick fire barrier as standard when wall or floor thickness is not stated.
- 5- The minimum length for these special elements with fire barrier can be 60cm.

►► Determination of Special Lengths

After installation of standard busbar 3m lengths, you will be in need of special lengths which are smaller than 3m.

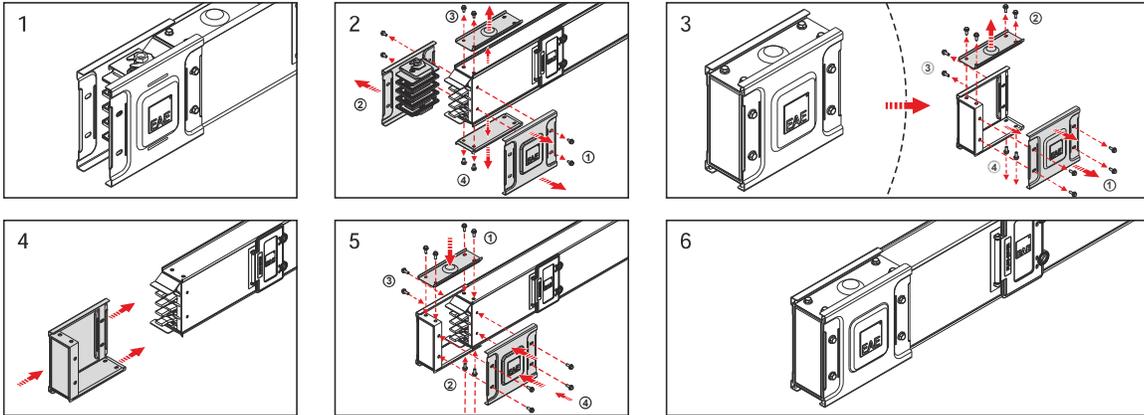
The minimum length for these special elements can be 35 cm. Please measure the lengths of these modules as shown below.



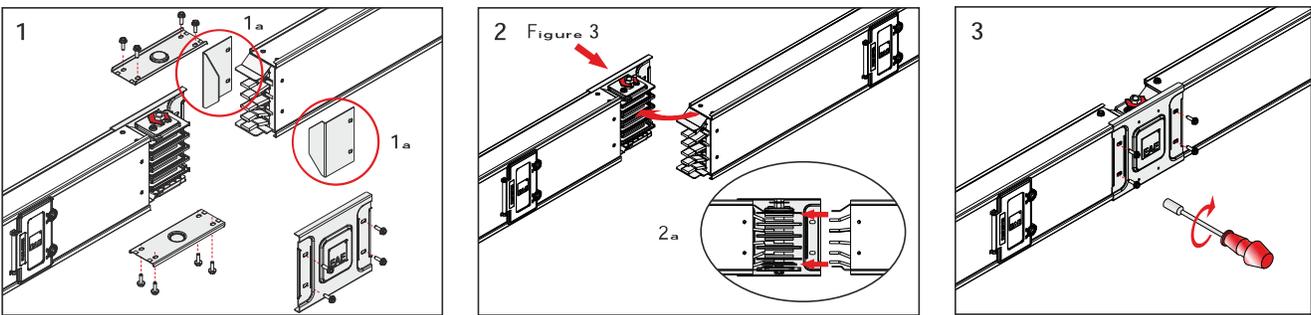
Measure "A" length in cm, to determine the length of special busbar subtract 12 from "A".

$$X = A - 12 \text{ (cm)} \quad X = \text{Length of Special Busbar}$$

►► KO-II Installation of End Closer



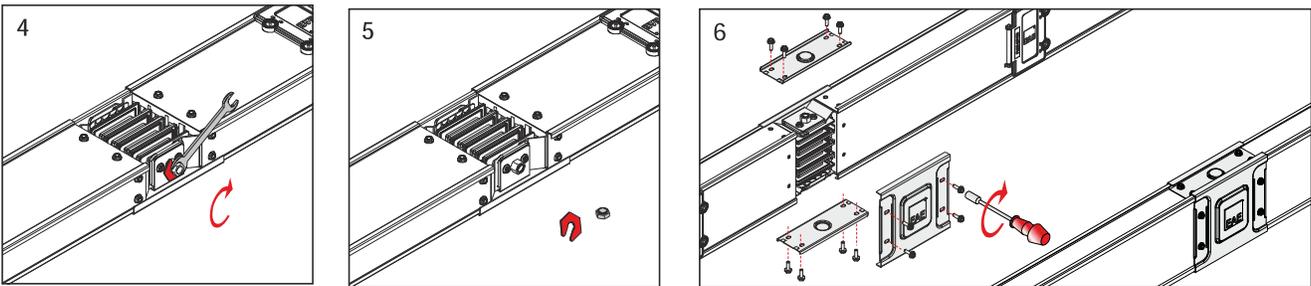
►► KO-II Mounting instructions for Joints



1- Remove joint top cover plate, joint side cover plate and the screws from non-block joint bolt. (Pieces marked as 1a shall be thrown away.)

2- Introduce bolted and non-bolted ends of the busbar into each other carefully, till joint side cover plate screws can be put on.

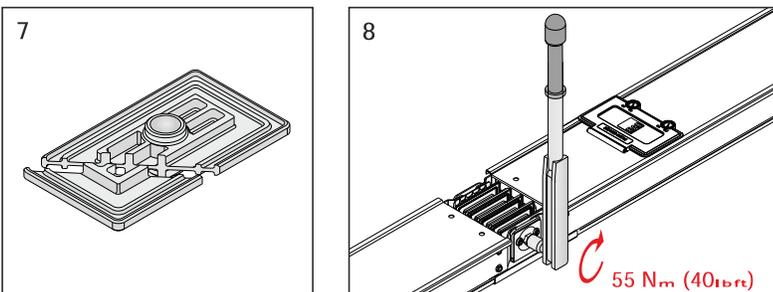
3- Fix the joint side cover of the block joint.



4- Tighten the double headed nut until upper nut is broken.

5- Take away the broken nut and plastic separator.

6- Install top and bottom joint cover plates. Check the joint before fitting the last joint side cover plate. Fit the joint cover side plate and tighten and screws. Check the position of the earth conductor when installing KO-II with five conductors.



7- Ensure that the insulation plates of the joint, are not cracked or broken.

8- If removal is required for any reason, tighten nut by calibrated torque wrench adjusted to 55 Nm (40 lbf ft) after re-fixing block joint set.

CE DECLARATION OF CONFORMITY

Product Group E-Line KO-II Busbar Energy Distribution System

Manufacturer EAE Elektrik Asansor End. Insaat San. ve Tic. A.S.
Akcaburgaz Mahallesi, 119. Sokak,
No:10 34510 Esenyurt-Istanbul

This is to attest, under our sole responsibility, that the aforementioned products conforms with the determined regulations, guidelines and the below standards.

Standard : IEC 60439-1
IEC 60439-2

CE - Directive
2006/95/EC "Low Voltage Directive"

Type Tests include verification of;

- | | |
|--|---|
| 1- Temperature-rise Limits (8.2.1) | 8- The Resistance of Insulating Materials to Abnormal Heat and Fire (8.2.9) |
| 2- Dielectric Properties (8.2.2) | 9- Structural Strength (8.2.10) |
| 3- Short-circuit Strength (8.2.3) | 10- Crushing Resistance (8.2.12) |
| 4- The Effectiveness of The Protective Circuit (8.2.4) | 11- Resistance of Insulating Materials to Abnormal Heat (8.2.13) |
| 5- Clearances and Creepage Distances (8.2.5) | 12- Resistance to Flame Propagation (8.2.14) |
| 6- Mechanical Operation (8.2.6) | 13- Fire Resistance in Building Penetration (8.2.15) |
| 7- Degree of Protection (8.2.7) | |

Date

30.12.2006

EAE Elektrik A. .

EAE Elektrik Asansor End. Insaat San. ve Tic. A.S.
Akcaburgaz Mahallesi, 119. Sokak, No:10 34510 Esenyurt-Istanbul
Tel: +90 (212) 866 20 00 Fax: +90 (212) 886 24 20 www.eae.com.tr

TESTATI **FORMIT**

Issued to: EAE Electric S.A. Iktelli Örgänize Sanayi Bölgesi Ad No. 112

Requirements: IEC 60439-2: 2000

Antenn, August 27, 2002

Antenn, P.O. Box 5185, 6500

Website: www.kemamag.hu Telephone: +31 26 3 52 20 00, Telefax: +31 26 3 52 58 00

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160A 800A BUSBAR SYSTEM PRODUCT OVERVIEW (E-LINE KO-II)

1- Standards & Certification:

- Busbar system shall be designed and manufactured as per IEC 60439-2 standard. Each individual rated busbar shall have separate type test certificate from an independent internationally accredited laboratory.
- Manufacturing facility of busbar systems shall have ISO 9001 and ISO 14001 certification.
- Busbar system shall have CE marking.
- Each product shall have a "Type Label", which indicates the brand, type of the unit, conductor number and electrical details.

2- General Structure of Products:

- Busbar system shall be Air-Insulated and Plug-in type. Aluminium or Copper conductors shall be tin plated along the entire length. Housing shall be galvanized steel or if required RAL 7038-Electrostatic painted.

2.1- Electrical Characteristics:

- Busbar systems nominal insulation voltage shall be 1000V.
 - As per ampere rates, minimum short circuit values shall be like below;
 - Temperature rise shall be maximum 50K over 40°C ambient temperature for both tin plated Aluminium and Copper conductor busbars.
- | |
|--|
| 160A: 1sec/rms-10kA, Peak-17kA |
| 250 and 315A: 1sec/rms-15kA, Peak-30kA |
| 400 and 500A: 1sec/rms-30kA, Peak-63kA |
| 600A and above: 1sec/rms-35kA, Peak-73,5kA |

2.2- Housing and Structure:

- Busbar system shall be of air insulated type. The bars shall be supported by insulators installed into the housing at every 25 cm.
- On a three meter standard length busbar the distance between the plug-in points on one side shall be 50cms. The points shall be on both sides of the busbar making the average distance of plug-in points 25cm.
- To prevent wrong alignment of the phase sequence during installation there shall be mechanical barriers on the joint that shall ensure correct mounting.
- IP Plug-in covers of the busbar system should be hinged. Plug-in windows shall have automatic shutter system. This shutter shall open automatically when the earth contact of tap-off box is inserted.
- Busbar system shall have all necessary accessories (elbows, offsets, panel-transformer connections, reductions, etc). Manufacturer shall supply special dimensioned units in short time, if the project conditions requires.
- For horizontal runs, a horizontal expansion unit shall be used at every 40m and expansion points of the building.
- For vertical applications, a vertical expansion unit shall be used at every floor. Busbar system shall be rigidly fixed by supports at every floor.

2.3- Conductors:

- Busbar system shall have Nickel and Tin-plated 6101 class aluminium conductors (160-600A). / Busbar system shall have Tin-plated Electrolytic copper conductors (250-800A).
 - Busbar system shall have below number of conductors and phase configuration;
- 4 Conductors:(4 full size conductors + Housing (earthing)
 - 4 ½ Conductors :(4 full size conductors + ½ earth conductor + Housing)
 - 5 Conductors :(5 full size conductors + Housing (earthing))
 - 5 Conductors :(5 full size conductors, 5th bar shall be used as clean earth + Housing).
- Neutral conductor shall have the same cross-section (100%) of phase conductors.

2.4- Insulation:

- Busbars shall have air-insulation system.
- Rated insulation voltage of the system shall be 1000 V.

2.5- Joint Structure:

- Electrical and mechanical connection shall be made at joints by "single bolt" joint construction and each joint shall have two "Belleville" washers.
- Insulators of the joint shall be manufactured of glass-reinforced polyester.
- Joints shall be realized by a torque spanner (wrench) set at 55 Nm.
- To prevent the joints from transportation damages, they shall be protected by metal caps, which shall be removed before installation.
- Joint bolt shall be locked from both sides (Bolt head and nut).

2.6- Protection:

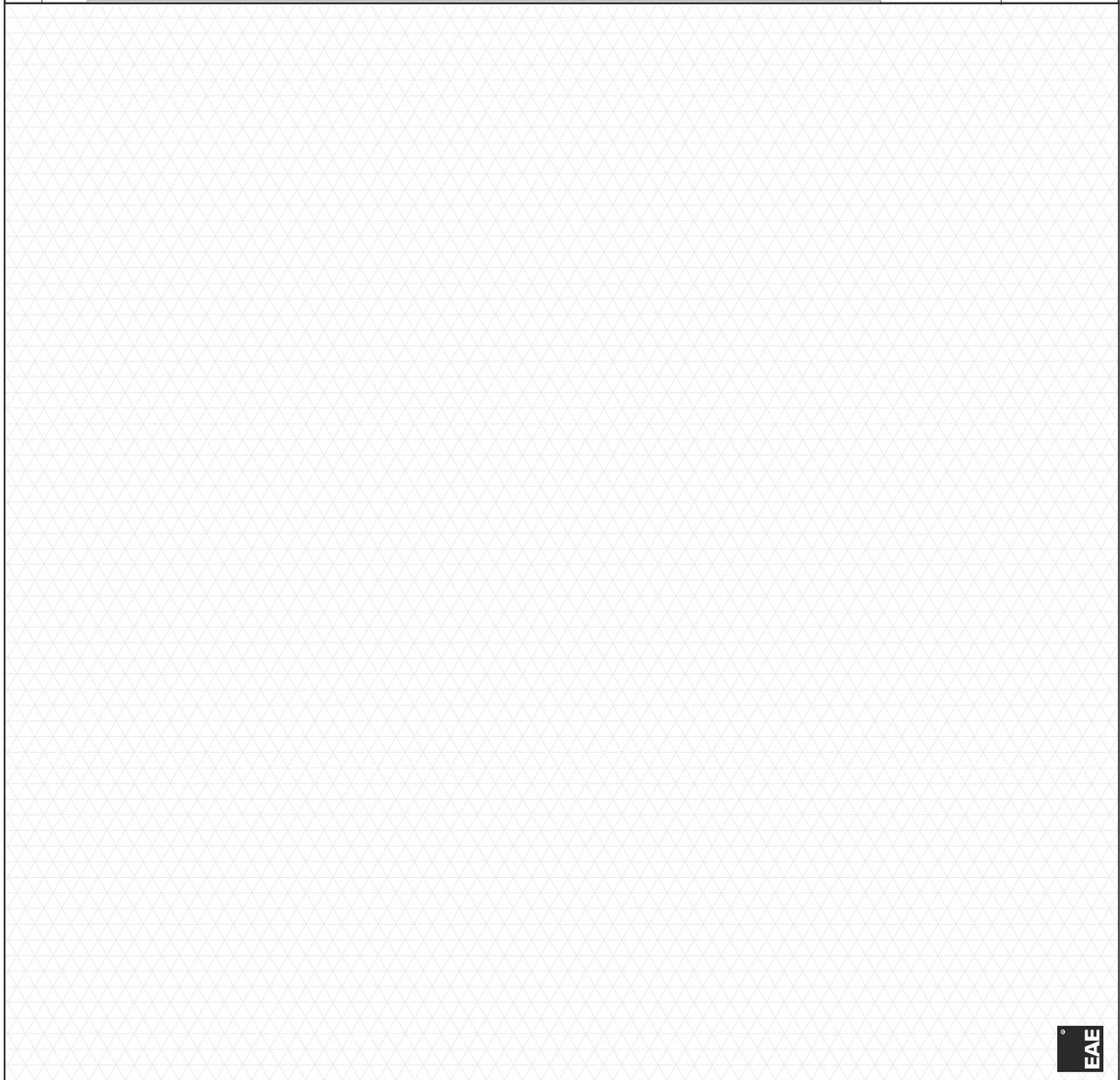
- Protection degree of the busbar system shall be minimum IP55.

3- Tap Off Boxes:

- Rating of plug-in tap off boxes shall be up to and including 400A. Plug-in tap off boxes shall be installed, when the busbar line is energized.
- Tap off boxes shall have an electrical interlock mechanism, which ensures that plug-in tap off box cannot be removed mechanically from the busbar, when the switch is at "ON" position. Mechanical interlock mechanism shall prevent the cover of the box from opening, when the switch is at "ON" position.
- When the switch is at "OFF" position and the cover is open, tap off box shall provide IP2X protection level. (There shall not be any accessible live part in the box).
- Tap Off boxes shall be suitable for any brand of MCB.
- Contacts of plug-in tap off box shall be silver-plated copper.
- While inserting the contacts of Plug-in tap off boxes, earth contact shall make first contact.
- Tap off boxes up to 80A shall be manufactured of (850 GLW) type plastic material. Tap off boxes from 160A up to 400A shall be manufactured of sheet steel and epoxy painted RAL 3020.

4- Installation and Commissioning:

- Busbar systems shall be installed as per single-Line drawings respect to required ampere rates and manufacturer installation guide (torque values, lockers, etc.). Electrical installer shall run an insulation test after installation according to manufacturer's test procedures. The results of the test shall be reported to the manufacturer. Minimum insulation value shall be 1Mohm.

Component List		Quantity	
Item	Component		
			Company :
			Project :
			Project No :
			Prepared by :
		Name :	
		Date :	
		Signature :	

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Component List		Quantity
Item	Component	
Company :		Prepared by
Project :		
Project No :		
Name :		
Date :		
Signature :		

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