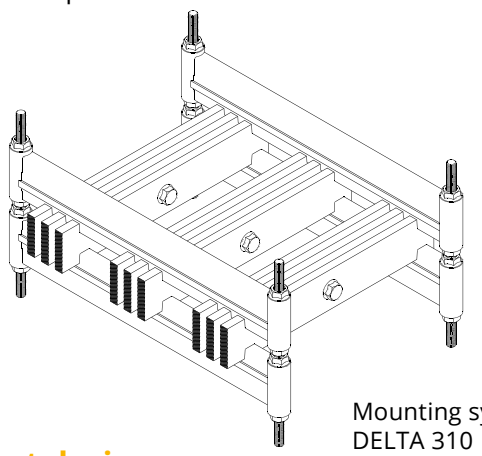
Bus-bar supports

DELTA

DELTA 110 • DELTA 210 • DELTA 310

The system is designed for setting up bus-bar systems with rated currents up to 5 000 A and short-circuit withstand up to 200 kA.



Mounting system
DELTA 310

Technical data of the productu

Phase spacing	120 mm
Permitted tensile load	20 kN
Support system weight	1500 g
Critical tensile load	40 kN
Operating voltage	1000 V
External breakdown voltage	20 kV
Operating temperature	-40 ˚C až +130 ˚C
Flammability rating	UL 94-VO
Permitted bending load	0,6 kN
Product colour	RAL 7032 grey

Product design

The body of the DELTA bus-bar support is made of highly resistant plastic based on polyester composites reinforced with glass fiber. The rigid support enables perfect fixing of vertically oriented 10-mm copper or aluminum conductors with a spacing of 120 mm. The supports are tightened and fastened to the structure using two metal bolts with M10 thread. The bus-bar support DELTA is manufactured in a three-groove design for three conductors in a phase with the type designation DELTA 310, and in a two-groove and a single-groove design with the type designation DELTA 210 and DELTA 110. The product is characterized by its high mechanical, electrical and thermal strength.

Product installation

The density and arrangement of the DELTA bus-bar supports should be such that the static bending load on the support caused by the weight of the system as well as the dynamic tensile load caused by the short-circuit current do not exceed the permitted load limits. In order to facilitate and simplify the design of the structure, the recommended density of the bus-bar supports to be installed is provided in the annex with the determination of the spacing (X). This value respects the mechanical properties of the entire system under static and dynamic load. These values are valid provided that the following basic quality features are respected by the manufacturer when installing the product:

1. Bus-bar supports are installed at a spacing that does not exceed the recommended maximum value (X). They are firmly connected to the structure of the distribution system so that the short-circuit dynamic load does not cause the axis of the system to deviate from its direction and exceed the permissible dynamic tensile load.
2. Particularly in the case of two- and three-wire systems with higher weight, make sure that the weight is evenly distributed on the individual supports. In these cases, we recommend installing at least a pair of supports in the individual assembly bays. Use the area in the dividing plane between the assemblies with advantage to install the mounting couplings. When the mounting couplings of the bus-bar system are disconnected during transport or installation, the static load ratios of the bus-bar supports will not change.
3. In horizontally oriented systems, the metal bolts of the supports are stressed by tensile or compression load; in vertically oriented systems, excessive bending load of the metal bolts should be eliminated.
4. When installing two or more conductors in a phase, it is recommended to combine conductors into bundles by connecting the phase conductors with screws, usually at 1/2 the distance (X) between the supports. The mechanical connection of the phase conductors by means of a terminal block consisting of a steel bolt limits the repulsive forces between the conductors during a short circuit and significantly affects the mechanical strength of the bus-bar system.
5. When using aluminum conductors, we recommend to combine conductors into bundles as a prerequisite for a high-quality structure.

Declaration of Conformity

DELTA Series bus-bar supports conform to the requirements of technical standards and regulations – TP 2002103, ČSN EN 6060243-1/99, ČSN EN 60695-2-11/01. The product is certified by EZÚ, Pod lisem 129, 171 02 Prague 8, Czech Republic.

Table 1 – Determination of the spacing X – the distance between supports (copper conductors, loose conductors, no conductor bundles formed)

Conductor cross-section (mm)	I_{ks} / I_{kdyn} (kA) Number of conductors	10 / 17	20 / 40	30 / 63	40 / 84	50 / 105	60 / 132	70 / 154	80 / 176	90 / 198	100 / 220	110 / 242
		Recommended values of the spacing (X) between DELTA supports in mm										
40 × 10	I	1 000	800	600	500	400	300	250	230	200		
40 × 10	II	1 000	900	550	400	300	250	230	200	180		
40 × 10	III	1 000	900	600	500	400	300	250	230	200		
50 × 10	I	1 000	900	700	500	400	300	250	230	200	180	150
50 × 10	II	1 000	900	650	500	350	300	250	230	200	180	150
50 × 10	III	1 000	900	700	500	400	300	250	230	200	180	150
60 × 10	I	1 000	900	700	600	400	350	300	250	200	180	150
60 × 10	II	1 000	1 000	700	500	400	350	300	250	200	180	150
60 × 10	III	1 000	1 000	850	600	500	400	350	250	200	180	150
80 × 10	I	1 000	900	800	600	500	400	300	250	200	180	150
80 × 10	II	1 000	1 000	800	600	500	400	300	250	200	180	150
80 × 10	III	1 000	1 000	900	700	500	400	350	250	200	180	150
100 × 10	I	1 000	1 000	900	750	500	400	350	250	200	180	150
100 × 10	II	1 000	1 000	1000	800	500	400	350	250	200	180	150
100 × 10	III	1 000	1 000	1000	800	500	400	350	250	200	180	150
120 × 10	I	1 000	1 000	1000	800	500	450	350	250	200	180	150
120 × 10	II	1 000	1 000	1000	800	500	450	350	300	200	200	150
120 × 10	III	1 000	1 000	1000	900	600	500	400	300	250	200	150

Table 2 – Determination of the spacing X – the distance between the supports (copper conductors bundles formed), conductor

Conductor cross-section (mm)	I_{ks} / I_{kdyn} (kA) Number of conductors	10 / 17	20 / 40	30 / 63	40 / 84	50 / 105	60 / 132	70 / 154	80 / 176	90 / 198	100 / 220	110 / 242
		Recommended values of the spacing (X) between DELTA supports in mm										
40 × 10	II	1 000	1 000	700	550	450	350	300	250	200		
40 × 10	III	1 000	1 000	900	700	500	400	300	250	200		
50 × 10	II	1 000	1 000	800	550	500	400	350	250	200	180	150
50 × 10	III	1 000	1 000	900	700	500	400	350	250	200	180	150
60 × 10	II	1 000	1 000	900	700	500	450	350	250	200	180	150
60 × 10	III	1 000	1 000	1 000	800	500	450	350	250	200	180	150
80 × 10	II	1 000	1 000	1 000	800	500	450	400	300	250	180	150
80 × 10	III	1 000	1 000	1 000	800	500	450	400	300	250	200	150
100 × 10	II	1 000	1 000	1 000	1 000	800	500	400	300	250	200	150
100 × 10	III	1 000	1 000	1 000	1 000	800	500	400	300	250	200	150
120 × 10	II	1 000	1 000	1 000	1 000	800	500	400	300	250	200	150
120 × 10	III	1 000	1 000	1 000	1 000	800	500	400	300	250	200	150

Table 3 and 4 – Dimensioning of the conductors in distribution boards – permitted current load (A) – applies to coated and horizontally mounted conductors

Bus-bar temperature 85 ˚C Temperature inside the distribution board 35 ˚C, ON 35 7102						
Conductor material	Copper bus-bars Number of conductors in a phase			Aluminum bus-bars Number of conductors in a phase		
Size	I	II	III	I	II	III
40×10	1055	1790	2640	830	1410	2075
50×10	1275	2170	3060	1020	1730	2450
60×10	1490	2530	3580	1190	2000	2860
80×10	1930	3080	4440	1550	2480	3580
100×10	2330	3730	5125	1880	3000	4140
120×10	2730	4370	5730	2215	3530	4650

Bus-bar temperature 85 ˚C Temperature inside the distribution board 35 ˚C, ON 35 7102						
Conductor material	Copper bus-bars Number of conductors in a phase			Aluminum bus-bars Number of conductors in a phase		
Size	I	II	III	I	II	III
40×10	664	1130	1660	523	890	1310
50×10	800	1365	1925	640	1080	1535
60×10	935	1590	2240	750	1270	1800
80×10	1215	1940	2800	975	1580	2220
100×10	1465	2340	3220	1180	1890	2600
120×10	1710	2720	3600	1400	2240	2940

Table 5 – Determination of the spacing X – the distance between supports (aluminum conductors, loose conductors, no conductor bundles formed)

Conductor cross-section (mm)	I_{ks}	10	20	30	40	50	60	70	80	90
	I_{kdyn} (kA)	17	40	63	84	105	132	154	176	198
	Number of conductors	Recommended values of the spacing (X) between DELTA supports in mm								
40 × 10	I	1 000	800	500	400	300				
40 × 10	II	1 000	550	350	250	200				
40 × 10	III	1 000	650	400	300	250				
50 × 10	I	1 000	800	550	400	330	250			
50 × 10	II	1 000	650	400	300	250	200			
50 × 10	III	1 000	700	500	350	300	230			
60 × 10	I	1 000	900	650	450	350	280	250		
60 × 10	II	1 000	700	500	370	300	230	200		
60 × 10	III	1 000	900	550	400	350	250	230		
80 × 10	I	1 000	900	700	500	400	300	250	230	
80 × 10	II	1 000	900	600	450	300	280	250	220	
80 × 10	III	1 000	1 000	700	500	400	330	280	250	
100 × 10	I	1 000	1 000	800	550	450	350	300	250	200
100 × 10	II	1 000	1 000	700	550	450	350	300	250	200
100 × 10	III	1 000	1 000	800	600	500	400	350	250	200
120 × 10	I	1 000	1 000	800	600	500	400	300	250	200
120 × 10	II	1 000	1 000	800	600	500	350	300	250	200
120 × 10	III	1 000	1 000	900	700	500	400	300	250	200

Table 6 – Determination of the spacing X – the distance between supports (aluminum conductors, conductor bundles formed)

Conductor cross-section (mm)	I_{ks}	10	20	30	40	50	60	70	80	90	100
	I_{kdyn} (kA)	17	40	63	84	105	132	154	176	198	220
	Number of conductors	Recommended values of the spacing (X) between DELTA supports in mm									
40 × 10	II	1 000	900	550	400	300	250	230	200		
40 × 10	III	1 000	900	600	500	350	300	250	230		
50 × 10	II	1 000	900	600	450	350	300	250	225	200	
50 × 10	III	1 000	1 000	700	500	400	300	250	230	200	
60 × 10	II	1 000	1 000	700	500	400	330	250	225	200	180
60 × 10	III	1 000	1 000	800	600	500	400	300	250	200	180
80 × 10	II	1 000	1 000	800	600	500	400	300	250	200	180
80 × 10	III	1 000	1 000	900	600	500	400	350	250	200	180
100 × 10	II	1 000	1 000	900	600	550	450	350	250	200	180
100 × 10	III	1 000	1 000	1 000	800	600	500	400	300	250	200
120 × 10	II	1 000	1 000	1 000	800	600	500	400	300	250	200
120 × 10	III	1 000	1 000	1 000	900	600	500	400	300	250	200

Table 7 – Mounting sizes of the DELTA bus-bar supports

Conductor size (mm)	Z	Recommended support bolt type
40 × 10	160	SV 230
50 × 10	170	SV 230
60 × 10	180	SV 230
80 × 10	200	SV 230
100 × 10	220	SV 230
120 × 10	240	SV 270

The bus-bar support system consists of:
plastic pressing of the support body – 2 pcs, metal bolt SV 230 or SV 270 – 2 pcs, nut M10, washer and elastic washer – 8 pcs

Bus-bar supports

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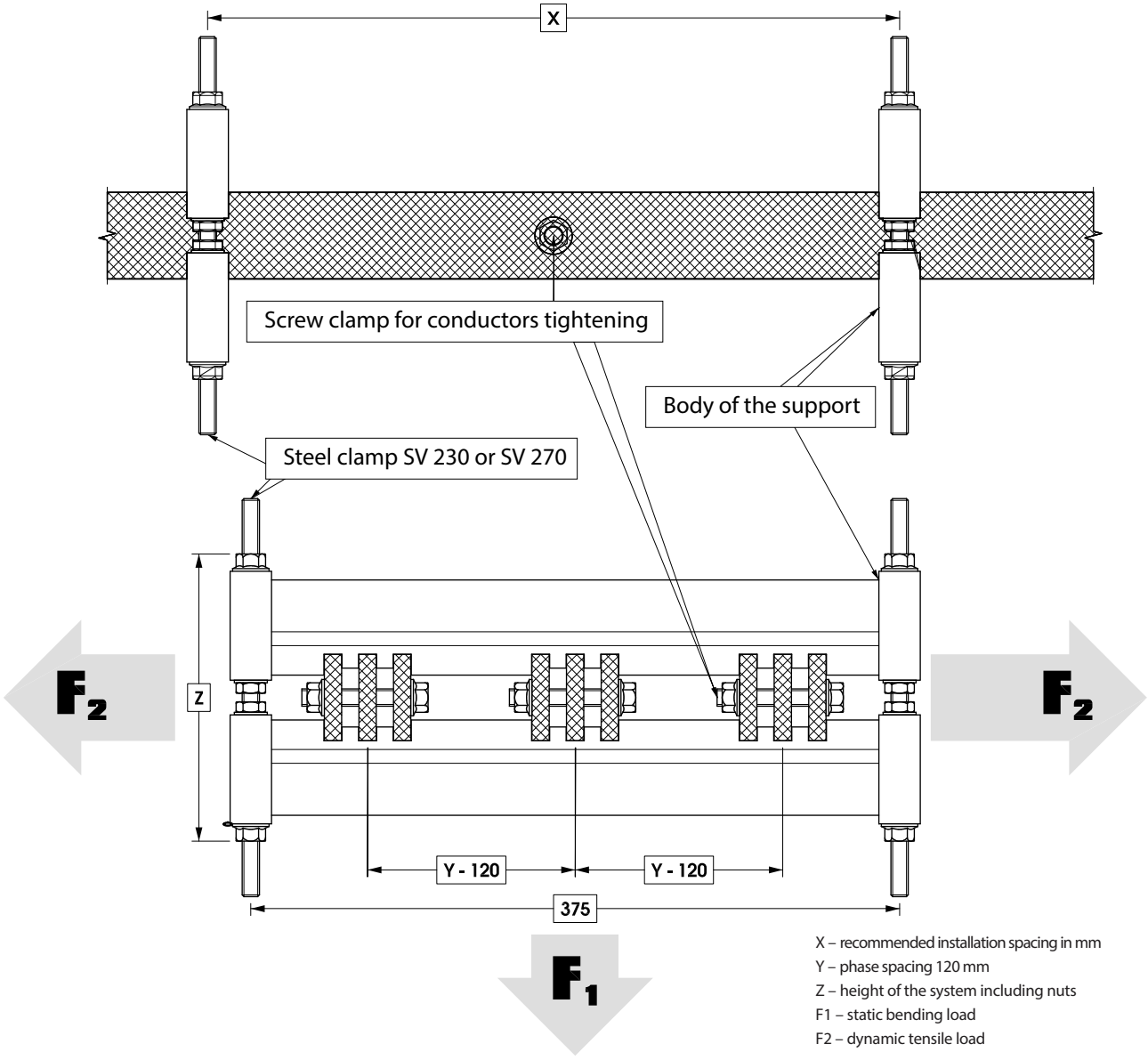

X – recommended installation spacing in mm
Y – phase spacing 120 mm
Z – height of the system including nuts
F1 – static bending load
F2 – dynamic tensile load