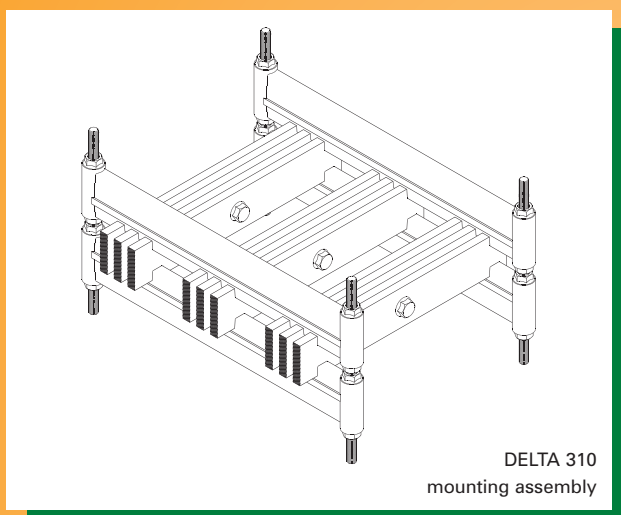


Bus-bar supports

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 strength up to 200 kA.



Technical Data

Phase spacing	120 mm
Permissible tensile load	20 kN
Support assembly weight	1500 g
Critical tensile load	40 kN
Operating voltage	1000 V
External breakdown voltage	20 kV
Operating temperature	-40 °C to +130 °C
Flammability rating	UL 94-VO
Permissible bending load	0.6 kN
Product colour	grey RAL 7032

Design

The body of the DELTA bus support is made of high-strength plastics based on glass fiber-reinforced polyester composites. The rigid support enables vertically oriented copper or aluminium conductors 10 mm thick to be perfectly fixed at a spacing of 120 mm. Two metallic bolts M10 thread are provided to tighten the supports and fastening them to the structure. The DELTA bus-bar support is manufactured either in the three-groove design to carry three conductors in

phase, – this is Type DELTA 310 – or in the two-groove or single-groove design, types DELTA 210 and DELTA 110, respectively. The product features a high mechanical, electrical and thermal strength.

Installation

The density and arrangement of the DELTA bus supports should be such that the static bending load of a support due to the gravity of the system and the dynamic tensile load of the support due to short-circuit current will not exceed the permitted limits. The recommended densities of the mounted bus-bar supports with their spacing (X) are given on the following pages in order to facilitate and simplify the design. This spacing respects the mechanical properties of the entire system during static as well as dynamic load. The data are usable provided that the following basic qualitative requirements are complied with by the manufacturer when mounting the product:

1. The bus-bar supports should be mounted at a spacing not exceeding the recommended maximum value (X). The supports should be fixed to the distribution facility structure so strongly that a short-circuit dynamic load will not bring about any deviation of the system axis from its direction and the permitted dynamic tensile load will not be exceeded.
2. Make sure that the weight is uniformly distributed among the individual supports, especially for the rather heavy two-conductor and three-conductor systems. We recommend installing at least a pair of supports in

each assembly bay. The area in the dividing plane between the mounting units can be used with advantage to install mounting couplings. Disconnection of the bus-bar system mounting couplings during transport or installation will not bring about any change in the static load situation of the bus-bar supports.

3. In horizontally oriented systems the metallic bolts of the supports are stressed by tensile or compression load. In vertically oriented systems, any excessive bending load of the metallic bolts should be eliminated.
4. We recommend that, when installing two or more conductors in phase, conductors be combined into bundles, viz. by a common screw connection of the phase conductors typically at one-half of the support spacing (X). Such mechanical connection of the phase conductors by means of a clamp made from a steel bolt will limit repulsive forces between the conductors in a short-circuit situation and affect appreciably mechanical strength of the bus-bar system.
5. For aluminium conductors, combination of the conductors into bundles is recommended 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 606243-1/99, ČSN EN 60695-2-11/01. The product has been certified by EZÚ, Pod Lisem 129, 171 02 Praha 8, Czech Republic.

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

Conductor cross section (mm)	I _{ks} I _{kdyn} (kA) Number of conductors	10	20	30	40	50	60	70	80	90	100	110
		17	40	63	84	105	132	154	176	198	220	242
Recommended value of the spacing (X) between the 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 distance X – spacing between the supports (copper conductors, conductor bundles formed)

Conductor cross section (mm)	I _{ks} I _{kdyn} (kA) Number of conductors	10	20	30	40	50	60	70	80	90	100	110
		17	40	63	84	105	132	154	176	198	220	242
Recommended value of the spacing (X) between the 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

Tables 3 and 4 – Dimensioning of the conductors in distribution boards – permissible current load (A) – for 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			ALUMINIUM BUS-BARS		
	Number of conductors in phase			Number of conductors in 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 65 °C, ON 35 7102						
Conductor material	COPPER BUS-BARS			ALUMINIUM BUS-BARS		
	Number of conductors in phase			Number of conductors in 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 distance X – spacing between the supports (aluminium conductors, loose line, no conductor bundles formed)

Conductor cross section (mm)	I _{ks} I _{kdyn} (kA) Number of conductors	10	20	30	40	50	60	70	80	90
		17	40	63	84	105	132	154	176	198
Recommended value of the spacing (X) between the 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 distance X – spacing between the supports (aluminium conductors, conductor bundles formed)

Conductor cross section (mm)	I _{ks} I _{kdyn} (kA) Number of conductors	10	20	30	40	50	60	70	80	90	100
		17	40	63	84	105	132	154	176	198	220
Recommended value of the spacing (X) between the 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 bolted connection 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 comprises:

- 2 plastic support body mouldings, 2 SV 230 or SV 270 metallic bolts,
- 1 M10 nut, 8 washers / lock washers

Bus-bar supports

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