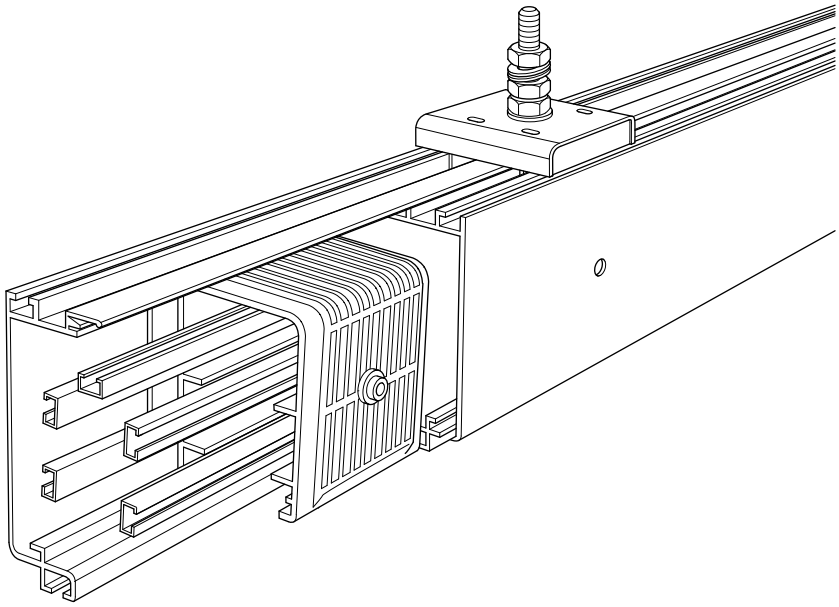
DEMAG
Cranes & Components

Technical data
DKK compact conductor lines



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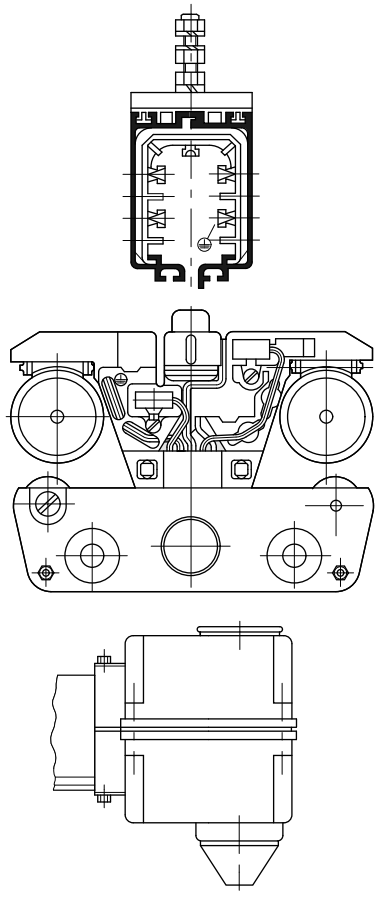
Contents

1 Technical information



1. Conductor lines

Delivery form: Available with AL enclosure, with 4 or 5 conductors and cross sections of 10 – 70 mm².
Standard lengths of 4 m.
Ambient temperatures and types of enclosure: AL – 30° C to + 100° C for IP 23.

2. Current collector trolleys

4 and 5-pole designs for loads of 25 A to 40 A at 100 % CDF, with plain bearings for the upper/lower travel rollers.
Max. connecting round cable cross section 10 mm²; max. travel speed 200 m/min.

3. Powerfeeds

End powerfeed or line powerfeed on a 1 m section for conductor cross sections of 10 to 70 mm².

DKK housing material PVC
Existing systems resp. system parts made of DKK housing material PVC in principle are compatible and replaceable or extendable by DKK housing material ALU.

When replacing or extending systems resp. system parts using DKK housing material PVC by DKK housing material ALU a protective grounding (PE) is absolutely necessary.
Upon request the DKK-aluminium housing can be ordered with integrated housing-protective grounding.

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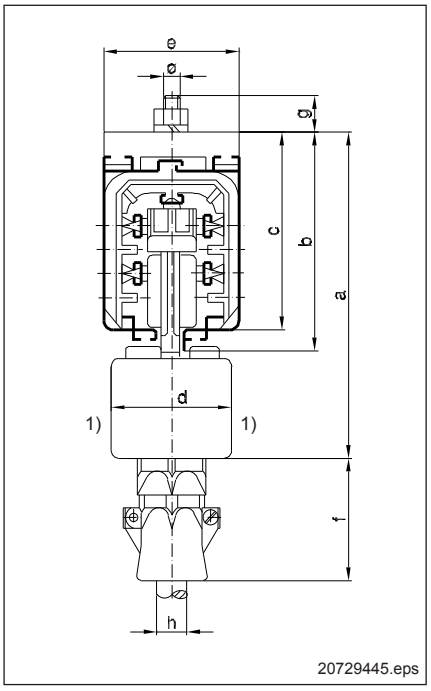
Design features:

- Space-saving, compact conductor lines for mobile electric equipment including cranes, trolleys, portable electric tools and other appliances;
- High electrical safety with separate insulators;
- Split enclosure provides easy access to the conductors;
- Wide range of application owing to high thermal and mechanical strength provided by the aluminium enclosure;
- Simple installation thanks to prepared assemblies;
- Simple attachment of electrical signal and pulse generators for fully and semi-automatic control systems;
- Resistant to corrosion;
- Light, compact design;
- Safety conductor line (protection against accidental contact).



Type designation (example):

D K K 4 - 10 - AL

- AL — Enclosure material: Aluminium
- 10 — Nominal Cu conductor cross section in mm²
- 4 — Number of conductors (including PE conductor)
- K — Compact conductor line
- K — Compact
- D — Demag

Dimensions [mm]

a =	170 (145)	f =	76 (40)
b =	98	g =	40
c =	88	h =	14–18 ø (12–14 ø)
d =	54	ø =	M 8
e =	60		

Dimensions in ( ) for DKK-SW 4/25/2,5 and 5/25/2,5

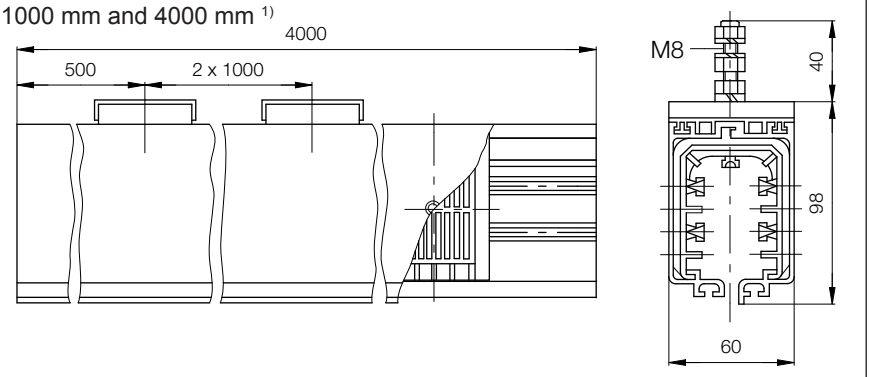
Technical data							
Conductor line							
Enclosure [2]		Aluminium					
Standard lengths	mm	4000 + 1000 (powerfeed)					
Voltage		500 VAC					
Number of conductors / poles		4- oder 5-poles					
Conductor cross section	Cu/mm²	10	16	20	30	50	70
Weight (4-pole)	kg/m	2,0	2,2	2,4	2,6	3,2	3,8
Weight (5-pole)	kg/m	2,1	2,4	2,6	2,9	3,5	4,0
Loading A (100 % CDF)	A	60	80	90	120	200	280
Ambient temperature	°C	-30 bis +100 (short-term +140)					
Curved sections R min.	mm	900 (10, 16, 20 and 30 mm²) 1100 (50 and 70 mm²)					
Suspension distance max. Curved section Straight section	 mm mm	 800 3000					
Type of enclosure		IP 23					

Technical data				
Current collector trolley				
Enclosure		Plastic		
Voltage		500 VAC		
Loading at	100 % CDF	25 A	20 A	40 A
Loading at	30 % CDF	30 A	25 A	50 A
Conn. cross section	max. mm²	2,5	10	10
Fuse	max.	63 A	125 A	125 A
Curve negotiating R	min. mm	700	1000	
Travel speed		200 m/min (straight travel)		
Regulations		VDE and UVV		

1) Fitting of stress relief union on three sides only possible for DKK-SW 4/25/2,5 and 5/25/2,5
2) Several installation parts of the DKK (housing of electrical supply at centre and at end, parts of the suspensions, etc.) are made of plastic.

2 Straight sections

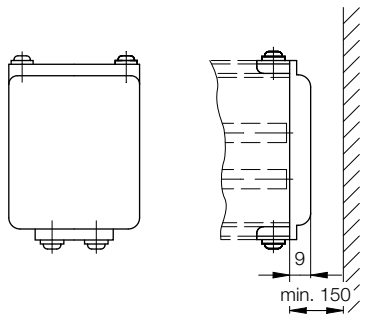
DKK 4 / DKK 5 straight sections (4 and 5-pole including PE conductor)
1000 mm and 4000 mm [1)]



Conductor cross section mm²	DKK 4 straight sections				DKK 5 straight sections [2)]			
	4000 mm		1000 mm		4000 mm		1000 mm	
	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit
10	979 140 44	8,4	979 330 44	2,1	979 150 44	8,5	979 335 44	2,3
16	979 141 44	8,8	979 331 44	2,2	979 151 44	9,7	979 335 44	2,3
20	979 142 44	9,4	979 332 44	2,5	979 152 44	10,2	979 336 44	2,7
30	979 149 44	10,5	979 332 44	2,5	979 153 44	11,6	979 336 44	2,7
50	979 255 44	12,7	979 333 44	3,2	979 256 44	13,8	979 337 44	3,5
70	979 257 44	14,9	979 334 44	3,7	979 258 44	16,0	979 338 44	4,0

Accessories

End cap



A Accessories for DKK 4 and DKK 5

A set of accessories is required for each straight section, curve section, power-feed (conductor connectors, joint connectors, joint plate, retaining plates, screws, nuts and bolts).

B Accessories for a DKK section for attachment to a C-rail [parts as above (A), but with link plates instead of retaining plates].

C End cap for DKK 4 and DKK 5

D Stop for DKK 4 and DKK 5

One stop point is required for each length of track. Where expansion joints are used, one stop point is required **for each sub-section**.

loose parts		A [3)]		B	C	D
Designation	For conductor cross sections	Accessories Part no.	Accessories Weight kg/unit	C-rail arrangement Part no.	End cap complete Part no.	Stop complete Part no.
DKK 4 DKK 5	10, 16, 20	979 044 44 979 045 44	0,34 0,35	979 144 44 979 145 44	979 016 44 979 016 44	979 146 44 979 146 44
DKK 4 DKK 5	30, 50, 70	979 344 44 979 345 44	0,40 0,41	979 444 44 979 445 44	979 016 44 979 016 44	979 146 44 979 146 44

1) Other lengths from 160 mm and lengths without PE conductors are also available.
2) Max. cross section of the 5th conductor for DKK 10 - 30 mm² = 10 mm², for DKK 50 - 70 mm² = 16 mm²
3) Accessories component set A is required for extending existing conductor lines.

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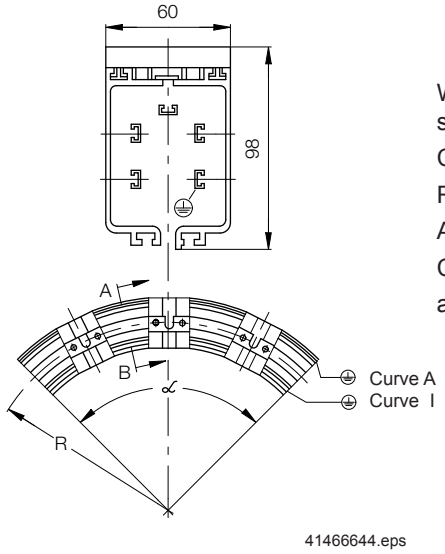
3 Curved sections

Curved sections for DKK 4 / DKK 5 (4 and 5-pole including PE conductor)



When ordering curved sections please state:

Conductor type (e.g. DKK 4 – 16 AL)

Radius R

Angle α

Curve I (inside) or A (outside)

and sketch of track layout if possible.

Max. distance between suspension for curved sections 800 mm.

Conductor cross section [mm²]	Smallest radius [mm]	Max. straightened-out length [mm]
10, 16, 20, 30 50, 70	900 1100	2800

4 Powerfeeds

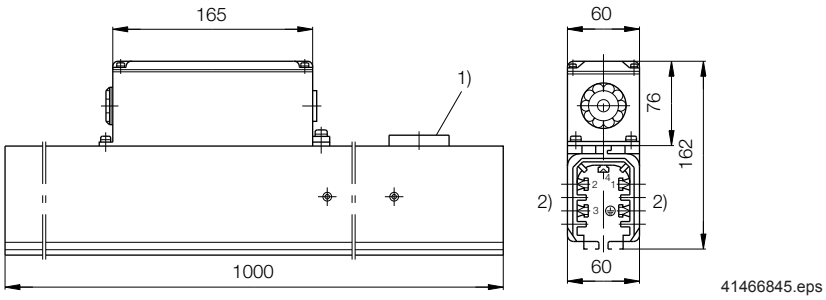
Centre powerfeed

Standard length: 1000 mm

Powerfeeds without PE conductor and 350 mm in length are available.

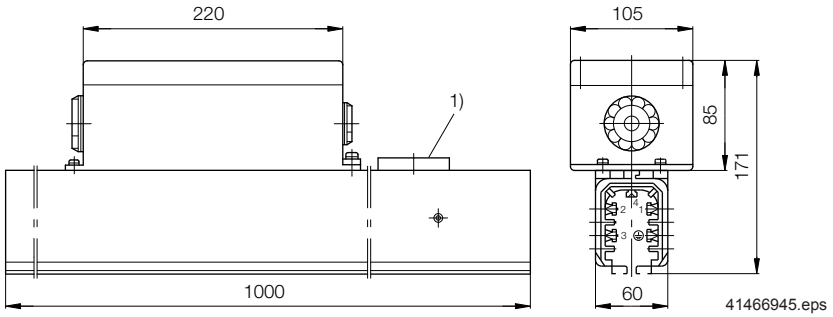
Max. cross section of connected conductors 10 mm² including PE conductor

Max. cable diameter 19 mm.



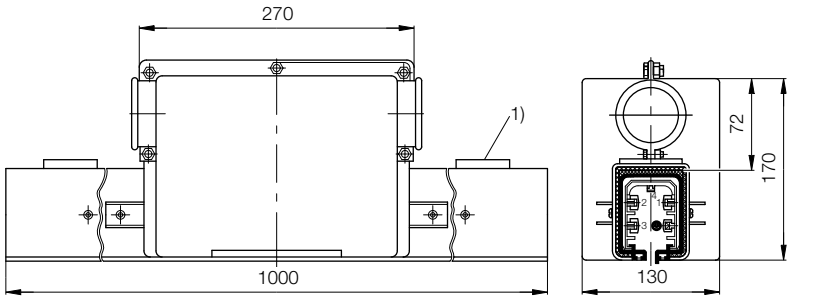
Max. cross section of connected conductors 35 mm²

Max. cable diameter 36 mm and 24 mm.



Max. cross section of connected conductors 70 mm²

Max. cable diameter 2 x 50 mm.

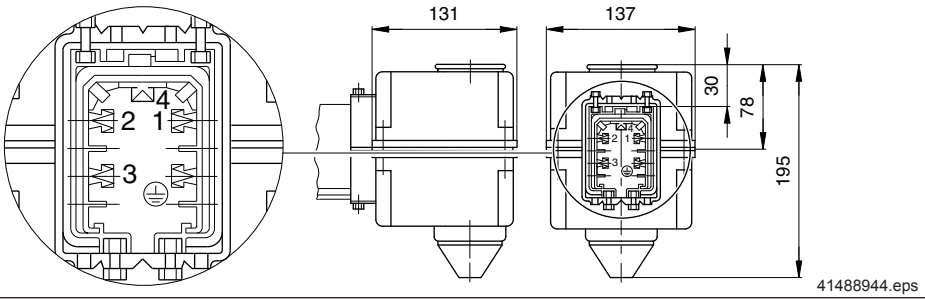


1) Every powerfeed must be suspended.
2) Terminal box arranged on the side on request.

Centre powerfeed	Connected cross section max. 10 mm²				Connected cross section max. 35 mm²				Connected cross section max. 70 mm²			
Conductor cross section [mm²]	DKK 4 - 1000 mm		DKK 5 - 1000 mm		DKK 4 - 1000 mm		DKK 5 - 1000 mm		DKK 4 - 1000 mm		DKK 5 - 1000 mm	
	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit	Part no.	kg/unit
10, 16 20, 30	979 211 44 979 212 44	2,75 3,2	979 213 44 979 213 44	2,85 2,85	979 226 44 979 227 44	4,8 5,2	979 228 44 979 228 44	4,9 4,9	-	-	-	-
50, 70	-	-	-	-	-	-	-	-	979 243 44	5,0	979 244 44	5,4

End powerfeed

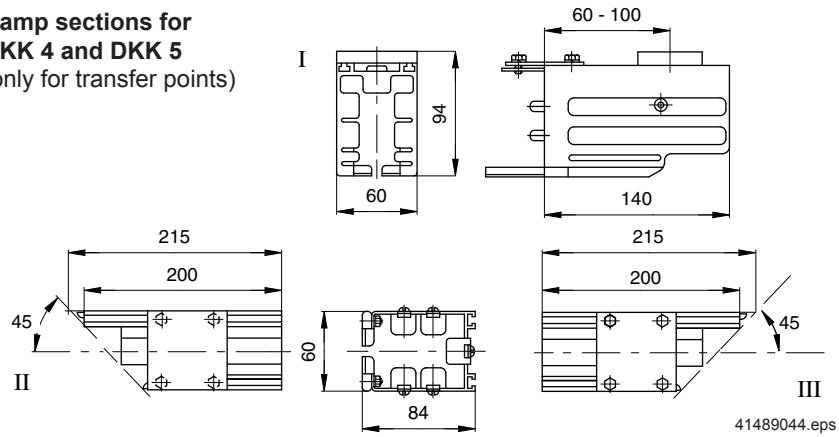
Max. cable diameter 50 mm



End powerfeed			
Conductor cross section [mm²]	Max. connected cross section [mm²]	DKK 4 und DKK 5	
		Part no.	kg/unit
10, 16, 20	25	979 247 44	0,6
30, 50, 70	70	979 249 44	0,7

5 Ramp sections, expansion joints

Ramp sections for DKK 4 and DKK 5
(only for transfer points)

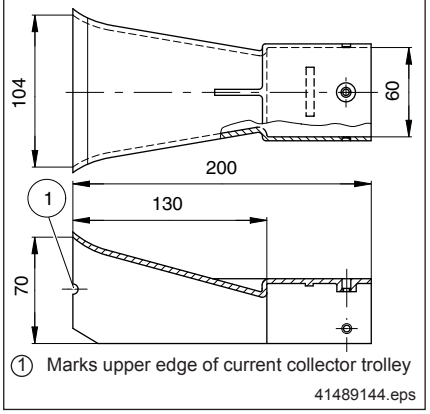


Entry speed	max. 100 m/min	Gap between transfer sections	min. 10 mm
Protections against accidental contact	IP 10		max. 100 mm
Horizontal offset	max. ± 10 mm		
Vertical offset	max. ± 8 mm		

Item	Designation	Part no.	kg/unit
I	Ramp section [1]	979 270 44	0,29
II	45° ramp section for RH track switch [2]	on request	0,65
III	45° ramp section for LH track switch [2]	on request	0,65

1) 90° ramp section, 140 mm dead section.
2) Ramp sections are available with other angles. Only available fixed to conductor sections.

Funnel entry attachment for DKK 4 and DKK 5 with accessories



① Marks upper edge of current collector trolley

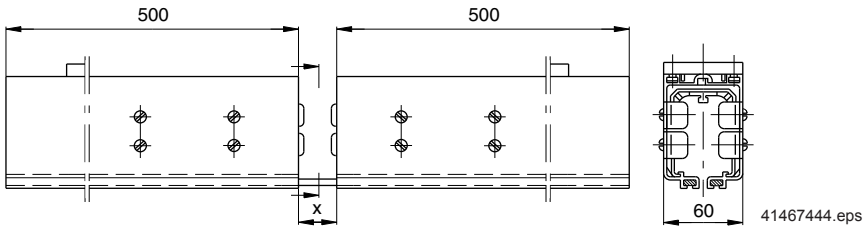
For entry and transfer points:

Entry speed	max. 100 m/min
Protection against accidental contact	IP 10
Horizontal offset	± 20 mm
Vertical offset	± 15 mm
Gap between attachments	min. 10 mm

Ramp section and funnel attachment dead for 270 mm.

	Part no.	kg/unit
Funnel attachment with accessories	979 178 44	0,150

Expansion joints for DKK 4 and DKK 5

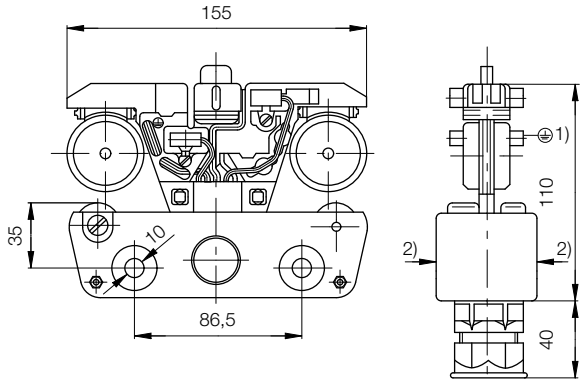


Every expansion joint must be suspended. For dimension X see diagram 1, page 12.

Designation	Conductor cross section [mm²]	DKK 4		DKK 5	
		Part no.	kg/unit	Part no.	kg/unit
Expansion joint	10, 16, 20	979 302 44	3,0	979 303 44	3,2
	30, 50, 70	979 306 44	3,5	979 307 44	3,7

6 Current collector trolleys

DKK-SW 4 / 25 / 2,5 and DKK-SW 5 / 25 / 2,5 current collector trolleys



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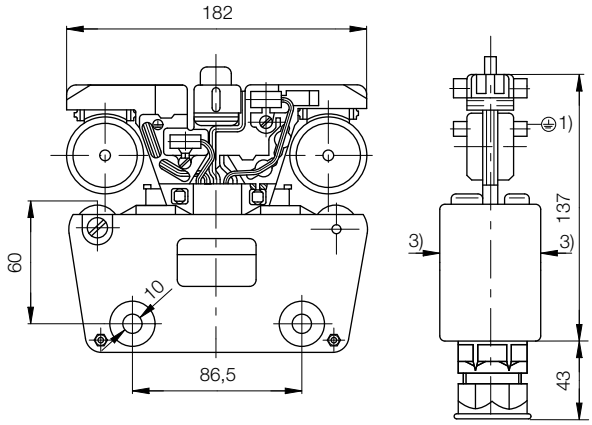
DKK-SW 4 / 40 / 10 and DKK-SW 5 / 40 / 10
DKK-SW 4 / 20 / 10 and DKK-SW 5 / 20 / 10 current collector trolleys



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1) Current collector trolleys without PE conductor are available.
2) PG 16 cable entry gland possible.
3) Cable entry gland on the side possible on request.

Current collector trolleys without connecting cable		Cross section [mm²]	Part no.	Weight/unit [kg]
DKK-SW 4 / 25 / 2,5	Bronze	-	979 060 44	0,60
DKK-SW 5 / 25 / 2,5		-	979 160 44	0,65
Connecting cable [5]	YMHYk-J	5 x 2,5	504 934 44	0,28
DKK-SW 4 / 20 / 10	Graphite	-	979 359 44	0,70
DKK-SW 5 / 20 / 10		-	979 360 44	0,75
DKK-SW 4 / 20 / 10	Bronze	-	979 279 44	0,70
DKK-SW 5 / 20 / 10		-	979 280 44	0,75
Connecting cable [5]	H 07 RN-F	4 x 4	471 341 99	0,40
		4 x 6	471 346 99	0,55
		4 x 10 [6]	471 320 99	1,00
		5 x 6 [6]	471 949 99	0,65
		5 x 10 [6]	471 950 99	1,15

5) Length required must be specified in meters.

6) Larger cable entry gland required.

Sliding carbon contacts

Sliding carbon contacts, cpl.	DKK-SW 4		DKK-SW 5		For current collector trolley
	Part no.	kg/unit	Part no.	kg/unit	
Bz 25	979 165 44	0,07	979 166 44	0,09	SW / 25 /2,5
Gr 20	979 286 44	0,07	979 287 44	0,09	SW / 25 /10
Bz 40	979 288 44	0,11	979 289 44	0,13	SW / 40 /10

Sliding carbon contact complete [3 sliding contacts (phase), 1 sliding contact (PE conductor), 2 wear protection rollers]. Bz = bronze, Gr = graphite.

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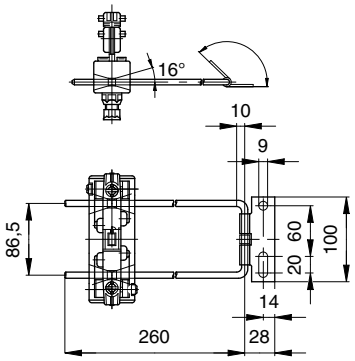
7 Towing arms for current collector trolleys

Towing arms for DKK-SW 4 and DKK-SW 5

Not for transfer points



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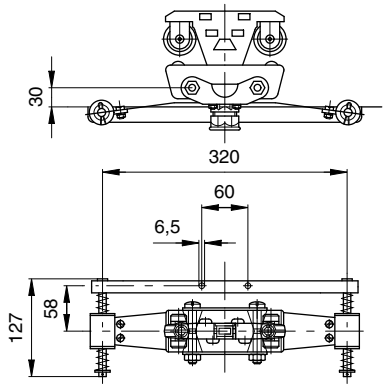
For transfer points



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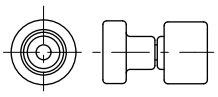
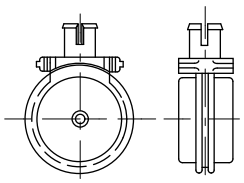
Current collector trolley towing arms	Part no.	Weight/unit [kg]
Not for transfer points	979 162 44	0,350
For transfer points	979 180 44	0,500

Accessories		Part no.	Weight/unit [kg]
I	Supporting roller	979 233 44	0,02
II	Travel roller	979 285 44	0,04

Supporting roller I



Travel roller II



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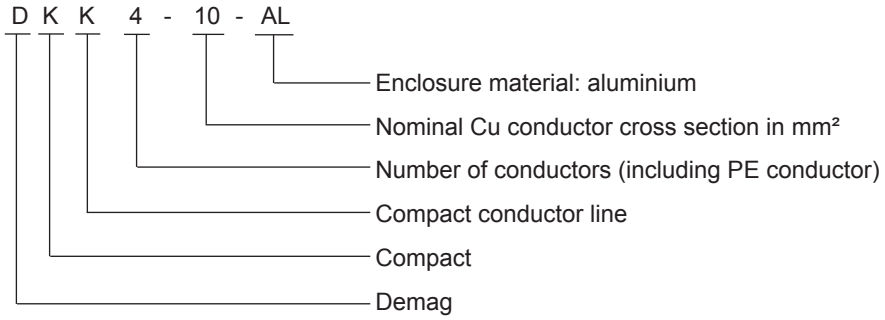
8 Important for project drafting

Straight sections, curved sections

The designation code for the DKK installation is:



Selection criteria for DKK Alu

Criteria	AL material
Permissible enclosure temperature	- 30 °C to + 100 °C
Max. continuous conductor length	200 m [2]

Maximum spacing of suspension centres of aluminium design.

max. 3 m with 10, 16 and 20 mm² conductor cross section

max. 2 m with 30, 50 and 70 mm² conductor cross section

max. 0,8 m for curved sections

Standard spacing of suspension centres: 2 m for all conductor cross sections

Electrical load (continuous current)

Conductor cross section [3]	[mm²]	10	16	20	30	50	70
Continuous current (100% CDF)	[A]	60	80	90	120	200	280

In order to be able to join up the components electrically and mechanically, a set of accessories (see section 2) is needed for each straight section, curved section, powerfeed and expansion joint. Two suspension fittings can be assembled with each set of accessories.

Each DKK installation – or parts of installations – must be secured by a stop point to prevent longitudinal movement. The ends of the track must be protected against accidental contact by end caps.

Accessories, stop points, end caps

The fixed current supply for DKK conductor lines is fed in at the powerfeed. Centre and end powerfeeds are available.

The type of powerfeed selected depends on:

- Design of the conductor cross section and the voltage drop along the line,
- Position of the powerfeed in the installation,
- Cross section of connected conductors,
- Fitting dimensions.

The centre powerfeed is delivered ready assembled on a 1 m straight section. The end powerfeed must be assembled on site. The power feed section connecting cable must have sufficient flexibility so that DKK conductor line expansion is not restrained.

1) Greater lengths are possible by using expansion joints.
2) Greater lengths on request (please state conditons of use).
3) Cross section of 5th conductor max. 16 mm²

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Isolating section

The conductor lines may be interrupted for control signal transmission. Isolating sections are integrated in the factory according to customer specifications. An isolating section features a 30 mm interruption for a sliding contact length of 25 mm. Use 2 current collectors for uninterrupted signal transmission, if required.

DKK 4 and DKK 5 ramp sections

Ramp sections are used at transfer points. Transfer points are track switches, turntables, latching points etc.

DKK 4 and DKK 5 funnel-shaped entry attachments

The funnel-shaped entry attachment can only be used in conjunction with the ramp section. They are used at transfer points if they are off-set and at free entry points.

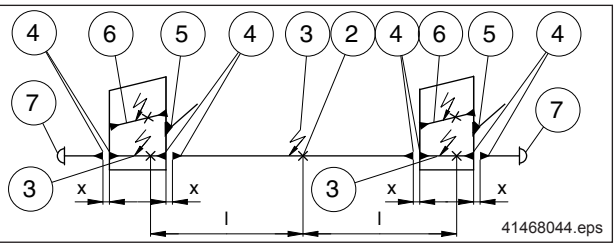
If two current collector trolleys are used within arm's reach at transfer points, protection against contact is no longer ensured. In this case, the current collector trolley transferring must be electrically isolated.

	Ramp section	Funnel-shaped entry attachment
Entry speed	max. 100 m/min	max. 100 m/min
Protection against accidental contact	IP 10	
Horizontal offset:	max. ± 10 mm	± 20 mm
Vertical offset:	max. ± 8 mm	± 15 mm
Gap between attachments	min. 10 mm max. 100 mm	min. 10 mm

Use of ramp sections

For enclosure AL material

④ Ramp section 979 270 44
For gap X see diagram 1, page 12



Expansion joints for DKK 4 and DKK 5

Expansion joints are required in the following cases:

1. For aluminium-enclosed conductor lines over 200 m in length.
2. For straight lines between 2 curved sections.
3. Where conductor lines pass from inside to outdoors.

Please note: By fitting expansion joints, the conductor line is divided into two or more separate lengths. Each of these sections must be connected to the supply.

Possible powerfeed arrangements:

1. One powerfeed section at the centre of each separate length.
2. One powerfeed at the centre of one length of conductor line. One powerfeed section on either side of the expansion joint and connection of the separate lengths by means of flexible cables.

Two current collector trolleys and two towing arms 979 162 44 must be used to ensure that the current supply is not interrupted.

The minimum current collector trolley centre distance is 520 mm. For gap X see diagram 1, page 12. One expansion joint must be supsended on each side.

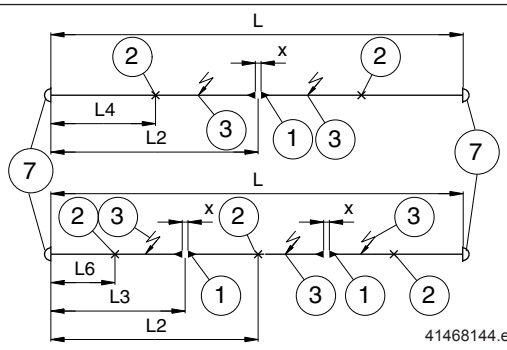
If within arm's reach, the transferring current collector trolley must be electrically isolated or the expansion joint must be covered.

Use of expansion joints

Straight tracks

① Expansion joint
For gap X see diagram 1, page 12
Enclosure material
AL L > 200 m

① Expansion joint
For gap X see diagram 1, page 12



Use of expansion joints

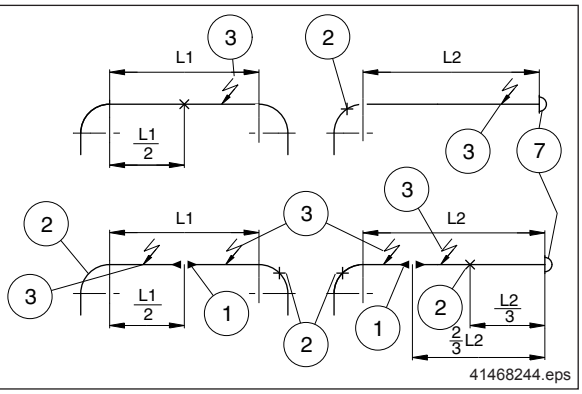
Curved tracks

Symbols used in all diagrams on pages 11 and 12

① = Expansion joint
② = Stop point
③ = Powerfeed
④ = Ramp section 979 279 44
⑤ = 45° ramp section for LH track switch (item III)
⑥ = Curved section with fitted funnels and item III and fitted powerfeed
⑦ = End cap

Without ① expansion joint
Enclosure material
AL L1 ≤ 20 m L2 ≤ 100 m

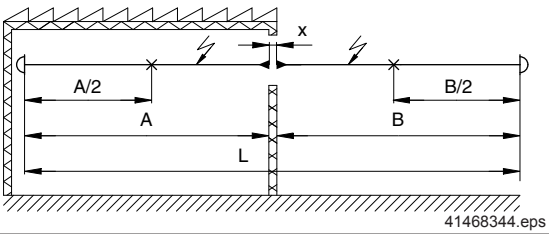
With ① expansion joint



Transfer
from inside to outdoors

Expansion joint
Enclosure material
AL A ≤ 200 m - B ≤ 200 m

For gap X see
diagram 1, page 12



Gap X

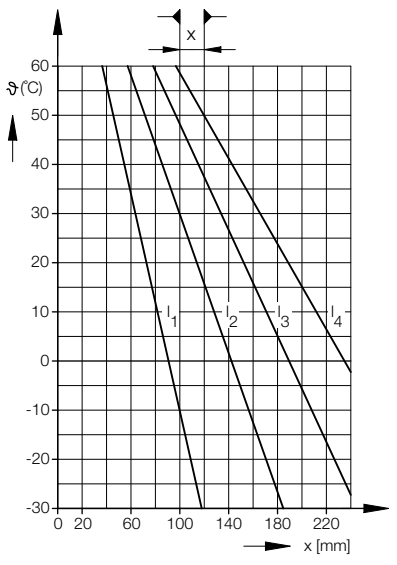
Gap X must be adjusted during assembly according to the temperature during assembly and the distance between the stop points.

Diagram 1
For ambient temperatures +100°C to -30°C

Example:

Alu enclosure material
Temperature during assembly ϑ = 20°C
Distance between stop points l = 60 m
Gap from diagram X = 115 mm

l_1 = 40 m
l_2 = 60 m
l_3 = 80 m
l_4 = 100 m



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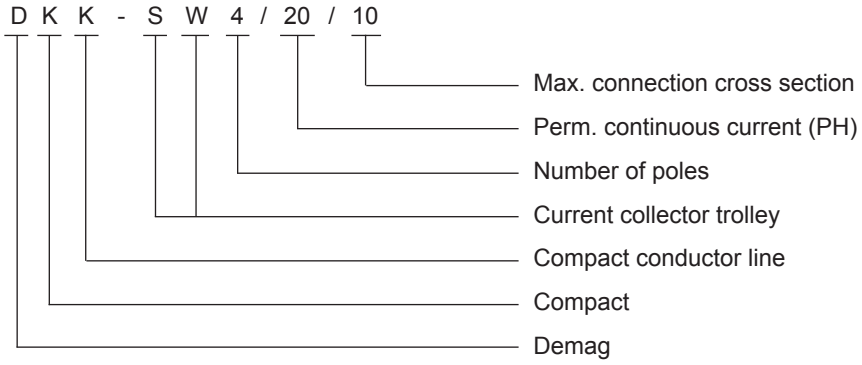
Current collector trolleys

Designation code for DKK current collector trolleys



Technical data

Criteria		DKK 4 and DKK 5		
		SW / 25 / 2,5	SW / 20 /10	SW /40 /10
Sliding contact material		Bronze	Graphite	Bronze
Permissible voltage		500 V ~	500 V ~	500 V ~
Max. continuous current	100 % CDF	25 A	20 A	40 A [1]
	30 % CDF	30 A	25 A	50 A [1]
Max. connected cross section		2,5 mm²	10 mm²	10 mm²
Stain relief cable gland/ Clamping range for outside Ø		PG16	M32	M32
		Ø 12 -14 mm	Ø 13 -20 mm	Ø 13 -20 mm
Max. fuse protection for connected conductor cross section	2,5 mm²	63 A	63 A	63 A
	4 mm²	-	80 A	80 A
	6 mm²	-	100 A	100 A
	10 mm²	-	125 A	125 A
Travel speed (straight track)		200 m/min	200 m/min	200 m/min
Negotiating curves to R		700 mm	1000 mm	1000 mm

Permissible continuous current (sum of all nominal currents)

n	Current collector trolley connection	DKK-SW 4 / 25 / 2,5 DKK-SW 5 / 25 / 2,5			DKK-SW 4 / 20 / 10 DKK-SW 5 / 20 / 10			DKK-SW 4 / 40 / 10 DKK-SW 5 / 40 / 10		
		CDF			CDF			CDF		
		100 %	60 %	30 %	100 %	60 %	30 %	100 %	60 %	30 %
1		25 A	30 A	30 A	20 A	25 A	25 A	40 A	45 A	50 A
2	parallel	50 A	60 A	60 A	40 A	50 A	50 A	80 A	90 A	100 A
3	parallel	70 A	80 A	90 A	60 A	70 A	75 A	110 A	125 A	150 A

Application criteria for current collector trolleys

When DKK conductor lines are used in the open air, in chemical environments and near the sea, current collector trolley 979 359 44 or 979 360 44 with graphite sliding contacts should be used. The number of current collector trolleys should be increased by 1 (n + 1).

The smallest permissible conductor cross section should be used in order to keep the effects of reactions on the current collector trolleys as low as possible.

Towing arms for DKK-SW 4 and DKK-SW 5

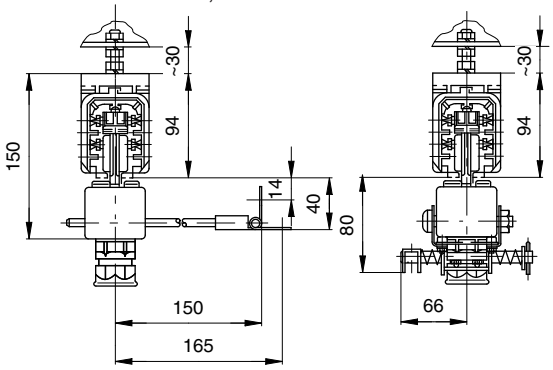
Towing arm 979 162 44 cannot be used at transfer and entry points (exception: expansion joints).

In such cases, towing arm 979 180 44 should be used.

1) The 5th sliding contact has a max. current capacity of 25 A.

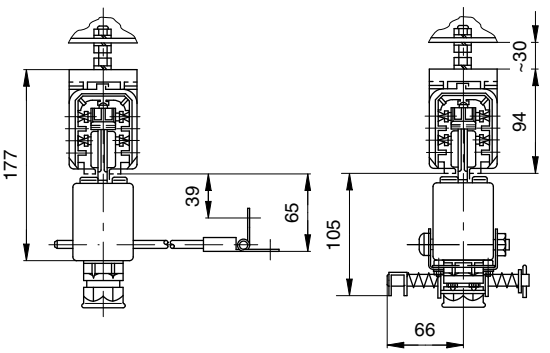
Fitting dimensions

DKK-SW 4 / 25 / 2,5
DKK-SW 5 / 25 / 2,5



DKK-SW 4 / 20 / 10
DKK-SW 5 / 20 / 10

DKK-SW 4 / 40 / 10
DKK-SW 5 / 40 / 10



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Accessories for mounting the DKK to structures provided by the customer

	Clamping range [mm]	I section girder	Length [m]	Part no.
Clamp M 10 x 45 Clamp M 10 x 50	8 - 16 16 - 30	160 - 400 425 - 600		974 548 44 974 549 44
C-rail 40 x 25 mm galvanized			0,60 0,70 0,80 0,92 6,00	
Angle bracket			-	974 529 44
Accessories DKK 4 10-30 mm² Accessories DKK 5 10-30 mm² Accessories DKK 4 50-70 mm² Accessories DKK 5 50-70 mm²				979 144 44 979 145 44 979 444 44 979 445 44

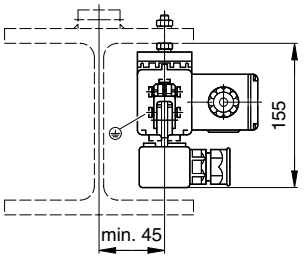
For one complete DKK section (conductor connectors, joint connectors, joint plate, link plates, nuts and bolts) see section 2.

Mounting examples

I Current collectors trolleys
DKK-SW 4 / 25 / 2,5 and
DKK-SW 5 / 25 / 2,5

II Current collectors trolleys
DKK-SW 4 / 20 / 10,
DKK-SW 5 / 20 / 10,
DKK-SW 4 / 40 / 10 and
DKK-SW 5 / 40 / 10

Suspension from upper flange.
Only for I and towing arm 979 162 44



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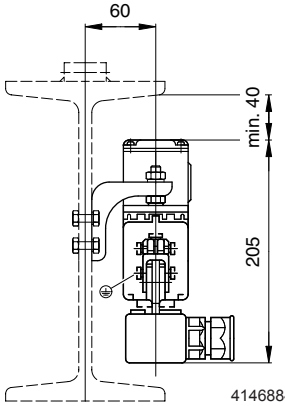
Attachment with angle bracket to web



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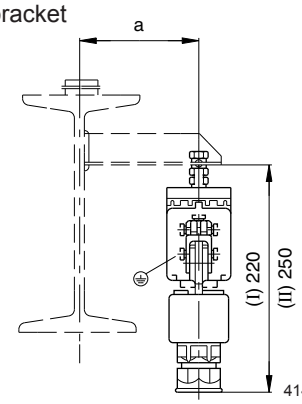
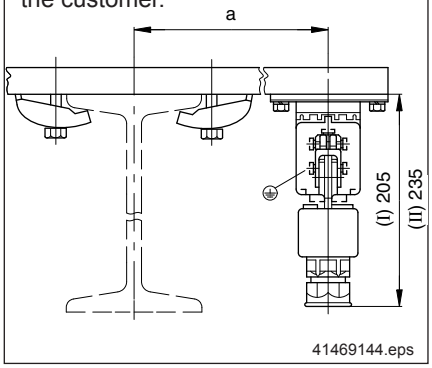
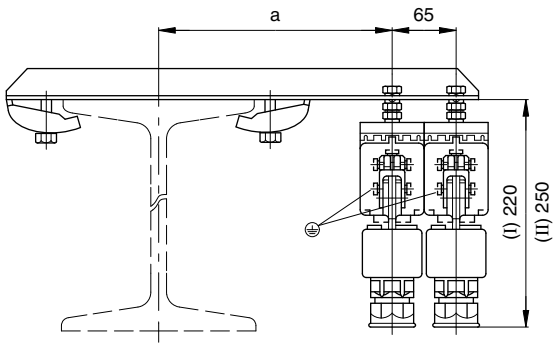
Suspension from welded angle bracket



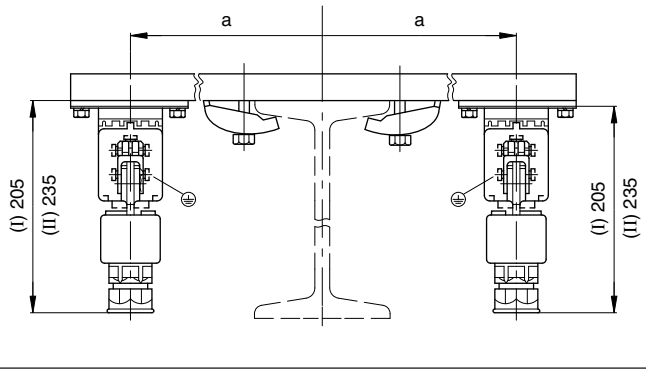
Suspension from one side of C-rail. Dimension a must be specified by the customer.



Suspension from bolted angle bracket.
Dimension a must be specified by the customer.



Suspension from both sides of C-rail.
Dimension a must be specified by the customer.



9 Resistance against chemicals

9.1 Acids

Agent		Installation parts	Enclosure material	Remarks
Acid	conc.	Plastic [1]	AL [1]	
Chromatic acid	40 %	⊕	-	Avoid direct contact
Chromatic sulphuric acis	20 %	⊕	-	
Nitric acid	10 %	+	⊕	Increased wear on sliding contacts
Sulphuric acid	10 %	+	-	
Acetic acid	5 %	+	⊕	
Carbonic acid	10 %	+	+	
Oleic acid		+	+	
Tartaric acid	10 %	+	+	
Formic acid	20 %	+	-	Min. distance from bath: 5 m Max. temperature + 30 °C Increased wear on current collectors
Arsenic acid	10 %	+	-	
Boric acid	10 %	+	⊕	
Hydrofluoric acid	10 %	+	⊕	
Lactic acid	10 %	+	⊕	
Phosphoric acid	50 %	+	⊕	
Oxalic acid	10 %	+	⊕	
Hydrochloric acid	20 %	⊕	-	
Citric acid	10 %	+	⊕	

9.2 Other chemicals

Agent	Installation parts	Enclosure material	Remarks
	Plastic [1]	AL [1]	
Alkaline solutions < 1 %	+	+	Min. distance: 5 m
Alkaline solutions > 1 %	⊕	⊕	
Ammoniacal water	-	⊕	
Alcohols	+	+	
Aliphatic hydrocarbons	-	+	
Aromatic hydrocarbons	-	-	
Chloric solvents	-	-	
Esters	-	-	
Ketone	-	-	
Trichlorethylene	-	⊕	
Alkaline solvents			Cannot be generally answered

9.3 Fuels, oils, grease etc.

Agent	Installation parts	Enclosure material	Remarks
	Plastic [1]	AL [1]	
Cleaning petrol	⊕	⊕	
Normal grade petrol	⊕	⊕	
Super grade petrol	⊕	⊕	Avoid direct contact
Kerosene	⊕	⊕	
White spirits	⊕	⊕	
Diesel oil	⊕	⊕	
Benzene	-	⊕	
Oils, grease (non-aromatic)	+	+	
Drilling oil	+	+	Avoid direct contact
ATE brake fluid	⊕	⊕	
Foodstuffs and consumables	+	+	Avoid direct contact with aluminium Always use double current collectors
Seawater Distance < 5 km	+	-	
Seawater Distance > 5 km	+	⊕	

1) Information on resistance applies to room temperature (20° C).
The following applies for all chemicals: Increased oxidation (corrosion) on the conductors

+ resistant
⊕ resistant within limits
- not resistant

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10 Calculation and selection

The cross sections of conductor lines must be determined taking into account the voltage drop and the permissible current loading.

- Cross sections are determined taking into account a max. permissible voltage drop of 2,5 % for crane tracks + 2,5 % for crane bridge. The principal factors are the starting current I_A x cos φ_A of the largest motor and the nominal current I_N x cosφ_N of the next smaller motor. For motors connected in parallel, the currents must be added together.

  The calculated cross sections should be halved for current supplies to solo hoists.
- Cross sections are calculated taking into account the max. permissible current load for supply lines to VDE 100 Part 430/523. The determining factor is the sum of nominal currents of all drive units plus any other electrical consumers. The currents contained in brackets in diagram 2 (see page 18) must not be exceeded.

Permissible voltage drop

The voltage drop depends on current I_G. Current I_G is obtained by adding the starting current (I_A x cos φ_A) and nominal current (I_N x cos φ_N) (see table 1 below and key motor data in DH technical data volume 1 203 340 44). The conductor cross section can be selected using equation 1 or diagram 2.

Table 1 shows the values for determining I_G according to the number of cranes on one conductor line.

Table 1

Number of cranes on cunductor line	Of all cranes together (order according to output)			
	1st Motor	2nd Motor	3rd Motor	4th Motor
1	I_A x cos φ_A	I_N x cos φ_N	-	-
2	I_A x cos φA	I_N x cos φ_N	I_N x cos φ_N	-
3	I_A x cos φ_A	I_A x cos φ_A	-	-
4	I_A x cos φ_A	I_A x cos φ_A	I_N x cos φ_N	-
5	I_A x cos φ_A	I_A x cos φ_A	I_N x cos φ_N	I_N x cos φ_N

For double drives accordingly: 2 x I_A x cos φ_A or 2 x I_N x cos φ_N.
Exception: For double hoist units with delayed switching-on I_A x cos φ_A + I_N x cos φ_N.

Calculating the conductor cross section

1. Conductor cross section

$$A = \frac{1{,}73 \times L \times I_G}{\Delta U \times \varkappa} \quad [mm^2]$$

2. Find: length of line

$$L = \frac{\Delta U \times \varkappa \times A}{1{,}73 \times I_G} \quad [m]$$

3. Adjustment for starting current I_A x cosφ_A or nominal current I_N x cosφ_N for a different voltage U_2

$$I_2 = \frac{U_1 \times I_1}{U_2} \quad [A]$$

4. Adjustment for conductor cross section A_2 for a different length of line L_2

$$A_2 = \frac{L_2 \times A_1}{L_1} \quad [mm^2]$$

5. Permissible voltage drop (ΔU = 10 V at 400 V corresponds to 2,5%)

$$\Delta U = 10\ V$$

$$\Delta U = \frac{U \times 2{,}5\%}{100\%} \quad [V]$$

6. Conversion of 400 V, 50 Hz to required voltage and frequency

$$I_2 = I_1 \times \frac{400V}{U_2} \times \frac{50\ Hz}{f_2}$$

Explanation of symbols

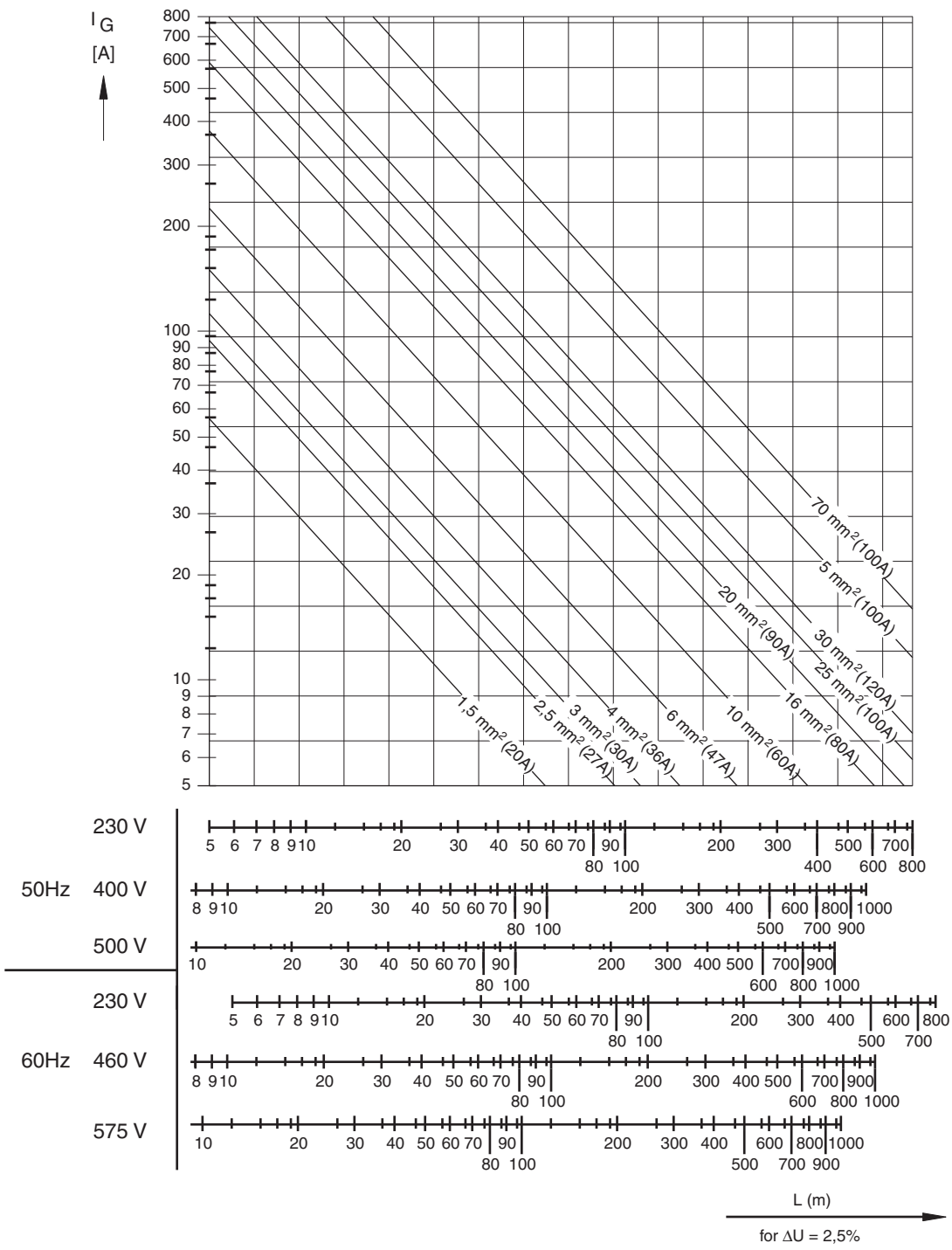
A = conductor cross section [mm²]
L = length of line [m]
I = starting current (I_A x cos φ_A) [A] or nominal current (I_N x cos φ_N) [A] to 1)
I_G = sum total of current intensities [A] to table 1 and 1)
f = frequency [Hz]
χ = conductivity (for Cu $\varkappa = 56 \left[\frac{mm^2}{\Omega \times m}\right]$)
ΔU = permissible voltage drop [V]
U = voltage [V]

1) See DH technical data volume 1 (203 340 44)

Determining the conductor cross section by diagram

Determining the conductor cross section for the maximum permissible voltage drop of 2,5 %.

Diagram 2



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The conductor cross section and/or the voltage drop may be reduced by the number and position of powerfeeds.

ℓ = powerfeed length
L = conductor length

ℓ = L for end powerfeed
ℓ = L/2 for middle powerfeed
ℓ = L/4 for end powerfeed on both ends
ℓ = L/6 bei centre powerfeed for each L/6 from the ends
ℓ = L/10 for middle powerfeed and centre powerfeed for each L/10 from the ends

Example:

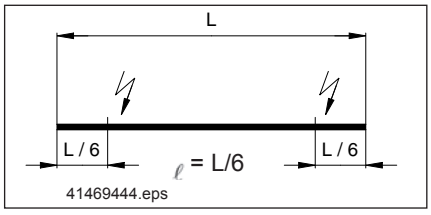
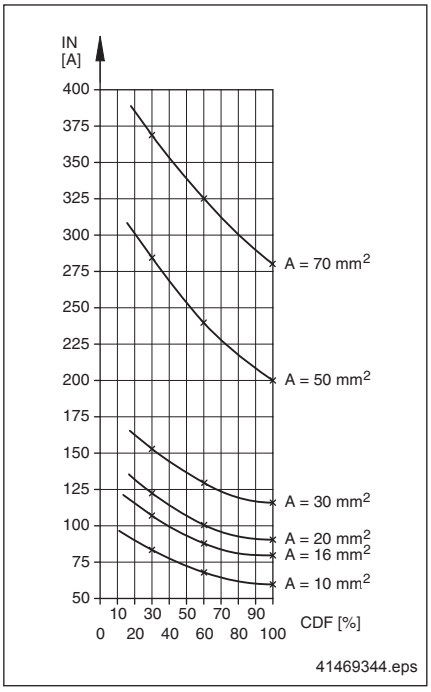


Diagram 3

Determining the conductor cross-section for a maximum permissible temperature rise of the conductors.



Permissible temperature rise

The permissible temperature rise depends on the sum total of all nominal currents I_{Ntot} (diagram 3).

When determining the conductor cross sections by means of equation 1, page 17 or diagram 2, page 18, the result obtained must always be compared with the cross section determined by using diagram 3.
The larger cross section should always be selected.

I_{Ntot} = Sum total of all nominal currents
CDF = Cyclic Duration Factor

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