

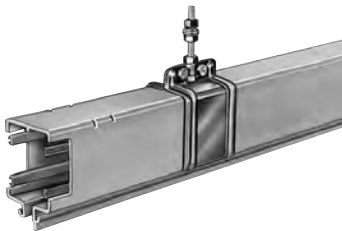
POWERRAIL ENCLOSED CONDUCTOR SYSTEMS

KBSL • KSL • KSLT

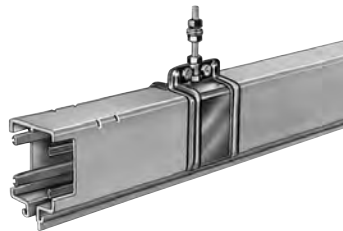


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Powerail versions (drawings see page 5).



Type KBSL⁽¹⁾
color: green



Type KSL
color: green



Type KSLT
color: gray



Type KSLT
with sealing strip „D“



Type KSLT
with plastic shielding „FP“

General

The Powerail types KBSL, KSL and KSLT are totally enclosed, touch-proof conductor systems for safe mobile power feeding of: Overhead Cranes, Monorail Systems, Electric Hoists, Automated Storage and Retrieval Systems, Electric Power Tools, Machine Tools, Assembly and Test Lines, Hanger Door Motors, Studio & Station Lighting Systems and many other applications.

These Powerail can be used for indoor and outdoor applications.

Because of the more favourable thermal properties we recommend to use a Powerail type with gray housing (KSLT/KSG) for outdoor applications.

Main characteristics are minimum space requirement, easy installation and resistance against corrosion.

VAHLE Powerails fully meet all VDE safety requirements.

Other combinations of cross sections, as shown on page 5, are possible. Regulation VDE 0100, part 430 has to be considered when using an N-conductor. Powerail KSLT can be equipped with sealing strip „D“ (IP 24) or with plastic shielding „FP“. Touch-proofness is then given with (EN 60529 (VDE 0470 part 1)). It is protected to IP 23 standards.

The touch-proofness is only guaranteed if the collectors are totally inserted into the Powerail system. If the Powerail is mounted within easy reach and the collectors can leave the system during operation, protection against manual contact must be provided. This is valid for tension above 25 V three phase current and 60 V alternate current.



Approvals

KSL: UL-approved.
KSL/KSLT: CSA-approved on request before placing the order.

Housing

The compact insulating housing holds from 4-5 pure copper conductors. KBSL preferably for indoors, all others for in- & outdoor use.

Standard sections are 1, 2, 3 or 4 m long.

Other sections and curves are available.

The ground conductor is identified by international color code. Long and short lip housing profiles (see page 6) and collector safety keys avoid phase reversing.

Any number of conductors can be accomplished by installing various Powerails side by side.

Couplings:

The KBSL, KSL and KSLT can be supplied from 40 - 100 A alternatively with bolted joints or plug-in joints. With 140 and 200 A bolted joints are always needed. The sections for plug-in and bolted joints are identically constructed.

Joint cover

The housing of the Powerail types KBSL, KSL and KSLT are connected by plastic joint covers.

Main power supply:

The Powerail systems can be fed either by line feeds or end feeds.

End caps:

The open ends of Powerail are closed by end caps.

Hangers:

Standard brackets for Powerail attachment to crane girders are available (see page 8). The Powerail lies in fixpoint or sliding hangers. The max. support distance for interior installations is 2000 mm and for exterior installations 1333 mm.

Expansion during temperature fluctuation:

The extensions can be compensated for the KBSL, KSL and KSLT by expansion joint sections (without electrical separation).

Anti-condensation sections:

These sections are used for transfer of the Powerail to outdoor areas to avoid condensation. The Powerail is not separated electrically.

Contact sections, turntables and switches:

Powerail for working areas and transfer applications see page 12.

Sectionalizing:

Available in air gap version, where the collector carbon bridges the gap, e.g. for mains.

Also available in insulating piece version. In this case the insulating piece is longer than the carbon and each Powerail section can be separated electrically, e.g. for control.

Collector:

The current collectors are made of re-inforced polyester, for high strength and light weight. Spring loaded carbon brushes maintain uniform contact. Connecting cables or terminal boxes and hinged or flexible towing arms included. Double collectors for transfer applications and higher amperage.

The length of the collector cable may not exceed 3 m if the added overcurrent protection device is not designed for the load capacity of this cable. Please refer also to regulations VDE 0100, part 430 and EN 60204-32.

(Note: this might happen in case of several collector running in one system).

The connecting cables are sufficiently dimensioned for the indicated continuous current ratings.

Consider reduction factors for different kinds of installation as per VDE 0298-4.

Please note: For use in galvanizing and pickling plants, under aggressive conditions and low voltage applications we would appreciate receiving detailed information, especially of the environmental conditions. For quotations and order processing including Powerail systems with curves, dead sections, turntables, switches etc. we require your drawings or sketches. Please use our questionnaire, page 29/30.

All steel parts and hardware of Powerails can be supplied in stainless steel version (version K)

| Technical Data of Powerail KBSL · KSL · KSLT | | | |
|--|--------------------------------------|--|--|
| Electrical properties: | | Mechanical properties: | |
| Dielectric strength | IEC 60243-1-3 30-40 kV/mm | Flexible strength | 75 N/mm ² ± 10 % |
| Specific resistance | IEC 600935 x 10 ¹⁵ Ohm/cm | Tensile strength | 40 N/mm ² ± 10 % |
| Surface resistance | IEC 6009310 ¹³ Ohm | Temperature range (ambient): - 30 °C to + 60 °C | |
| Leakage resistance | IEC 60112CTI 600-2,7 | | |
| Permissible operating voltage | 600 V | | |
| Flame test proof: | | Housing Resistance to chemicals: | |
| no flaming particles, self extinguishing | DIN 41 02 – Class B 1 Part 1 | at + 45 °C | Gasoline Mineral Oil Grease Sulphuric acid 50 % Caustic soda 25 % & 50 % Hydro-chloric acid, concentrated |

Consider the voltage drop calculation to maintain the limits established by the motor manufacturers:

AC:

$$\Delta U = \sqrt{3} \times I \times l \times Z$$

DC:

$$\Delta U_1 = 2l \times I \times R$$

$$\Delta U_2 = \frac{\Delta U_1 \cdot 100}{V}$$

ΔU_1 = Voltage drop [V]

ΔU_2 = Voltage drop [%]

I = Ampere load [A]

R = Resistance [Ohm/m]

l = Power feed length [m]

L = System length [m]

Effective length:

$l = L$ power feed located at the end of the system

$l = L/2$ power feed located at the mid-point of the system

$l = L/4$ power feed located at both ends of the system

$l = L/6$ power feed located at $L/6$ from each end of the system

Z = Impedance Ohm/1000 m

V = Voltage rating [V]

The total ampere load is determined from the nominal rated current of all motors working simultaneously on the same feed section of your electrification system. A diversity factor of 0.5 – 0.9 can be considered.

The conductor size and/or number of feed points should be increased or booster cables should be used in parallel in case the drop is exceeding the limitations.



POWERRAIL TYPES, ENGINEERING DATA AND CAT.-NOS.

| Type ⁽¹⁾ | HS c/w PE SS w/o PE | No. of Conductors | Ampere rating(per conductor) continuous A | Copper cross section mm ² | | | Control line | Max. Voltage rating V | Leakage distance mm |
|---------------------|------------------------------|----------------------|---|---|----|--------------------|--------------|--------------------------------|---------------------------|
| | | | | L1 L2 L3 | | N/5 ⁽³⁾ | | | |
| KBSL 4/ 40 ... HS | | 4 | 40 | 10 | 10 | - | - | 600 | 30 |
| KBSL 4/ 40 ... SS | control line | 4 | 40 | - | - | - | 10 | 600 | 30 |
| KBSL 4/ 60 ... HS | | 4 | 60 | 15 | 15 | - | - | 600 | 30 |
| KBSL 4/ 60 ... SS | control line | 4 | 60 | - | - | - | 15 | 600 | 30 |
| KBSL 4/100 ... HS | | 4 | 100 | 25 | 25 | - | - | 600 | 30 |
| KBSL 4/140 ... HS | | 4 | 140 | 35 | 35 | - | - | 600 | 30 |
| KBSL 4/200 ... HS | | 4 | 200 ⁽²⁾ | 50 | 50 | - | - | 600 | 30 |
| | | | | | | | | | |
| KBSL 5/ 40 ... HS | | 5 | 40 | 10 | 10 | 10 | - | 600 | 30 |
| KBSL 5/ 40 ... SS | control line | 5 | 40 | - | - | - | 10 | 600 | 30 |
| KBSL 5/ 60 ... HS | | 5 | 60 | 15 | 15 | 15 | - | 600 | 30 |
| KBSL 5/ 60 ... SS | control line | 5 | 60 | - | - | - | 15 | 600 | 30 |
| KBSL 5/100 ... HS | | 5 | 100 | 25 | 25 | 25 | - | 600 | 30 |
| KBSL 5/140 ... HS | | 5 | 140 | 35 | 35 | 25 | - | 600 | 30 |
| KBSL 5/200 ... HS | | 5 | 200 ⁽²⁾ | 50 | 50 | 25 | - | 600 | 30 |
| | | | | | | | | | |
| KSL 4/ 40 ... HS | | 4 | 40 | 10 | 10 | - | - | 600 | 30 |
| KSL 4/ 40 ... SS | control line | 4 | 40 | - | - | - | 10 | 600 | 30 |
| KSL 4/ 60 ... HS | | 4 | 60 | 15 | 15 | - | - | 600 | 30 |
| KSL 4/ 60 ... SS | control line | 4 | 60 | - | - | - | 15 | 600 | 30 |
| KSL 4/100 ... HS | | 4 | 100 | 25 | 25 | - | - | 600 | 30 |
| KSL 4/140 ... HS | | 4 | 140 | 35 | 35 | - | - | 600 | 30 |
| KSL 4/200 ... HS | | 4 | 200 ⁽²⁾ | 50 | 50 | - | - | 600 | 30 |
| KSL 5/ 40 ... HS | | 5 | 40 | 10 | 10 | 10 | - | 600 | 30 |
| KSL 5/ 40 ... SS | control line | 5 | 40 | - | - | - | 10 | 600 | 30 |
| KSL 5/ 60 ... HS | | 5 | 60 | 15 | 15 | 15 | - | 600 | 30 |
| KSL 5/ 60 ... SS | control line | 5 | 60 | - | - | - | 15 | 600 | 30 |
| KSL 5/100 ... HS | | 5 | 100 | 25 | 25 | 25 | 15 | 600 | 30 |
| KSL 5/140 ... HS | | 5 | 140 | 35 | 35 | 25 | - | 600 | 30 |
| KSL 5/200 ... HS | | 5 | 200 ⁽²⁾ | 50 | 50 | 25 | - | 600 | 30 |
| | | | | | | | | | |
| KSLT 4/ 60 ... HS | | 4 | 60 | 15 | 15 | - | - | 600 | 30 |
| KSLT 4/ 60 ... SS | control line | 4 | 60 | - | - | - | 15 | 600 | 30 |
| KSLT 4/100 ... HS | | 4 | 100 | 25 | 25 | - | - | 600 | 30 |
| KSLT 4/140 ... HS | | 4 | 140 | 35 | 35 | - | - | 600 | 30 |
| KSLT 4/200 ... HS | | 4 | 200 ⁽²⁾ | 50 | 50 | - | - | 600 | 30 |
| KSLT 5/ 60 ... HS | | 5 | 60 | 15 | 15 | 15 | - | 600 | 30 |
| KSLT 5/ 60 ... SS | control line | 5 | 60 | - | - | - | 15 | 600 | 30 |
| KSLT 5/100 ... HS | | 5 | 100 | 25 | 25 | 25 | - | 600 | 30 |
| KSLT 5/140 ... HS | | 5 | 140 | 35 | 35 | 25 | - | 600 | 30 |
| KSLT 5/200 ... HS | | 5 | 200 ⁽²⁾ | 50 | 50 | 25 | - | 600 | 30 |

4

... Suffix types e.g. 2 m KSL 4/60 with PE → KSL 4/60 - 2 HS Order. - No. 250 002, shorter lengths are made up from the next larger standart lengths.

⁽¹⁾ KBSL is w/o stiffener clamps. KSL/KSLT and KSG are c/w stiffener clamps (see page 6).

⁽²⁾ 80% intermittent.

Ground = PE

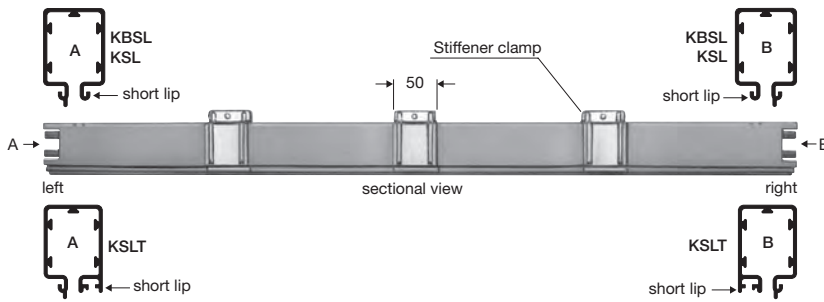
⁽³⁾ Please refer to page 2 for use as N -conductor see page 2.

For mounting configurations also see pages 8, 10, 11,13, 14, 20, 23, 25

| | Impedance at 50 Hertz 20° C $\Omega / 1000 \text{ m}$ | Resistance at 20° C $\Omega / 1000 \text{ m}$ | Weight kg/m | Order-No. | Configurations |
|--|---|---|-------------|-----------|---|
| | 1,81 | 1,80 | 1,643 | 252 96• | <p> KBSL 4 pole, 40-200 A color green KSL 4 pole, 40-200 A color green </p> <p> KBSL 5 pole, 40-200 A color green KSL 5 pole, 40-200 A color green </p> |
| | 1,81 | 1,80 | 1,643 | 256 55• | |
| | 1,31 | 1,28 | 1,778 | 253 21• | |
| | 1,31 | 1,28 | 1,778 | 253 25• | |
| | 0,76 | 0,72 | 2,134 | 253 23• | |
| | 0,59 | 0,53 | 2,455 | 252 68• | |
| | 0,38 | 0,36 | 3,060 | 252 69• | |
| | 1,81 | 1,80 | 1,734 | 256 13• | |
| | 1,81 | 1,80 | 1,734 | 256 56• | |
| | 1,31 | 1,28 | 1,903 | 253 22• | |
| | 1,31 | 1,28 | 1,903 | 253 26• | |
| | 0,76 | 0,72 | 2,348 | 253 24• | |
| | 0,59 | 0,53 | 2,668 | 252 70• | |
| | 0,38 | 0,36 | 3,274 | 252 71• | |
| | 1,81 | 1,80 | 1,753 | 257 36• | <p> KSLT 4 pole, 60-200 A color gray </p> <p> KSLT 5 pole, 60-200 A color gray </p> |
| | 1,81 | 1,80 | 1,753 | 257 64• | |
| | 1,31 | 1,28 | 1,888 | 250 00• | |
| | 1,31 | 1,28 | 1,888 | 251 46• | |
| | 0,76 | 0,72 | 2,244 | 250 01• | |
| | 0,59 | 0,53 | 2,565 | 250 69• | |
| | 0,38 | 0,36 | 3,170 | 254 04• | |
| | 1,81 | 1,80 | 1,844 | 256 93• | |
| | 1,81 | 1,80 | 1,844 | 257 65• | |
| | 1,31 | 1,28 | 2,013 | 250 02• | |
| | 1,31 | 1,28 | 2,013 | 251 47• | |
| | 0,76 | 0,72 | 2,458 | 250 03• | |
| | 0,59 | 0,53 | 2,778 | 250 73• | |
| | 0,38 | 0,36 | 3,384 | 254 05• | |
| | 1,31 | 1,28 | 2,038 | 256 00• | <p> KSLT 60-200 A with neoprene sealing strip "D" </p> <p> KSLT 60-200 A with plastic shielding "FP" </p> |
| | 1,31 | 1,28 | 2,038 | 256 01• | |
| | 0,76 | 0,72 | 2,394 | 256 02• | |
| | 0,59 | 0,53 | 2,715 | 256 03• | |
| | 0,38 | 0,36 | 3,320 | 256 04• | |
| | 1,31 | 1,28 | 2,163 | 256 05• | |
| | 1,31 | 1,28 | 2,163 | 256 06• | |
| | 0,76 | 0,72 | 2,608 | 256 07• | |
| | 0,59 | 0,53 | 2,928 | 256 08• | |
| | 0,38 | 0,36 | 3,534 | 256 09• | |

• Add last number (1, 2, 3, 4 length suffix) in accordance to bars required.

Description in brackets for control.
 (*) In case of using a conductor as N.



KBSL without stiffener clamps.

KSL & KSLT with stiffener clamps.

Sections for plug-in joints and bolted joints are equal.

Extra finish of KBSL, KSL and KSLT, surcharge Cat.-No.:

| Type | Index K stainless steel clamps & hardware | | Index I (60 A) copper conductors with stainless steel cap | |
|-------------|---|--------|---|---------|
| | 4 pole | 5 pole | 4 pole | 5 pole |
| KSL | 250 830 | | 258 301 | 258 302 |
| KSLT | 254 755 | | 258 303 | 258 304 |

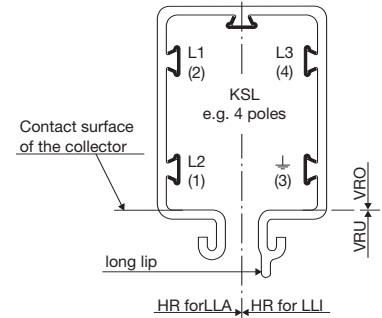
Index K: } for special environmental conditions
Index I: }

Supplements for KSLT

| See pages 2 & 5 | Type | Weight kg/m | Order-No. |
|---|-----------|-------------|-----------|
| Neoprene sealing strip supply length max. 50 m | D | 0,225 | 254 751 |
| Coupling for sealing strip | | | 258 300 |
| Fastener for sealing strip | | | 258 432 |
| Mounting trolley for sealing strip | | | 258 345 |
| Plastic shielding including Peg | FP | 0,260 | 254 752 |



Support spacing
750 up to max. 2000 mm,
depending on the radius
max. L = 3600 mm,
max. \sphericalangle 120°



Min. bending radius horizontal in mm

KSL

| | 60 A | 100 A | 140 A | 200 A |
|-------|------|-------|-------|-------|
| 4pole | 600 | 600 | 900 | 900 |
| 5pole | 750 | 750 | 900 | 900 |

KSLT: Minimum bending radius horizontal
1000 mm

Minimum bending radius vertical for KSL
and KSLT = 1800 mm

| Surcharge | Order-No. KSL | KSLT |
|------------------|---------------|---------|
| horizontal curve | 251 500 | 257 270 |
| vertical curve | 251 490 | 257 260 |

Curves with plastic shielding on request.

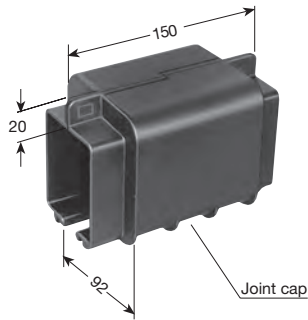
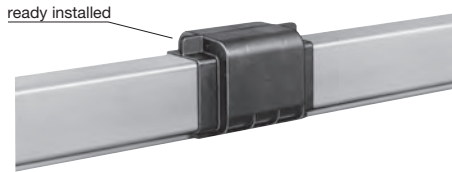
KBSL not to be used for curves.

⁽¹⁾ Shorter sections see page 4. and 5.

⁽²⁾ Long lip side of Powerails should always be mounted facing the track (see page 8).
Notify exceptions for replacements and/or extensions and determine correct curves.



Plug-in joints 40-100 A



4 or 5 Copper Connecting pins



for KBSL & KSL 4 pole

for KSLT 4 pole

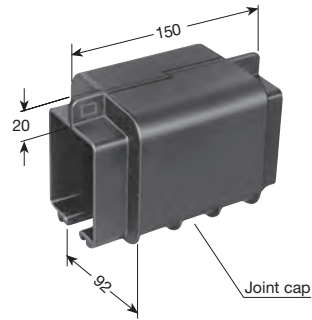
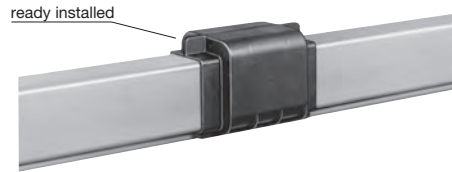
| Type | Weight kg | Order-No. | Type | Weight kg | Order-No. |
|--------------|-----------|-----------|---------------|-----------|-----------|
| VBK 4 | 0,215 | 257 907 | VBKT 4 | 0,205 | 257 913 |

for KBSL & KSL 5 pole

for KSLT 5 pole

| Type | Weight kg | Cat.- No. | Type | Weight kg | Order-No. |
|--------------|-----------|-----------|---------------|-----------|-----------|
| VBK 5 | 0,225 | 257 908 | VBKT 5 | 0,215 | 257 914 |

Bolted joints 40-200 A



4 or 5 Copper Connecting pins



for KBSL & KSL 4 pole

for KSLT 4 pole

| Type | Weight kg | Order-No. | Type | Weight kg | Order-No. |
|--------------|-----------|-----------|---------------|-----------|-----------|
| VBS 4 | 0,285 | 258 818 | VBTS 4 | 0,275 | 259 148 |

for KBSL & KSL 5 pole

for KSLT 5 pole

| Type | Weight kg | Cat.- No. | Type | Weight kg | Order-No. |
|--------------|-----------|-----------|---------------|-----------|-----------|
| VBS 5 | 0,310 | 258 819 | VBTS 5 | 0,300 | 259 149 |

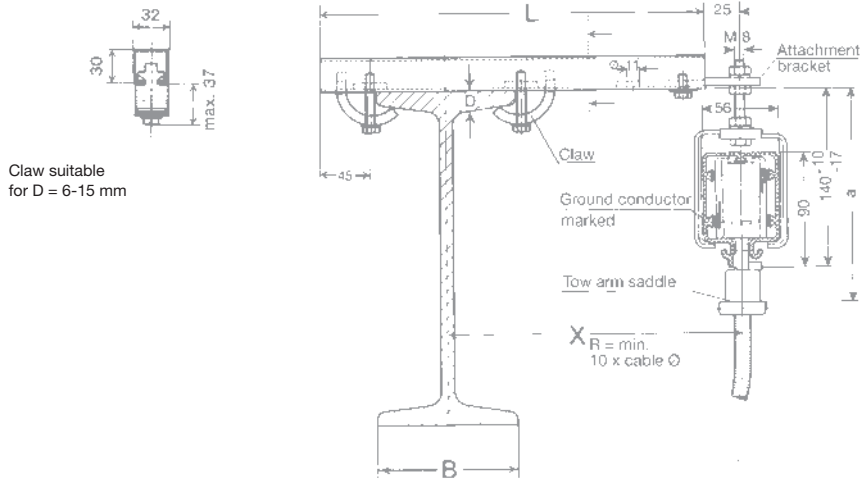
⁽¹⁾ Identically constructed for main current and control line



BRACKETS KBSL • KSL • KSLT

These brackets are easily bolted to any type of standard I-beam.

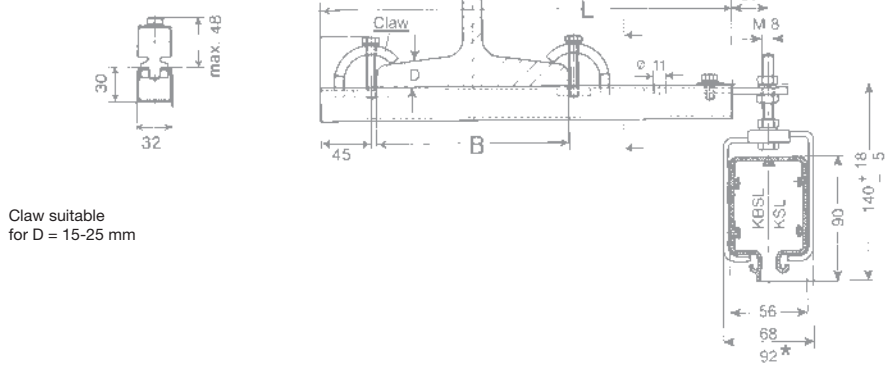
View without I-beam



| Powerail Type | KBSL - KSL - KSLT | | |
|---------------|----------------------------------|----------------------------------|----------------------------------|
| Collector | SKR | SKN | SKNT |
| Dim.a | 161 ⁺⁷ ₋₁₅ | 165 ⁺⁷ ₋₁₅ | 175 ⁺⁷ ₋₁₅ |

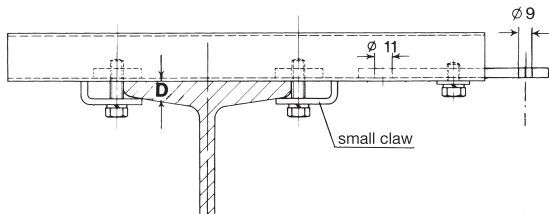
For KBSL, KSL and KSLT dimensions "a" also for double collectors.

View without I-beam



Claw suitable for D = 15-25 mm

EHK small claw version



Attention:
Make sure that hoist wheels have enough clearance. Use small claw if necessary. Check I-beam dimension D.

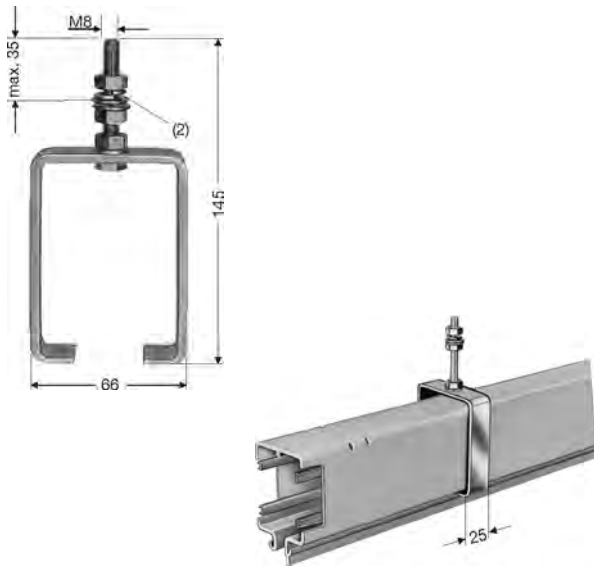
□ rail of EHK is identical to type S 1, Cat. 8a.

| Type | X mm | L mm | B max mm | Weight kg | Order-No. for std.-brackets | Order-No. with small claw |
|---------|------|------|----------|-----------|-----------------------------|---------------------------|
| EHK 250 | 250 | 350 | 170 | 1,070 | 251 600 | 251 720 |
| EHK 300 | 300 | 400 | 170 | 1,150 | 251 610 | 251 730 |
| EHK 400 | 400 | 500 | 170 | 1,300 | 251 620 | 251 740 |
| EHK 500 | 500 | 600 | 170 | 1,450 | 251 630 | 251 750 |
| EHK 600 | 600 | 700 | 170 | 1,600 | 251 640 | 251 760 |
| EHK 700 | 700 | 800 | 170 | 1,750 | 251 650 | 251 770 |
| EHK 750 | 750 | 850 | 170 | 1,820 | 251 660 | 251 780 |
| EHK 800 | 800 | 900 | 170 | 1,900 | 251 670 | 251 790 |

Select next larger size bracket when I-beam dimension B is more than 170 mm.

SLIDING HANGERS

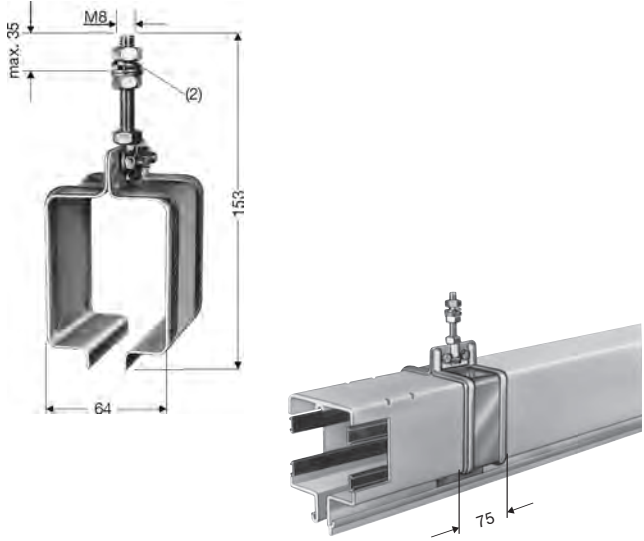
FIXPOINT HANGERS



Sliding hanger mounted to Powerail-section.

for KBSL only (one-piece bracket)

| Type | Weight kg | Order-No. |
|------------|-----------|-----------|
| KGB | 0,225 | 259 001 |

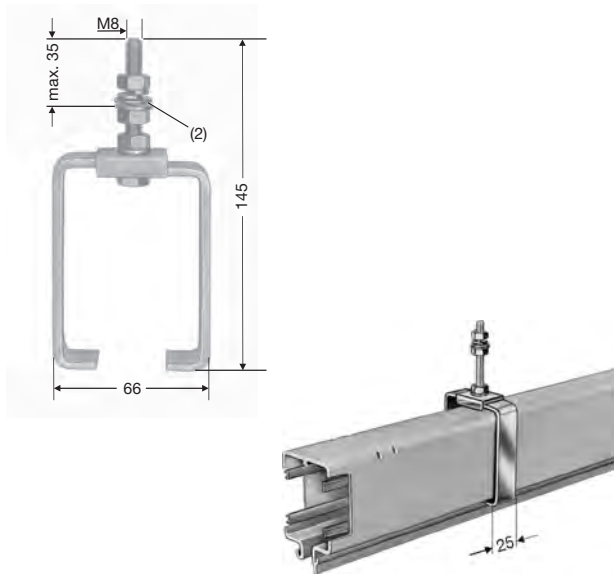


Fixpoint hanger mounted to Powerail section. Hanger consists of steel clamp and bolt M 8.

for KBSL & KSL

for KSLT

| Type | Weight kg | Order-No. | Type | Weight kg | Order-No. |
|---------------------------|-----------|-----------|----------------------------|-----------|-----------|
| KF | 0,215 | 258 806 | KFT | 0,210 | 258 810 |
| KF/K⁽¹⁾ | 0,215 | 258 807 | KFT/K⁽¹⁾ | 0,210 | 258 811 |



Sliding hanger mounted to Powerail-section.

for KBSL & KSL

for KSLT

| Type | Weight kg | Order-No. | Type | Weight kg | Order-No. |
|----------------------------|-----------|-----------|-----------------------------|-----------|-----------|
| KSH | 0,251 | 252 894 | KSHT | 0,230 | 252 895 |
| KSH/K⁽¹⁾ | 0,220 | 250 660 | KSHT/K⁽¹⁾ | 0,230 | 254 757 |

⁽¹⁾ stainless steel
⁽²⁾ Flat washers only be used in slotted holes.



End feeds

without powerail section



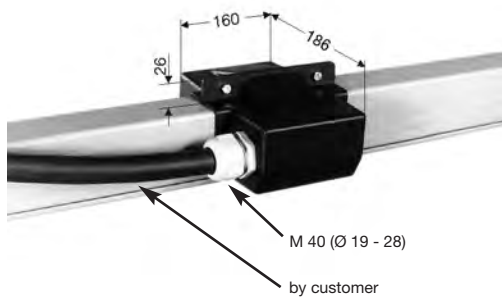
Cable gland M 32,
Cable-Ø 17 - 26 mm
for cable cross section max. 10 mm²

End feed comes loose without Powerail. It will be mounted at either end.

for KBSL, KSL & KSLT

| Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|-------|-----------|--------------------------------|----------------------------------|
| KEK 4/40-60 | 40-60 | 0,400 | 258 421 | 258 423 |
| KEK 5/40-60 | 40-60 | 0,420 | 258 422 | 258 424 |

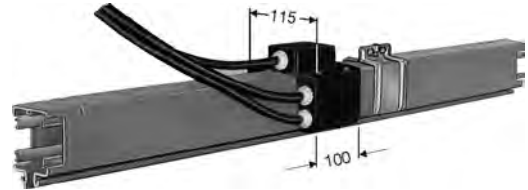
Joint feed



Line feeds⁽¹⁾

with 2 m cables incl. 1 m section

| A | Cable-Ø mm | Cable cross section mm ² |
|-----|------------|-------------------------------------|
| 40 | 9,5 | 6 |
| 60 | 11,5 | 10 |
| 100 | 13,5 | 25 |
| 140 | 14,5 | 35 |



Terminal box
32 mm over Powerail

for KBSL & KSL

| Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|-----|-----------|--------------------------------|----------------------------------|
| KNKL 4/ 40 | 40 | 4,000 | 259 209 | 259 205 |
| KNKL 4/ 60 | 60 | 4,100 | 259 211 | 259 207 |
| KNKL 4/100 | 100 | 6,300 | 259 213 | - |
| KNKL 4/140 | 140 | 8,200 | 259 215 | - |
| KNKL 5/ 40 | 40 | 4,400 | 259 221 | 259 217 |
| KNKL 5/ 60 | 60 | 4,700 | 259 223 | 259 219 |
| KNKL 5/100 | 100 | 7,400 | 259 225 | - |
| KNKL 5/140 | 140 | 9,950 | 259 227 | - |

for KSLT

| Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|-----|-----------|--------------------------------|----------------------------------|
| KNKLT 4/ 60 | 60 | 4,200 | 259 240 | 259 236 |
| KNKLT 4/100 | 100 | 6,400 | 259 242 | - |
| KNKLT 4/140 | 140 | 8,300 | 259 244 | - |
| KNKLT 5/ 60 | 60 | 4,800 | 259 252 | 259 248 |
| KNKLT 5/100 | 100 | 7,500 | 259 254 | - |
| KNKLT 5/140 | 140 | 10,050 | 259 256 | - |

The joint feed KNS is without powerail. It can only be used with KBSL and KSL 4 pole

| Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|-------|-----------|--------------------------------|----------------------------------|
| KNS 4/40-60 | 40-60 | 0,560 | 258 001 | 258 002 |

⁽¹⁾ The powerail section is part of the system length (see example of ordering page 21 & 22).

⁽²⁾ For full type designation add suffix of Powerail section, e.g. KEK 4/60 w/ PE → KEK 4/60 HS Order-No. 258 421.

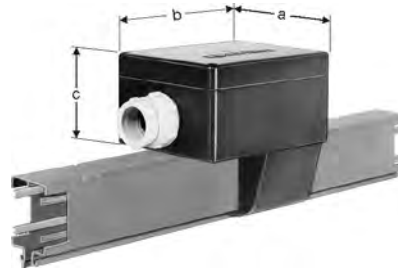
Line feed⁽¹⁾

with terminal box incl. 1 m powerail section

Cable connections type HS

| A | M | Cable-Ø mm | Nom.- connection- dia. mm ² | Cable connection at |
|-----|----|---------------|---|------------------------|
| 40 | 25 | 9 - 18 | 6 | M8 (Type KNK/KNKT: M6) |
| 60 | 32 | 17 - 26 | 10 | M8 (Type KNK/KNKT: M6) |
| 100 | 50 | 23 - 34 | 25 | M8 |
| 140 | 50 | 23 - 34 | 35 | M8 |
| 200 | 50 | 29 - 40 | 50 | M10 |

All SS-types with PG 25



| | KNK KNKT 40-60 A | KNKS KNKST 40-140 A | KNKS KNKST 200 A |
|---|------------------------|---------------------------|------------------------|
| a | 115 | 156 | 206 |
| b | 115 | 196 | 286 |
| c | 70 | 100 | 140 |

for KBSL & KSL

for KSLT

| Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE | Type ⁽²⁾ | A | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|-----|--------------|--------------------------------------|--|---------------------|-----|--------------|--------------------------------------|--|
| KNK 4/ 40 | 40 | 2,464 | 258 254 | 258 256 | – | – | – | – | – |
| KNK 4/ 60 | 60 | 2,600 | 258 258 | 258 260 | KNKT 4/ 60 | 60 | 2,700 | 259 161 | 259 163 |
| KNK 5/ 40 | 40 | 2,631 | 258 262 | 258 264 | – | – | – | – | – |
| KNK 5/ 60 | 60 | 2,800 | 258 250 | 258 252 | KNKT 5/ 60 | 60 | 2,900 | 259 165 | 259 167 |
| KNKS 4/ 40 | 40 | 3,314 | 258 266 | – | – | – | – | – | – |
| KNKS 4/ 60 | 60 | 3,450 | 258 268 | – | KNKST 4/ 60 | 60 | 3,550 | 259 169 | – |
| KNKS 4/100 | 100 | 3,800 | 258 270 | – | KNKST 4/100 | 100 | 3,900 | 259 171 | – |
| KNKS 4/140 | 140 | 4,100 | 258 272 | – | KNKST 4/140 | 140 | 4,200 | 259 173 | – |
| KNKS 4/200 | 200 | 5,400 | 258 612 | – | KNKST 4/200 | 200 | 5,500 | 258 624 | – |
| KNKS 5/ 40 | 40 | 3,581 | 258 274 | – | – | – | – | – | – |
| KNKS 5/ 60 | 60 | 3,750 | 258 276 | – | KNKST 5/ 60 | 60 | 3,850 | 259 175 | – |
| KNKS 5/100 | 100 | 4,150 | 258 278 | – | KNKST 5/100 | 100 | 4,250 | 259 177 | – |
| KNKS 5/140 | 140 | 4,450 | 258 280 | – | KNKST 5/140 | 140 | 4,550 | 259 179 | – |
| KNKS 5/200 | 200 | 5,800 | 258 616 | – | KNKST 5/200 | 200 | 5,900 | 258 628 | – |

End caps

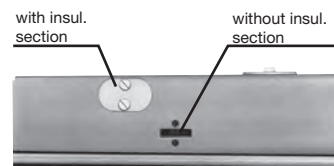


End cap assembled on Powerail

for KBSL, KSL & KSLT

| Type | Weight kg | Order-No. |
|------|-----------|-----------|
| MEK | 0,086 | 256 527 |

Conductor dead sections



It is to be indicated, which copper rails are to be separated and which type of current collector is used (see page 5).
Installation factory-assembled.

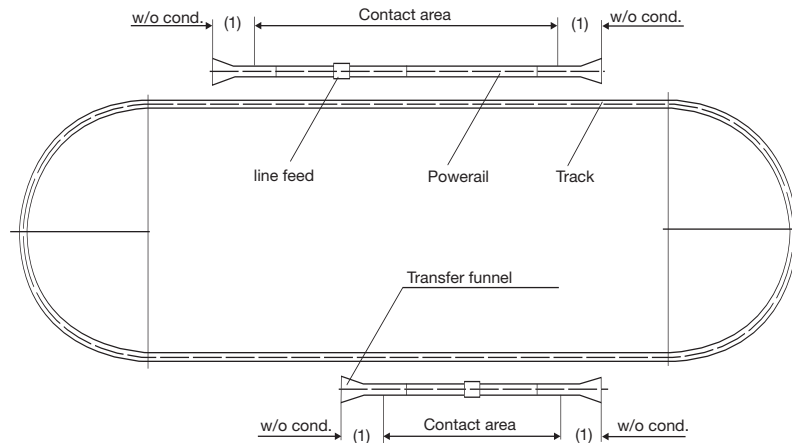
for KBSL, KSL & KSLT

| Type | with air gap 5 mm Order-No. | Type | with insul. section 30 mm Order-No. |
|--------|-----------------------------------|--------|---|
| STLA 1 | 251 860 | STLI 1 | 250 220 |
| STLA 2 | 251 870 | STLI 2 | 250 590 |
| STLA 3 | 251 880 | STLI 3 | 250 600 |
| STLA 4 | 251 890 | STLI 4 | 250 610 |
| STLA 5 | 251 900 | STLI 5 | 250 620 |

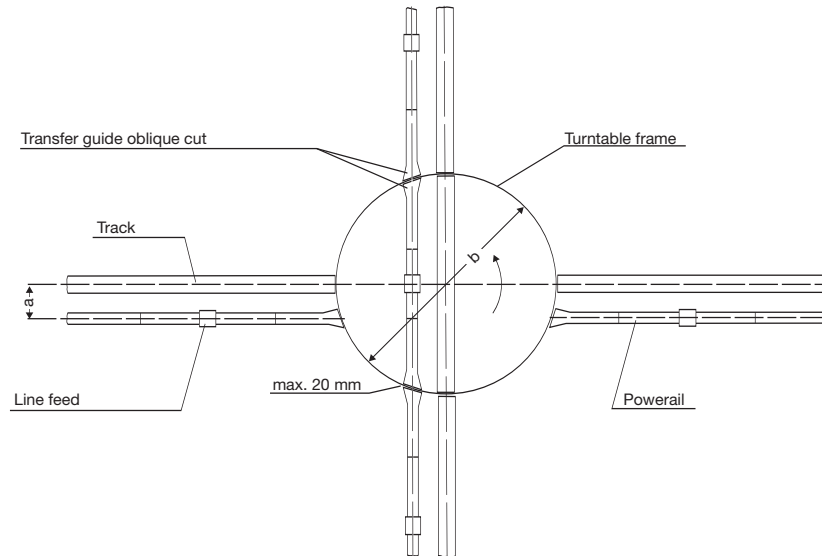
⁽¹⁾ Above sections come factory assembled on a 1 m Powerail section (Please refer to ordering example on page 21).

⁽²⁾ Suffix types e.g.. KNK 4/60 w/ PE → KNK 4/60 HS Order-No. 258 258.

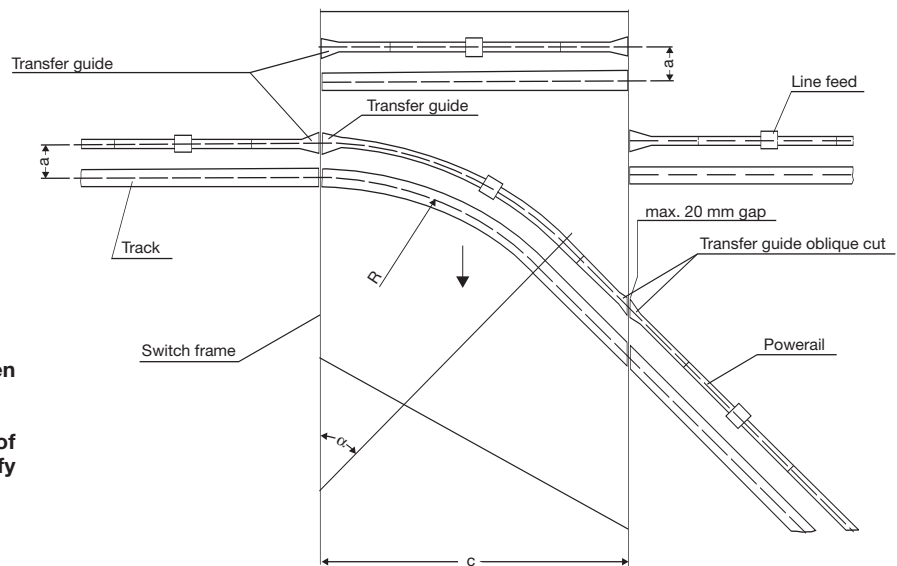
Contact section⁽¹⁾



Turntable



Sliding switch



Max. 20 mm air gap between transfer guides.

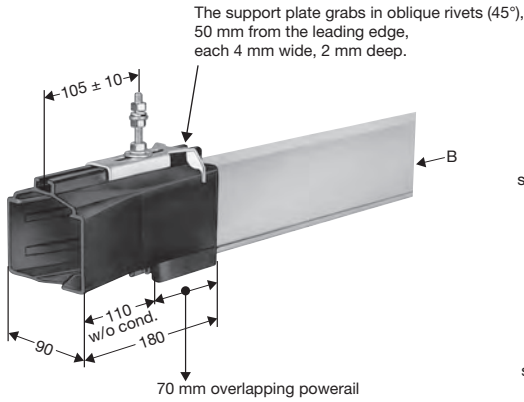
Please submit drawings of transfer applications. Specify dimensions a, b, c, R and angle α ($\alpha = \text{max. } 50^\circ$)

Please submit drawings for all transfer applications.



Transfer guides LH straight incl. Fixpoint hanger

Left hand version (für AUN)
incl. fixpoint hanger



4- & 5poles, 40 to 200 A

Sketch shows left hand version (page 6)
with Powerail section
Offset: horizontal ± 8 mm, vertical ± 3 mm

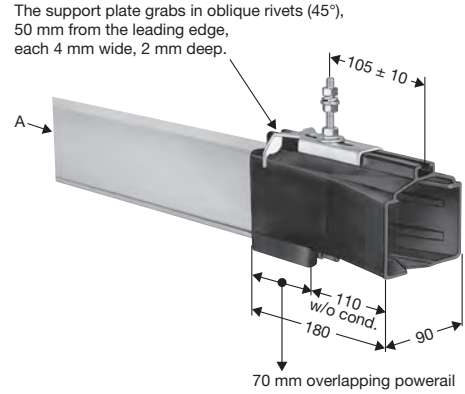
for KBSL & KSL

for KSLT

| Type ⁽¹⁾ | Weight kg | Order-No. | Type ⁽¹⁾ | Weight kg | Order-No. |
|---------------------|-----------|-----------|---------------------|-----------|-----------|
| AUN | 0,340 | 257 455 | AUNT/L | 0,340 | 257 456 |

RH incl. Fixpoint hanger

Right hand version (für AUN)
incl. fixpoint hanger



4- & 5poles, 40 to 200 A

Sketch shows right hand version (page 6)
with Powerail section
Offset: horizontal ± 8 mm, vertical ± 3 mm

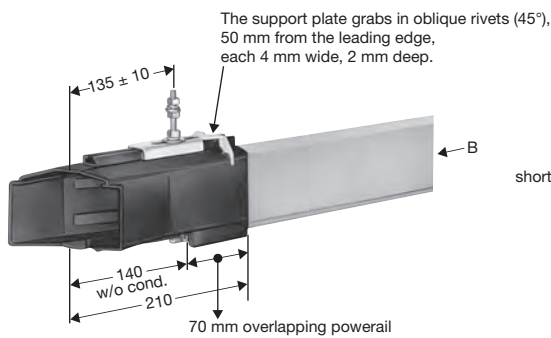
for KBSL & KSL

for KSLT

| Type ⁽¹⁾ | Weight kg | Order-No. | Type ⁽¹⁾ | Weight kg | Order-No. |
|---------------------|-----------|-----------|---------------------|-----------|-----------|
| AUN | 0,340 | 257 455 | AUNT/R | 0,340 | 257 457 |

Transfer guides LH oblique incl. Fixpoint hanger

Left hand version (für AUN)
incl. fixpoint hanger



4- & 5poles, 40 to 200 A

Sketch shows left hand version (page 6)
with Powerail section
Offset: horizontal ± 8 mm, vertical ± 3 mm

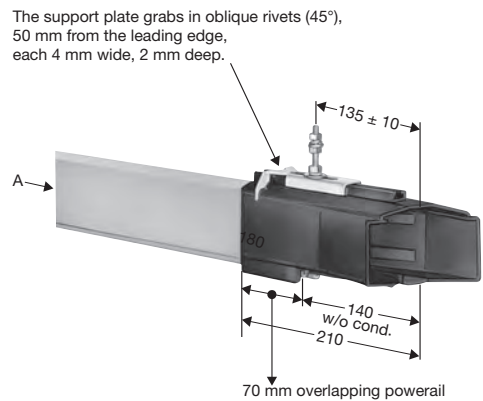
for KBSL & KSL

for KSLT

| Type ⁽¹⁾ | Weight kg | Order-No. | Type ⁽¹⁾ | Weight kg | Order-No. |
|---------------------|-----------|-----------|---------------------|-----------|-----------|
| AUNS | 0,380 | 257 459 | AUNST/L | 0,380 | 257 460 |

RH incl. Fixpoint hanger

Right hand version (für AUN)
incl. fixpoint hanger



4- & 5poles, 40 to 200 A

Sketch shows right hand version (page 6)
with Powerail section
Offset: horizontal ± 8 mm, vertical ± 3 mm

for KBSL & KSL

for KSLT

| Type ⁽¹⁾ | Weight kg | Order-No. | Type ⁽¹⁾ | Weight kg | Order-No. |
|---------------------|-----------|-----------|---------------------|-----------|-----------|
| AUNS | 0,380 | 257 459 | AUNST/R | 0,380 | 257 461 |

⁽¹⁾ With KBSL and KSL left and right execution, as well as control line are identically constructed. With KSLT HS-and SS-versions are identically constructed.

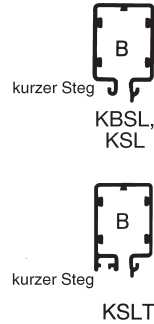
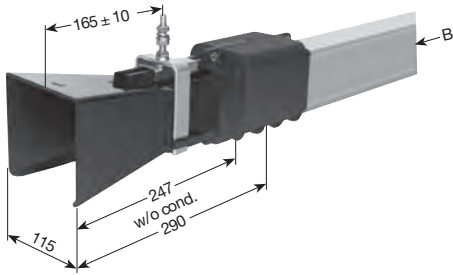
Always use double collectors or two collectors for transfer applications (see page 18 and 19).



TRANSFER FUNNELS⁽¹⁾

LH

Offset:
horizontal ± 15 mm
vertical ± 10 mm



Sketch shows left hand version (page 6)

for KBSL & KSL

| Type | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|-----------------|--------------|--------------------------------------|--|
| ESTN 4 L | 0,795 | 256 164 | 256 166 |
| ESTN 5 L | 0,800 | 256 172 | 256 174 |

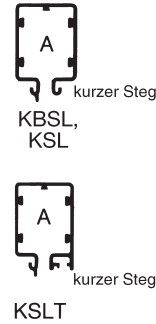
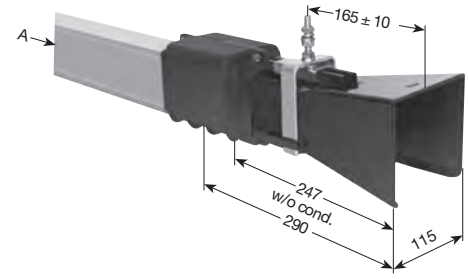
Flexible support tow arms KFML are essential (see page 20).

for KSLT

| Type | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|------------------|--------------|--------------------------------------|--|
| ESTTN 4 L | 0,825 | 256 168 | 256 170 |
| ESTTN 5 L | 0,830 | 256 176 | 256 178 |

Flexible support tow arms KFML are essential (see page 20).

RH



Sketch shows right hand version (page 6)

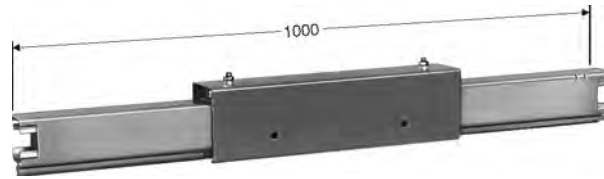
for KBSL & KSL

| Type | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|-----------------|--------------|--------------------------------------|--|
| ESTN 4 R | 0,795 | 256 163 | 256 165 |
| ESTN 5 R | 0,800 | 256 171 | 256 173 |

for KSLT

| Type | Weight kg | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|------------------|--------------|--------------------------------------|--|
| ESTTN 4 R | 0,825 | 256 167 | 256 169 |
| ESTTN 5 R | 0,830 | 256 175 | 256 177 |

Flexible support tow arms KFML are essential (see page 20).



This anti-condensation-section consists of 1 m Powerail with openings covered by a protection hood. The anti-condensation section does not disconnect the powerail electrically.

Feeding

No extra feeds required as the Powerail is not interrupted.

Collectors

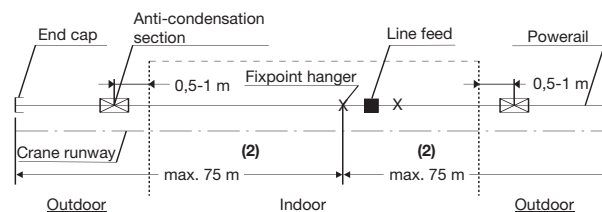
No extra collectors required.

Application of Anti-Condensation Section:

The anti-condensation section will be used where Powerails are passing from indoor to outdoor, preventing condensation of the outside mounted Powerail. The warm air from indoors can escape through the anti condensation section.

Installation

The anti-condensation section is to be placed directly (0,5 m - 1 m max.) at the transfer point from indoor to outdoor. See sketch.



for KBSL and KSL

for KSLT

| Type ⁽³⁾ | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE | Type ⁽³⁾ | Order-No. Power line HS c/w PE | Order-No. Control line SS w/o PE |
|---------------------|--------------------------------------|--|---------------------|--------------------------------------|--|
| BTK 4/ 40 | 257 679 | 257 681 | – | – | – |
| BTK 4/ 60 | 258 652 | 258 725 | BTKT 4/ 60 | 258 660 | 258 727 |
| BTK 4/100 | 258 653 | – | BTKT 4/100 | 258 661 | – |
| BTK 4/140 | 258 654 | – | BTKT 4/140 | 258 662 | – |
| BTK 4/200 | 258 655 | – | BTKT 4/200 | 258 663 | – |
| BTK 5/ 40 | 257 680 | 257 682 | – | – | – |
| BTK 5/ 60 | 258 656 | 258 726 | BTKT 5/ 60 | 258 664 | 258 728 |
| BTK 5/100 | 258 657 | – | BTKT 5/100 | 258 665 | – |
| BTK 5/140 | 258 658 | – | BTKT 5/140 | 258 666 | – |
| BTK 5/200 | 258 659 | – | BTKT 5/200 | 258 667 | – |

⁽¹⁾ Above sections come ready assembled on 1 m Powerail and are a part of the system length.

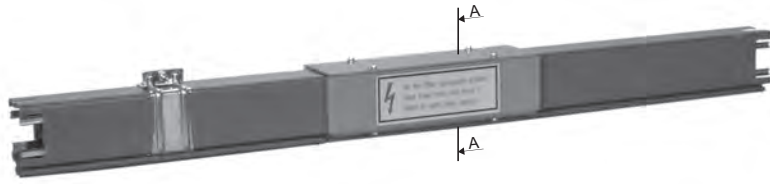
⁽²⁾ For longer runs use Expansion joint section (see page 17).

⁽³⁾ Suffix types e.g. BTK 4/60 w/ PE → BTK 4 /60 **HS** Order-No. 258 652



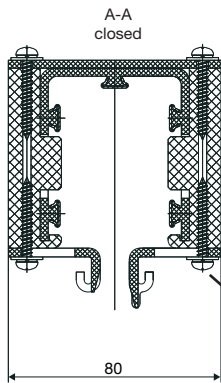
TELESCOPE SECTIONS⁽¹⁾

incl. 1 m section

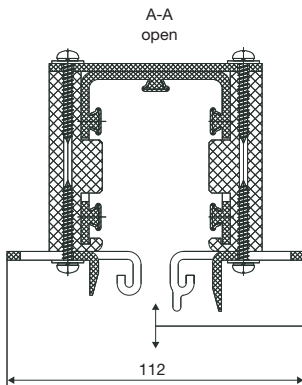


Assembly and disassembly of the collector is possible at the end of the track as well as at the removing section.
With plants with frequent maintenance procedures or several current collectors in a system (e.g. test plants) removing sections are to be planned.

For single collectors



To open the section loosen 4 cross-head screws and push both sliders outwards.



Mounting and Demounting of the collector

| KBSL / KSL | | KSLT | |
|---------------------|--|---------------------|--|
| Type ⁽²⁾ | Order-No. Power line HS c/w PE | Type ⁽²⁾ | Order-No. Power line HS c/w PE |
| ATK 4/ 40 | 257 988 | ATKT 4/ 40 | 258 117 |
| ATK 4/ 60 | 252 811 | ATKT 4/ 60 | 252 821 |
| ATK 4/100 | 252 812 | ATKT 4/100 | 252 822 |
| ATK 4/140 | 252 813 | ATKT 4/140 | 252 823 |
| ATK 4/200 | 252 814 | ATKT 4/200 | 252824 |
| ATK 5/ 40 | 257 990 | ATKT 5/ 40 | 258 119 |
| ATK 5/ 60 | 252 816 | ATKT 5/ 60 | 252 826 |
| ATK 5/100 | 252 817 | ATKT 5/100 | 252 827 |
| ATK 5/140 | 252 818 | ATKT 5/140 | 252 828 |
| ATK 5/200 | 252 819 | ATKT 5/200 | 252 829 |
| Type ⁽²⁾ | Order-No. Control line SS w/o PE | Type ⁽²⁾ | Order-No. Control line SS w/o PE |
| ATK 4/ 40 | 257 989 | ATKT 4/ 40 | 258 118 |
| ATK 4/ 60 | 252 815 | ATKT 4/ 60 | 252 825 |
| ATK 5/ 40 | 257 991 | ATKT 5/ 40 | 258 120 |
| ATK 5/ 60 | 252 820 | ATKT 5/ 60 | 252 830 |

For double collectors

| KBSL / KSL | | KSLT | |
|---------------------|--|---------------------|--|
| Type ⁽²⁾ | Order-No. Power line HS mit PE | Type ⁽²⁾ | Order-No. Power line HS mit PE |
| ATKD 4/ 40 | 257 992 | ATKTD 4/ 40 | 258 121 |
| ATKD 4/ 60 | 252 831 | ATKTD 4/ 60 | 252 841 |
| ATKD 4/100 | 252 832 | ATKTD 4/100 | 252 842 |
| ATKD 4/140 | 252 833 | ATKTD 4/140 | 252 843 |
| ATKD 4/200 | 252 834 | ATKTD 4/200 | 252 844 |
| ATKD 5/ 40 | 257 994 | ATKTD 5/ 40 | 258 123 |
| ATKD 5/ 60 | 252 836 | ATKTD 5/ 60 | 252 846 |
| ATKD 5/100 | 252 837 | ATKTD 5/100 | 252 847 |
| ATKD 5/140 | 252 838 | ATKTD 5/140 | 252 848 |
| ATKD 5/200 | 252 839 | ATKTD 5/200 | 252 849 |
| Type ⁽²⁾ | Order-No. Control line SS w/o PE | Type ⁽²⁾ | Order-No. Control line SS w/o PE |
| ATKD 4/ 40 | 257 993 | ATKTD 4/ 40 | 258 122 |
| ATKD 4/ 60 | 252 835 | ATKTD 4/ 60 | 252 845 |
| ATKD 5/ 40 | 257 995 | ATKTD 5/ 40 | 258 124 |
| ATKD 5/ 60 | 252 840 | ATKTD 5/ 60 | 252 850 |

By opening and closing the sliders at the bottom of the powerail housing the collector can be mounted and demounted easily.

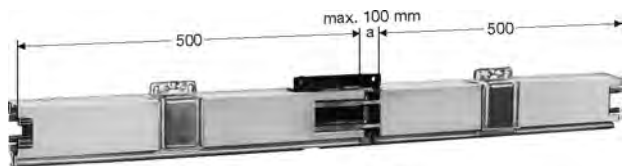
Before opening disconnect mains.

The removing section does not disconnect the powerail electrically.

⁽¹⁾ Above sections come ready assembled on 1 m Powerail and are a part
⁽²⁾ Suffix types e.g. TKL 4/60 w/ PE → TKL 4 /60 **HS** Order-No. 250 850.

EXPANSION JOINT SECTIONS⁽¹⁾

incl. 1 m section



Expansion joint sections are required to compensate for expansion and contraction of KSL Powerail in varying temperatures without interrupting electrical power.

Sealing strip "D" and plastic shield "FP" of the KSLT are interrupted within the range of the expansion joint section.

The expansion joints are used if the Powerail length between two curves, switches or other fix points is exceeding 20 meters, or corresponding to a temperature difference (t) of

- $\Delta t \ 20^\circ \text{C} = 100 \text{ m}$
- $\Delta t \ 30^\circ \text{C} = 68 \text{ m}$
- $\Delta t \ 40^\circ \text{C} = 50 \text{ m}$
- $\Delta t \ 60^\circ \text{C} = 34 \text{ m}$
- $\Delta t \ 80^\circ \text{C} = 25 \text{ m}$

Adjacent sketches, Fig. 1 and Fig. 2 show this type of application. Longer runs or a higher difference in temperature require several expansion joints or the telescope section as explained on page no. 18 of this catalog. When in doubt please consult the factory. For arrangements of the fixpoints refer to sketch 1-3. The rest of the Powerail is mounted in sliding hangers.

Feeding

Expansion joints do not interrupt electrical power, so there is no need for an extra feeding. Expansion joints do not influence the voltage drop of a system.

Current collector

No special or extra collector required.

Mounting

The expansion joint section is installed on sliding hangers in the center between two fix points.

The gap dimensions «a» depends on the ambient temperature during installation. See adjacent diagram and example.

Example: Temperature 18°C
«a» = 50 mm

| KBSL / KSL | | KSLT | |
|---------------------|--|---------------------|--|
| Type ⁽²⁾ | Order-No. Power line HS c/w PE | Type ⁽²⁾ | Order-No. Power line HS c/w PE |
| DVK 4/ 40 | 257 054 | — | — |
| DVK 4/ 60 | 252 430 | DVKT 4/ 60 | 254 851 |
| DVK 4/100 | 252 440 | DVKT 4/100 | 254 852 |
| DVK 4/140 | 252 450 | DVKT 4/140 | 254 853 |
| DVK 4/200 | 250 249 | DVKT 4/200 | 250 336 |
| DVK 5/ 40 | 257 687 | — | — |
| DVK 5/ 60 | 252 470 | DVKT 5/ 60 | 254 854 |
| DVK 5/100 | 252 480 | DVKT 5/100 | 254 855 |
| DVK 5/140 | 252 490 | DVKT 5/140 | 254 856 |
| DVK 5/200 | 250 250 | DVKT 5/200 | 250 337 |
| Type ⁽²⁾ | Order-No. Control line SS w/o PE | Type ⁽²⁾ | Order-No. Control line SS w/o PE |
| DVK 4/ 40 | 257 688 | — | — |
| DVK 4/ 60 | 252 460 | DVKT 4/ 60 | 254 857 |
| DVK 5/ 40 | 257 689 | — | — |
| DVK 5/ 60 | 252 500 | DVKT 5/ 60 | 254 858 |

Fig. 1

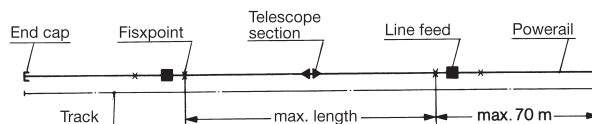


Fig. 2

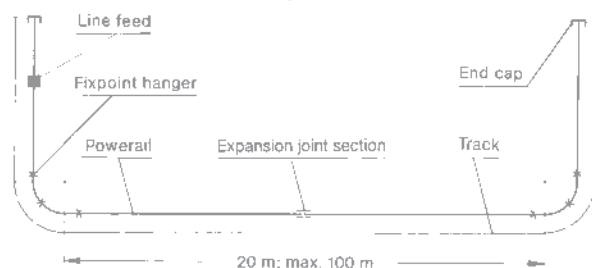
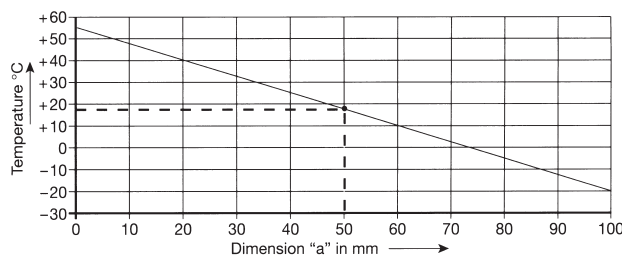
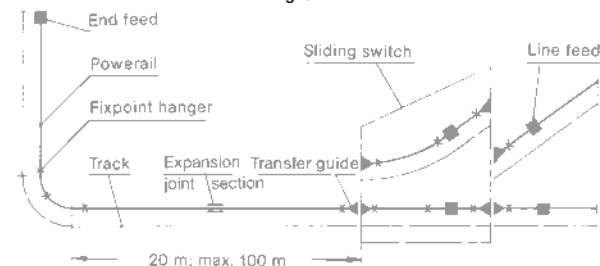


Fig. 3

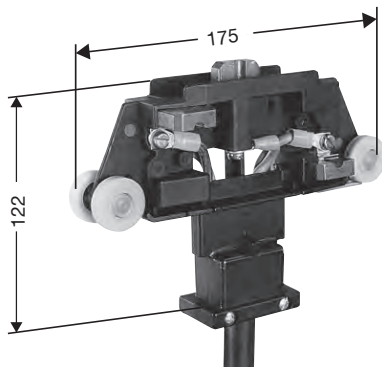


⁽¹⁾ Above sections come ready assembled on 1 m Powerail and are a part of the system length.

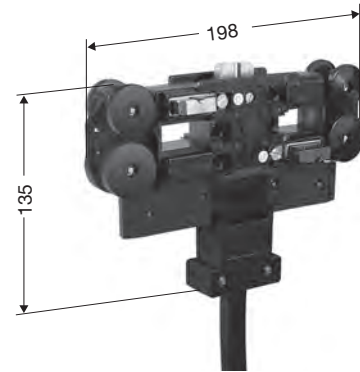
⁽²⁾ Suffix types e.g. DVK 4/60 w/ PE → DVK 4 /60 HS Order-No. 252 430.



COLLECTORS



SKR, 5 pole



SKN, 5 pole

| Type ⁽²⁾ | A ⁽¹⁾ | Order-No. Power line HS c/w PE | Type ⁽²⁾ | A ⁽¹⁾ | Order-No. Steuerstrom ST w/o PE | Poles | Weight kg | Max. speed m/min. | | General |
|---|------------------|--------------------------------------|---------------------|------------------|---------------------------------------|-------|--------------|----------------------|---------------|---|
| | | | | | | | | Nor- mal | Trans- fer | |
| KBSL, KSL & KSLT w/o sealing strip «D» or shielding «FP» | | | | | | | | | | |
| SKR 4/25-1 | 25 | 256 773 | SKR 4/25-1 | 25 | 255 928 | 4 | 0,485 | 100 | – | for straight runs and curves R > 0.6 m/with ball bearing wheels Not to be used for transfer guides and transfer funnels |
| SKR 5/25-1 | 25 | 257 690 | SKR 5/25-1 | 25 | 255 931 | 5 | 0,572 | 100 | – | |
| SKR 4/40-1 | 40 | 255 926 | – | – | – | – | 0,665 | 100 | – | |
| SKR 5/40-1 | 40 | 255 929 | – | – | – | – | 0,795 | 100 | – | |
| SKN 4/40-1 | 40 | 257 130 | SKN 4/25-1 | 25 | 257 170 | 4 | 0,915 | 180 | 80 | for straight runs and curves R > 1.2 m/with ball wearing wheels |
| SKN 5/40-1 | 40 | 257 140 | SKN 5/25-1 | 25 | 257 180 | 5 | 1,045 | 180 | 80 | |
| SKN 4/40 K-1 | 40 | 257 150 | SKN 4/25 K-1 | 25 | 257 190 | 4 | 0,885 | 180 | 80 | for curved runs R 0.6-1.2 m/with ball bearing wheels |
| SKN 5/40 K-1 | 40 | 257 160 | SKN 5/25 K-1 | 25 | 257 200 | 5 | 1,035 | 180 | 80 | |



SKNT, 4pole

| Type ⁽²⁾ | A ⁽¹⁾ | Order-No. Power line HS c/w PE | Type ⁽²⁾ | A ⁽¹⁾ | Order-No. Control line ST w/o PE | Poles | Weight kg | Max. speed m/min. | | General |
|--|------------------|--------------------------------------|---------------------|------------------|--|-------|--------------|----------------------|---------------|---|
| | | | | | | | | Nor- mal | Trans- fer | |
| KSLT with sealing strip «D» or shielding «FP» | | | | | | | | | | |
| SKNT4/40-1 | 40 | 254 861 | SKNT 4/25-1 | 25 | 254 867 | 4 | 0,935 | 100 | 60 | for straight runs and curves R > 1.0 m/with ball bearing wheels |
| SKNT5/40-1 | 40 | 254 862 | SKNT 5/25-1 | 25 | 254 868 | 5 | 1,090 | 100 | 60 | |

Trolley connecting cable 1 m long. Longer cable available. Copper cross section 2.5 mm² per core for 25 A and 4 mm² for 40 A. Longer cable available.

Collectors for higher speed and cleaning trolleys on request.

⁽¹⁾ All ampere data for 60%intermittent duty. For the Powerail types KBSL/KSL/KSLT with CU-Inox conductors consider half of the electrical ampere load.

⁽²⁾ For full Type designation add Power or Control, suffix e.g. SKR 4/25-1 w/ PE → SKR 4/25-1 **HS** Order-No. 256 773

SKR 4/25-1 w/o PE → SKR 4/25-1 **ST** Order-No. 255 928.

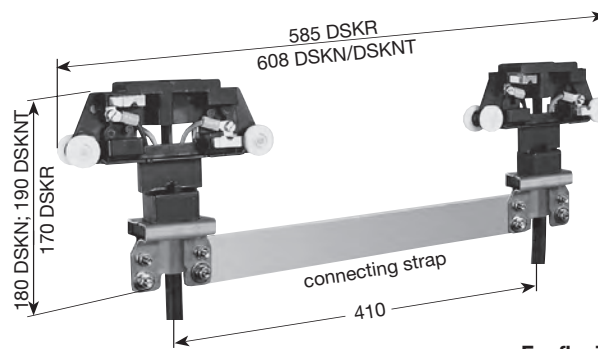


Illustration shows DSKR, 5pole, type F

F = flexible strap connection for curves⁽²⁾
S = rigid bar connection for straight runs

| Type ⁽³⁾ | A ⁽¹⁾ | Order-No. Power line HS c/w PE | Type ⁽³⁾ | A ⁽¹⁾ | Order-No. Control line ST w/o PE | Poles | Weight kg |
|--------------------------|------------------|--------------------------------------|---------------------|------------------|--|-------|--------------|
| KBSL/KSL and KSLT | | | | | | | |
| DSKR 4/50 F-1 | 50 | 257 691 | DSKR 4/50 F-1 | 50 | 256 485 | 4 | 1,430 |
| DSKR 5/50 F-1 | 50 | 257 692 | DSKR 5/50 F-1 | 50 | 256 491 | 5 | 1,600 |
| DSKR 4/50 S-1 | 50 | 257 693 | DSKR 4/50 S-1 | 50 | 256 371 | 4 | 1,210 |
| DSKR 5/50 S-1 | 50 | 257 694 | DSKR 5/50 S-1 | 50 | 256 372 | 5 | 1,384 |
| DSKR 4/80 F-1 | 80 | 256 473 | - | - | - | 4 | 1,790 |
| DSKR 5/80 F-1 | 80 | 256 479 | - | - | - | 5 | 2,050 |
| DSKR 4/80 S-1 | 80 | 255 944 | - | - | - | 4 | 1,570 |
| DSKR 5/80 S-1 | 80 | 256 370 | - | - | - | 5 | 1,830 |
| DSKN 4/80 F-1 | 80 | 257 780 | DSKN 4/50 F-1 | 50 | 257 880 | 4 | 2,230 |
| DSKN 5/80 F-1 | 80 | 257 790 | DSKN 5/50 F-1 | 50 | 257 890 | 5 | 2,550 |
| DSKN 4/80 S-1 | 80 | 258 385 | DSKN 4/50 S-1 | 50 | 258 386 | 4 | 1,900 |
| DSKN 5/80 S-1 | 80 | 258 387 | DSKN 5/50 S-1 | 50 | 258 388 | 5 | 2,200 |

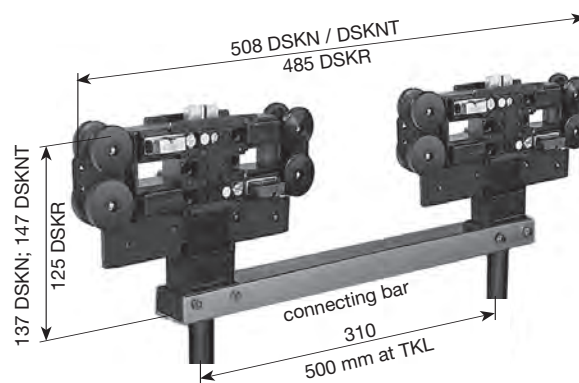


Illustration shows DSKN, 5pole, type S

F = flexible strap connection for curves⁽²⁾
S = rigid bar connection for straight runs

| Type ⁽³⁾ | A ⁽¹⁾ | Order-No. Power line HS c/w PE | Type ⁽³⁾ | A ⁽¹⁾ | Order-No. Control line ST w/o PE | Poles | Weight kg |
|--|------------------|--------------------------------------|---------------------|------------------|--|-------|--------------|
| KSLT with sealing strip «D» or shielding «FP» | | | | | | | |
| DSKNT 4/80 F-1 | 80 | 254 873 | DSKNT 4/50 F-1 | 50 | 254 879 | 4 | 2,330 |
| DSKNT 5/80 F-1 | 80 | 254 874 | DSKNT 5/50 F-1 | 50 | 254 880 | 5 | 2,640 |
| DSKNT 4/80 S-1 | 80 | 258 397 | DSKNT 4/50 S-1 | 50 | 258 398 | 4 | 2,000 |
| DSKNT 5/80 S-1 | 80 | 258 399 | DSKNT 5/50 S-1 | 50 | 258 400 | 5 | 2,320 |

Double collector for 50 A with 2 connecting cables 2,5 mm² per core.

Double collector for 80 A with 2 connecting cables 4 mm² per core.

Trolley connecting cable 1 m long; longer cable available.

⁽¹⁾ All ampere data for 60% intermittent duty. For the Powerail types KBSL/KSL/KSLT with CU-Inox conductors consider half of the electrical ampere load.

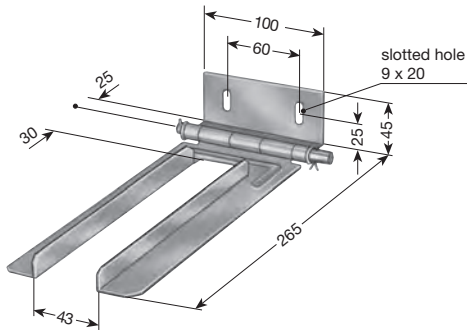
⁽²⁾ Do not use double collectors, but 2 singles for curves with less than 1.2 m radius and for transfer guides more than 45° oblique cut. (see page 12).

⁽³⁾ For full Type designation add Power or Control, suffix e.g. DSKR 4/80 S-1 w/ PE → DSKR 4/80 S-1 **HS** Order-No. 255 944
 DSKR 4/50 S-1 w/o PE → DSKR 4/50 S-1 **ST** Order-No. 256 371.



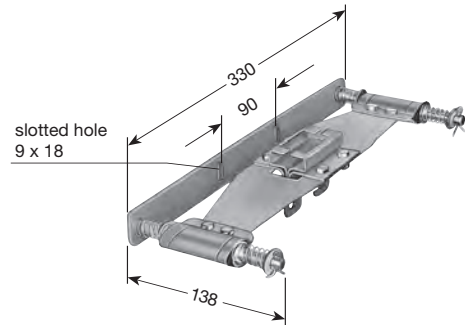
TOW ARMS

for single & double collector⁽²⁾
Mounting dimensions see page 8



| Type | Weight kg | Order-No. |
|----------------------------|-----------|-----------|
| KWS | 0,480 | 250 380 |
| KWS/K⁽¹⁾ | 0,480 | 252 340 |

flexible support type, with single collector
for transfer funnels (see page 14)
Mounting dimensions see page 25



| Type | Weight kg | Order-No. for all types |
|--------------------------------|-----------|-------------------------|
| KFML für SKN u. SKNT | 1,170 | 252 970 |

Spare parts

Powerail

| | Type | KBSL | KSL | KSLT |
|--|------|-----------|-----------|-----------|
| | | Order-No. | Order-No. | Order-No. |
| Joint cap, 150 mm for plug-in joint and bolted joint | | 257 921 | 257 921 | 257 922 |
| Stiffener clamp, 50 mm | | – | 258 797 | 258 798 |
| Stiffener clamp of stainless steel | | – | 258 812 | 258 813 |
| Bolted joint splice w/hardware plug in joint, max. 100 A | | 259 274 | 259 274 | 259 274 |
| Bolted joint 40 - 200 A | | 258 796 | 258 796 | 258 796 |
| Coupling for sealing strip D | | – | – | 258 300 |
| Fastener for sealing strip D | | – | – | 258 432 |
| Peg for plastic shielding FP | | – | – | 280 500 |
| Adapter for new/old style Powerail (bei alter KSL/KSLT) | | 258 822 | 258 822 | 258 822 |
| Mounting trolley for sealing strip D | | – | – | 258 345 |

| Collector | Type | KBSL, KSL und KSLT | | KSLT mit |
|--|------|--------------------|-----------|-----------------------|
| | | SKR | SKN(K) | „D“ oder „FP“ SKNT |
| | | Order-No. | Order-No. | Order-No. |
| Carbon brush phase, incl. brush holder (lateral) | | 257 600 | 254 890 | 254 890 |
| Carbon brush upper fifth pole, incl. brush holder | | 257 600 | 254 891 | 254 891 |
| Carbon brush ground , incl. brush holder (lateral) | | 257 601 | 254 892 | 254 892 |
| Carbon pressure spring, standard (ca. 5 N) | | 258 758 | 258 757 | 258 757 |
| Carbon pressure spring, reinforced (ca. 8,5 N) | | 258 761 | 258 760 | 258 760 |
| Throat part, straight runs (SKN) | | – | 254 893 | – |
| Throat part, for curves (SKN/K) | | – | 254 894 | 254 898 |
| Glider plate | | – | – | 258 370 |
| Trolley wheel (below) | | – | 254 895 | 254 895 |
| Guide roller (above) | | – | 254 903 | 254 903 |
| Connecting strap for double collectors | | 258 379 | 258 379 | 258 379 |
| Connecting bar for double collectors | | 258 430 | 258 431 | 258 431 |
| Attachment clamp KWZL | | – | 254 897 | 254 897 |
| Attachment clamp KWZ | | 250 310 | – | – |
| Cleaning brushes complet set (2 pieces) | | – | 252 851 | 252 851 |

⁽¹⁾ Stainless steel

⁽²⁾ In case of installing 2 Powerail systems in parallel use one towing arm each per collector unit.



Runway Electrification – 40 m

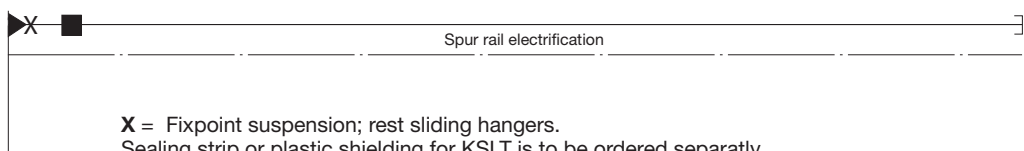
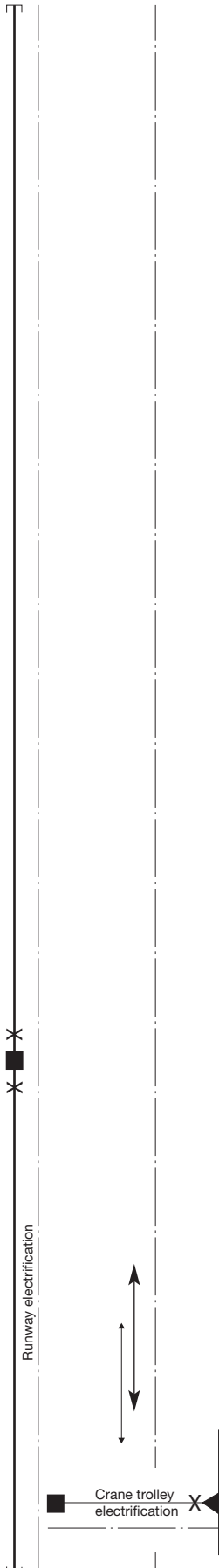
| Qty. | Description | Type | Order-No. | Type | Order-No. |
|------|------------------|-------------------------|-----------|-------------------------|-----------|
| 9 | Powerail, 4 m | KBSL 4/60-4 HS | 253 214 | KSL 4/60-4 HS | 250 004 |
| 1 | Powerail, 3 m | KBSL 4/60-3 HS | 253 213 | KSL 4/60-3 HS | 225 003 |
| 1 | Line Feed, 1 m | KNKS 4/60 HS | 258 268 | KNKS 4/60 HS | 258 268 |
| 10 | Joint Kits | VBK 4 | 257 907 | VBK 4 | 257 907 |
| 2 | Fixpoint Hangers | KF | 258 806 | KF | 258 806 |
| 19 | Sliding Hangers | KGB | 259 001 | KSH | 250 050 |
| 2 | End Caps | MEK | 256 527 | MEK | 256 527 |
| 1 | Double Collector | DSKN 4/80 S-1 HS | 258 385 | DSKN 4/80 S-1 HS | 258 385 |
| 1 | Tow arm | K/WS | 250 380 | KWS | 250 380 |

Crane Trolley Electrification – 12 m

| Qty. | Description | Type | Order-No. | Type | Order-No. |
|------|--|-------------------------|-----------|-------------------------|-----------|
| 2 | Powerail, 4 m | KBSL 4/60-4 HS | 253 214 | KSL 4/60-4 HS | 250 004 |
| 1 | Powerail, 4 m to make up 1 x 3,890 m | KBSL 4/60-4 HS | 253 214 | KSL 4/60-4 HS | 250 004 |
| 1 | End Feed | KEK 4/40-60 HS | 258 421 | KEK 4/40-60 HS | 258 421 |
| 1 | Transfer Guide 0,110 m long | AUN | 257 455 | AUN | 257 455 |
| 2 | Joint Kitsl | VBK 4 | 257 907 | VBK 4 | 257 907 |
| 1 | Fixpoint Hanger | KF | 258 806 | KF | 258 806 |
| 5 | Sliding Hangers | KGB | 259 001 | KSH | 252 844 |
| 1 | Double collector | DSKN 4/80 S-1 HS | 258 385 | DSKN 4/80 S-1 HS | 258 385 |
| 1 | Tow arm | KWS | 250 380 | KWS | 250 380 |

Spur Rail Electrification – 30 m

| Qty. | Description | Type | Order-No. | Type | Order-No. |
|------|--|-----------------------|-----------|----------------------|-----------|
| 7 | Powerail, 4 m | KBSL 4/60-4 HS | 253 214 | KSL 4/60-4 HS | 250 004 |
| 1 | Powerail, 1 m to make up 1 x 0,890 m | KBSL 4/60-1 HS | 253 211 | KSL 4/60-1 HS | 250 001 |
| 1 | Line Feed, 1 m incl. 1 m Powerail | KNK 4/60 HS | 258 258 | KNK 4/60 HS | 258 258 |
| 1 | Transfer Guide 0,110 m lang | AUN | 257 455 | AUN | 257 455 |
| 8 | Joint Kits | VBK 4 | 257 907 | VBK 4 | 257 907 |
| 1 | Fixpoint Hanger | KF | 258 806 | KF | 258 806 |
| 14 | Sliding Hangers | KGB | 259 001 | KSH | 252 894 |
| 1 | End Cap | MEK | 256 527 | MEK | 256 527 |

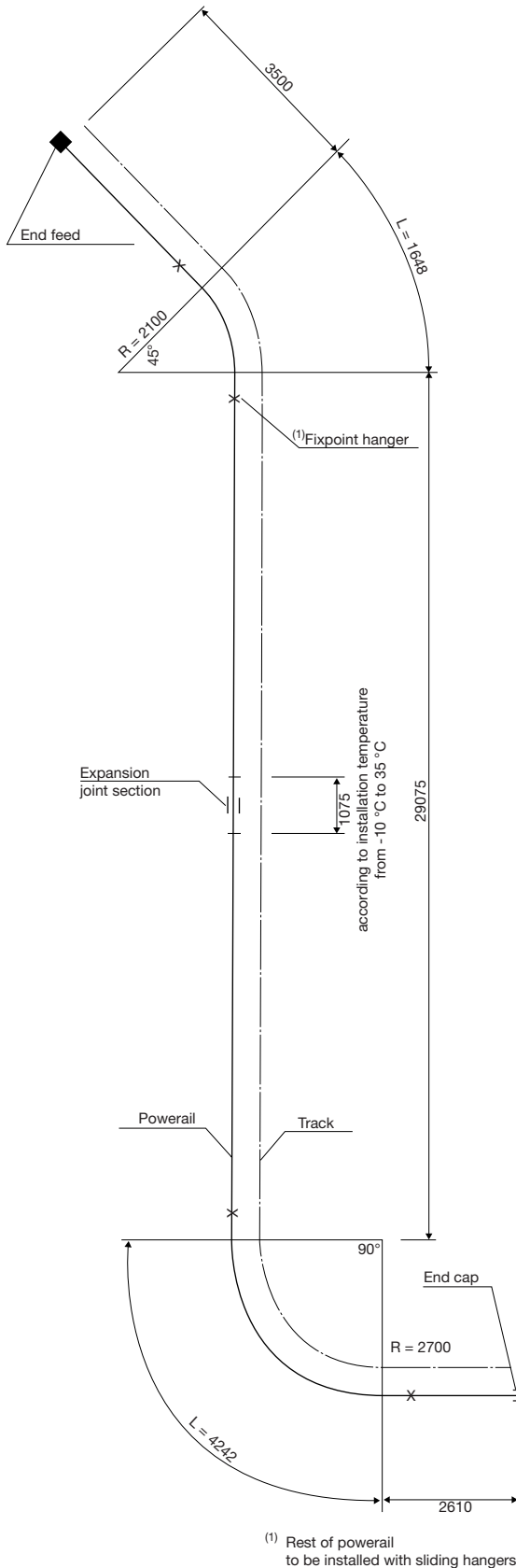


X = Fixpoint suspension; rest sliding hangers.
Sealing strip or plastic shielding for KSLT is to be ordered separately.

Hoist Electrification in curves, per customer's drawing

47,5 m powerail KBSL 4/60 consisting of:

| Qty. | Description | Type | Order-No. |
|------|---|-----------------------|-----------|
| 8 | Powerail, 4 m | KBSL 4/60-4 HS | 253 214 |
| 1 | Powerail, 4 m to make up 1 x 3500 mm | KBSL 4/60-4 HS | 253 214 |
| 2 | Powerail. 3 m to make up 1 x 2610 mm and 1 x 2500 mm | KBSL 4/60-3 HS | 253 213 |
| 1 | Powerail, 2 m for horizontal curve 45°, R = 2100 mm, L = 1648 mm, LLA with 100 mm straight powerail left and right | KSL 4/60-2 HS | 250 002 |
| 2 | Powerail. 3 m for horizontal curve 2 x 45°, R = 2700 mm, L = 2121 mm, LLI | KSL 4/60-3 HS | 250 003 |
| 3 | Surcharge for bending, horizontal | | 251 500 |
| 1 | End Feed | KEK 4/40-60 HS | 258 421 |
| 1 | Expansion Joint | DVK 4/60 HS | 252 430 |
| 14 | Joint Kits | VBK 4 | 257 907 |
| 4 | Fixpoint Hangers | KF | 258 806 |
| 24 | Sliding Hangers | KGB | 259 001 |
| 1 | End Cap | MEK | 256 527 |
| 1 | Collector | SKR 4/40-1 HS | 255 926 |
| 1 | Tow arm | KWS | 250 380 |



47,5 m Powerail KSL 5/60 consisting of:

| Qty. | Description | Type | Order-No. |
|------|---|-----------------------|-----------|
| 8 | Powerail, 4 m | KSL 5/60-4 HS | 250 024 |
| 1 | Powerail, 4 m to make up 1 x 3500 mm | KSL 5/60-4 HS | 250 024 |
| 2 | Powerail. 3 m to make up 1 x 2610 mm and. 1 x 2500 mm | KSL 5/60-3 HS | 250 023 |
| 1 | Powerail, 2 m for horizontal curve 45°, R = 2100 mm, L = 1648 mm, LLA with 100 mm straight Powerail left and right | KSL 5/60-2 HS | 250 022 |
| 2 | Power.. 3 m to make up horizontal curve 2 x 45°, R = 2700 mm, L = 2121 mm, LLI | KSL 5/60-3 HS | 250 023 |
| 3 | Surcharge for bending, horizontal | | 251 500 |
| 1 | End Feed | KEK 5/40-60 HS | 258 422 |
| 1 | Expansion Joint | DVK 5/60 HS | 252 470 |
| 14 | Joint Kits | VBK 5 | 257 908 |
| 4 | Fixpoint Hangers | KF | 258 806 |
| 24 | Sliding Hangers | KSH | 252 894 |
| 1 | End Cap | MEK | 256 527 |
| 1 | Collector | SKN 5/40-1 HS | 257 140 |
| 1 | Tow arm | KWS | 250 380 |



Power supply with support rail for moving machinery

like drilling machines, grinders, screw drivers etc. along assembly lines or above work benches in any type of plant.

No power cables on the floor to cause accidents and no obstruction to personnel by trailing cables.

Containers or baskets carrying bolts and nuts or other hardware for the assembling work can also be supported from and pushed along the carrier rail.

General

The KTW-System consists of a galvanized C-track taking the carrier trolleys or other hook-up elements and the Enclosed Powerail for power supply.

The support carrier is supplied with an attachment plate. Electrical plugs, fuses etc. can be fixed to the plate as per customers' requirements. The carrier is mechanically connected to the collector by a hinge and moved manually. C-track and Powerail are fixed to a support angle.

Powerail

Types KBSL or KSLT (40-200A) are used as power supply with appropriate collector (max. 40 A).

Support rail

corresponds to C-track, cat. 8a, page 2, galvanized.

Support distance

depends on mechanical stress. The max. support distance is 2 m considering a load capacity of 50 kg between hangers. For higher loads the support distance must be reduced correspondingly.

Other combinations are possible, refer to cat. 3a (LSV) or 4b (VKL).

Engineering Data:

Powerail KBSL-KSLT

| | |
|-------|---|
| 40 A | (100% DF) copper conductor 10 mm ² |
| 60 A | (100% DF) copper conductor 15 mm ² |
| 100 A | (100% DF) copper conductor 25 mm ² |
| 140 A | (100% DF) copper conductor 35 mm ² |
| 200 A | (80% DF) copper conductor 50 mm ² |

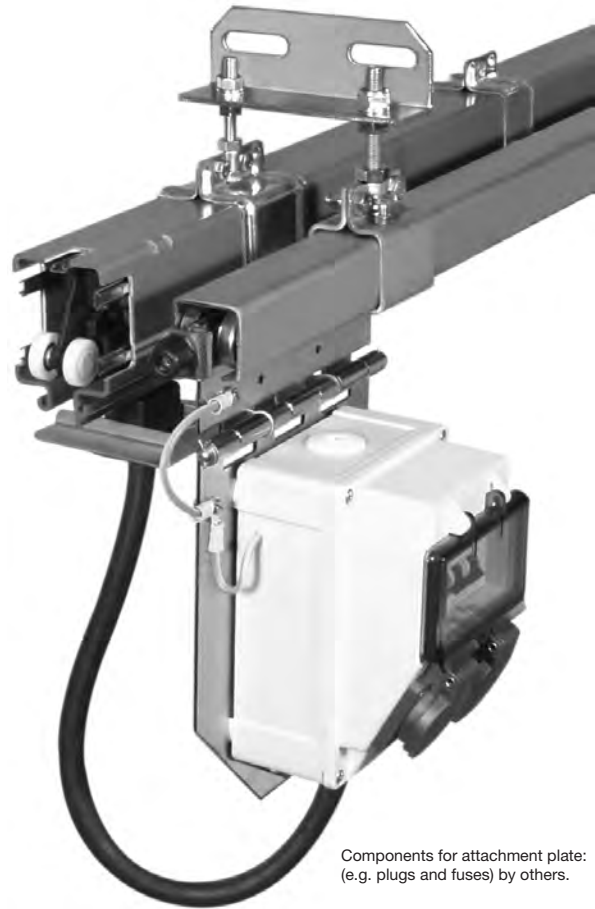
| | |
|-------------------------|------------------------------------|
| Voltage rating: | up to 600 V |
| No. of conductors: | 4 & 5 |
| Std. sections: | 4 m |
| Support distance: | variable up to 2 m |
| Temperature resistance: | -30° C/+60° C |
| Collector rating: | 40 A & multiple (60% DF) |
| Weight: | 1.65 up to 3.35 kgs/m (see page 4) |

C-track S 2

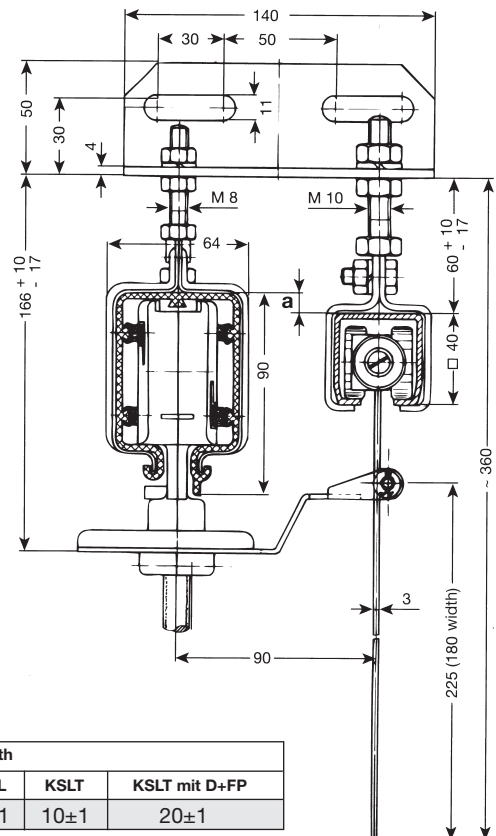
| | |
|---------------------|---------------------|
| Section modulus Wx: | 3.1 cm ³ |
| Moment of inertia: | 6.7 cm ⁴ |
| Material: | Galvanized steel |
| Std. sections: | 4 m |
| Support distance: | variable up to 2 m |
| Weight: | 2.5 kgs/m |

Carrier Trolley

| | |
|--------------------|-----------------|
| Carrying capacity: | up to 50 kgs |
| Weight: | approx. 1.5 kgs |



Components for attachment plate: (e.g. plugs and fuses) by others.



| KTW-Systems with | | | |
|------------------|------|------|---------------|
| | KBSL | KSLT | KSLT mit D+FP |
| Dim a | 10±1 | 10±1 | 20±1 |

Please consider dimensions of line feeds (see page 10 & 11)



KTW-SYSTEM WITH KBSL OR KSLT

Bill of Material

| Ampere capacity A | KTW Systems with Powerail - HS c/w PE | | | | | | | | | | | |
|----------------------|---|-----------|---------------------|-------------------|-----------|---------------------|--|-----------|---------------------|--------------------|-----------|---------|
| | KBSL 4 | | | KBSL 5 | | | KSLT 4 | | | KSLT 5 | | |
| Type ⁽²⁾ | Weight kg/m | Order-No. | Type ⁽²⁾ | Weight kg/m | Order-No. | Type ⁽²⁾ | Weight kg/m | Order-No. | Type ⁽²⁾ | Weight kg/m | Order-No. | |
| | KTW-Systems | | | | | | KTWT-Systems | | | | | |
| 40 | KTW 4/ 40 | 4,926 | 270 607 | KTW 5/ 40 | 5,050 | 270 608 | – | – | – | – | – | |
| 60 | KTW 4/ 60 | 4,960 | 270 000 | KTW 5/ 60 | 5,090 | 270 020 | KTWT 4/ 60 | 4,990 | 270 300 | KTWT 5/ 60 | 5,120 | 270 304 |
| 100 | KTW 4/100 | 5,350 | 270 010 | KTW 5/100 | 5,580 | 270 030 | KTWT 4/100 | 5,380 | 270 301 | KTWT 5/100 | 5,610 | 270 305 |
| 140 | KTW 4/140 | 5,640 | 270 040 | KTW 5/140 | 5,860 | 270 280 | KTWT 4/140 | 5,670 | 270 302 | KTWT 5/140 | 5,890 | 270 306 |
| 200 | KTW 4/200 | 6,240 | 270 050 | KTW 5/200 | 6,460 | 270 070 | KTWT 4/200 | 6,270 | 270 303 | KTWT 5/200 | 6,490 | 270 307 |
| | End feed | | | | | | End feed | | | | | |
| 40-60 | KEK4/40-60 | 0,400 | 258 421 | KEK5/40-60 | 0,400 | 258 422 | KEK 4/40-60 | 0,400 | 258 421 | KEK 5/40-60 | 0,400 | 258 422 |
| | Line Feeds⁽¹⁾ | | | | | | Line Feeds⁽¹⁾ | | | | | |
| 40 | KNK 4/ 40 | 2,464 | 258 255 | KNK 5/ 40 | 2,631 | 258 263 | – | – | – | – | – | |
| 60 | KNK 4/ 60 | 2,600 | 258 259 | KNK 5/ 60 | 2,800 | 258 251 | KNKT 4/ 60 | 2,700 | 259 162 | KNKT 5/ 60 | 2,900 | 259 166 |
| 100 | KNKS4/100 | 3,800 | 258 271 | KNKS5/100 | 4,150 | 258 279 | KNKST4/100 | 3,900 | 259 172 | KNKST5/100 | 4,250 | 259 178 |
| 140 | KNKS4/140 | 4,100 | 258 273 | KNKS5/140 | 4,450 | 259 130 | KNKST4/140 | 4,200 | 259 174 | KNKST5/140 | 4,550 | 259 180 |
| 200 | KNKS4/200 | 5,400 | 254 080 | KNKS5/200 | 5,800 | 254 090 | KNKST4/200 | 5,500 | 254 787 | KNKST5/200 | 5,900 | 254 791 |
| | Collector SKR with carrier trolley & tow arm | | | | | | For Powerail with neoprene sealing strip or plastic shielding: Collector SKNT with carrier trolley & tow arm. | | | | | |
| 40 | STW 4/40 | 2,380 | 270 080 | STW 5/40 | 2,480 | 270 100 | STWT 4/40 | 2,520 | 270 614 | STWT 5/40 | 2,680 | 270 615 |
| 40 | STWL 4/40 | 2,480 | 270 610 | STWL 5/40 | 2,540 | 270 611 | STWTL 4/40 | 2,620 | 270 616 | STWTL 5/40 | 2,780 | 270 617 |

STW and STWL can be used for KSLT without sealing strip and shielding.
Both types specially suitable for systems with side pull.

Supplement for KSLT Powerail

| see pages 2, 5, 6 | Type | Weight kg/m | Order-No. |
|------------------------|------|-------------|-----------|
| Neoprene sealing strip | D | 0,225 | 254 751 |
| Plastic shielding | FP | 0,260 | 254 752 |

Spare Parts List

| Description | Type | Weight kg/m | Order-No. | Description | Type | Weight kg/m | Order-No. |
|-------------------|-------------|-------------|-----------|--|--------------|-------------|-----------|
| C-track | S 2 | 2,490 | 316 634 | Fixpoint for C-track (2 pieces) | FBS 2 | 0,380 | 315 150 |
| Joint | VS 2 | 0,680 | 315 050 | Sliding Hanger for C-track | ABS 2 | 0,370 | 315 140 |
| End cap for track | K 40 | 0,009 | 316 449 | Carrier trolley w/attachment plate (short) | TW | 1,700 | 270 190 |
| Bumper | PS 2 | 0,150 | 317 000 | Carrier trolley w/attachment plate (long) | TWL | 1,800 | 270 609 |
| Mounting bracket | TK | 0,350 | 270 130 | Tow arm for STW/STWTL | TMN | 0,180 | 270 313 |

Spare parts list for Powerail KBSL and KSLT see page 20.
TWL specially suited for systems with side pull.

Example for Ordering

| | Type | Order-No. |
|------------------------------------|----------------------|-----------|
| 100 m KTW-System 4pole | KTW 4/100 HS | 270 010 |
| 1 Line Feed 4pole | KNKS 4/100 HS | 258 271 |
| 20 Collectors c/w carrier trolleys | STW 4/ 40 HS | 270 080 |



KTW-System in production line

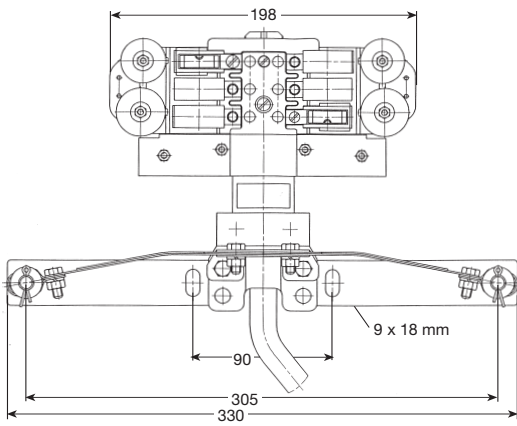


KTW-System for storage/retrieval installations

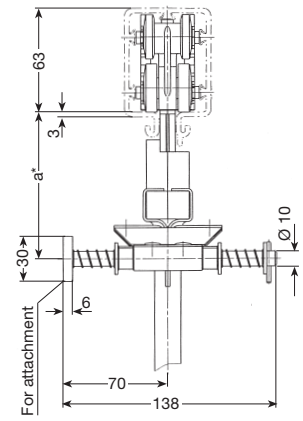
⁽¹⁾ The Powerail section for the line feed ist part of the system lenght.

⁽²⁾ For full type designation add suffix of powerail section see example for ording.

FLEXIBLE TOW ARM CONFIGURATIONS



max. horizontal offset ± 15 mm
 max. vertical offset ± 10 mm



Flexible tow arm KFML with collector SKN

| for Collector | SKN | SKNT |
|-----------------------|-----|------|
| Dim. a ⁽¹⁾ | 95 | 105 |



Powerail for the current supply of a hangar crane.

⁽¹⁾ Adjust standard gauge during installation.



QUESTIONNAIRE

Company: _____ Date: _____

Tel: _____ Fax: _____

E-Mail: _____ Internet: (URL) _____

1. Number of powerail installations: _____

2. Type of equipment to be powered: _____

3. Operating voltage: _____ Volts, Phases: _____, Frequency: _____ Hz
Three phase voltage: AC voltage: DC voltage:

4. Track length: _____

5. Number of powerails: _____ (neutral: _____ control rails: _____ ground rail: _____)

6. Mounted position of powerail:

- Powerail pendant, collector cable facing to the bottom
- Support distance _____ m (max. 2 m)
- Other: _____

7. Number of consumers per system: _____

8. Indoor: Outdoor:

9. Other operating conditions (humidity, dust, chemical influence etc.)

10. Ambient temperature: _____ °C min. _____ °C max.

11. Position and number of feeding points and isolating sections⁽¹⁾: _____

12. Position and number of isolating sections (e.g. for maintenance): _____

13. Brackets required: yes no c/c distance beam /Powerail

14. How are the rails laid out? (Please provide sketch): _____

15. Travel speed: _____

16. Power consumption of the individual consumer loads:
(Please consult table on reverse side) _____

17. Max. Voltage drop from the powerail feed point to the consumer considering starting current:
3% or _____ % referring to nominal voltage

Remarks: _____

⁽¹⁾ For curved tracks, powerail with isolating sections etc., we require sketches to enable us to prepare a quotation.



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Date: _____

| Motor data | Crane 1 | | | | | | Crane 2 | | | | | | | |
|-----------------|----------|-----------------|--------------------|------|------------------|--------------------|------------------------------|----------|-----------------|--------------------|------|------------------|--------------------|------------------------------|
| | Power kW | Nominal current | | | Starting current | | Type of Motos ⁽¹⁾ | Power kW | Nominal current | | | Starting current | | Type of Motos ⁽¹⁾ |
| | | A | cos φ _N | % ED | A | cos φ _A | | | A | cos φ _N | % ED | A | cos φ _A | |
| Hoist motors | | | | | | | | | | | | | | |
| Auxiliary hoist | | | | | | | | | | | | | | |
| Long travel | | | | | | | | | | | | | | |
| Cross travel | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Motor data | Crane 3 | | | | | | Crane 4 | | | | | | | |
|-----------------|----------|-----------------|--------------------|------|------------------|--------------------|------------------------------|----------|-----------------|--------------------|------|------------------|--------------------|------------------------------|
| | Power kW | Nominal current | | | Starting current | | Type of Motos ⁽¹⁾ | Power kW | Nominal current | | | Starting current | | Type of Motos ⁽¹⁾ |
| | | A | cos φ _N | % ED | A | cos φ _A | | | A | cos φ _N | % ED | A | cos φ _A | |
| Hoist motors | | | | | | | | | | | | | | |
| Auxiliary hoist | | | | | | | | | | | | | | |
| Long travel | | | | | | | | | | | | | | |
| Cross travel | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Mark with * those motors which can run simultaneously.
 Mark with Δ those motors which can start up simultaneously.

⁽¹⁾Use: K for squirrel cage motor
 S for slipring motor
 F for frequency controlled motor

Further remarks: _____

Signature: _____



Products and Service

| | Catalog no. |
|--|-------------|
| Powerails | 1 a |
| Battery Charging Systems | 1 b |
| Insulated Powerails U 10 | 2 a |
| Insulated Powerails U 20 - U 30 - U 40 | 2 b |
| Insulated Powerails U 15 - U 25 - U 35 | 2 c |
| Aluminum Enclosed Conductor Systems LSV - LSVG | 3 a |
| Powerail Enclosed Conductor Systems KBSL - KSL - KSLT | 4 a |
| Powerail Enclosed Conductor Systems VKS - VKL | 4 b |
| Powerail Enclosed Conductor Systems MKLD - MKLF - MKLS | 4 c |
| Powerail Enclosed Conductor Systems VKS 10 | 4 d |
| Powerail Enclosed Conductor Systems KBH | 4 e |
| Heavy Enclosed Conductor Systems | 5 |
| Trolley Wire and Accessories | 6 |
| Cable Tenders | 7 |
| Cable Carriers for □ tracks | 8 a |
| Cable Carriers for Flatm Cables on I beams | 8 bF |
| Cable Carriers for Round Cables on I beams | 8 bR |
| Cable Carriers and Accessories for ◇ tracks | 8 c |
| Conductor Cables and Fittings | 8 L |
| Spring Operated Cable Reels | 9 a |
| VAHLE POWERCOM® Digital Transmission Systems | 9 c |
| CPS® Contactless Power Supply | 9 d |
| SMG - Slotted Microwave Guide | 9 e |
| Position Encoding Systems | 9 f |
| Motor Powered Cable Reels | 10 |
| Installations/Commissioning | |
| Spare Parts/Maintenance Service | |

