

CABLE CARRIERS

for \diamond -tracks



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General

VAHLE-Festoon systems support electric cables or hoses for mobile machinery.

The cable carriers contained in this catalog comply with VDE regulations. Diamond tracks are especially well suited for curved installations.

Application

Cable carriers ride on the square bar parallel to the traversing track of the equipment. This arrangement ensures that the total length of equipment (e.g. hoist, crab, trolley, etc.) is used as storage distance for the carriers (see sketch below). The first carrier (lead carrier) is connected to the equipment by an outrigger and towed along the diamond track.

All carriers are connected to each other via the cables or hoses installed. Depending on the cable/hose package, the loop, the speed, the acceleration and the type of curve radii it might be necessary to consider tension relief elements.

Important for proper performance:

- Consider min. permissible bending radii of cables
- Consider a cable loop safety length of 10-15% for straight runs and 20% for curved tracks.

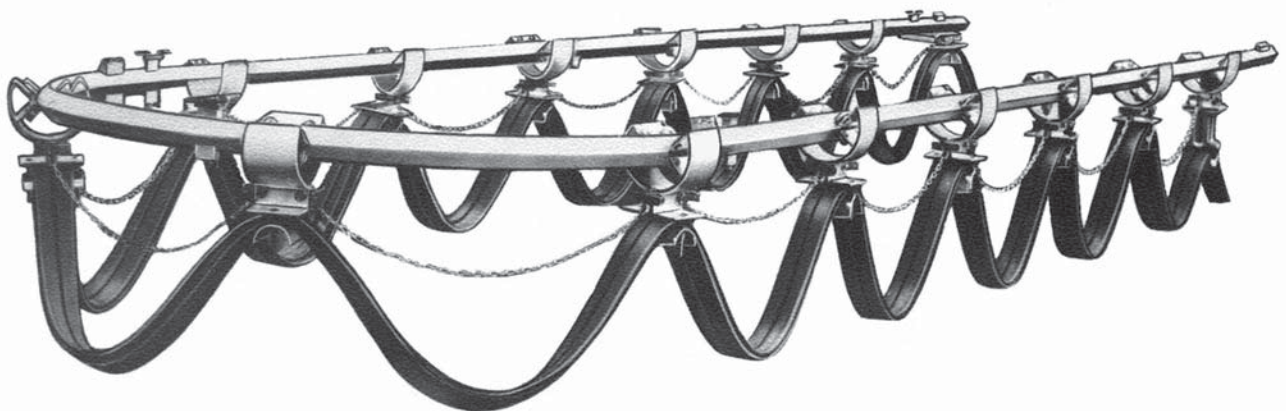
Layout

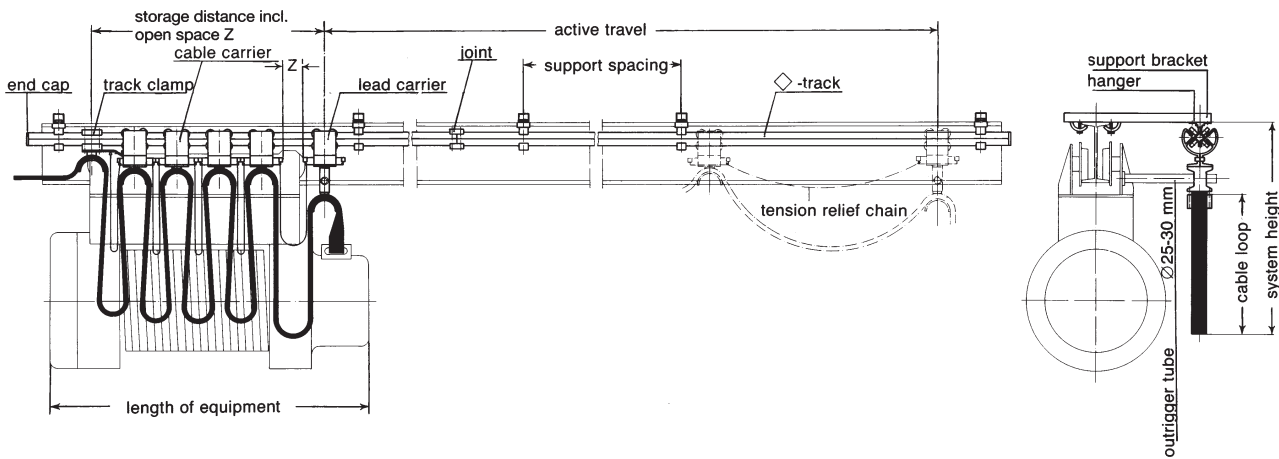
The types of cables are determined according to the required number of conductors and the current load of the equipment (see cat. 8L). The dimensions of cables are the basis for the selection of the carrier type. The length of cable results from active travel distance plus storage distance, extra safety length plus end connections (see installation information).

Consider a multiplier of 0.7 x smallest radius for the maximum permissible cable loop in curved installations. The maximum permissible speed depends on the total amount of curve angles.

For systems specification please refer to the example for ordering in this catalog.

We welcome your inquiry on your particular application. Kindly consult your local Vahle agent or the factory using the questionnaire and submitting a system layout.





Name and Address of Customer: _____

Ref.: _____

1. Type of Application _____

2. Outdoors indoors _____

3. Temperature range _____ ° C min. _____ ° C max. _____

4. Is round or flatform cable envisaged? _____

5. How much space is available for storage? _____ mm

6. Is it possible to extend the track for the festoon cable system in case the length of equipment is insufficient for storage space?
 Yes, by _____ mm, no, not possible.

7. Special operating conditions: _____

8. Length of crane trolley: _____ mm

9. Travel distance of crane trolley: _____ mm

10. Travelling speed: _____ m/min.

11. Max. loop depth: _____ mm

12. Further details: _____

12. Required cables:

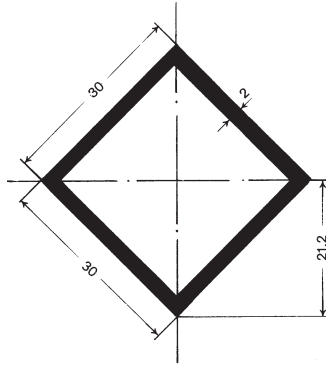
| No. of cables | No. & size of conductors | ø mm | width x thickness of flatform cables |
|---------------|--------------------------|------|--------------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |

Please, submit the completed Questionnaire together with your inquiry. Your system layout drawing will be appreciated in case of curves.



V 3 TRACK AND ACCESSORIES

Track



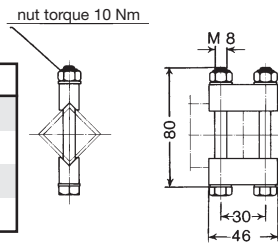
| | |
|---------------------------------|---|
| Type | V 3 |
| Order- No. | 360 196 |
| Order- No. for bending | 360 026 |
| For cable carrier | WV 3 |
| Material | steel |
| Surface protection | galvanized |
| Supply lengths | 6 m |
| Standard support spacing | 2 m (1 m in storage section and curves) |
| Moment in inertia Jx | 2,94 cm ⁴ |
| Section modulus Wx | 1,39 cm ³ |
| Weight | 1,77 kg/m |

Other support centers and permissible area loads

| | | | | | | |
|-----------------|--------|-------|-------|-------|-------|-------|
| Support spacing | 1 m | 1,5 m | 2 m | 2,5 m | 3 m | 3,5 m |
| perm. area load | 111 kg | 74 kg | 47 kg | 30 kg | 21 kg | 15 kg |

Joint clamp

| | |
|--------------------|-----------------|
| Type | VV 3 |
| Order- No. | 360 018 |
| Material | steel/aluminium |
| Surface protection | galvanized |
| Weight | 0,125 kg |



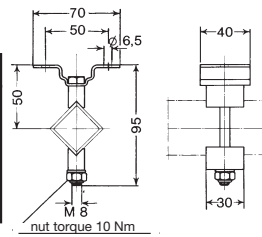
End cap

| | |
|------------|--------------|
| Type | K 30 |
| Order- No. | 360 023 |
| Material | polyethylene |
| Weight | 0,008 kg |



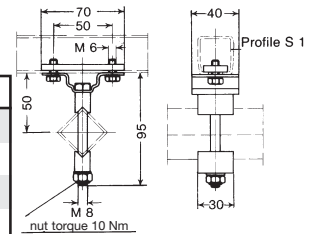
Hanger underhung

| | |
|--------------------|-----------------|
| Type | ADV 3 |
| Order- No. | 360 019 |
| Material | steel/aluminium |
| Surface protection | galvanized |
| Weight | 0,11 kg |



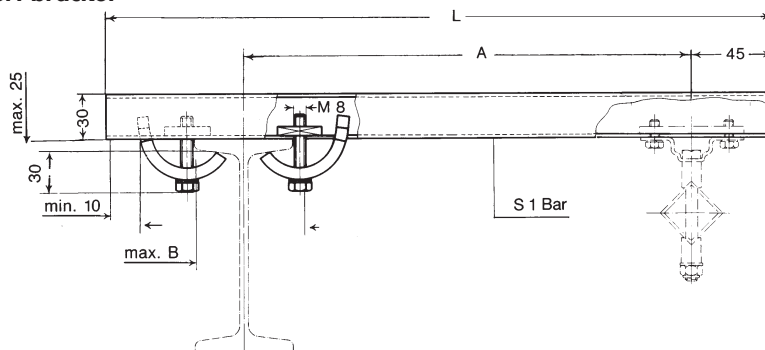
Hanger underhung for HK support

| | |
|--------------------|-----------------|
| Type | AKV 3 |
| Order- No. | 360 020 |
| Material | steel/aluminium |
| Surface protection | galvanized |
| Weight | 0,19 kg |



2 bolts M 6 x 30, order- No. 360 030 to be ordered separately

Support bracket



Dim A depends on width of machinery (e.g. crane trolley). Make sure that hoist wheels have enough clearance.

| Type | Material | Surface protection | Weight kg | A (adjustable) mm | L mm | max. B mm | Order- No. |
|--------|----------|--------------------|-----------|-------------------|------|--------------------|------------|
| HK 200 | steel | galvanized | 0,980 | 200 | 400 | 210 ⁽¹⁾ | 310 220 |
| HK 300 | | | 1,130 | 300 | 500 | 210 ⁽¹⁾ | 310 230 |
| HK 400 | | | 1,290 | 400 | 600 | 210 ⁽¹⁾ | 310 240 |
| HK 500 | | | 1,430 | 500 | 700 | 210 ⁽¹⁾ | 310 250 |

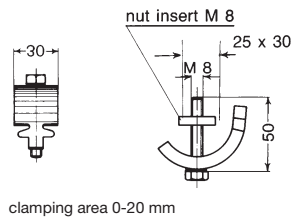
Our delivery: 1 pair of claws and track S1. Hangers AKV 3 to be ordered separately.

ACCESSORIES AND CABLE CARRIERS FOR V 3 TRACK



Claw for HK

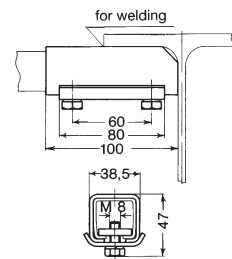
| | |
|--------------------|------------|
| Type | SP |
| Order- No. | 310 390 |
| Material | steel |
| Surface protection | galvanized |
| Weight | 0,200 kg |



Flat nut M 8 separately available
Order- No. 310 955.

Support Attachment for HK

| | |
|--------------------|---------------------|
| Type | AH 1 |
| Order- No. | 310 400 |
| Material | steel |
| Surface protection | Hardware galvanized |
| Weight | 0,460 kg |



Bracket bars and hangers to be ordered separately.

Bracket bars for HK

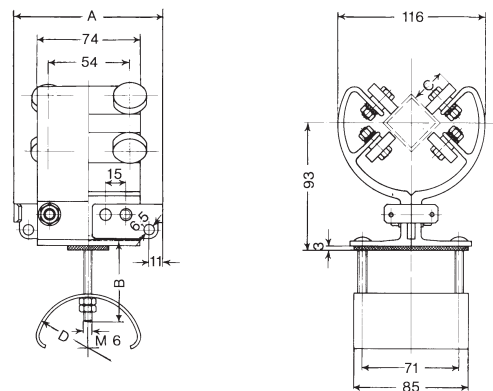
| Type | Material | Surface protection | Weight kg | L mm | Order- No. |
|-----------|----------|--------------------|-----------|------|------------|
| S 1 - 400 | steel | galvanized | 0,620 | 400 | 310 600 |
| S 1 - 500 | | | 0,780 | 500 | 310 610 |
| S 1 - 600 | | | 0,930 | 600 | 310 620 |
| S 1 - 700 | | | 1,090 | 700 | 310 630 |

Cable Carriers for V 3 Track

Engineering data

| Type | WV 3-25 F for indoor use | WV 3-32 F for indoor and outdoor use |
|------------|---|--|
| Wheels | Ball bearings $\varnothing 25$, galvanized Z-sealed Temperature resistance lub grease: -30° to $+125^{\circ}$ C Travelling speed: max. 80 m/min. | Ball bearings $\varnothing 32$, galvanized RS-sealing Temperature resistance lub grease: -30° C to $+125^{\circ}$ C Travelling speed: max. 100 m/min. |
| Material | Carrier body: Aluminium Bumper plates: Steel, galvanized Support saddle: Steel, galvanized Hardware: galvanized | |
| Loop depth | max. 3.5 m with max. cable load (max. 20 kg per carrier) | max. 3.5 m with max. cable load, (max. 25 kg/carrier) |

Cable Carriers for Flatform Cable

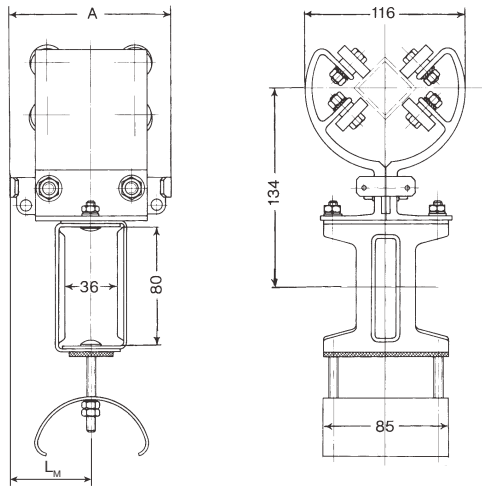


| Type | Cable | max. thickness of individual cable mm | max. clamping capacity in mm height x width | mm | | | | Weight kg | Order- No. |
|------------------|-----------|---------------------------------------|---|-----|----|----|----|-----------|------------|
| | | | | A | B | C | D | | |
| WV 3-25 F/50-110 | flat-form | 7,9 | 30 x 65 | 110 | 60 | 25 | 50 | 0,90 | 360 000 |
| WV 3-25 F/50-140 | | | 45 x 65 | 140 | 80 | | | | 360 001 |
| WV 3-25 F/80-110 | | 10,0 | 15 x 65 | 110 | 60 | | 80 | 0,96 | 360 004 |
| WV 3-25 F/80-140 | | | 30 x 65 | 140 | 60 | | | | 360 005 |
| WV 3-32 F/50-110 | flat-form | 7,9 | 30 x 65 | 110 | 60 | 32 | 50 | 1,05 | 360 002 |
| WV 3-32 F/50-140 | | | 45 x 65 | 140 | 80 | | | | 360 003 |
| WV 3-32 F/80-110 | | 10,0 | 15 x 65 | 110 | 60 | | 80 | 1,11 | 360 006 |
| WV 3-32 F/80-140 | | | 30 x 65 | 140 | 60 | | | | 360 007 |



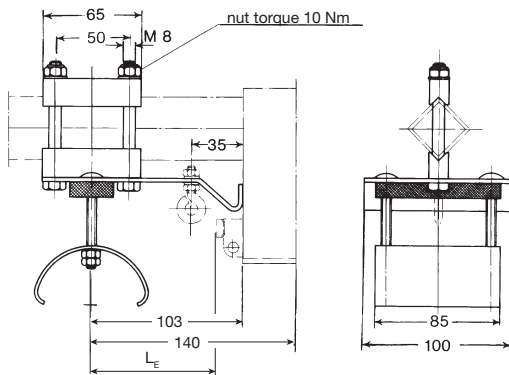
V 3 LEAD CARRIERS AND TRACK CLAMPS3

Lead Carriers for flat form Cable



| Type | for Cable carriers | L _M | Cable | A mm | Weight kg | Order- No. |
|-------------------------|-------------------------|----------------|-----------|------|-----------|------------|
| MV 3-25 F/50-110 | WV 3-25 F/50-110 | 55 | flat-form | 110 | 1,27 | 360 008 |
| MV 3-25 F/50-140 | WV 3-25 F/50-140 | 70 | | 140 | | 360 009 |
| MV 3-25 F/80-110 | WV 3-25 F/80-110 | 55 | | 110 | 1,33 | 360 012 |
| MV 3-25 F/80-140 | WV 3-25 F/80-140 | 70 | | 140 | | 360 013 |
| MV 3-32 F/50-110 | WV 3-32 F/50-110 | 55 | flat-form | 110 | 1,42 | 360 010 |
| MV 3-32 F/50-140 | WV 3-32 F/50-140 | 70 | | 140 | | 360 011 |
| MV 3-32 F/80-110 | WV 3-32 F/80-110 | 55 | | 110 | 1,48 | 360 014 |
| MV 3-32 F/80-140 | WV 3-32 F/80-140 | 70 | | 140 | | 360 015 |

Track clamps c/w bumper for flatform Cable



| Type | for Cable carriers | L _E | Cable | Weight kg | Order- No. |
|------------------|-------------------------|----------------|----------|-----------|------------|
| EV 3-F/50 | WV 3-25 F/50-110 | 85 | flatform | 0,66 | 360 016 |
| | WV 3-25 F/50-140 | 70 | | | |
| | WV 3-32 F/50-110 | 85 | | | |
| | WV 3-32 F/50-140 | 70 | | | |
| EV 3-F/80 | WV 3-25 F/80-110 | 85 | flatform | 0,73 | 360 017 |
| | WV 3-25 F/80-140 | 70 | | | |
| | WV 3-32 F/80-110 | 85 | | | |
| | WV 3-32 F/80-140 | 70 | | | |

V 3 CONTROL CARRIERS AND ACCESSORIES

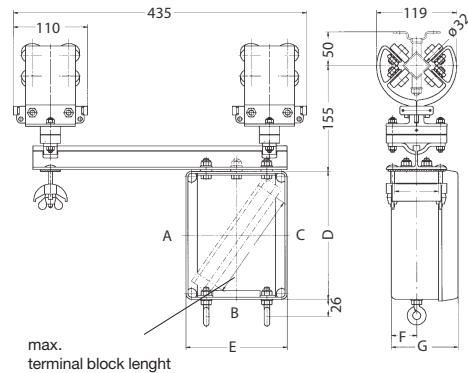


Control Carriers

| Type | D | E | F | G | Weight kg | Order- No. |
|-------------|-----|-----|----|-----|-----------|------------|
| | mm | | | | | |
| ST-V3-32/A1 | 190 | 150 | 38 | 100 | 4,9 | 360 138 |
| ST-V3-32/A2 | 280 | 200 | 62 | 140 | 6,3 | 360 139 |

Ausführung

| | |
|---|------------------------|
| Carrier body: aluminium | Support bar: aluminium |
| Wheels: steel ball bearings | Terminal box: noryl |
| Max. cable load: 25 kg | |
| Temperature resistance: - 30° C to + 100° C | |



Attention: The junction box is to be grounded with terminal block Type EK 2.5 N PA!

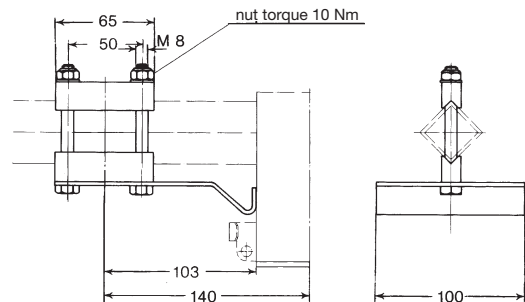
| ST-V3-32/A1 | | | ST-V3-32/A2 | | |
|--------------|--------------------|--------------------|--------------|--------------------|--------------------|
| Cable glands | max. number A-Side | max. number B-Side | Cable glands | max. number A-Side | max. number B-Side |
| M 20 x 1,5 | 6 | 2 | M 20 x 1,5 | 12 | 6 |
| M 25 x 1,5 | 5 | 1 | M 25 x 1,5 | 10 | 6 |
| M 32 x 1,5 | 3 | 1 | M 32 x 1,5 | 8 | 4 |
| M 40 x 1,5 | 2 | 1 | M 40 x 1,5 | 4 | 2 |
| M 50 x 1,5 | 2 | 1 | M 50 x 1,5 | 3 | 1 |
| M 63 x 1,5 | - | - | M 63 x 1,5 | 3 | 1 |

Max. length of Terminal block
 A1 = 130 mm
 A2 = 220 mm

Bumper

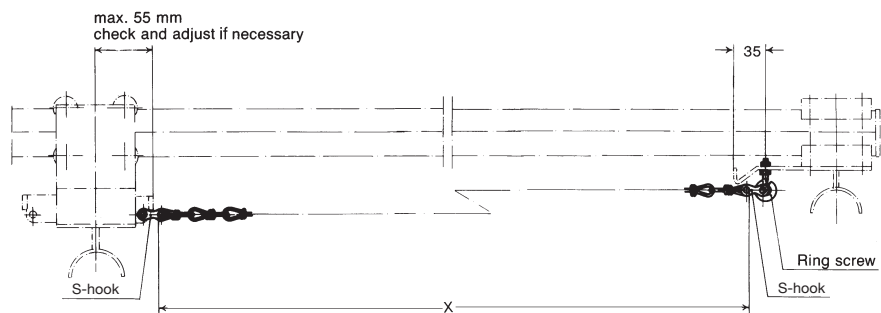
required c/w control carriers

| | |
|------------|-----------------|
| Type | PV 3 |
| Order- No. | 360 021 |
| Material | steel/aluminium |
| Weight | 0,49 kg |



Strain Relief Chain c/w Accessories

| | |
|--------------------|------------|
| Type | ZEK |
| Order- No. | 360 027 |
| Material | steel |
| Surface Protection | galvanized |
| Weight kg/m | 0,075 |



Accessories:

Each piece of chain requires:
 2 S-hooks, Order- No. 360 390.

Each Track clamp requires:
 1 ring screw RS, Order- No. 360 029.

$$X = \frac{(F \times 1,05) + Z}{n + 1}$$

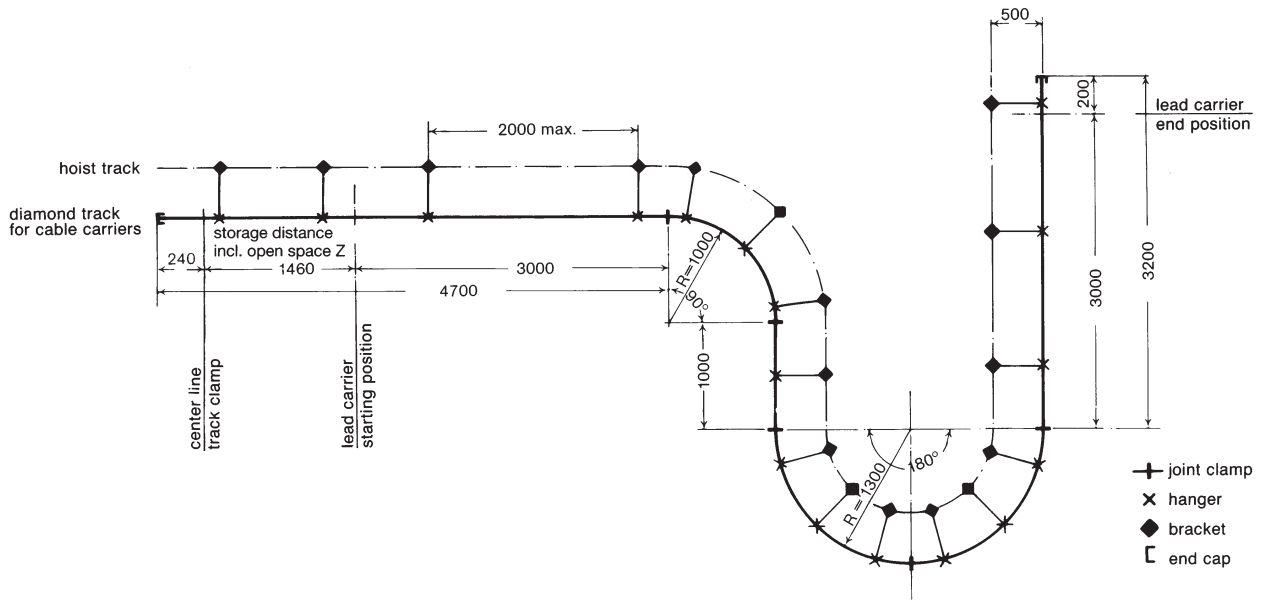
- X = Chain length in mm
- F = Travel distance of lead carrier in mm
- n = Number of cable carriers (w/o lead carriers and end clamps)
- 1,05 = Safety length factor
- Z = Open space in storage section (see page 11, point 5)



EXAMPLE FOR ORDERING

Inquiry: Hoist on track per drawing – Indoor Installation –

| | |
|--|--|
| Travelling speed: | 30 m /min. |
| Cables: | 1 PVC-flatform (K) H 07 VV H 2 - F 4 G 4 (7,1 x 22 mm) 1 PVC-flatform (K) H 07 VV H 2 - F 8 G 2,5 (5,9 x 35,7 mm) |
| max. Cable loop depth: | 1 m (per structural environment) |
| required hookup cable end connections: | 1 x 2 m + 1 x 5 m |



How to select the correct system:

- Calculation of lead carrier's active travel
 $3000 \text{ mm} + \frac{2 \times 1000 \text{ mm} \times \pi \times 90^\circ}{360^\circ} + 1000 \text{ mm} + \frac{2 \times 1300 \text{ mm} \times \pi \times 180^\circ}{360^\circ} + 3000 \text{ mm} = \mathbf{12660 \text{ mm}}$
- Max. permissible cable loop depth (see page 9)
 $0,7 \times R_{\min.} = 0,7 \times 1000 \text{ m} = \mathbf{700 \text{ mm}}$
($R_{\min.}$ = smallest curve radius of the system)
- Checking the travelling speed (see diagram page 9)
 Total of curve angles: $90^\circ + 180^\circ = 270^\circ$
 Smallest curve radius: 1000 mm
 That means okay for max. travelling speed of **30 m/min.**
- Selection of carriers (see page 5) **WV 3-25 F/50-110**
- Find out the quantity of carriers required (see diagram, pages 10/11) **11 Stück**
- Find out the storage distance (see page 10) plus 1 carrier length open space
 $1350 \text{ mm} + 110 \text{ mm} = \mathbf{1460 \text{ mm}}$
- Find out length of each strain relief chain (see formula page 7)
 $X = \frac{(12\ 660 \times 1,05) + 110 \text{ mm}}{12} = 1117 \text{ mm}$
 Total chain length: $12 \times 1117 \text{ mm} = 13404 \text{ mm} \approx \mathbf{ca. 14 \text{ m}}$
- Length of cable required (chain length + storage distance) x cable loop safety length + 7000 mm for hookup cable end connections $(12\ 660 + 1460 \text{ mm}) \times 1,2 + 7000 \text{ mm}$ for connections $\approx \mathbf{ca. 24 \text{ m}}$

Material to order:

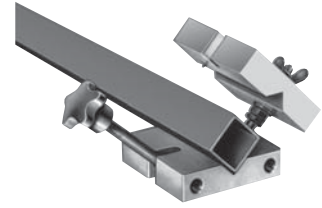
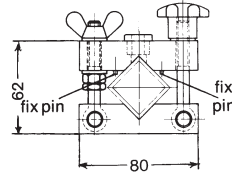
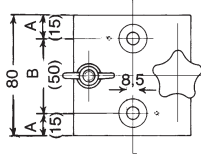
| Qty. | material | Order- No. |
|----------|--|------------|
| 14,555 m | square bar track, type V 3 in 1 x 4.7 m 1 x 1.571 m (curve) 1 x 1 m 2 x 2.042 m (curves) 1 x 3.2 m extras for curved sections 1 x 90° R = 1000, L = 1571 mm 2 x 180° R = 1300, L = 2 x 2042 mm ⁽¹⁾ Surcharge for bending per section | 360 025 |
| 5 | joint clamps VV 3 | 360 018 |
| 2 | end caps KV 3 | 360 023 |
| 17 | hangers AKV 3 | 320 020 |
| 17 | brackets HK 500 | 310 250 |
| 11 | cable carriers Typ WV 3-25 F/50-110 | 360 000 |
| 1 | lead carrier Typ MV 3-25 F/50-110 | 360 008 |
| 1 | track clamp with bumper Typ EV 3-F/50 | 360 016 |
| 14 m | chain ZEK | 360 027 |
| 24 | chain buckles KSS | 360 028 |
| 1 | ring screw Typ RS | 360 029 |
| 24 m | plastic flat cable (K) H 07 VV H 2 - F 4 G 4 (7,1 x 22 mm) | 330 180 |
| 24 m | plastic flat cable (K) H 07 VV H 2 - F 8 G 2,5 (5,9 x 35,7 mm) | 330 160 |
| 2 | cable glands M 32x1,5 for 4 x 4 mm ² | 330 920 |
| 2 | cable glands M 40x1,5 for 8 x 2,5 mm ² | 330 990 |
| 1 | drill-jig BV 3-50/15 | 360 024 |
| 2 | drill $\varnothing 8,5 \times 90^\circ$ | 360 032 |



Drill-jig

(see installation information)

| | |
|------------|--|
| Type | BV 3-50/15 |
| Order- No. | 360 024 |
| Material | aluminium, drill inserts hardened steel |
| Weight | 0,75 kg |

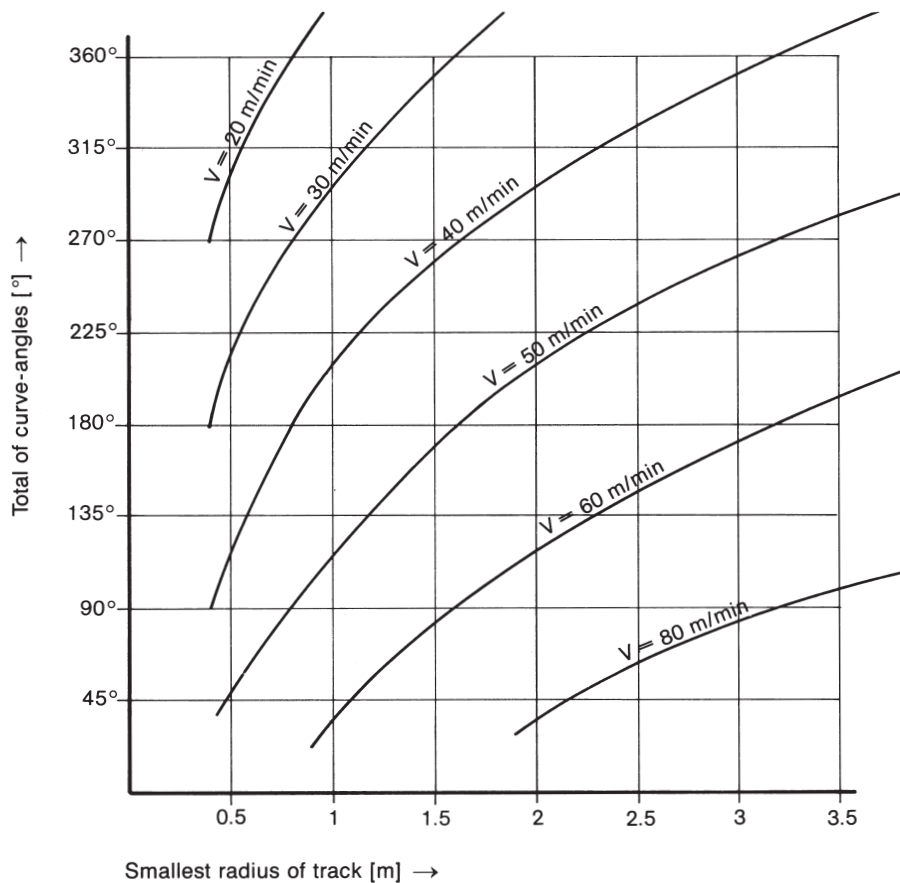


Spiral Driller

| | |
|------------|-------------|
| Type | Ø 8,5 x 90° |
| Order- No. | 360 032 |
| Material | HSS |

Angle of Drill $\leq 90^\circ$.

Diagram for permissible travelling speed in curves



Max. permissible cable loop for installations with curves

| |
|---|
| $= 0,7 \times \text{smallest curve-radius of track layout}$ |
|---|

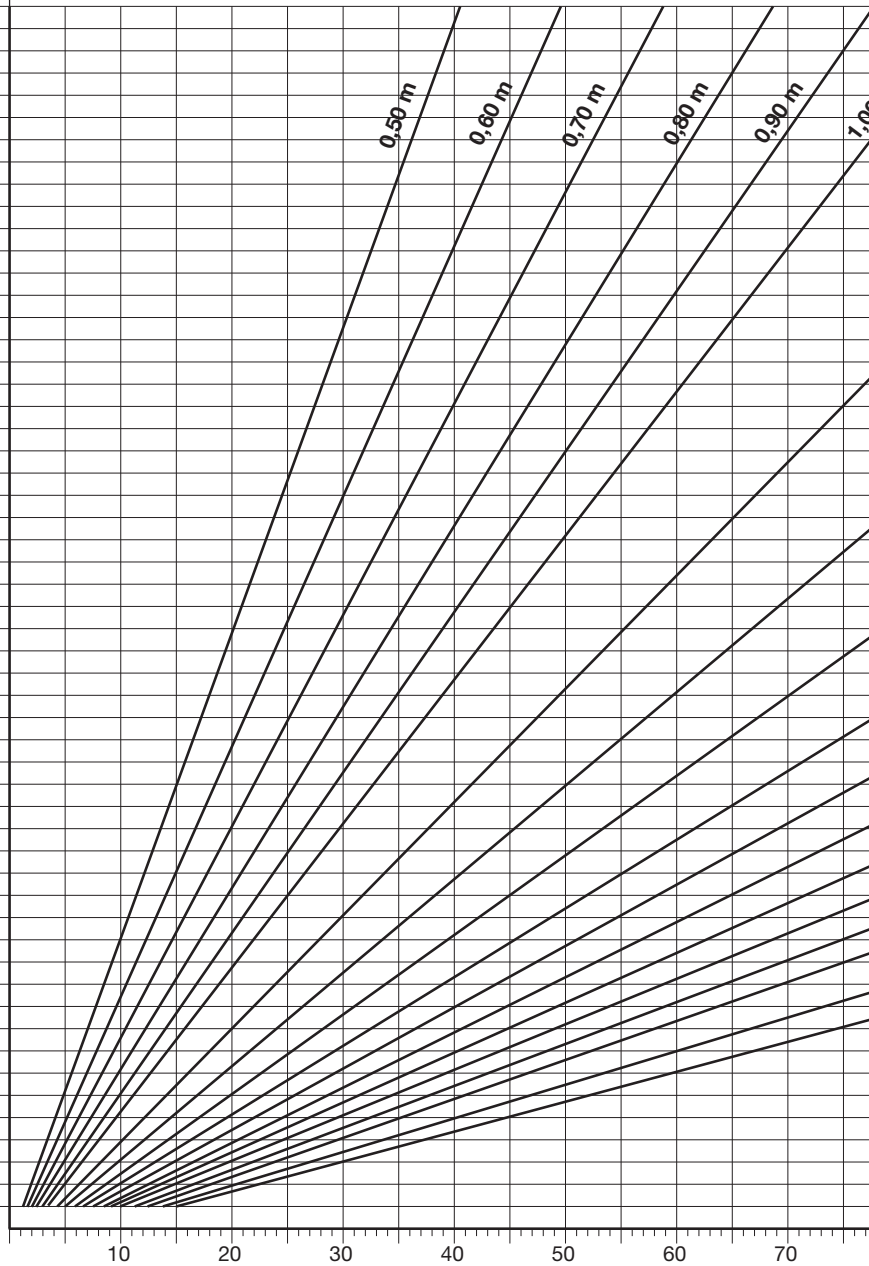


DETERMINING STORAGE DISTANCE AND NUMBER OF CARRIERS

(The Diagram considers a cable loop safety length of 20%)

| Number of carriers | carrier type | | Number of carriers ^l |
|------------------------------------|------------------|------------------|---------------------------------|
| | WV 3-25 F/50-110 | WV 3-25 F/50-140 | |
| | WV 3-25 F/80-110 | WV 3-25 F/80-140 | |
| | WV 3-32 F/50-110 | WV 3-32 F/50-140 | |
| | WV 3-32 F/80-110 | WV 3-32 F/80-140 | |
| storage distance (mm) w/o factor Z | | | |
| 55 | 6190 | 7840 | 55 |
| 54 | 6080 | 7700 | 54 |
| 53 | 5970 | 7560 | 53 |
| 52 | 5860 | 7420 | 52 |
| 51 | 5750 | 7280 | 51 |
| 50 | 5640 | 7140 | 50 |
| 49 | 5530 | 7000 | 49 |
| 48 | 5420 | 6860 | 48 |
| 47 | 5310 | 6720 | 47 |
| 46 | 5200 | 6580 | 46 |
| 45 | 5090 | 6440 | 45 |
| 44 | 4980 | 6300 | 44 |
| 43 | 4870 | 6160 | 43 |
| 42 | 4760 | 6020 | 42 |
| 41 | 4650 | 5880 | 41 |
| 40 | 4540 | 5740 | 40 |
| 39 | 4430 | 5600 | 39 |
| 38 | 4320 | 5460 | 38 |
| 37 | 4210 | 5320 | 37 |
| 36 | 4100 | 5180 | 36 |
| 35 | 3990 | 5040 | 35 |
| 34 | 3880 | 4900 | 34 |
| 33 | 3770 | 4760 | 33 |
| 32 | 3660 | 4620 | 32 |
| 31 | 3550 | 4480 | 31 |
| 30 | 3440 | 4340 | 30 |
| 29 | 3330 | 4200 | 29 |
| 28 | 3220 | 4060 | 28 |
| 27 | 3110 | 3920 | 27 |
| 26 | 3000 | 3780 | 26 |
| 25 | 2890 | 3640 | 25 |
| 24 | 2780 | 3500 | 24 |
| 23 | 2670 | 3360 | 23 |
| 22 | 2560 | 3220 | 22 |
| 21 | 2450 | 3080 | 21 |
| 20 | 2340 | 2940 | 20 |
| 19 | 2230 | 2800 | 19 |
| 18 | 2120 | 2660 | 18 |
| 17 | 2010 | 2520 | 17 |
| 16 | 1900 | 2380 | 16 |
| 15 | 1790 | 2240 | 15 |
| 14 | 1680 | 2100 | 14 |
| 13 | 1570 | 1960 | 13 |
| 12 | 1460 | 1820 | 12 |
| 11 | 1350 | 1680 | 11 |
| 10 | 1240 | 1540 | 10 |
| 9 | 1130 | 1400 | 9 |
| 8 | 1020 | 1260 | 8 |
| 7 | 910 | 1120 | 7 |
| 6 | 800 | 980 | 6 |
| 5 | 690 | 840 | 5 |
| 4 | 580 | 700 | 4 |
| 3 | 470 | 560 | 3 |
| 2 | 360 | 420 | 2 |
| 1 | 250 | 280 | 1 |
| storage distance (mm) w/o factor Z | | | |

1. The active travel distance of the lead carrier to be plotted on the horizontal axis (equals the machinery travelling distance with straight runs; in case of curves see runway calculation on page 8).
2. Draw an upward vertical line from this point.
3. Where this vertical axis upward intersects with the sloping line (loop depth; also see formula on page 9) now draw a horizontal axis to the left.



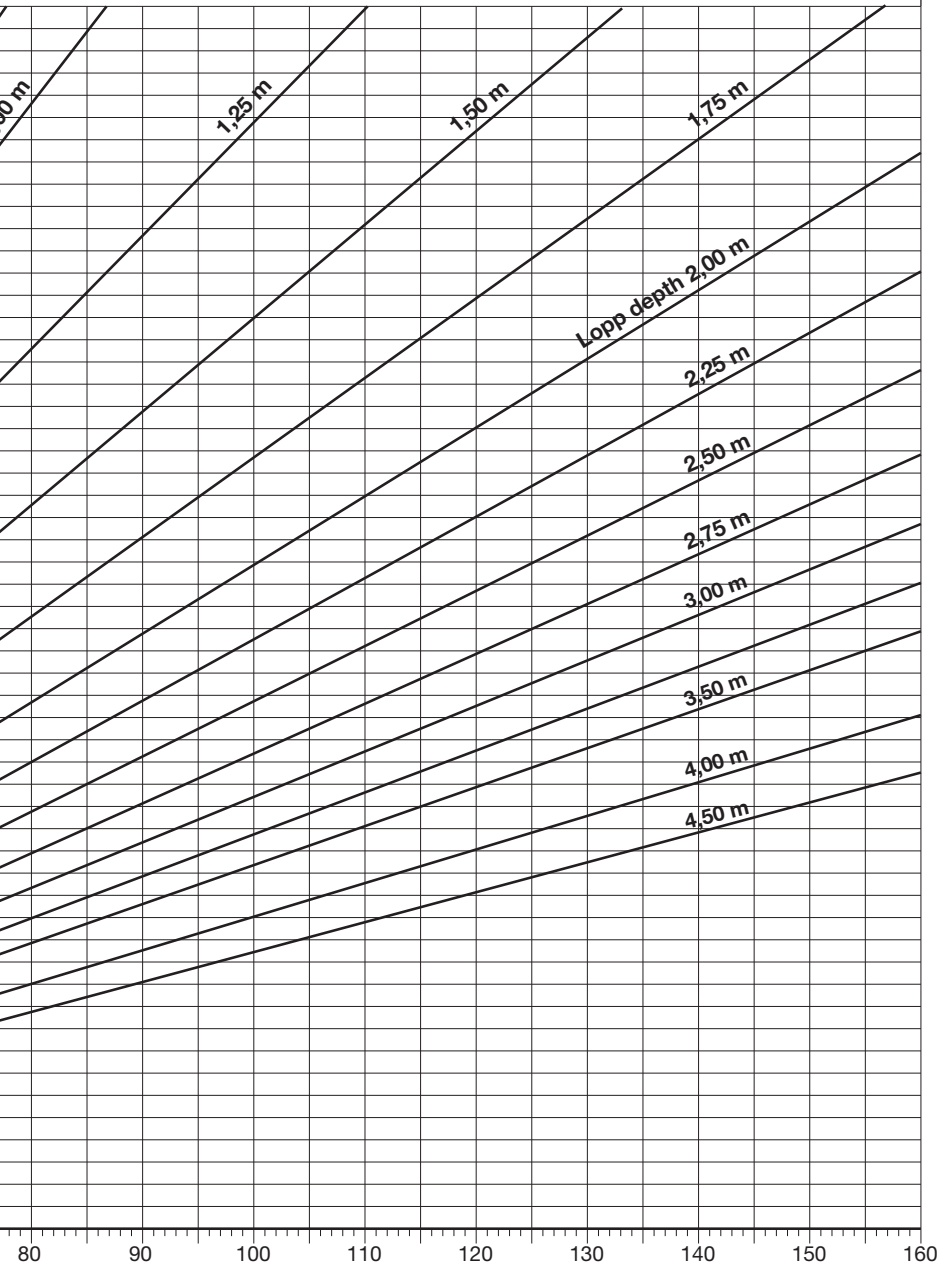
For straight runs → machinery travelling distance in meters
 For curved runs → active travel distance of lead carrier in meters

DETERMINING STORAGE DISTANCE AND NUMBER OF CARRIERS



4. There, at the vertical axis you find the required number of carriers, track clamp and lead carrier not included. Always select the next larger quantity when your line ends up between two numbers.

5. The table on the left shows the required storage distance for the chosen type and number of carriers (considering all carriers, 1/2 of lead carrier and 1/2 of track clamp pushed closely together). Allow approx. one carrier length for the open space Z (see details on page 3).



| Products and Service | Catalog No. |
|--|--------------------|
| 1 Open conductor systems | |
| Open conductor systems | 1a |
| 2 Insulated conductor systems | |
| U 10 | 2a |
| FABA 100 | 2b |
| U 15 - U 25 - U 35 | 2c |
| U 20 - U 30 - U 40 | 2d |
| 3 Compact conductor systems | |
| VKS 10 | 3a |
| VKS - VKL | 3b |
| 4 Enclosed conductor systems | |
| KBSL - KSL | 4a |
| KBH | 4b |
| MKLD - MKLF - MKLS | 4c |
| LSV - LSVG | 4d |
| 5 Contactless power system | |
| Contactless power system (CPS®) | 5a |
| 6 Data transmission | |
| VAHLE Powercom® | 6a |
| Slotted Microwave Guide (SMG) | 6b |
| 7 Positioning systems | |
| VAHLE-APOS® | 7a |
| 8 Festoon systems and cables | |
| Festoon systems for □- tracks | 8a |
| Festoon systems for flat cables on I- tracks | 8b |
| Festoon systems for round flat cables on I- tracks | 8c |
| Festoon systems for ◇- tracks | 8d |
| Cables | 8e |
| 9 Reels | |
| Spring operated cable reels | 9a |
| Motor powered cable reels | 9b |
| 10 Others | |
| Battery charging systems | 10a |
| Heavy enclosed conductor systems | 10b |
| Tender | 10c |
| Contact wire | 10d |

Assemblies/Commissioning

Spare parts/Maintenance service



| Products and Service | Catalog No. |
|--|-------------|
| 1 Open conductor systems | |
| Open conductor systems | 1a |
| 2 Insulated conductor systems | |
| U 10 | 2a |
| FABA 100 | 2b |
| U 15 - U 25 - U 35 | 2c |
| U 20 - U 30 - U 40 | 2d |
| 3 Compact conductor systems | |
| VKS 10 | 3a |
| VKS - VKL | 3b |
| 4 Enclosed conductor systems | |
| KBSL - KSL - KSLT | 4a |
| KBH | 4b |
| MKLD - MKLF - MKLS | 4c |
| LSV - LSVG | 4d |
| 5 Contactless power system | |
| Contactless power system (CPS®) | 5a |
| 6 Data transmission | |
| VAHLE Powercom® | 6a |
| Slotted Microwave Guide (SMG) | 6b |
| 7 Positioning systems | |
| VAHLE APOS® | 7a |
| 8 Festoon systems and cables | |
| Festoon systems for □- tracks | 8a |
| Festoon systems for flat cables on I- tracks | 8b |
| Festoon systems for round flat cables on I- tracks | 8c |
| Festoon systems for ◇- tracks | 8d |
| Cables | 8e |
| 9 Reels | |
| Spring operated cable reels | 9a |
| Motor powered cable reels | 9b |
| 10 Others | |
| Battery charging systems | 10a |
| Heavy enclosed conductor systems | 10b |
| Tender | 10c |
| Contact wire | 10d |

Assemblies/Commissioning

Spare parts/Maintenance service



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ELECTRIFICATION SYSTEMS

| Products and Service | Catalog No. |
|--|--------------------|
| 1 Open conductor systems | |
| Open conductor systems | 1a |
| 2 Insulated conductor systems | |
| U 10 | 2a |
| FABA 100 | 2b |
| U 15 - U 25 - U 35 | 2c |
| U 20 - U 30 - U 40 | 2d |
| 3 Compact conductor systems | |
| VKS 10 | 3a |
| VKS - VKL | 3b |
| 4 Enclosed conductor systems | |
| KBSL - KSL - KSLT | 4a |
| KBH | 4b |
| MKLD - MKLF - MKLS | 4c |
| LSV - LSVG | 4d |
| 5 Contactless power system | |
| Contactless power system (CPS®) | 5a |
| 6 Data transmission | |
| VAHLE Powercom® | 6a |
| Slotted Microwave Guide (SMG) | 6b |
| 7 Positioning systems | |
| VAHLE APOS® | 7a |
| 8 Festoon systems and cables | |
| Festoon systems for □- tracks | 8a |
| Festoon systems for flat cables on I- tracks | 8b |
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| Festoon systems for ◇- tracks | 8d |
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| Motor powered cable reels | 9b |
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| Battery charging systems | 10a |
| Heavy enclosed conductor systems | 10b |
| Tender | 10c |
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Assemblies/Commissioning

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