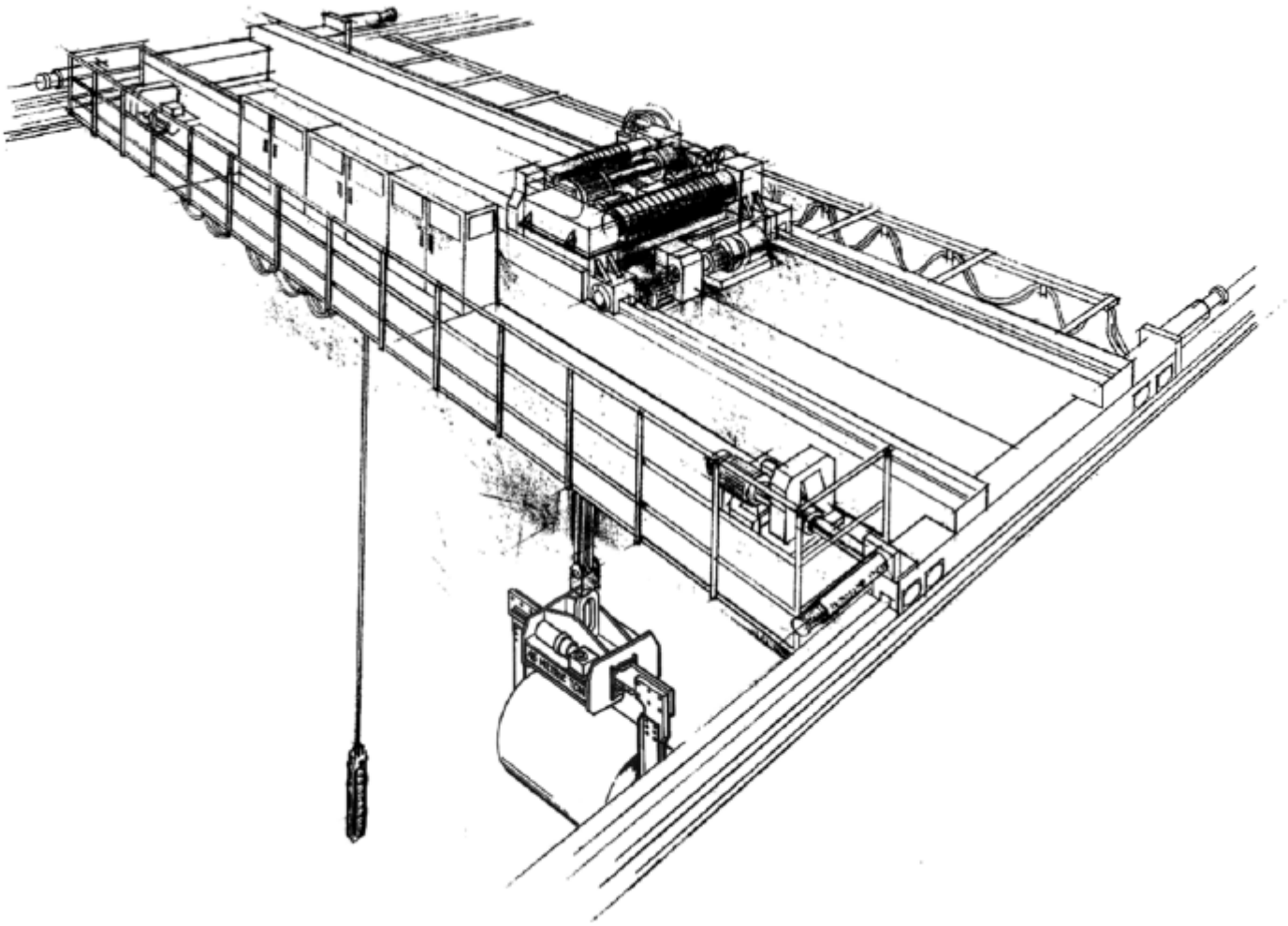

FABA

Conductor Bar System

Standard Components

MAGNETEK
UNCOMMON POWER

Electromotive Systems

publication #FABASC-04 1/1/04
Part Number: 000-2201

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FABA 100 Introduction

Introduction

FABA is designed to work with systems of all types for continuous flow production, such as monorails, workstations, automated systems and is the lifeline for Monorail Systems. The rapid growth of just-in-time production and delivery practices has increased demand for more productive, continuous workflows. To meet this demand, Electromotive Systems by MagneTek offers FABA-100, the compact conductor rail for today's electrified monorail systems.

Designed to ensure maximum protection against accidental electrical contact, the conductor rail system is enclosed in impact-resistant PVC housing which is non-flammable and chemically resistant against most volatile materials. The system provides further security through the use of sturdy plastic hangers and collector arm components. Plus, conductor rails are available in different colors to provide visual identification of power, ground, neutral, communications and other pathways for safe and efficient trouble-shooting. FABA meets European safety standards for finger-safe construction.

FABA's specially designed, compression spring-loaded collector shoes won't jump out of the rails as other designs allow. This ensures continuous electrical contact and maximum load control. FABA also provides reliable performance in both indoor and outdoor applications. And, since FABA does not require chains, belts, or other moving parts, it virtually eliminates the need for maintenance. Even our collector shoes can provide thousands of hours of use before replacement is required.

Installation is easy, with parts that fit together in a simple, intuitive way. FABA provides flexibility; taking power up, down, under, over, around- wherever it's needed in virtually any direction, level, or work area imaginable. FABA use ranges from carrier only applications to part of a fully automated, computer controlled system managing multiple workloads simultaneously.

Since the FABA 100 system consists of components that are assembled on-site and are not factory pre-assembled systems, care should be taken when the installation is very elaborate or special requirements are to be considered. This publication is intended to outline the general requirements for most standard applications. Applications and conditions outside of those described here should be taken under advisement and consultation with the factory is recommended. All generally accepted technical and safety rules are to be observed during the planning, installation and operation of this system.

General Information

Dependable and proven conduction of current. Assured transmission of control commands. Guaranteed high operating readiness - no cable failures. Extremely low in care and maintenance. The various systems are compatible with each other. The orange color is optically attractive and signalizes an "Attention - step back".

- Individual conductor rails. Each conductor rail is individually covered with an insulating sleeve.
- Protection of all live parts against accidental contact. IP 2x rating (installation always outside the manual area for potentials above 50 V alternating- or 120 V direct current).
- Conductor rails may be strung to arbitrary 4-pole systems.
- The rail center distance is variable.
- Number of poles is unlimited.
- Individual current conductors are fastened to the equipment.
- Traveling speeds up to 400 meter per minute (on occasions even higher).
- Reliable and proven electric power-, control command- and data transfer.
- Permissible continuous current (at 100% DC) FABA 100 = 100 Amp.
- Permissible operating voltage up to 1000 V.
- For continuous ambient temperatures from - 30°C to + 55°C for the standard insulation
  -30°C to + 80°C for the heat-resistant insulation.
- Installation in dry interior spaces; with additional measures in damp, wet interior spaces and outdoors.
- Possible arrangement of the conductor surface down or sideways.
- The rail center distance is 15 mm.
- The single current collectors for permissible continuous currents up to 50 A are fastened to the mobile equipment.
- Computer-aided data may be transferred simultaneously and reliably to several mobile carriers via the conductor rails.

For all operating equipment data transfer may be carried out flawlessly during standstill as well as for travelling speeds up to 20 m/sec during unidirectional traffic as well as during reversing traffic. Please refer to Section IS 100 D for more information about Data Transfer. For all other applications, please consult the factory.

Typical applications

Electric monorails * Light girder cranes, longitudinal and traversing travel * shelve systems * machine tools, automated assembly lines * devices, robotic movement (even three-dimensionally) through extended and / or work areas very rapidly * Slip rings with arbitrary number of poles, from a diameter of 400 mm.

Table 1: Technical Data - FABA 100

Metal rail	Cross - section	24 mm²
	Material	copper
Permissible continuous current : (100 % Duty cycle)	Standard Insulation to 35°C ambient temp	100 Ampere
	Heat resistant-Insulation to 55°C ambient temp.	100 Ampere
Resistance of metal rails at ambient temperatures to 35°C:	For alternate current (50 Hz), impedance, 15 mm center distance	Z = 0.00078 Ohm/m
	For direct current	R = 0.00077 Ohm/m
Coefficient of linear expansion for the conductor rail		$\alpha = 17 \cdot 10^{-6}$ [K^{-1}]
Conductor rail :	Number of poles	Unlimited
	length	3 meter and 5 meter
	Hanger distance	Straight sections maximum 0.8 meter Bends maximum 0.4 meter
	Center distance minimum	15 mm
	Bending radius possible on site“	Minimum 500 mm, in all directions
Insulating sleeve:	Color for standard insulation	Current conductor rails orange Ground conductor rails yellow with green stripe
	Color for heat resistant insulation	Current conductor rails black Ground conductor rails green with continuous yellow stripe
	Same lengths as metal rail	Easy shortening "on the site" possible
	Material	Standard design: hard PVC. Heat resistant design: heat resistant hard PVC
	Combustibility	Flame-resistant, self-extinguishing
Current collector:	Number of poles	from 1 to multi-poles arbitrarily selected
	System	Individual design (each "operates" on its own)
	Each conductor rail (current/data/ground)	Basically only 1 current collector required
	Permissible continuous current (at 100 %) at 35°C ambient temperature	One-arm design = 16 c.e.. 20 Amp Parallel-arm-design = 20, 30, 40, 50 Amp
	Fastening to the operating equipment	All neighboring collectors attachable in series
	Operating area	One-arm design, stroke ± 15, swivel ± 20 mm One arm small, stroke ± 8, swivel ± 8 mm Parallel-arm, stroke ± 15, swivel ± 20 mm Parallel-long-arm, stroke ± 30, swivel ± 50 mm
	Collector shoe	The length of the collector shoe bridges switch-junctions, expansion points and similar separations
	Collector shoe composition	Copper graphite, silver containing carbon for data transfer

Table 1: Technical Data - FABA 100

Complete system	Permissible operating voltage	Up to 1000 V
	Travelling speed	Up to 400 meters per minute (higher possible)
	Application	Indoors; outdoors with additional cover
	Arrangement of the rail conductor surface	Down or sideways
	Protection against accidental contact with live parts	IP 2x
	Permissible continuous ambient temperature	- 30°C to + 55°C for standard insulation - 30°C to + 80°C for heat-resistant insulation
	Expansion points	Yes; at arbitrary locations by caps
	Electrical separation points	Yes; at arbitrary locations by caps
	Mechanical separation	Yes, with caps on switches; Pick up guides for extended separations for parallel-arm conductors
	Chemical resistively	Largely resistant to gasoline, oils, dilute bases and dilute acids
	Combustibility (insulation casing)	UL 94 V-O

Track Layout

1. For the desired compact installation of the system, special attention is to be paid that the conductor rails are installed so as not to impede the free movement of the current collectors moving through the complete installation, including bends etc. .. please refer to "Operating Range of the Current Collector".
2. The system is suitable for a back and forth operation. Special precautions do not have to be taken.
3. Very careful planning and installation is a prerequisite for travelling speeds above 400 meter per minute, please consult the factory.
4. Radii of more than 0.5 meter for conductor rails are possible in all directions, hence, horizontal and vertical bends and inclines can be released. Rails with radii of less than 0.5 m can only be bent at the factory.
5. Mechanical interruptions of the conductor rails with transfer caps (e.g. for pivot and sliding switches, shunting stages, or hoist stations) have to be installed correctly so that the permissible displacement of the opposing caps is not exceeded while loading just one end of the switch.

Environment

1. FABA 100 may be installed in dry interior applications without restrictions.
   a) In damp areas, Conductor Rail centers are to be 30 mm and installed hanger clamp height to be 40 mm to prevent current creepage.
   b) Deflect dripping water with covers in otherwise dry interior spaces.
   c) In areas where water jets are in operation, the rails are to be installed with appropriate deflectors and may only be sprayed when turned off.
2. For outdoor installations, the rails are to be installed with an additional cover.
3. Do not employ in areas of explosion hazard.
4. Conductor rails which are planned for areas where external mechanical demands (e.g. use of ladders) are to be expected have to be provided with covers (at least in part).
5. Cover from external, heavy showers of sparks (welding or grinding sparks).
6. Consult the factory for applications with extreme chemical influences.
7. The system cannot be heated.

Manual Operation

1. Without limitations for operating voltages up to 60 V alternating or 120 V direct current.
2. Above operating voltages of 60 V alternating or 120 V direct current:
   a) Without limitations in electrical / locked electrical operating locations.
   b) In general operating locations, a suitable distance from personnel is to be observed. Safety distance / manual operation is 2.5 m in height and 1.25 m to the side, measured from the floor.
   c) Additional safety measures should be taken if there is danger of touching the live conductor surface with thin, conducting objects (e.g. ends of wires).
   d) Please contact the factory for transmission of voltages above 1000 V.
3. Final temperatures up to 75°C may develop for standard insulation or of up to 100°C for heat-resistant insulation.

Electrical Transmission of Power

Important considerations, for most applications:

1. Current capacity of the conductor rails - refer to Table 1 :

   In determining the total current for all uses please consider the following :
   a) How often or at which points is the system to be power supplied ?
   b) What will be electrified, how large is the duty cycle (DC) ?
   c) How high is the expected maximum ambient temperature ?

Table 2: Conductor Rails

		Conductor Rails Permissible Continuous Current (A) for 100% Duty cycle, for continuous ambient temperature (°C) up to									
steel	Heat-resistant	40	40	40	40	40	35	30	25	20	15
	Standard	100	90	80	70	60	--	--	--	--	--
copper	Heat-resistant	100	100	100	100	100	90	80	70	60	50

2. Potential drop
   a) The potential drop for conductor rails is in general not to be more than 3 %.
   b) Consider how often or at which points the system is to be power supplied.
   c) The resistance of the conductor rails increases with higher ambient temperatures - refer to table 3. These values were determined under continuous currents of 100 A for FABA 100.

Table 3: Conductor Rails

		continuous ambient temperature(°C) up to Resistance (Ohm/km)					
Alternate current (impedance); 50 Hz		35	40	50	60	70	80
FABA 100	15 mm center separation	0.78	0.83	0.95	1.05	1.18	1.34
	Direct current	0.77	0.82	0.94	1.04	1.16	1.32

3. Conductor rail for the ground conductor:
   a) Whether and when the ground conductor rail is employed is to be determined for the individual installation (i.e. users with small protective voltage? User protectively insulated?
   b) Ambient temperature should be an important consideration in determining whether to select standard or heat-resistant insulation.
   c) Do not use ground conductor rails for control purposes
   d) The ground conductor may be placed as desired, however we suggest to locate it in the front if there is danger of contact.
4. Current capacity of the current collectors - refer to table 4
   a) The ambient temperature has to be considered.
   b) In **principle only one current collector** is required per conductor rail for the transmission of power

Table 4: Current collector

Permissible continuous current [A] for 100 % Duty cycle for continuous ambient temp. (°C) up to		35	40	50	60	70	80
One-arm current collector		20	20	16	12	8	4
	small; with cable 0.75 mm²	10	10	8	6	4	2
	with cable 1.5 mm²	16	16	12	9	6	3
Parallel-arm collector with cable	1.5 mm²	20	20	16	12	8	4
	2.5 mm²	30	30	25	20	15	10
	4.0 mm²	40	40	33	26	20	14
	6.0 mm²	50	50	42	34	26	18
Parallel-arm collector, long arm	1.5 mm²	20	20	16	12	8	4
with cable	2.5 mm²	30	30	25	20	15	10
	4.0 mm²	40	40	33	26	20	14
	6.0 mm²	50	50	42	34	26	18

5. Current collector for the ground conductor: same as for the transmission of power, only one current collector is required for the ground conductor rail.

Data Transfer

1. Please refer to section IS 100 D "Data Transfer" for more detailed information.
2. For simple tasks (i.e. to trigger control commands, electric or isolation separations are arranged in additional conductor rails) use current collectors with copper-carbon.
3. For computer aided data transfer additional conductor rails (copper only) and current collectors with silver-carbon (perhaps to per rail) should be considered.

Component information

1. Conductor rails:
   a) Alignment of the collector surface may be down or sideways.
   b) Arbitrary number of poles possible.
   c) Minimum and usual rail center separation of 15 mm.
   d) Hanger- or support separation for straight sections of maximum 0.8ÿm, in radii / bends of max. 0.4 m
2. Hanger clamps:
   a) One-pole for rail center separations of 15 mm or larger.
   b) Multi-pole for rail center separations of 15 mm.

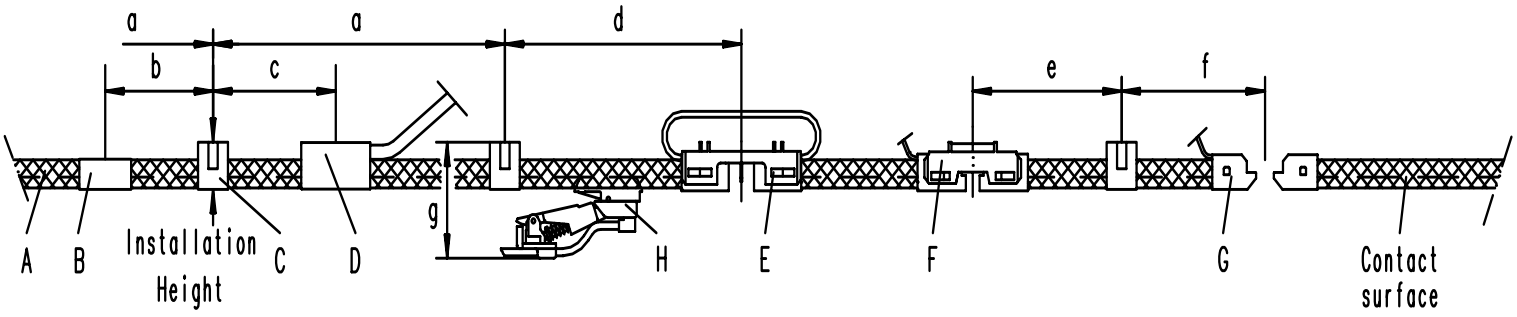
   I**mportant!** The assembly height of 27, 32, or 40 mm is critical for installations where future construction or integration of additional systems is required. The construction height remains the same for further components in the complete installation and is of importance if the system is to be configured in continuous webs, for example; electric monorails.
3. Feeds:
   a) Power feeds of up to 100 A are possible at each conductor rail splice, a single-core feed cable is required.
   b) It is possible to feed (control currents, data transfer and similar) at separation points such as switch transfer locations etc.., and also at the beginning or the end of a system:
4. Expansions:
   a) Only centered fix points are to be arranged for linear systems of up to 60 m where the end caps can expand. The conductor rails are designed to slide in their hanger clamps to account for changes in the length of the conductor rail caused by fluctuations in ambient temperature and current heating.
   b) Expansion points are to be provided for installations longer than 25 meters, in installations of straight stretches and between bends where both ends are fixed firm (e.g.. through switches, lifts etc..)

5. Separation points :
   a) Electric separations of the conductor rails can be provided at practically every point of the system, (i.e. at repair stretches; they may serve to trigger control pulses). The separation points or separation caps may be provided with connecting cables depending on the requirement.
   b) Mechanical separations are required for switches and lift sections. They are installed by affixing transfer caps which are available in one-pole and multi-pole design. The power feed is possible on these caps.
   c) The separation points are installed so that they may be bridged by one collector shoe. Usually only one current collector is required per conductor rail, however, some applications may require more than on collector.
   d) Pick up guides are available for large conductor rail separations, refer to Section IS 100 U.

General Installation Instructions

1. No special tools are required for simple installations in straight sections.
2. For branched stretches like the electric monorail, or for extended installations some special tools are recommended to provide ease of installation.
3. First mark all conductor rail hanger locations and install the hanger clamps in a well aligned manner.
4. Next consider the installation area of switches, hoist stations, lift sections and bends; these must be carefully pre-aligned.
5. Inspection at the end of the installation :
   - Are conductor rails correctly engaged in the hanger clamps?
   - Do both sides of all housings (joint/feed) and all caps embrace the insulating sheath of the conductor rails?
   - Are all screws and bolts securely tightened, and rail connectors tightened?
   - Have all burrs been removed from the contact surface?
   - Are all cables connected?
   - Are the transfers at mechanical separation points - such as switches - in operating order?
   - Is the expansion gap correctly adjusted?
   - Fixed points installed?

Basic Diagram



Measurement a **Hanger clamp distance**: max. 800 mm in the straight section; a max. of 400 mm in bends.
Separation of support clamps; adhered to on at least one side as follows :
Measurement b **For the rail connector** of the conductor rail: min. least 100 mm; max. 200 mm.
Measurement c **For the feed**: min. 100 mm; max. 200 mm.
Measurement d **For the expansion**: min. 100 mm; max. 200 mm.
Measurement e **For separations with separation caps**: min. 100 mm; max. 200 mm supported both sides.
Measurement f **For the separation with transfer caps**: min. 50 mm; max. 100 mm-refer to Section IS 100 U.
Measurement g **Height of system** = upper edge of support clamp to lower edge of current collector fastening :
Note : Assembly height is the height of the hanger clamp.

with standard collector	with standard small collector
for assembly height 27 = 73 mm;	for assembly height 27 = 71 mm;
for assembly height 32 = 78 mm;	for assembly height 32 = 76 mm;
for assembly height 40 = 86 mm	for assembly height 40 = 84 mm

with double arm collector	with long double arm collector	with double shoe collector
for assembly height 27 = 98 mm;	for assembly height 27 = 108 mm;	for assembly height 27 = 98 mm;
for assembly height 32 = 103 mm;	for assembly height 32 = 113 mm;	for assembly height 32 = 103 mm;
for assembly height 40 = 111 mm	for assembly height 40 = 121 mm	for assembly height 40 = 111 mm

A. Conductor Rail

FABA 100 for 100 Amp; 3 m or 5 m long; Collector arrangement selectively facing down or sideways; unlimited number of poles possible; radii from 0.5 m; under 0.5 m only bent at the factory; simple installation by clipping into the hanger clamp.

B. Rail Splice Connector

Screw-type or plug-in type for quick installation.

C. Hanger Clamp

Determine the construction height according to your local conditions, select 27 or 32 or 40 mm.
Use only : 32 mm or 40 mm for crane installations, for mounting to consoles for example.
27 mm only for small mounting Systems (EHB);
Construction: Use a 1-pole hanger clamp 32 mm height for rail centers for more than 15 mm.
Use a multi pole hanger for 15 mm centers.

Screw type hanger clamps are shown in this list, other designs are found in Section IS 100 K.

D. Power Feed

Up to 50 A etc. 100 A at the conductor rail joint; use a single-core connection cable.

E. Expansion

Shown is the "expansion bridge" design: an air gap remains between the ends of the conductor rails, to compensate a change in length of the conductor rails of up to 25 mm (caused by heat / cold). A fixed point is to be installed between two expansion points.

F. Separation with separation caps

For electrical interruption. For instance at repair sections or to trigger control pulses; with the possibility of single-core feed at one or both sides;

Note: An air gap remains between the plugged-in separating caps, allowing for compensation in the change in lengths of the conductor rails up to 10 mm.

G. Separation with transfer caps

For example for switches, hoist stations with feed-in possibility. Please refer to Section IS 100 U for installations with pick up guides.

H. Current Collector

Single-design: each "operates" independently. Most often only one current collector is required per conductor rail. Suitable for unidirectional and reversing operation. Unrestricted travelling speed of up to 400 m/min, for robotic machines and the like. The highly flexible connecting cables are one-core and are fastened to the exchangeable head or wear part.

- One-arm current collector 16 or 20 A; for a conductor rail center separation of 15 mm; are plugged onto one common base plate; the base plate is bolted to the equipment.
- Parallel-arm current collector for 25 or 50 A; for a conductor rail center separation of 20 mm or more;

I S 1 0 0 B

Standard Components

Conductor Rail

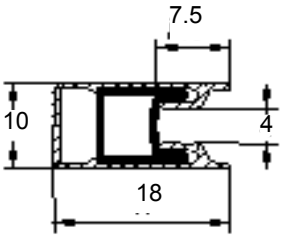


Figure 1

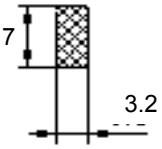


Figure 2

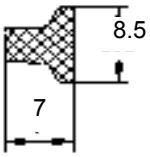


Figure 3

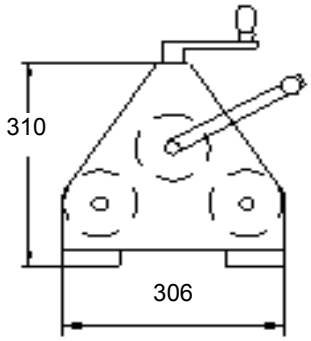


Figure 4

Table 1: Conductor Rail

Item No.	Figure	Length	Material	Insulation hard-PVC		Weight
200 009 299		3 m		Standard	orange	0.720
200 009 499		5 m		Standard	orange	1.200
200 010 299		3 m	Metal-rail	Standard	Ground green with yellow stripe	0.720
200 010 499		5 m		Standard	Ground green with yellow stripe	1.200
	1. Conductor-rail					
201 011 299		3 m		Heat-resistant	black	0.805
201 011 499		5 m	copper	Heat-resistant	black	1.340
201 012 299		3 m		Heat-resistant	Ground green with yellow stripe	0.805
201 012 499		5 m		Heat-resistant	Ground green with yellow stripe	1.340
241 000 005	2. Bending strips	100 m	PVC black	Ring material	remains in the bend	3.200
241 000 006	3. Bending profile	5 m	PVC red	Straight profile	multiple use	0.250
241 045 001	4. Bending machine	not shown			for manual operation	11.20
518 503 000	Fine file					0.095
518 505 000	Hacksaw					0.135
518 505 010	Blades			(spares; 12 Pieces)		0.038

Technical Information

- Permissible continuous current (for 100 % Duty Cycle) 100 Ampere; for standard insulation up to an ambient temperature of 35 °C; for heat-resistant insulation up to an ambient temperature of 55 °C.
- For higher ambient temperatures; reduce according to Table 1 in Section IS 100 A.
- Permissible continuous ambient temperatures:
  from – 30°C to + 55°C for standard insulation.
  from – 30°C to + 80°C for heat-resistant insulation.
- Refer to Table 2 in Section IS 100 A for the resistance of the conductor rails and ambient temperature implications.
- Metal rail and insulating sleeve are of equal length.

Planning Instructions

- Conductor rails may be shortened "on site".
- Radii are possible in all directions:

bending radii larger than 0.5 m on site

bending radii from 0.2 m to 0.5 m can only be bent at the factory.

- In general the use of rail lengths of 5000 mm is standard. However where cramped physical conditions are present, 3000 mm length is recommended for better handling.

Installation Instructions - detailed installation instructions may be found in Section IS 100 Z

a) Hanger clamp distance: Maximum 800 mm in straight runs. Maximum 400 mm in bends.

b) Shortening: With fine-toothed hacksaw, start sawing at the conductor surface. De-burr the cuts, especially the metal conductor surface, with a fine file

c) Bends: Accomplished with the bending machine using bending strips. Generally done on site, or at the factory if requested or for radii smaller than 0.5m. The smallest bending radius to all sides is 500 mm.

- Determine the approximate length of the curve and mark it with a felt pen on the insulating sleeve. Mark at least 150 mm from the end of the rail (both ends of the rail cannot be bent and remain straight).
- When bending over the conducting surface or the back of the rail, insert the grey bending strip between the back of the metal rail and the insulating sleeve. When using the "screw-type" rail connector and/or the separating or transfer caps, insert the strip 40 mm shorter. After bending retract the strip by 20 mm.
- When bending over the wide side of the rail, the red bending profile has to be inserted into the slit of the conductor surface and the grey bending strip has to be inserted into the back of the rail.
- Insert the rail into the bending machine until the first mark on the bend is centered over one of the lower rolls. Tighten the upper roll depending on the required radius. Slide the rail through the machine up to the second marking. It is possible to make corrections passing the rail through the machine again. Record the scale setting for equal bends.
- If two bent rails have to be joined, shorten the rails to be joined on the straight end (approximately. 150 mm). Use only "screw-type" rail connectors.

Rail-Connectors- plug-in type

Figure 1

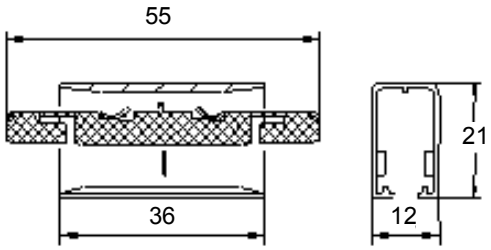


Figure 2

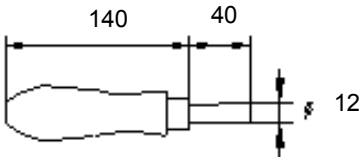


Figure 3

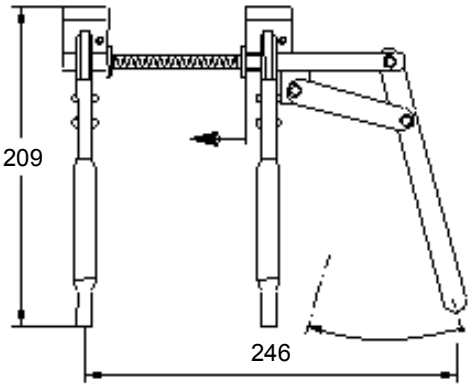


Table 2: Rail Connectors - Plug in type

Order No.	Figure		Weight
241 002 010	1. Rail connector. plug-in	one-pole; complete; packed unit. in bag	0.008
241 026 006	1. Housing	Plastic-orange (as spare only)	0.003
241 026 015	1. Plug-in connector	Bronze spring-steel (as spare only)	0.005
241 046 020	2. Installation handle	Metal end with bore of ∅ 8.5	0.135
241 046 010	3. Connecting vice		1.296

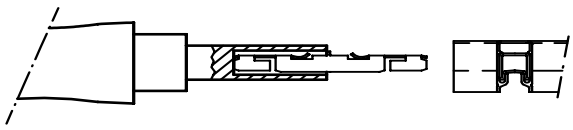
Technical Information

- Permissible continuous current 100 A (for 100 % Duty Cycle).
- Permissible ambient temperatures – 30°C to + 80°C .

Planning Instructions

- Distance to the next hanger clamp minimum 100 mm; maximum 200 mm.
- Used for quick installation of extensive systems.
- Do not use in bends.
- The rail connector is not remountable or reusable.

Installation Instructions



- Insert the plug connector into the installation handle.
- Press the plug connector to the stop into the unmounted conductor rail.
- Slide the housing onto the end of the conductor rail (over the plug connector) until the stop.
- Clip the rail into the previously installed hanger clamps.
- Guide the rail to the one already installed.
- Slide on the housing; take care that the sides of the housing embraces both insulating sheaths!
- Fix the connecting vice to both sides of the joint: tighten both tongues by holding the tongue which grips the installed rail with the left hand; using the right hand push the handle so that the conductor rails are drawn completely together (to be reversed for "left-handed" persons).
- **Inspection:** Make certain both insulating rims are embraced by both sides of the housing.
- Disassembly: If the connection of the conductor rail has to be separated it must be cut out with a fine-toothed hacksaw from the side of the conductor surface approximately 60 to 70 mm (refer to "shortening" of conductor rail)

Rail-Connectors- screw-type

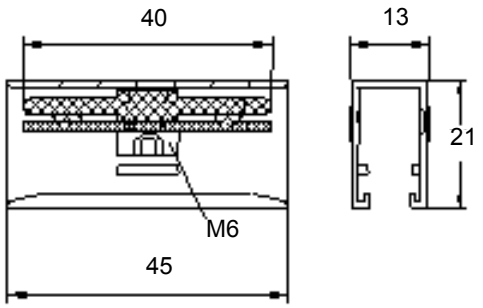


Figure 1

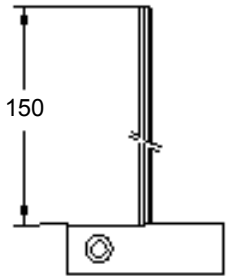


Figure 2

Table 3: Rail Connectors - screw type

Item No.	Figure	Description	Weight
241 002 000	1. Rail connector screw-type	one-pole; complete; Packed unit. in bag	0.017
241 026 005	1. Housing	Plastic-orange (as spare only)	0.003
251 002 000	1. Screw connector	Clip with spring-steel and screw M6 (as spare only)	0.014
518 501 010	2. Screwdriver 4 mm	for recessed hex-bolt	0.036

Technical Information

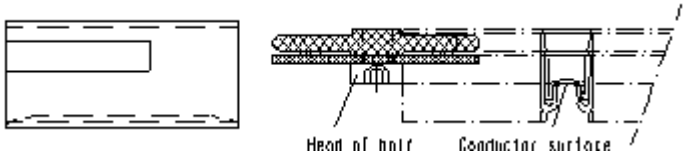
- Permissible continuous current 100 A (for 100 % Duty Cycle).
- Permissible ambient temperatures – 30°C to + 80°C.

Planning Instructions

- Distance to the next hanger clamp minimum 100 mm; maximum 200 mm.
- Used primarily for smaller installations and for joints of the conductor rails in bends.
- The rail connector is remountable and reusable several times.
- A gap of 10 mm remains between the ends of the conductor rails.

Installation Instructions

- Slightly loosen the screw of the screw connector with the screw driver.
- Insert the screw connector into the installed conductor rail.
- Slide on the housing; making sure that the housing embraces the insulating sleeve rims!



- Clip the next conductor rail into the installed hanger clamp.
- Guide the conductor rail to the joint and slide together until the stop; make sure that the housing completely embraces the insulating sleeve rims!
- Tighten the screw securely using an Allen key screwdriver.
- Inspection: Make certain both insulating sleeves embraced by both sides of the housing.

Hanger-Clamp - screw-type assembly

Figure 1

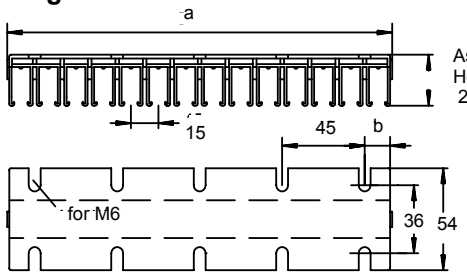


Figure 2

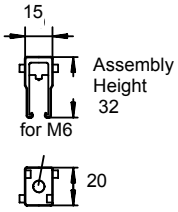


Figure 5 **Figure 6** **Figure 7** **Figure 8**

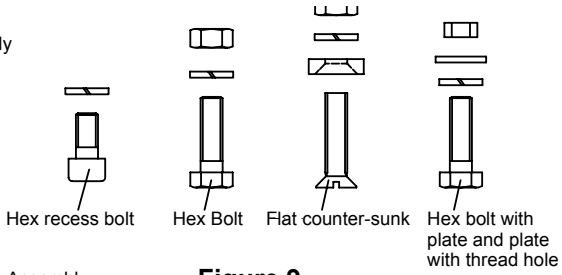


Figure 3

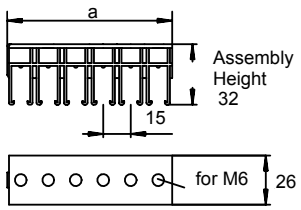


Figure 4

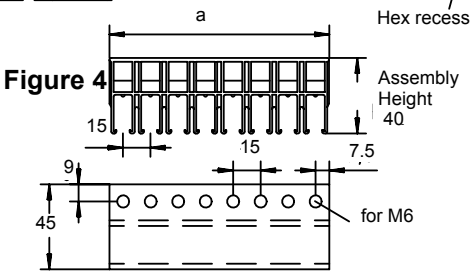


Figure 9

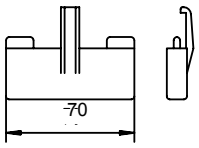


Table 4: Hanger Clamp-screw type

Item No.	Figure		Height	a	b	Assembly	Weight
241 006 128		4-poles		60	30		0.015
241 006 127		5-poles		75	15		0.019
241 006 137		6-poles		90	30		0.023
241 006 126		7-poles		105	30		0.026
241 006 130		8-poles		120	15		0.030
241 006 131	1. Hanger-clamp	9-poles	27 mm	135	30	One piece Plastic-orange	0.034
241 006 132		10-poles		150	30		0.038
241 006 133		11-poles		165	15		0.042
241 006 134		12-poles		180	45		0.045
241 006 135		13-poles		195	45		0.049
241 006 136		14-poles		210	15		0.053
241 003 000	2. Hanger-clamp	1-pole	32 mm	continues		One piece; Plastic-orange	0.004
241 009 211		2-poles		30			0.006
241 009 212		3-poles		45			0.009
241 009 213		4-poles		60			0.012
241 009 214		5-poles		75			0.015
241 009 215		6-poles		90			0.018
241 009 216	3. Hanger clamp	7-poles	32 mm	105		One piece; Plastic-orange	0.021
241 009 217		8-poles		120			0.024
241 009 218		9-poles		135			0.027
241 009 219		10-poles		150			0.030
241 009 220		11-poles		165			0.033
241 009 210		12-poles		180			0.036
241 009 223		4-poles		60			0.020
241 009 224		5-poles		75			0.025
241 009 225	4. Hanger-clamp	6-poles	40 mm	90		One piece; Plastic-orange	0.030
241 009 226		7-poles		105			0.035
241 009 227		8-poles		120			0.040
241 013 000	5. Screw Set	M6 x 12	For threaded hole, with spring washer • set, zinc plated;				0.005
241 013 001	6. Screw Set	M6 x 20	For clamp Figure 1,with washer orange, spring washer/nut,set				0.008
241013 003	7. Screw Set	M6 x 25	for through hole • with spring washer and nut; set				0.010
241 013 022	7. Screw Set	M6 x 12	For clamp Figure 3 • with washer, spring washer and plate with thread hole, set, zinc plated				0.008
241 013 023	8. Screw Set	M6 x 16					0.009
241 013 024	8. Screw Set	M6 x 20					0.010
241 046 021	9. Dismantling wedge		For removing rail from hanger; plastic-orange				0.014

Technical Information

- Permissible ambient temperatures – 30°C to + 80°C.
- FABA hanger clamps guarantee good sliding characteristics for the conductor rail during the expansion process.
- Other types of hanger clamps are available including clip-in types (for electric monorail tracks). Please refer to Section IS 100 K for more information.

Planning Instructions

- Recommendations for Construction Height:
  27 mm for confined installation conditions only;
  32 mm for crane installations (for example, for mounting to collector mounting plate)
  40 mm for crane installations (for example, for mounting on collector mounting plate)
- The 1-pole type is preferred for conductor rail center separations larger than 15 mm; for example 30 mm centers used for an outside application.
- For multi-pole hanger clamps with an assembly height of 32 mm and above, control and feed cables may be passed through openings above.
- The installation of the ground rails is possible at any location.
- Distances of supporting points: in straight sections maximum. 800 mm; in bends maximum 400 mm; to the ends of the conductor rails minimum 100 mm to maximum 300 mm.
- The hanger clamps are screwed to the collector mounting plate (customer supplied), tracks, etc.. with M 6 screws; the multi-pole types are to be fastened left and right, above poles, and at the center.
- Standard-screw-fastening material according to Figure 5, Figure 6, Figure 9 and Figure 8; for other screw connections please consult the factory.

Installation Instructions

- Depending on the type of the installation, the hanger clamps are fastened directly or by means of collector mounting plate (customer supplied) to the track/conductor rail and must perfectly aligned.
- The conductor rails are simply clipped into the hanger clamps until they snap in with a click.
- The conductor rail can be removed from the hanger clamp at any time. To remove rail, spread the sides of the hanger clamp. For large or extensive system we suggest the use of a dismantling wedge.

Power Feeds

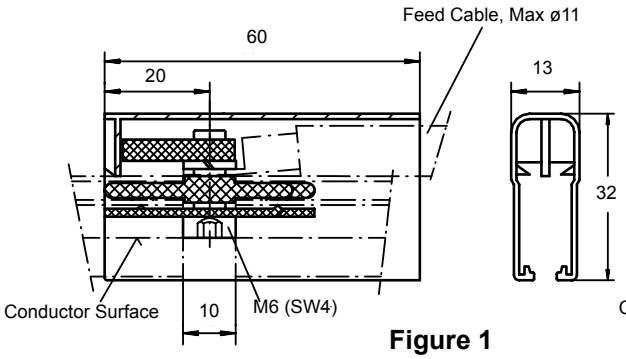


Figure 1

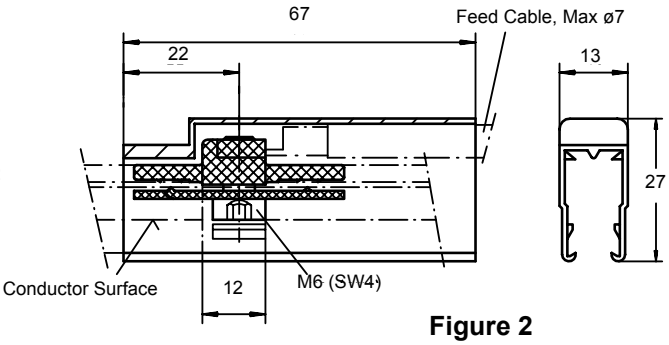


Figure 2

For 32 mm Height and above

For 27 mm Height

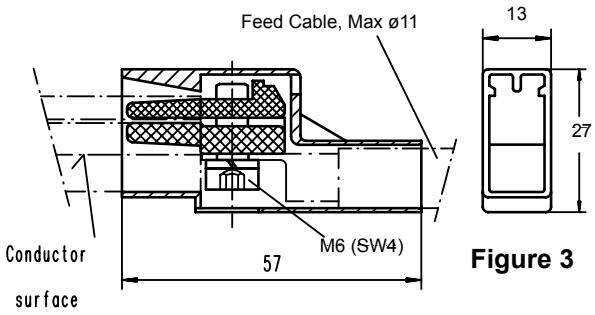


Figure 3

Figure 4

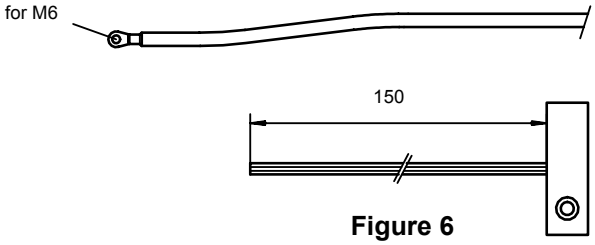


Figure 6

Table 5: Power Feeds

Item No.	Figure	Description				Weight
241 015 000	1. Splice-feed, 100A	one-pole; complete; Packing unit. in bag; for assembly height from 32mm, for feed cable up to 16 mm²				0.030
241 015 050	2. Splice-feed, 50A	one-pole; complete; Packing unit. in bag; for assembly height from 27mm; for feed cable up to 6mm²				0.024
241 015 090	3. End-feed, 100A	one-pole; complete; Packing unit in bag; for assembly height from 27mm, for feed cable up to 16 mm²				0.029
241 040 045	4. Feed cable	16 mm²	11 outer	∅ – 1000 V black	Single-core, highly flexible cable 1 m long, one side fitted with Terminal M6 (other length upon request	
241 040 026		6 mm²	7 outer-∅ k	1000 V black		
241 040 460		2.5 mm²	4.5 outer-∅	1000 V black		
241 040 453		1.5 mm²	4 outer-∅	1000 V black		
241 040 057		16 mm²	9 outer-∅	**Ground** green/yellow		
241 040 051		6 mm²	6.5 outer-∅	**Ground** green/yellow		
241 040 456		2.5 mm²	4 outer-∅	**Ground** green/yellow		
241 026 051	1. Housing	Assembly height 32 mm		Plastic-orange (only as spares)		0.007
241 015 051	2. Housing	Assembly height 27 mm				0.006
241 014 010	3. Housing	Face closed				0.005
251 015 000	1. Screw Clamp	with asymmetric nut		M 6 with recessed hex-bolt SW 4		0.023
241 015 052	2. Screw Clamp	with square nut				0.018
251 022 020	3. Screw Clamp	pair of clips on one side				0.023
506 006 002	5. Cable shoe	>1 - 2.5mm² cable		For crimping requirements		0.001
506 006 006	DIN 46234	>2.5 - 6mm² cable				0.002
506 006 010	E-Cu galv	>6 - 10mm² cable.				0.003
506 006 016	For above Feeds	>10 - 16mm² cable				0.004
518 501 010	6. Screwdriver Allen key 4 mm for recessed hex-bolt M 6					0.036

Technical Information

- The permissible continuous current depends on the feed cable and the ambient temperature :
  Splice-feed maximum 100 A or 50 A
  End-feed maximum 100 A
- Permissible ambient temperatures – 30°C to + 80°C.
- The feeds are suitable for the listed feed cables listed.

Planning Instructions

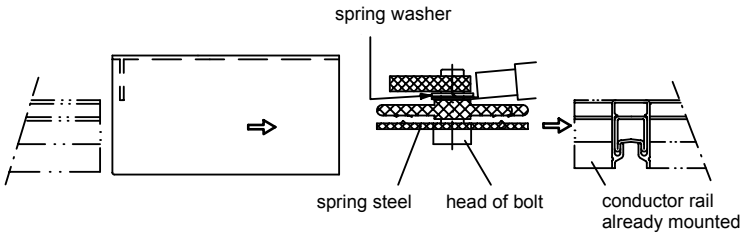
a) Splice-feed 100 A:
- Connection at the joint of the conductor rail (the rail connector is not required then).
- Not to be used in bends.
- Suitable for construction heights from 32 mm; for all conductor rails including ground. Figure 1, page 9.

b) Splice-feed 50 A:
- Connection at the joint of the conductor rail (the rail connector is not required).
- Not to be used in bends.
- Suitable for construction heights from 27 mm; for all conductor rails including ground. Figure 2, page 9.

c) End-feed 100 A:
- Connection at the beginning and/or end of the conductor rail installation.
- Suitable for construction heights from 27 mm. for all conductor rails including ground. Figure 3, page 9.

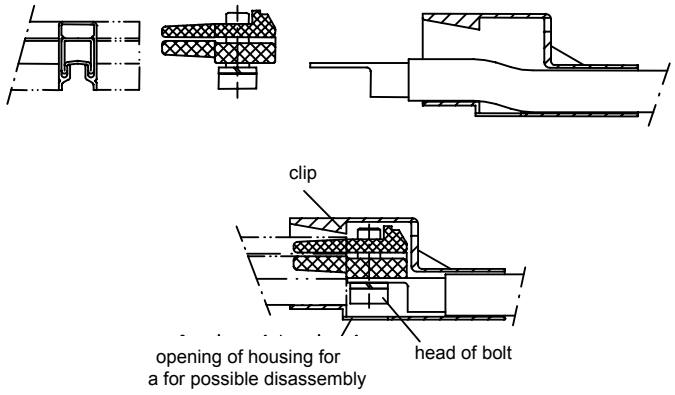
Installation Instructions

a) Power-feed, for maximum 100 A:
- Loosely connect the feed cable to the screw clamp.
- Insert the screw clamp into the installed conductor rail.
- Slide on the housing. Make sure that both sides of the insulating sheath are embraced.



- Clip the next conductor rail into the support clamp and move it towards the joint; slide together; the sides of the insulating sheath have to be embraced.
- Tighten the screw securely.
- Install the feed cable so that it can follow the linear expansion of the rail; for the installation through webs (e.g. electric monorail tracks) provide grommet protection.
- For more than 50 V: provide a separation of 3 mm or surface insulation to the grounded parts.
- Inspection: Make certain both sides of both insulating sheaths embraced by the housing

b) End-feed 100 A:
- Lead the feed cable through the housing.
- Loosely connect the cable lug to the screw clamp.
- Plug the screw clamp into the end of the conductor rail.
- Tighten the screw securely.
- Slide the housing on until the clip with the end of the thread snaps in.
- Install the feed cable so that it can follow the linear expansion of the rail.
- For more than 50 Volt: provide a separation of 3 mm or surface insulation to the grounded parts.



Expansion

General

Through fluctuations in the ambient temperature, current, or environmental heat generated the length of the conductor rail installation changes. The hanger clamps allow a flawless sliding or linear movement of the conductor rails.

Fixing points arrest the conductor rails at certain points, thus controlling any linear displacement.

Linear installations

Up to a length of 60 m require no special expansion components, just a centered fixed point.

All other installations require controlled expansion points :

- Linear sections of more than 60 m.
- Branched installations - e.g. electric monorail - with bends. switches. lift stations.

Building- and/or track expansion joints.

The following expansion components are used :

a) **Fixing point clip** in conjunction with a hanger clamp arrests the conductor rail, usually centered between two expansion point, proceeding or following a bend (for counter-directed bends the fixing point clip is to be installed in the centre of the bend).

Note: Transitions at switches and lift sections are in part constructed as fixing points.

b) **Expansion bridge** for linear expansions of the conductor rail up to 25 mm. Installation on the joint of the rail. Electrically, the expansion gap is bridged by a highly flexible cable designed for current at 50 A maximum. This is usually sufficient for branched installations with multiple feeds. If more than 50 A are required, bridging feeds are to be located to the left and right of the nearest rail joint and connected by a cable.

c) **Expansion rails** for linear expansions of the conductor rail up to 25 mm, 50 mm or 75 mm. Shipped ready to be installed with electric bridging of the expansion gap by a 6 mm² cable for maximum 50 A. If the expansion gap is to be bridged with more than 6 mm² cable, feeds are to be installed to the left and right with a bridging cable.

d) **Separation for electric interruptions** also compensates for the linear expansion of the conductor rail up to 10 mm. If and when the separation point is fed electrically, depends upon it’s purpose, refer to Electrical Separation, page 19. Observe the different assembly heights.

Apart from good pre-planning of the conductor rail installation, a correct and orderly installation is indispensable for the dependable operation of the system. This is especially important for extensively branched circuits, for systems with high travelling speeds, or for extreme fluctuations of temperature etc..

Fixed Point

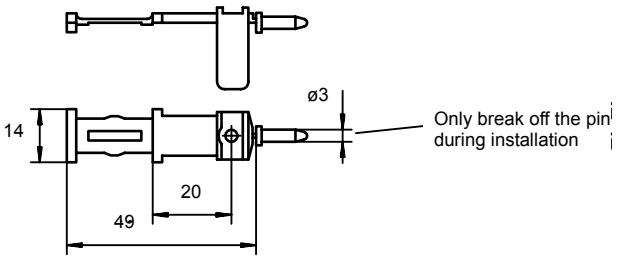


Table 6: Fixed Point

Item No.	Description		Weight
241 010 006	Fixed point clip	one-pole, plastic, one-piece, red	0.002

Technical Information

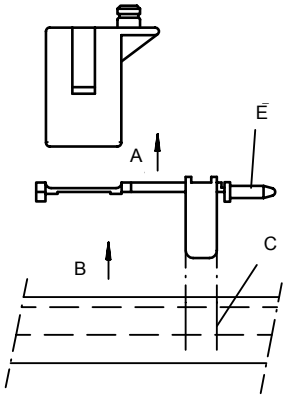
- Permissible continuous ambient temperatures – 30°C to + 80°C.
- For all conductor rails including ground.
- The fixing point clip used in conjunction with one hanger clamp (all types) holds the metal rail and the insulating sheath in the longitudinal direction.
- The conductor rail is allowed to expand or contract - sliding through the remaining hanger clamps - in both directions.

Planning Instructions

a) Location of a fixing point :
- In the center for straight installations of up to 60 m in length.
- Centered (usually) between two expansion points/joints.
- Take into consideration expansion bridges, expansion rails and separation caps.
- Immediately proceeding or following bends, install the fixing point in the center for counter-directional bends.

b) The fixing-point clip is not reusable.

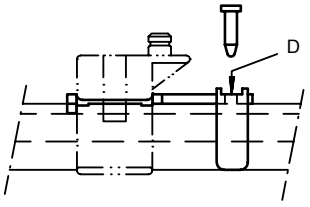
Installation Instructions



a) **Important:** The contact rail to which the fixed point clip is to be installed should not be connected with the rails already mounted. **Without butt joint connector** take into account the appropriate spacing (screwable = 10 mm. pluggable = 1 mm).

b) The contact rails that are already mounted must remain aligned absolutely correctly in the lengthwise direction, for example to the next expansion gap. **These rails do not move** during the fixed point installation. If needed, mark exact position with a felt pen.

c) The arrangement of the fixed point clip is made within a hanger clamp:
- Insert the fixed point clip into the hanger clamp (Arrow A).
- Insert contact rail (Arrow B)
  if using other hanger clamps– with space to already assembly rail: with plug connectors, screwable = 10 mm, pluggable = 1 mm.
- Mark the location of the fixing-point clip with a felt pen on the insulating sheath (refer to C).
- Remove the rail from the hanger clamp, locate the fixing-point clip corresponding with the marking and use it as a drill template.



- **Important**! Do not drill through the surface of the conductor.
- Break off the sharpened pin (refer to E) and tap it through the hole completely.
- Take the conductor rail with the pinned fixing clip installed on the conductor rail and firmly press the conductor rail into the hanger clamp so that it audibly snaps into place.

d) If a disassembly or correction should be required, a new fixing point clip is to be used. Remove the fixing-point clip, insert the pin again (as protection against contact) and install the new fixing-point clip)perhaps to the other side) as described above.

Expansion connector

Figure 1

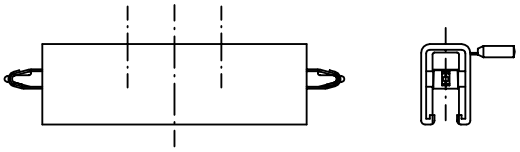


Figure 2

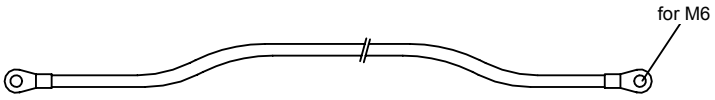


Table 7: Expansion Connector

Order No.	Description	Description		Weight
241 040 513	Figure 1. Expansion unit, without cable, up to 50A	For all building heights, With built-in spring contacts;Single-pole; Packaging unit in bags		0.014
251 040 093	Figure 2. Bridging cable for above 50 A (see below)	6mm^2. Outer diameter. 7 mm. 1000 V black, phase	Single-wire; highly flexible;Cable shoe for M6 on both sides; 1600 mm long(Other lengths on request)	0.178
251 040 094		6mm^2. Outer diameter. 6.5 mm. ground green-yellow		0.134

Technical Information

- Allowable ambient temperatures - 30°C to + 80°C.
- The expansion (Figure 1) is designed for an allowable continuous current of 50 Ampere at 35°C ambient temperature. With higher temperatures there is a reduction in compliance with Section IS 100 A-Table 3 = Parallel arm slider
- Bridging line will be required if the current transmission is not adequate with the expansion (see Planning Information). Allowable continuous currents and reduction through ambient temperature in compliance with VDE.

A) Spacing of the feeders for the bridging cable = 1500 mm

B) Bridging cable

C) Expansion (Expansion gap 2 to 27 mm between the rails)

D) Hanger clamp

E) Feed clamp : For bridging line 6 mm² = 50 Ampere

F) Fixed point / Fixed point clip

G) Length of the expansion stretch

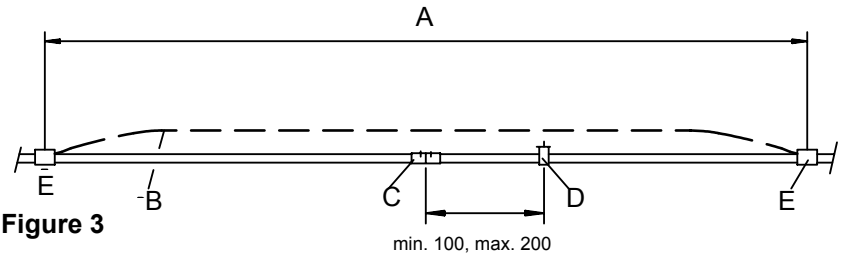
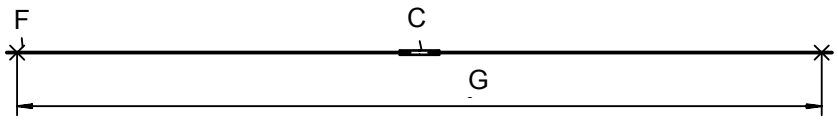


Figure 3

Figure 4



Planning Information

Table 8: Maximum Allowable Length of Expansion Stretch G (m)

Loading Duty cycle		10	20	30	40	50	60	70	80
		Temperature Difference [K]							
	100 %	31	25	21	18	16	14	12	11
FABA 100	60 %	42	31	25	21	18	16	14	12
	40 %	60	42	31	25	21	18	16	14
	Ground	60	60	42	31	25	21	18	16
Note : Expansion stretch G amounts to max. 60 m in every case									

a) The expansion is for all conductor rails (including ground).

b) For changes in the length of the conductor rail up to 25 mm.

c) Arrangement of the expansion
- Only in straight stretches
- Not in curves
- In general, between rail points
- In principle, between two fixed points, usually in the center.

d) The expansion gap will be bridged electrically (see Technical Information)
- Up to 50 Ampere through the spring contacts in the housing
- In case of higher currents, a bridging line may be required.

e) Maximum length of expansion stretch G and/or distance from fixed points F; see Figure 4 and adjacent tables . The maximum possible length depends upon the difference occurring in the ambient temperature and the power transmitted or heat generated thereby.

Example: Possible ambient temperature max. + 50°C. min. - 10°C; The resulting temperature difference = 60 K [Kelvin]; for FABA 100 (at. for example. 60 % ED or power utilization). in compliance with the table : permissible length of the expansion stretch is G = max. 16 m.

Assembly Instructions

a) Insert both rails (ends de burred) in housing up to the stop point.

b) Drill through insulating sleeve and upper strip of the metal rail with 3 mm drill bit, through existing boring in housing.

c) Pull expansion from the rails. De burr and clean boring in the metal rails.

d) Slide rails into expansion to the stop, break pins from housing and press completely into the borings. The rails must be able to pull apart and push together with low force.

e) If additional bridging lines are necessary the rails must not be restricted in their function. One support point clamp is necessary on one side at an interval of minimum 100; maximum 200 mm

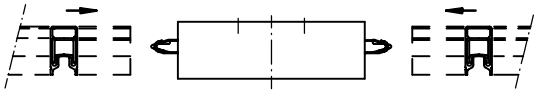
f) Set expansion gap (distance between the rails) :

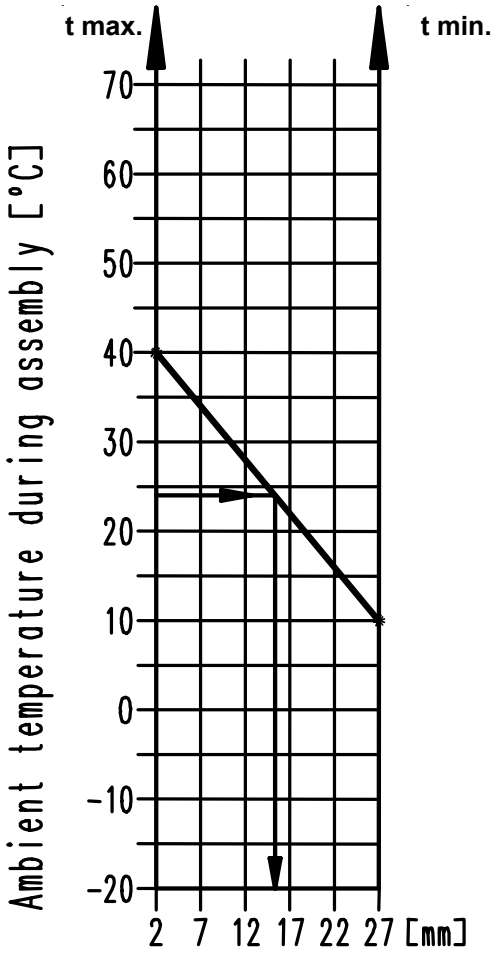
- In accordance with the ambient temperature at the time of installation using the diagram at right.

Example: Possible ambient temperature max. + 40°C. min. + 10°C; Mark points on diagram and join with a line; Ambient temperature during assembly = + 24°C. expansion gap to be set ca. 15 mm.

Important: Do not change the expansion gap during the following assembly

Figure 8





Expansion gap (between the rail) min. 2 - max. 7

Expansion Rail

Figure 1

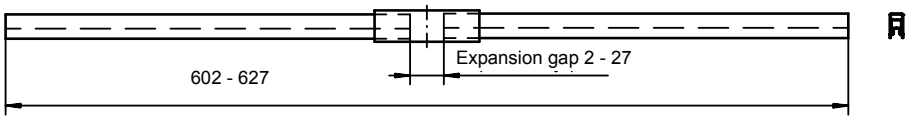
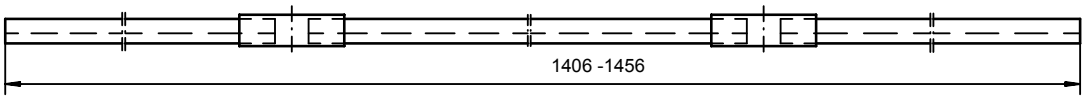


Figure 2



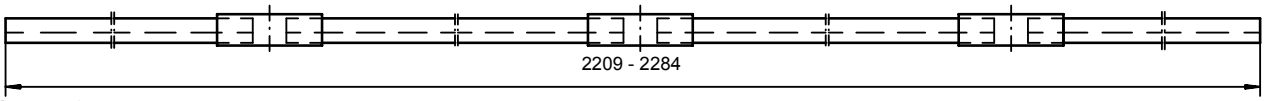


Figure 3

Figure 4

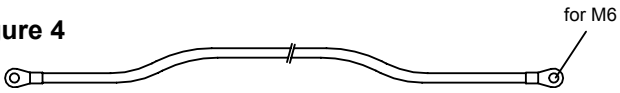


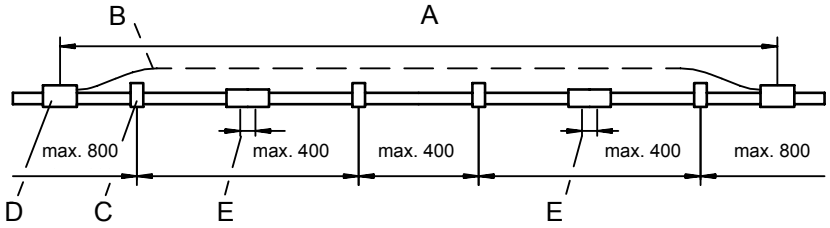
Table 9: Expansion Rail

Item No.	Figure	Rail Isolation			Weight
211 010 115	1. Expansion rail 25 mm	Standard	Orange	one-pole; Height 27 mm Metal rail. copper Ready to install	0.186
211 010 116			Green-yellow - **Ground**		0.186
211 010 121		Heat-resistant	Black		0.186
211 010 122			Green-yellow - **Ground**		0.186
211 010 117	2. Expansion rail 50 mm	Standard	Orange	one-pole; Height 27 mm Metal rail. copper Ready to install	0.426
211 010 118			Green-yellow - **Ground**		0.426
211 010 123		Heat-resistant	Black		0.426
211 010 124			Green-yellow - **Ground**		0.426
211 010 119	3. Expansion rail 75mm	Standard	Orange	one-pole; Height 27 mm Metal rail. copper Ready to install	0.666
211 010 120			Green-yellow - **Ground**		0.666
211 010 125		Heat-resistant	Black		0.666
211 010 126			Green-yellow - **Ground**		0.666
251 040 099	4. Bridging cable	1000 mm long For Figure 1	6 mm². outer-∅ 7 1 kV. black	Single core Highly Flexible Both sides Cable Lug for M6	0.090
251 040 100			6 mm². outer-∅ 6.5 Green-yellow - **Ground**		0.067
251 040 093		1600 mm long For Figure 2	6 mm². outer-∅ 7 1 kV. black		0.178
251 040 094			6 mm². outer-∅ 6.5. Green-yellow - **Ground**		0.134
251 040 097		2450 mm long for Figure 3	6 mm². outer-∅ 7 1 kV. black		0.268
251 040 098			6 mm². outer-∅ 6.5. Green-yellow - **Ground**		0.205

Technical Information :

- Expansion rail (Figures 1 to 3) are suitable for FABA 100; permissible continuous current 50 A, reduction by ambient temperature is the same as the conductor rail.
- Expansion rail with additional bridging cable: refer to Figure 5 (B); when continuous current of 100 A is required and reduction by ambient temperature is the same as the conductor rail. Each expansion gap is bridged by one highly flexible cable, each 6 mm².

Figure 5



G = Length of the expansion rail

H = Bridging cable

I = Hanger clamp

J = Feed clamp : 50 A for height 27 mm

K = Expansion gap 2-27 mm. measured between rail ends

Planning Instructions

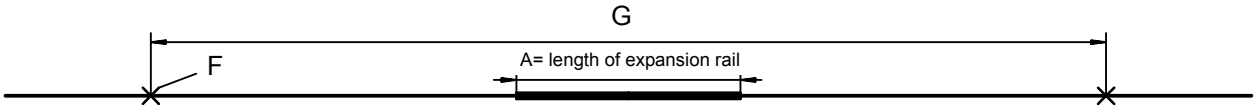


Table 10: Expansion Gap

FABA 100		Maximum allowable length of expansion stretch G [m]							
Loading Duty Cycle	Expansion Rail	Temperature Difference [K]							
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**
100 %	25 mm	39	31	26	22	19	17	15	14
	50 mm	60	60	52	44	38	34	30	28
	75 mm	60	60	60	60	57	51	45	42
METERS									
60 %	25 mm	52	39	31	26	22	19	17	15
	50 mm	60	60	60	52	44	38	34	30
	75 mm	60	60	60	60	60	57	51	45
40 %	25 mm	60	52	39	31	26	22	19	17
	50 mm	60	60	60	60	52	44	38	34
	75 mm	60	60	60	60	60	60	57	51
Ground	25 mm	60	60	52	39	31	26	22	19
	50 mm	60	60	60	60	60	52	44	38
	75 mm	60	60	60	60	60	60	60	57
Note: The expansion distance G is in any case 60 m at most.									

a) Use in area of building or rail expansion joints

b) Also suitable for assembly heights 32 and 40 mm

c) For all conductor rails including ground.

d) For fluctuations in length of the conductor rail of 25 mm, 50 mm or 75 mm.

e) Maximum length of the expansion distance G or separation of the fixing points

- If the expansion rail is exclusively used to compensate building or rail expansion joints, a fixing point is located immediately to the right and left next to the expansion rail.
- Permissible maximum length if expansion distance G [m]

Installation Instructions

a) Locate hanger clamps; separation maximum 400 mm, to others maximum 800 mm as usual (refer to Figure 5).

b) When the additional bridging cable is being installed :

- Install in a manner as not to impede the linear movement.
- Install the joint-feeds D.

c) Used for building or rail expansion :

- locate the expansion rail centered to the expansion joint.
- locate a fixing point/fixing-point clip immediately to the right and left of the expansion rail.

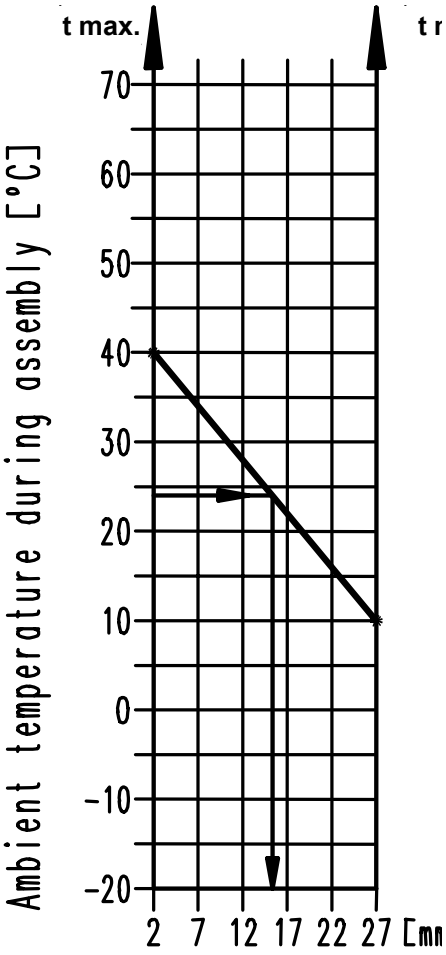
d) Adjust the expansion gap (distance between the rail ends) :

- Expansion rail
  according to Figure 1 = max. 27 mm;
  according to Figure 2 = max. 54 mm (2x27 mm);
  according to Figure 3 = max. 81 mm (3x27 mm)
- For application according to c) : expansion gap should correspond with the building-. rail expansion joint.
- Expansion gap according to the diagram
  Example:
  possible ambient temperature max. + 40°C. min. – 10°C;
  mark the points in the diagram and connect them with a straight line;
  temperature during installation = + 20°C;
  expansion gap to be set = approximately 12 mm.

Note: for the 50 mm expansion rail (Figure 2) = 2x12 mm. hence. a total of 24 mm;

for the 75 mm expansion rail (Figure 3) = 3x12 mm. hence. a total of 36 mm.

Important: Do not change the expansion gap for subsequent installation!



Expansion gap (between the r
min. 2 - max. 7

Electrical-Separation

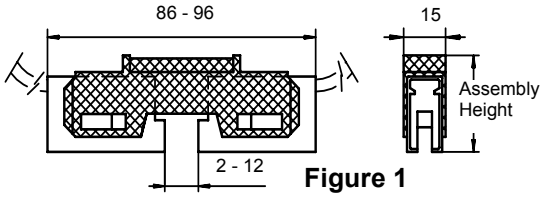


Figure 1

For zones with or without feed

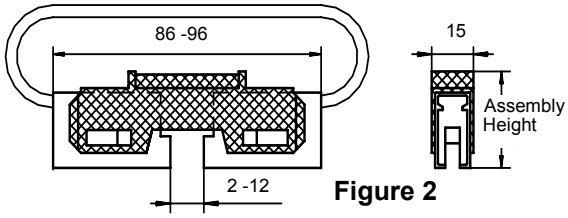
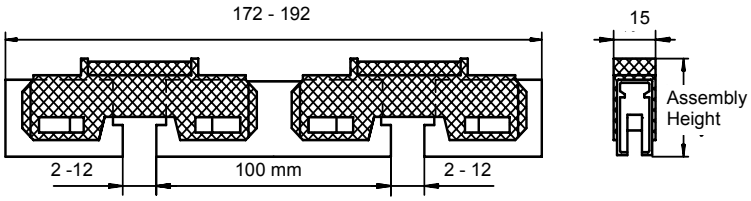


Figure 2

Used for bridging zones (e.g. 5 -7)

Figure 3



Isolation middle piece 100 mm in plastic

Figure 4

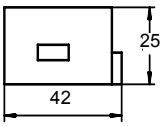


Figure 5

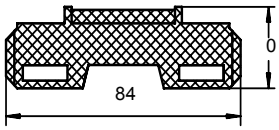


Figure 6

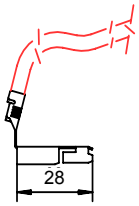


Table 11: Electrical Separation

Item No.	Fig.	Description		Including		Weight
241 025 020	1	Separation without connecting cable	Assembly height 27	2 plugs	one-pole; packing unit in bag;	0.020
241 025 021			Assembly height 32			0.021
241 025 022			Assembly height 40			0.023
241 025 026		with 1 connecting cable (1 m)	Assembly height 27	1 cable plus 1 plug	1 connecting cable complete in separate parts	0.050
241 025 027			Assembly height 32			0.051
241 025 028			Assembly height 40			0.053
241 025 023		with 2 connecting cables (1 m)	Assembly height 27	2 cables	2 pieces. separating caps 1 piece. holder	0.082
241 025 024			Assembly height 32			0.083
241 025 025			Assembly height 40			0.085
241 025 029	2	Separation with bridging cable	Assembly height 27	included : 1 bridging	as in Figure 1	0.030
241 025 030			Assembly height 32			0.031
241 025 031			Assembly height 40			0.033
241 025 040	3	Isolation 100 mm separation	Assembly height 27	2 plugs	as in Figure 1. however : 2 separating caps, 2 holders, 1 insulating piece 84 long	0.040
241 025 041			Assembly height 32			0.042
241 025 042			Assembly height 40			0.046
241 022 220	4	Separating cap	needs plug to assemble, choose Figure 6, Plastic-orange			0.006
241 006 108	5	Holder	Assembly height 27	as spare only		0.007
241 006 107			Assembly height 32			0.009
241 006 106			Assembly height 40			0.003
241 026 020	6	Plug without cable	1.5 mm². outer-∅ 4 mm mm. 1 kV. single-core. highly flexible; as spare only			0.003
241 040 490		Connecting cable	one side with plug; 1 m long (other lengths by request)			0.032
241 040 495		Bridging	1.5 mm². outer-∅ 4 mm. 1 kV. single-core. highly flexible; both sides with plug; 0.35 m long (other lengths by request); as spare only			0.015

Technical Information

- For the electric separations of the conductor rail (control purposes and many others)
- The separations also compensate changes in length of the conductor rail.
- The separation, corresponding to Figure 1, may by fed on one or both sides.
- Permissible ambient temperatures – 30°C to + 80°C.
- The plugs (Figure 6) are not remountable (not reusable).

Planning Instructions

A = separation

B = fixing point

C = length of expansion distance

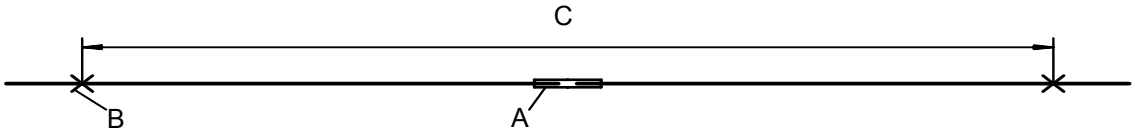


Table 12: Separation in Meters

FABA 100	Perm. Max. distance C in m							
	Difference Temperature (K)							
Separation	10	20	30	40	50	60	70	80
METERS								
Figure 1, Figure 2	60	30	20	15	12	10	9	8
Figure 3	60	60	40	30	24	20	18	16
Note: The expansion distance C is in any case at max. 60 m.								

a) For all conductor rails, usually not required for ground.

b) When resting on the web of the conductor rail, observe the assembly height. The separation will not be specially fastened.

c) Location :

Principally at every point of the installation, also to be added later; only in straight sections, not in bends. Generally between 2 fixing points at the center of both.

Separation corresponding to Figure 1 and Figure 2:

- The separation of both metal rail ends is at a maximum of 24 mm. It will be bridged by **one current collector.**
- Depending on the purpose, by feed cables on one or both sides. or by bridging (for example) to the next conductor rail.
- The separation compensates changes in length of the conductor rail.

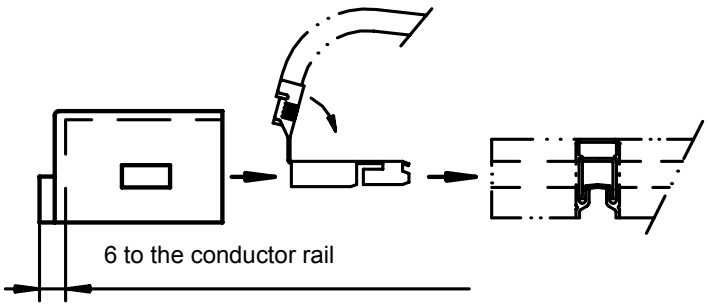
d) Isolation separation corresponding to Figure 3 :

- The center piece is of insulating material. The separation of the metal rail ends is at least 100 mm, at most 120 mm. Bridging by a current collector is impossible.
- The Isolation separation compensates changes in length of the conductor rail of up to 20 mm (2x10 mm).

e) The possible maximum length of the expansion distance C depends on the difference of the ambient temperatures present. Current heating is excluded in this case because the conductor rails will not be used for power transmission.

Example: Possible ambient temperature of max. + 30°C. min. – 10°C; hence. temperature difference = 40 K(Kelvin). According to the table. for FABA 100 the expansion distance C = max. 15 m according to Figure 1.

Installation Instructions



a) Plug into the rail end to the stop - with or without cable.
- Bend the end of the plug down - see arrow.
- Push on the separation cap until the stop, both sides have to embrace the rail.

b) Install the separation cap in the same manner to the other end of the rail.

c) Clip the separating cap(s) into the web.

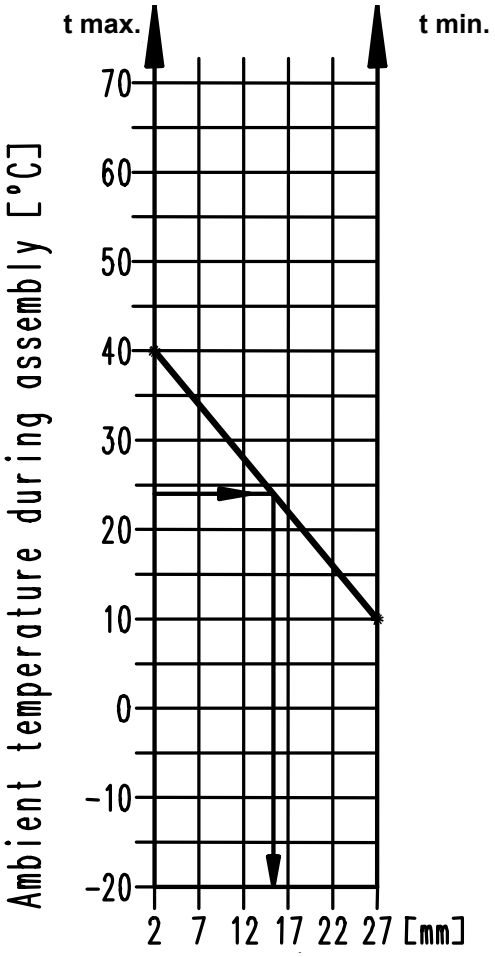
d) If the separating cap touches the web of the rail, no additional hanger clamps will be required.

If the separation has no support, locate hanger clamps on one side. for isolation separation to the right and left: Separation min. 50. max. 100 mm.

e) Adjust the expansion gap (separation between the caps) in correspondence with the graph: Separation = max. 12 mm. isolation separation = 24 mm (2x12).

Example: Possible ambient temperature max. + 40°C. min. + 10°C; mark the points in the graph and connect them with a straight line;

temperature during the installation = + 16°C;
expansion gap to be set approx. 10 mm.

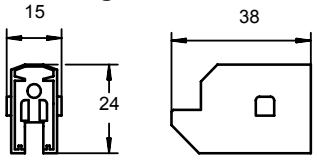


Expansion gap (between the rail) min. 2 - max. 7

Important: Do not change the expansion gap on subsequent installations!

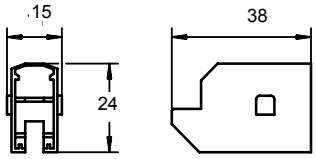
Transfer-Caps

Figure 1



Tap in caps

Figure 2



Feed Caps

Figure 5

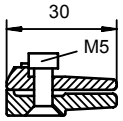


Figure 3

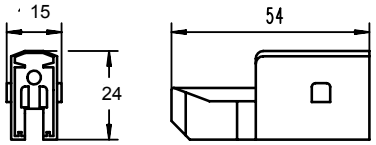


Figure 4

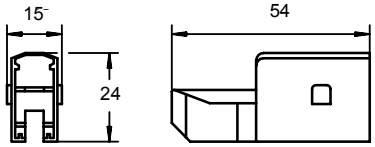


Figure 3 and Figure 4 require (2) collectors to bridge

Figure 6

Figure 7

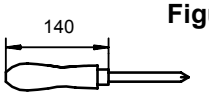


Table 13: Transfer Caps

Order No.	Feed possibility		Stagger of heights and sides		Weight
Transfer Cap					
241 017 045	Figure 1	Without	Permissible ± 2 mm	plug-type; plastic-orange	0.004
241 017 055	Figure 2+5	With	Permissible ± 2 mm	screw-on type; packing unit. in bag with clip. Figure 6 for cable up to 2.5 mm²	0.025
241 017 048	Figure 3	Without	Permissible ± 4 mm	plug-type; plastic-orange	0.005
241 017 155	Figure 4+5	With	Permissible ± 4 mm	screw-on type. packing unit. in bag with clip. Figure 6 for cable up to 2.5 mm²	0.025
Feed cable					
241 040 415	Figure 6	6 mm²	outer-∅ 7.0	1 kV black	0.110
241 040 421		2.5 mm²	outer-∅ 4.5	1 kV black	0.044
241 040 400		1.5 mm²	outer-∅ 4.0	1 kV black	0.030
241 040 417		6 mm²	outer-∅ 6.5	**Ground** green yellow	0.070
241 040 408		2.5 mm²	outer-∅ 4.0	**Ground** green yellow	0.036
				single-core. highly flexible; 1 m long (other lengths on request)	
241 017 035	Figure 2	For feed clamp Figure 5		plastic-orange as spare only	0.004
241 017 038	Figure 4				0.005
251 022 010	Figure 5	Screw-type feed clamp		with square nut as spare only	0.021
518 502 000	Figure 7	Philips screwdriver		for countersunk screw M 5	0.088

Technical Information

- Application: For mechanical separations of the conductor rail (e.g. on shunting stages, switches, etc..)
- Also as separation cap on conductor rail ends (used also for ground).
- Conducting surfaces whether positioned down or sideways.
- Suitable for all conductor rails including ground.
- The transfer caps without feed are not remountable (not reusable).
- Permissible ambient temperatures – 30°C to + 80°C.
- Refer to Section IS 100 U for more transfer caps and detailed data for transfers on switches, lift stations, etc..

Planning Instructions

- Transfer caps corresponding to Figures 1 and 2: Only one current collector is required on the vehicle for each conductor rail including ground, because the collector bridges both ends of the metal rail.
  The permissible air gap between opposing caps is:
  for a 90 degree-cut. max. 5 mm
  for a 45 degree-cut. max. 3 mm.
- Transfer caps corresponding to Figures 3 and 4: Two current collectors are required on the carrier for each conducting rail including ground.
  The permissible air gap between opposing caps is:
  for a 90 degree-cut. max. 8 mm
  for a 45 degree-cut. max. 5 mm.
- Hanger clamps are to be located behind the transfer caps :
  Distance to the cap. min. 20 mm. max. 50 mm.
- In bends or switches all caps can be fitted according to the cutting or sliding angle.
- For the transfer caps not to move into the range of the metal rail end, they must be secured with a fixed point.

Installation Instructions

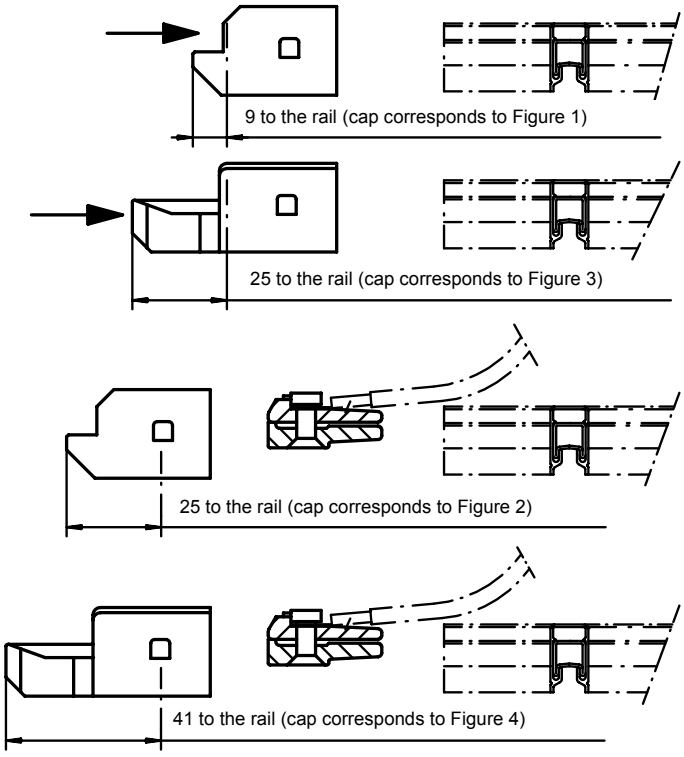
a) Metal rail and insulating sheath have to be of equal length.

b) If the conductor rails have been shortened, they are to be de-burred very carefully, including the inside.

c) Install the caps without feed with light blows of the hammer.

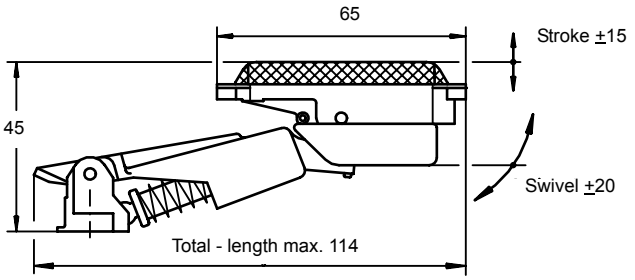
d) Caps with connection of one feed cable :
- Loosely connect the cable with screw-type clamp.
- Insert the screw-type clamp into the cap.
- Locate both of them on the conductor rail.
- The cap is adjustable towards the end of the rail by 3 mm.
- Tighten the Philips screw securely.

e) Inspect all caps to ensure both sides of the conductor rail sleeving are correctly secured.



One-Arm Current Collector

Figure 1



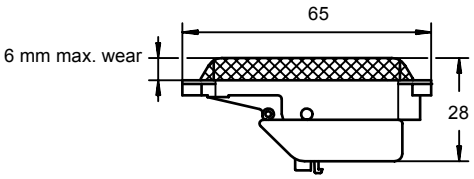


Figure 3

Figure 2

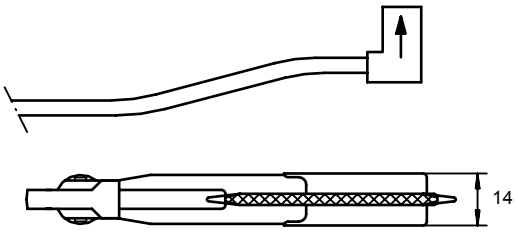


Figure 4

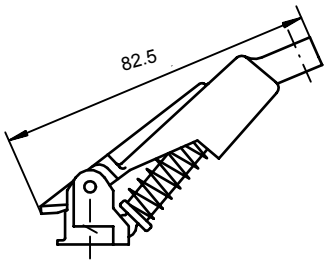


Table 14: Standard Type Current Collector

Item No.	Fig.	Description				Weight
241 035 030	1	One-arm current collector	20 A	orange	one-pole**; Cu carbon shoe ; without feed cable**	0.029
241 035 056			Ground	yellow		0.029
241 040 702	2	Feed cable 1 m long	20 A	black	1.5 mm^2. outer-∅ 4.0. single-core. highly flexible;	0.029
241 040 710			20 A	black	2.5 mm^2. outer-∅ 4.5. 1000V; one side with DIN-plug;	0.038
241 040 712			Ground	green-yellow	2.5 mm^2. outer-∅ 4.0. (other lengths by request)	0.033
241 035 250	3	Head with pivot and shoe	20 A	orange	Cu collector shoe; with spade connector and head (delivered only as unit), as spare only	0.014
241 035 265			Ground	yellow		0.014
251 035 001	4	Basic unit without shoe unit	20 A	orange	plastic; spring CrNi, as spare only	0.015
251 035 006			Ground	yellow		0.015
Order base plate and bolting material for fastening the current collectors: separately (see page 25)						

Table 15: Current Collector For Data Transfer

Item No..	Fig	Description		Weight
241 035 057	1	Data-collector	one-pole**; Silver** collector shoe**; without feed cable** basic unit orange; head grey	0.028
241 040 520	2	Feed cable	grey; 0.5 mm^2; outer-∅ 3.6; with shielding; single-core; highly flexible; one side with DIN-plug; 1 m long (other lengths by request)	0.020
241 040 702	2	Feed cable	standard cable: black; 1.5 mm^2; outer∅ 4.0; 1000 V; single-core; highly flexible; one side with DIN-plug; 1 m long (other lengths by request)	0.029
241 035 266	3	Data head	grey; Silver collector shoe; with plug connection;as spare only	0.013
251 035 001	4	Basic unit less head	standard design: plastic-orange, as spare only	0.015
Order base plate and bolting material for fastening the current collectors: separately				

Technical Information

a) • Permissible ambient temperatures – 30°C to + 80°C.
- Feed cable may be specially ordered.
- Differently colored feed cables are available upon on request.
- The ground current collector has a larger joint at the head, so that the head or the collector carbon protrudes by 3 mm as compared to the others.
- Suitable for:

  Travelling speeds up to 400 m/min. for back and forth operation
  Installations with the rail conductor surface facing down or sideways
  In bends from 500 mm radius.

b) One-arm current collector of standard design :

Permissible continuous current 20 A to 40°C ambient temperature. For higher temperatures reduce according to Table 3 in Section IS 100 A.

c) One-arm sliding contact for data transmission:

Design of the connection line with shielding: single shielding.

Planning Instructions

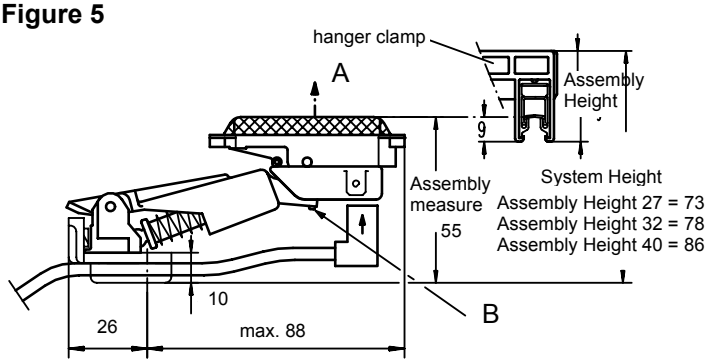
- Pay special attention that the stroke of max. ± 15 mm and / or the permissible swivel of max. ± 20 mm is not surpassed on the total length of the line.
- Install the collector mounting plate (customer supplied) to the mobile equipment in such a way so that for installations with bends the head of the current collector is located at the center of support- / guide roller - see arrow A of Figure 5.
- Usually only one collector is required per conductor rail. However, when using the data collector please refer to section IS 100 D "Data Transfer".

Installation Instructions

a) • Mount the collector (turned out approximately 30°) on the base plate and swivel in (lug of the base plate secures the foot of the collector).
- Ground collector can be mounted at every point.

b) Connecting cable:
- Plugged directly and carefully onto the collector shoe within the head.
- Insert only one cable through the opening of the base plate - do not twist the cable, it must move unhindered.
- The cable must not exert any stress or torque on the head of the current collector.
- If the cables have to be bundled, do so beyond the base plate after the radius tapers off.

Figure 5



c) Exchanging the head of the current collector:

Slightly push the clip on the end of the pivot (Arrow B) slightly together and pull off the head. When remounting clip it into the arm.

One-Arm Current Collector (small type for restricted space)

Figure 1

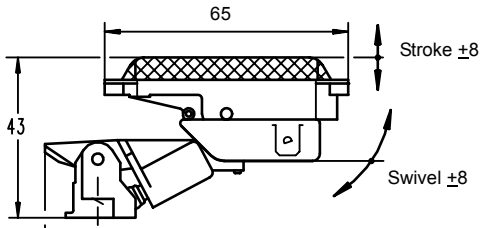
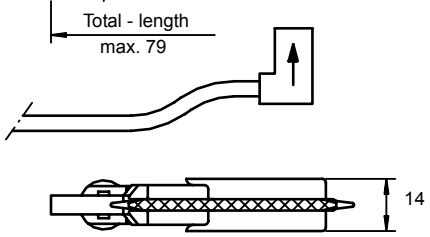


Figure 2



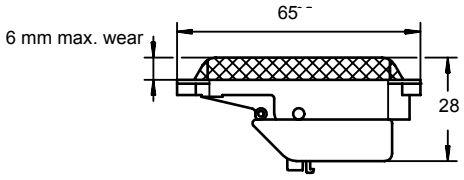


Figure 3

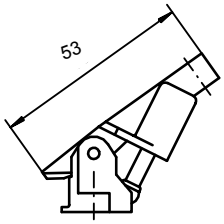


Figure 4

Table 16: One Arm Collector - Small

Order-No.	Fig.	Identification						Weight
241 035 078	1	One-arm collector small	10/16 A Ground for data	orange		**Cu**-collector shoe	without feed cable	0.021
241 035 079				yellow	one-pole;	**Cu**-collector shoe		0.021
241 035 087				orange/grey		**Silver** collector shoe		0.019
241 040 397	2	Feed-cable 1 m long	10 A 16 A Ground for data	black	0.75 mm², outer-í 3.5	1000 V	single-core, highly	0.020
241 040 702				black	1.5 mm², outer-∅ 4.0	1000 V	flex., one side with	0,029
241 040 712				green-yellow	2.5 mm², outer-∅ 4.0		DIN-plug; other	0.033
241 040 520				grey	0.5 mm², outer-∅ 3.6 with shield.		lengths by re.	0.020
241 035 250	3	Head small		orange	Cu collector shoe; with plug connection		as spare only	0.014
241 035 265			Ground	yellow	Cu collector shoe; with plug connection			0.014
241 035 266			for data	grey	Silver collector shoe; with plug connection			0.012
251 035 020	4	Basic unit small		orange	plastic; spring CrNi			0.007
251 035 021			Ground	Yellow				0.007
Order base plate and bolting material for fastening the current collectors: separate								

Technical Information

- Permissible continuous current, depending on feed cable, 16 A or 10 A up to 40°C ambient temperature. For higher temperatures reduce according to Table 3 of Section IS 100 A.
- Permissible ambient temperatures – 30°C to + 80°C.
- Suitable: For traveling speeds up to 200 m/min. for back and forth operation.
  For installations with the conductor surface facing down or sideways
  With bends from 500 mm radius.
- Order feed cables separately. Different colored feed cables by request.
- The ground current collector has a larger joint at the head, so that the head or the collector carbon protrudes by 3 mm as compared to the others.
- When using the data collector refer to Section IS 100 D "Data Transfer".

Planning Instructions

- This current collector is extremely small and its operating range is also especially small. Please pay attention to the permissible lift of max. ± 8 mm and the permissible lateral movement of max. ± 8mm.
- Refer to the instructions for the one-arm current collector.

Installation Instructions

- Basically identical to the "One-Arm Current Collector" with the following exceptions:
  assembly measurement 53 mm (instead of 55 mm).
  height of system: for assembly height 27 = 71 mm; for assembly height 32 = 76 mm; for assembly height 40 = 84 mm.

One-Arm - Cleaning Collector

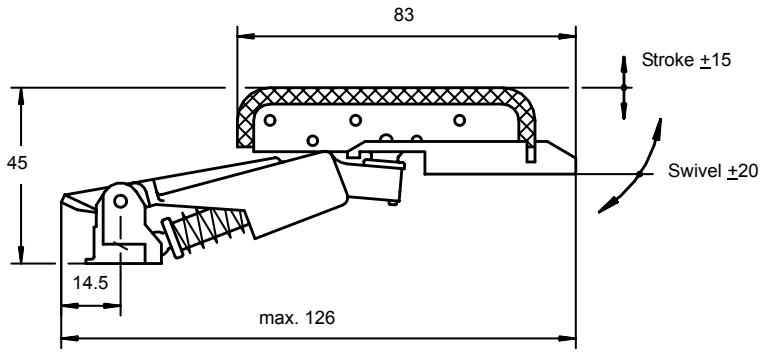


Figure 1

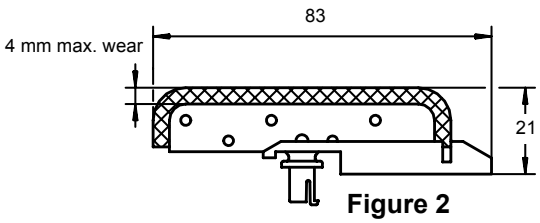
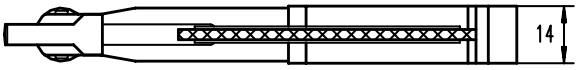


Figure 2



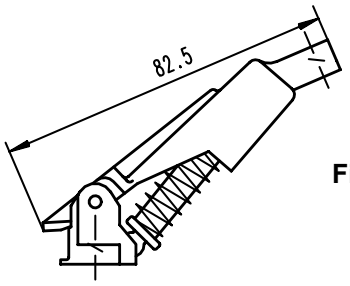


Figure 3

Table 17: One Arm Cleaning Collector

Item No.	Fig.	Description		Weight
241 035 063	1	One-arm cleaning collector	one-pole**; with fibre pad; without connecting cable**	0.022
241 035 268	2	Cleaning head	plastic with fibre pad; as spare only	0.007
251 035 001	3	Basic unit	plastic-orange; spring CrNi, as spare only	0.015
Order base plate with bolting material for fastening the current collectors: separately				

Technical Information

a) Application :

- in systems with rail collector surface facing down or sideways, in bends from 0.5 m radius;
- can be used for ground conductor rail
- one cleaning collector per conductor rail
- generally for use in all electric monorail installations
- recommended if data transfer has been planned or control commands are to be transferred
- required for the equalization of the rail conductor surface prior to the initial start-up
- for all installations where conditions of extreme dust or dirt is expected, especially for deposits of non-conductive suspended particles (such as small fibres / fluff).

b) The collector removes foreign coatings from the conductor surface. The fibre pad has a long lifetime and does not rust or splinter.

c) The cleaning collector does not serve for the transfer of power and is therefore mounted separately on the moving equipment.

d) Permissible ambient temperatures – 30°C to + 80°C.

e) Suitable for traveling speeds up to 200 m/min. for back and forth operation.

Planning Instructions

- To assure perfect contact, the complete system should be traversed with the cleaning collectors approximately 20 times before the initial start-up. Following start-up, use in regular intervals only if fouling is to be expected.
- For the electric monorail it is sensible to mount it on the following part of the carrier.
- In installations containing bends the base plate for mounting the current collectors should to be fastened to the mobile equipment in a manner to ensure that the head is in the center of the support/guide roller.

Installation Instructions

a) Fundamentally identical to the data on the "One-Arm Current Collector".

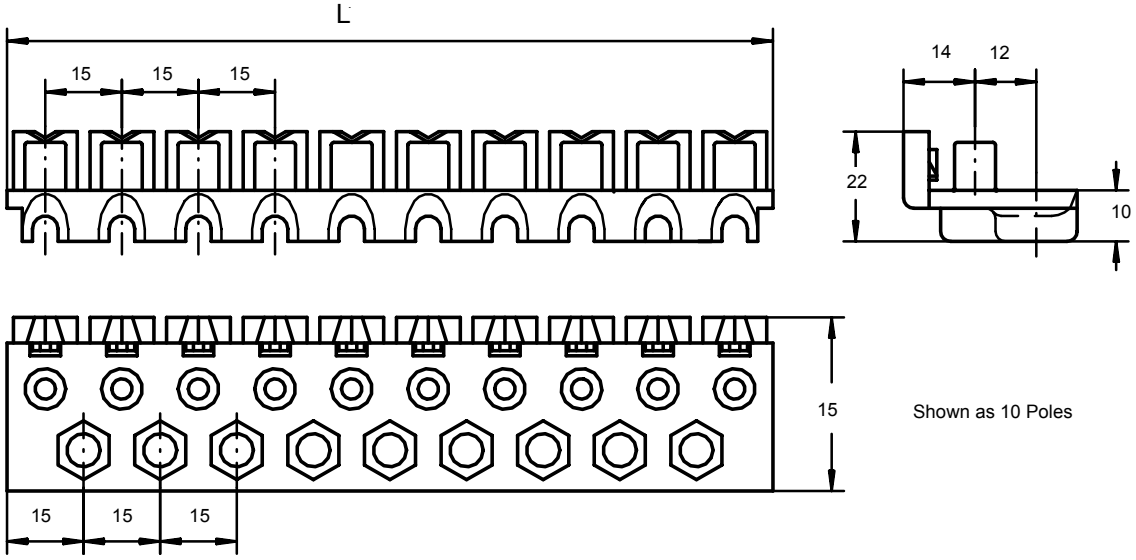
b) Mount the collector mounting plate (customer supplied) and the base plate as usual, refer to the Base Plate section starting on page 29.

c) The assembly measurement (with base plate) is 45 + 10 = 55 mm.

d) Replacement of the cleaning head:

- Press the bolt of the joint slightly together (as is done for the one-arm collectors) and pull off the head.
- Insert or clip on the spare head.

Base-Plate for one-arm - current-collector



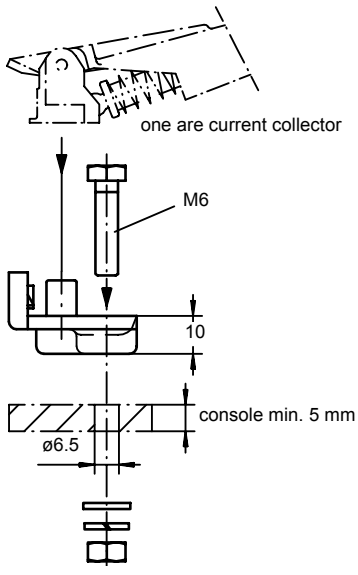
Shown as 10 Poles

Table 18: Base Plate for one arm Collector

Item No.	Description	Poles	Length L		Weight
241 036 051		2	29		0.009
241 036 025		3	44		0.012
241 036 032		4	59		0.015
241 036 029		5	74		0.018
241 036 026		6	89		0.021
241 036 023		7	104	One piece	0.024
241 036 020	Base plate	8	120	Plastic orange For conductor rail	0.027
241 036 024		9	135	Center separation 15 mm	0.031
241 036 060		10	150		0.034
241 036 061		11	164		0.038
241 036 062		12	179		0.041
241 036 063		13	194		0.045
241 036 064		14	210		0.048
241 013 025		to 8	2 pieces each	Hex. screw M6 x 25.	0.022
241 013 027	Screw-material	to 13	3 pieces each	Nut. washer. spring washer	0.033
241 013 028		14	4 pieces	Unit packed in bag	0.044

Technical Information

- For fastening to all one-arm current collectors.
- Permissible ambient temperatures – 30°C to + 80°C.



Planning Instructions

- Pay attention to the stability of the collector mounting plate (customer supplied).
- For installations containing bends, mount the collector mounting plate in such a manner to the mobile equipment that the head of the current collector is located in the center of the support- / guide roller.

Installation Instructions

- Bolt the base plate to the collector mounting plate.
- Location of bolts: always use the outer holes if possible; spacing of holes 15 mm whenever located between the mountings of the collector.
- Align the base plate so that the current collectors to be inserted are in line with or centered to the conductor rails. Sliding holes in the collector mounting plate are advisable for this purpose.

Double-Arm Current Collector with one shoe

Figure 1 with spade socket 4.8 x 0.9 to 20A
with screw connection M4 to 30A

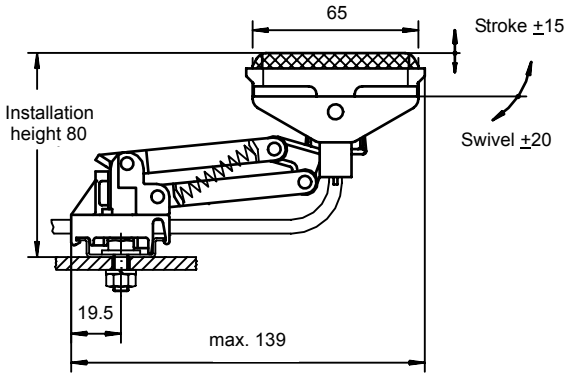


Figure 2 with screw connection M4 to 50A

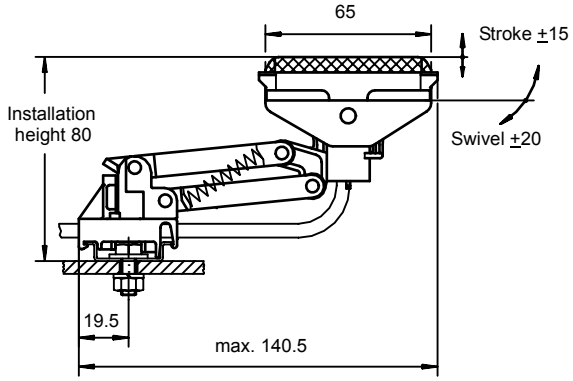


Figure 3 with spade socket 4.8 x 0.9 to 20A
with screw connection M4 to 30A

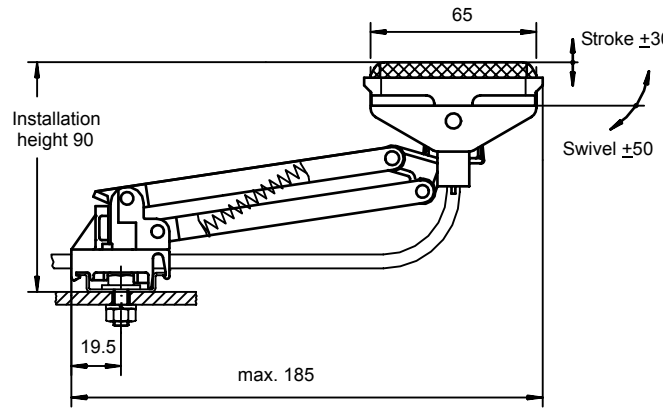


Figure 4 with screw connection M4 to 50A

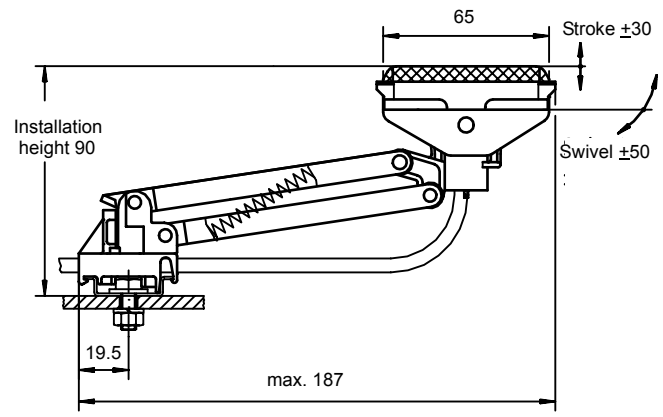


Table 19: Double Arm Current Collector, Single Shoe

Item No	Fig.				Weight
241 035 325	1	Spade Connection	Ground orange with yellow head and foot	1 pole;	0.040
241 035 326					0.040
241 035 155	1	Screw Connection M4		Cu Shoe;	0.040
241 035 156					0.040
241 035 167	2	Screw Connection M4		Plastic Body	0.040
241 035 168					0.040
241 035 331	3	Spade Connection		CrNi-Spring	0.048
241 035 332		With longer arm		Stainless steel	0.048
241 035 160	3	Screw Connection M4		without cable	0.048
241 035 161		With longer arm			0.048
241 035 163	4	Screw Connection M4		without collector	0.048
241 035 164		With longer arm		bracket	0.048

For Data Transfer					
241 035 327	11	Spade Connection	Body orange	With Silver Shoe	0.040
241 035 157		Screw Connection M4	Head grey		0.040
241 035 333	33	Spade Connection	Body orange		0.048
241 035 162		Screw Connection	Head grey		0.048

Figure 5 with spade socket 4.8 x 0.8 to 20A

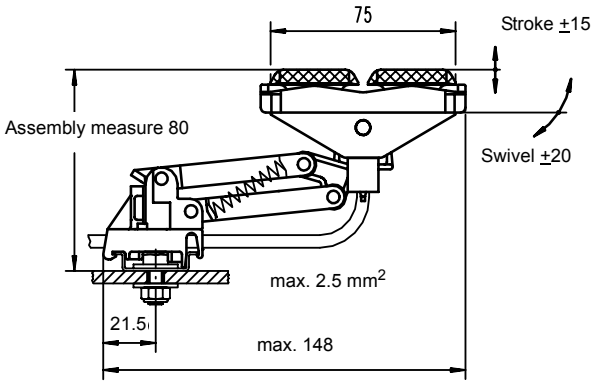


Figure 6 with spade socket 4.8 x 0.8 to 20A

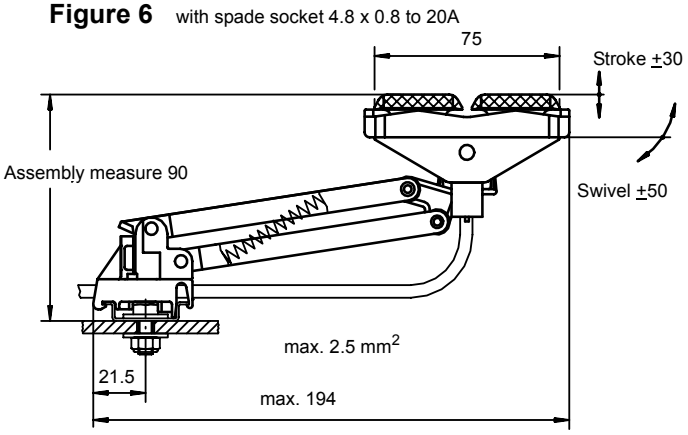
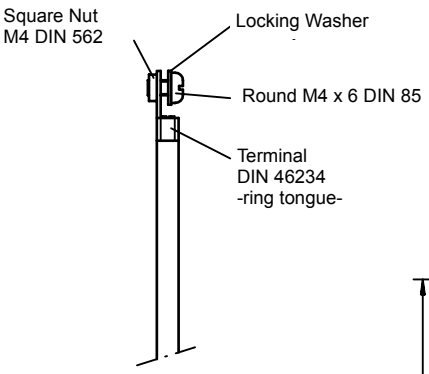


Table 20: Double Arm Current Collector, Double Shoe

Item No	Fig.					Weight
241 035 165	5	phase	Spade Connection	orange with yellow head and foot	**Cu**-collector shoe	0.038
241 035 166		ground				0.038
241 035 140	6	phase	Spade Connection	orange with yellow head and foot With longer Arm	**Cu-**collector shoe	0.046
241 035 141		ground				0.046

Attention! Systems with collectors with double long arms and pick-up guides have a larger installation measurement of 100 mm.

Accessories for double arm current collector



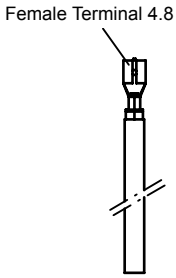
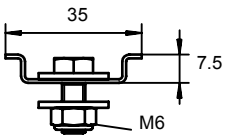
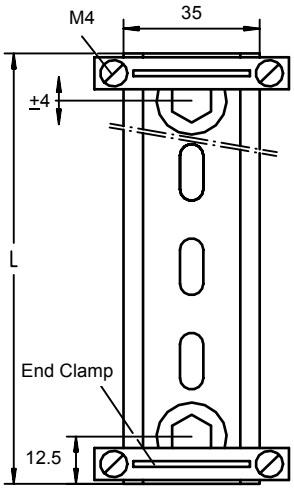


Figure 8



shown without end clamp

Figure 9



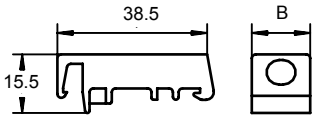


Figure 10a

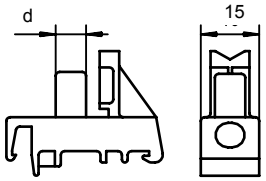


Figure 10b

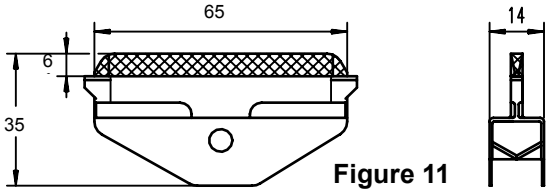


Figure 11

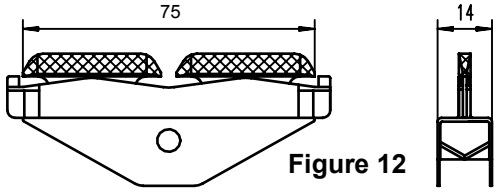


Figure 12

Table 21: Accessories for Double Arm Current Collector

Item No.	Fig.						Weight
241 040 011	7	Connection cable for screw connection (for collector Fig. 1, 2, 3, 4)	20 Amp.	black	1.5 mm² Outer -∅ 4.0	Single-wire; Highly flexible; 1000 V; One-end M4; 1 m long (other lengths on request)	0.030
241 040 013			30 Amp.		2.5 mm² Outer -∅ 4.5		0.040
241 040 014			40 Amp.		4 mm² Outer -∅ 6.0		0.080
241 040 016			50 Amp.		6 mm² Outer -∅ 7.5		0.120
241 040 012			Ground	green/yellow	2.5 mm² Outer -∅ 4.0		0.034
241 040 015					4 mm² Outer -∅ 5.0		0.056
241 040 017					6 mm² Outer -∅ 6.5		0.072
241 040 018	7	**Data** connection cable for screw connection (for collector Fig. 1 and 3)			0.5 mm² Outer -∅ 3.6; with shielding; grey; single-wire; highly flexible; one-sided M4; 1 m long (other lengths on request)		0.022
241 040 060	8	Connection cable for plug terminal (for collector Fig. 1. 3, 5, 6)	20 Amp.	black	1.5 mm² Outer -∅ 4.0	Single-wire; highly flexible; 1000 V; One-end with DIN plug; 1 m long (other lengths on request)	0.030
241 040 061			20 Amp.	black	2.5 mm² Outer -∅ 4.5		0.040
241 040 062			PE	green/yellow	2.5 mm² Outer -∅ 4.0		0.034
241 013 110	9	Support rail for holding collectors		2 pole	Length = 75	For sliding contact rails, Center point spacing 15 mm; complete: with 2 end clamps and 2 attachment screws; Design. galv. steel Zn	0.056
241 013 111				3/4-pole	Length = 100		0.064
241 013 112				5/6 pole	Length = 125		0.072
241 013 113				7/8-pole	Length = 150		0.080
241 013 114				9/10-pole	Length = 200		0.095
241 013 115				11/12-pole	Length = 225		0.104
241 013 116				13/14-pole	Length = 250		0.112
241 013 117	9	Support rail	**Length L = 400 mm**; for any desired sliding contact rails center spacing; Complete: With 2 end clamps and 2 attachment screws Design. galv. steel Zn				0.160

Table 21: Accessories for Double Arm Current Collector

241 024 075	10 a	Spacer piece	One-piece made of plastic; Width B = Centre spacing minus 15; State conductor rail centre spacing when ordering				0.005
251 035 055 251 035 056	10 b	Base plate	Ground	orange yellow	diameter d = 8 diameter d = 6,	One-piece, plastic, as spare only	0.006 0.006
241 035 321	11	Replacement head for plug connection (for collector Fig. 1 and 3)	Ground	orange	**Cu**-sliding carbon contact; for plug connection 4.8 x 0.8 **Silver**-sliding carbon contact; with plug connection 4.8 x 0.8		0.017
241 035 322				yellow			
241 035 323				grey			
241 035 315	12	Replacement head for screw connection (for collector Fig. 1, 2, 3, 4)	phase	orange	**Cu**-sliding carbon contact; for screw connection M4 **Silver**-sliding carbon contact; for screw connection M4		0.017
241 035 316			Ground	yellow			
241 035 317			Data-	grey			
241 035 420	12	Replacement head (for collector Fig. 5 and 6)	phase	orange	**Cu**-sliding carbon contact; with plug connection 4.8 x 0.8as spare only		0.015
241 035 421			Ground	yellow			

Technical Information

a)
- Permissible Ambient temperature – 30°C to + 80°C.
- Collector Cables must be ordered separately, other colors available upon request.
- Foot and head are self centering when disengaged from the conductor rail.
- Ground Collector is 4 mm higher.
- The head is spring loaded ± 5.
- Collector Cables must not be pulled taught.
- Suitable for:

  Speeds up till 400 m/min. and back and forth motion.
  Systems where contact surface is facing sideways or down.
  Bends above 500 mm Radius.
  20 - 50 Amps at 40øC Ambient temperature depending on the correct cable see page 28.

b) Allowable continuous current depends upon the connection line **20 A**, **30 A**, **40 A** or **50 A** up to 40°C ambient temperature. At higher temperatures. reduction in compliance with Table 3 in List IS 100 A.

c) Design with long arm:

Preferred place of installation. for example. crane systems. meaning when longer lifting / longer swing is necessary. **Attention!** Installed dimension for systems with hopper: 100 mm.

d) Design with double contact:

Maximum allowable continuous current **20 A** (otherwise as for b). Used preferably for control functions.

e) Parallel arm slider for data transmission:

Design of the connection line with shielding: single shielding.

f) For sliding contact rail center spacing larger than 15 mm. please note::
- Minimum 30 mm is necessary. For example, when laying in moist areas or in the open air;
- All parallel arm sliding contacts are suitable;
- Do not install any raising/lowering hoppers in the system.

Planning Instructions

- It is essential that the stroke and swivel tolerances of the collector be consistent through the entire system.
- Collector holder bracket should be situated on carriers where bends exist so that the collector head is in the middle of the drive roller of the carrier .
- Standard practice is one head collector for each conductor rail. Please see section IS 100 D for data transmission with collector.
- When rail centers of more than 15 mm are required: Use holder bracket 400 mm long (shorten to requirements); and use a spacer (Figure 7) between each collector.

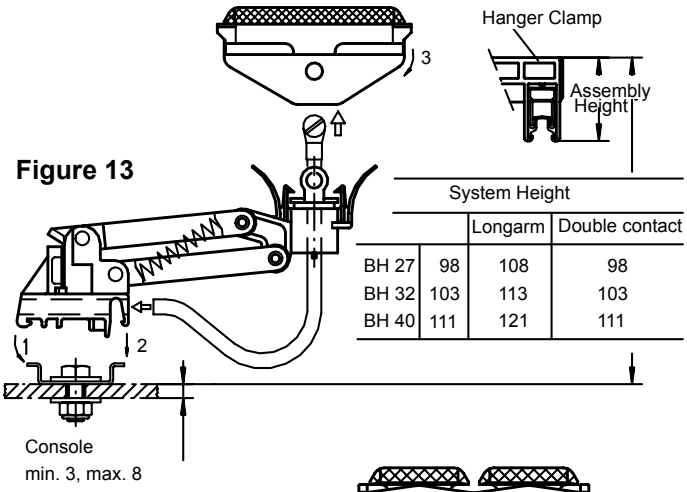


Figure 13

	System Height		
		Longarm	Double contact
BH 27	98	108	98
BH 32	103	113	103
BH 40	111	121	111

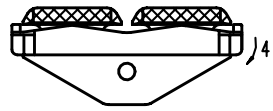
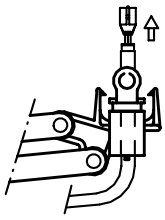


Figure 14



Installation Instructions

a) Screw collector bracket on holder.

b) Clip collector base starting from the back of the collector with a turning motion onto the holding bracket making sure collectors line up middle to the conductor rail. For spacing more than 15 mm use appropriate number of spacers with a width of 15 mm. Make sure the ground collector (yellow head) is positioned in the ground conductor rail.

c) Cable connection:

- For reliable function use only highly flexible cables.
- Cable connection screw-on type (Figure 13): Pass the cable end without terminal through the top pivot then through the hole in the base section and connect. Tighten Cable with screw connection M4 on to collector shoe, making sure the tongue on the collector shoe is positioned between the ring terminal and locking washer.
- Cable connection push on type (Figure 14): Pass Cable through top pivot make sure female terminal fits secure on male terminal. Allow for slack on cable for future shoe change before securing cable.
- Make sure cables are not twisted. The head must be allowed to pivot freely in all directions, failure to do this will result in poor collector function and cause excessive wear on collector shoes.

d) Shoe change:

- For Figure 13: Press head down and hold, tilt head backwards (Arrow 3).
- For Figure 14: toward arm and pull off (Arrow 4)

201 009 299	Conductor rail FABA 100 3M Standard	3
201 009 499	Conductor rail FABA 100 5M Standard	3
201 010 299	Conductor rail FABA 100 3M Ground	3
201 010 499	Conductor rail FABA 100 5M Ground	3
201 011 299	Conductor rail FABA 100 3M Heat Resistant	3
201 011 499	Conductor rail FABA 100 5M heat resistant	3
201 012 299	Conductor rail FABA 100 3M Heat Resistant Ground	3
201 012 499	Conductor rail FABA 100 5M Heat Resistant Ground	3
211 010 115	Expansion rail 25 mm	16
211 010 116	Expansion rail 25 mm	16
211 010 117	Expansion rail 50 mm	16
211 010 118	Expansion rail 50 mm	16
211 010 119	Expansion rail 75 mm	16
211 010 120	Expansion rail 75 mm	16
211 010 121	Expansion rail 25 mm	16
211 010 122	Expansion rail 25 mm	16
211 010 123	Expansion rail 50 mm	16
211 010 124	Expansion rail 50 mm	16
211 010 125	Expansion rail 75 mm	16
211 010 126	Expansion rail 75 mm	16
241 000 005	Bending strips	3
241 000 006	Bending profile	3
241 002 000	Rail connector, screw-type	6
241 002 010	Rail connector, plug-in	5
241 003 000	Hanger clamp 1-pole	7
241 006 106	Holder assembly height 40	17
241 006 107	Holder assembly height 32	17
241 006 108	Holder assembly height 27	17
241 006 126	Hanger clamp 7-poles	7
241 006 127	Hanger clamp 5-poles	7
241 006 128	Hanger clamp 4-poles	7
241 006 130	Hanger clamp 8-poles	7
241 006 131	Hanger clamp 9-poles	7
241 006 132	Hanger clamp 10-poles	7
241 006 133	Hanger clamp 11-poles	7
241 006 134	Hanger clamp 12-poles	7
241 006 135	Hanger clamp 13-poles	7
241 006 136	Hanger clamp 14-poles	7
241 006 137	Hanger clamp 6-poles	7
241 009 210	Hanger clamp 12-poles	7
241 009 211	Hanger clamp 2-poles	7
241 009 212	Hanger clamp 3-poles	7
241 009 213	Hanger clamp 4-poles	7
241 009 214	Hanger clamp 5-poles	7
241 009 215	Hanger clamp 6-poles	7
241 009 216	Hanger clamp 7-poles	7
241 009 217	Hanger clamp 8-poles	7
241 009 218	Hanger clamp 9-poles	7
241 009 219	Hanger clamp 10-poles	7
241 009 220	Hanger clamp 11-poles	7

Index of Standard Components

Index of Standard Components

241 035 421	Head as spare	32
241 036 020	Base plate 8-poles	29
241 036 023	Base plate 7-poles	29
241 036 024	Base plate 9-poles	29
241 036 025	Base plate 3-poles	29
241 036 026	Base plate 6-poles	29
241 036 029	Base plate 5-poles	29
241 036 032	Base plate 4-poles	29
241 036 051	Base plate 2-poles	29
241 036 060	Base plate 10-poles	29
241 036 061	Base plate11-poles	29
241 036 062	Base plate12-poles	29
241 036 063	Base plate13-poles	29
241 036 064	Base plate 14-poles	29
241 040 011	cable 20 Amp. 1.5 mm² outer-∅ 4.0	32
241 040 012	cable ground 2.5 mm² outer -∅ 4.0	32
241 040 013	cable 30 Amp. 1.5 mm² outer -∅ 4.0	32
241 040 014	cable 40 Amp. 1.5 mm² outer -∅ 4.0	32
241 040 015	cable ground 4 mm² outer -∅ 5.0	32
241 040 016	cable 50 Amp. 1.5 mm² outer -∅ 4.0	32
241 040 017	cable ground 6 mm² outer -∅ 6.5	32
241 040 018	data-cable 0.5 mm² Hasten-∅ 3.6	32
241 040 026	Feed cable 6 mm²	9
241 040 045	Feed cable 16 mm²	9
241 040 051	Feed cable 6 mm²	9
241 040 057	Feed Cable 16 mm²	9
241 040 060	Cable 20 Amp black 1.5 mm² outer-∅ 4.0	32
241 040 061	Cable 20 Amp black 2.5 mm² outer-∅ 4.5	32
241 040 062	Cable Ground 2.5 mm² outer-∅ 4.0	32
241 040 397	Feed cable 1 m long	26
241 040 400	Feed cable 1.5 mm²	22
241 040 408	Feed cable 2.5 mm²	22
241 040 415	Feed cable 6 mm²	22
241 040 417	Feed cable 6 mm²	22
241 040 421	Feed cable 2.5 mm²	22
241 040 453	Feed cable 1.5 mm²	9
241 040 456	Feed cable 2.5 mm²	9
241 040 460	Feed cable 2.5 mm²	9
241 040 490	Connecting cable one side with plug;	19
241 040 495	Bridging	19
241 040 513	Expansion	13
241 040 520	Feed cable	24
241 040 520	Feed cable 1 m long	26
241 040 702	Feed cable 1 m long 20 A	24
241 040 702	Feed cable	24
241 040 702	Feed cable 1 m long	26
241 040 710	Feed cable 1 m long 20 A	24
241 040 712	Feed cable 1 m long Ground	24
241 040 712	Feed cable 1 m long	26
241 045 001	Bending machine	3
241 046 010	Connecting vice	5
241 046 020	Installation handle	5
241 046 021	Dismantling wedge	7

251 002 000	Screw connector	6
251 015 000	Screw clamp with asymmetric nut	9
251 022 010	Screw-type feed clamp	19
251 022 020	Screw clamp pair of clips on one side	9
251 035 001	Basic unit without shoe 20 A	24
251 035 001	Basic unit	24
251 035 001	Basic unit	27
251 035 006	Basic unit without shoe, ground	24
251 035 020	Basic unit small	26
251 035 021	Basic unit small, ground	26
251 035 055	Base plate	33
251 035 056	Base plate	33
251 040 093	Bridging cable 6 mm²	13
251 040 093	Bridging cable 6 mm²	16
251 040 094	Bridging cable 6 mm²	13
251 040 094	Bridging cable 6 mm²	16
251 040 097	Bridging cable 6 mm²	16
251 040 098	Bridging cable 6 mm²	16
251 040 099	Bridging cable 6 mm²	16
251 040 100	Bridging cable 6 mm²	16
506 006 002	Cable shoe (galv >1 -2.5mm^2)	9
506 006 006	Cable shoe (galv >2.5 - 6mm^2)	9
506 006 010	Cable shoe (galv >6 - 10mm^2)	9
506 006 016	Cable shoe (galv >10 - 16mm^2)	9
518 501 010	Screwdriver 4 mm	6
518 501 010	Screwdriver SW 4	9
518 502 000	Philips screwdriver	9
518 503 000	Fine file	3

I S 1 0 0 D

Data Transfer

Insulated-Conductor-Rail System FABA 100

For the transmission of electric power and data to mobile equipment

Introduction

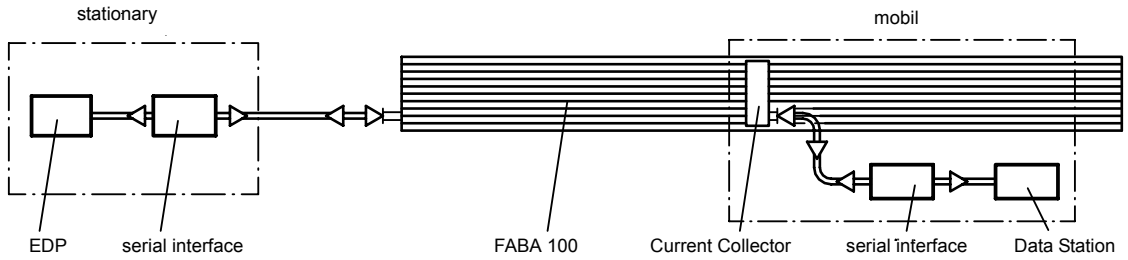
The FABA 100 conductor rail system is not only suitable for the transmission of electrical energy but data may certainly be transmitted also; where one has to differentiate between the type of "data".

1. For simple tasks such as the transmission of signals to the mobile equipment, for example to trigger control commands, the arrangement of electric or galvanic separation points within the conductor rail system is generally sufficient.

2. The separating points are located in specially installed conducting rails (i.e. beside those required for the power transmission) they are to be equipped as simple electric interruption or with a separately fed rail section. Such separating points can be installed without any problems at almost any point of the installation and they may be quite easily altered for different tasks. These electric separations may also be utilized for outdoor installations and are suitable for all conductor rails. As a rule, current collectors with copper containing collector shoes are suitable for data transfer. One current collector is sufficient for the transmission of control commands. Please use standard components for this purpose, see Section IS 100 B.

For automation and material-flow technique applications, information/data are to be transferred from a stationary computer via the conductor rail to a mobile data station. This places the highest demands on the conductor rail system.

Though some will argue that the transfer of data via conducting rails is "not to be achieved" with the assumption that interruptions and other disturbances will occur that place doubts on its proper functioning. However, we have been able to prover for many years, under real conditions, **that the transfer of data with our conductor rail system is carried out without any faults.**



- For flawless bit-by-bit data transfer from stop to a traveling speed of 20 m/sec
- For the passing of multiplex data without time delay (real-time-transfer)
- For the transfer of signals from incremental and absolute path-measuring-systems
- For the passing of sensor-signals and control parameters
- Switches and branches can be realized
- Several operating devices or machines on the same installation may be supplied simutaneously with data by the appropriate number of conductor rails
- It is possible to transfer data during unidirectional traffic as well as during the reversing operation
- Use only in dry indoor spaces
- Application of the components: crane installations, electric monorails, handling equipment, mobile robots, control units for shelves, automated assembly lines, etc...

General

- The installation or layout and the selection of all FABA-components must be planned very carefully.
- Correct installation is a prerequisite for a proper function –especially if high traveling speeds are planned.
- Data transfer is best suited to dry, indoor spaces. For other applications, please consult the factory
- Provide only for a conductor rail center separation of 15 mm.
- Arrangement of the conductor surface facing down or sideways.
- Back and forth operation is possible.
- Permissible ambient temperatures – 30°C to + 80°C.
- Installations may also be equipped with pick up guides, i.e. with larger mechanical separations - refer to Section IS 100 U.

Location of the Conductor rail system

Fig. 1 Example 8 poles :
Power transmission and data transfer
without shielding

Fig.2 Example 9 poles:
Power transmission without shielding
Data transfer **with shielding**

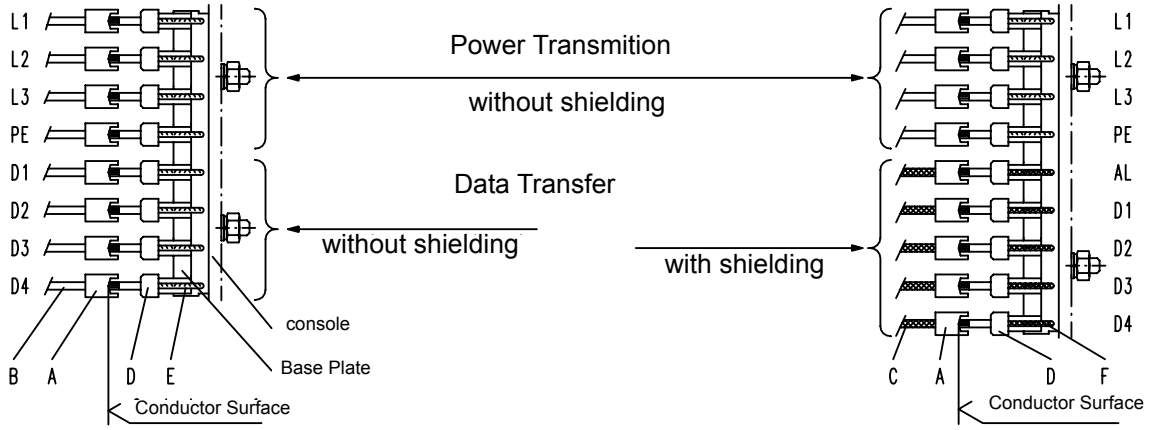
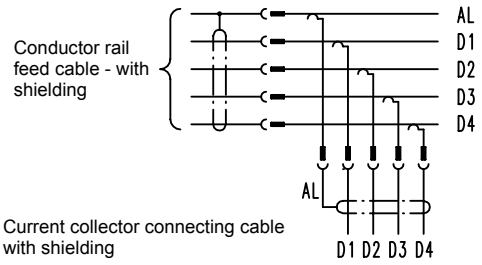


Fig. 3 Shielding :

Connect the shielding of the conductor rail feed cables as well as the current collector connection cables with the cable (AL) so that they are electrically at the same potential. The conductor rail feed cable (AL) is to be connected in accordance with the valid national regulations.



Legend

A Conductor rail corresponding to list IS 100 B :
  * for power transmission choice FABA 40 or FABA 100
  * for data transfer = FABA 100 - i.e. with copper metal rail

B Abb. 1 Conductor rail feed cable :
  * for power transmission = corresponding to list IS 100 B - without shielding
  * for data transfer = corresponding to list IS 100 B - without shielding - 1.5 mmý is sufficient

C Abb. 2 Conductor rail feed cable :
  * for power transmission = corresponding to list IS 100 B - without shielding
  * for data transfer = with shielding, refer to "Selection of Components" in this list

D Current collector :
  * for power transmission = with copper carbon collector shoe
  * for data transfer = with silver carbon collector shoe

E Abb. 1 Current collector connecting cable :
  * for power transmission and data transfer - without shielding

F Abb. 2 Current collector connecting cable :
  * for power transmission = without shielding
  * for data transfer = with shielding "grey"

Selection of Components

Fundamentally: Plan components according to Section IS 100 B; also for data transfer.

Conductor rail: For the transfer of data employ additional rails, but only FABA 100; metal rail of copper; standard or heat-resistant insulation.

Rail connector: Plug-type and screw-type designs are both suitable.

Conductor rail feed: Splice joint- and / or End feed;

- Feed cable **without shielding:** cross-section of 1.5 mm² is sufficient
- Feed cable **with shielding:** state length when ordering (item number **241 040 536)**

Design: one side with cable lug for M6; single-core, highly flexible; standard shielding;

outer-∅ 5.1 (PVC grey); impedance 75 Ohm.

Expansion: Plan components from Section IS 100 B.

Electrical separation: Usually not required for the transfer of data in the sense of this list.

Mechanical separation: (may also be planned for data transfer)

- With transfer caps for switches, shunting stages, lift sections and similar.

1. In one-pole design corresponding to section IS 100 B, may also have a feed-in;

1.a) Feed cable **without shielding** = cross-section of 1.5 mm² is sufficient

1.b) Feed cable **with shielding** = state length when ordering **Order-No.241 040 535**
Design: one side with cable lug for M5; single-core, highly flexible; standard shielding:
outer-∅ 5.1 (PVC grey); impedance 75 Ohm.

2. In multi-pole design corresponding to list IS 100 U with "straight caps", may be fed-into, refer to (1).

3. In multi-pole design corresponding to list IS 100 U with "bevel-cut caps", may also be fed-into;

3.a) Feed cable **without shielding** = cross-section of 1.5 mm² is sufficient

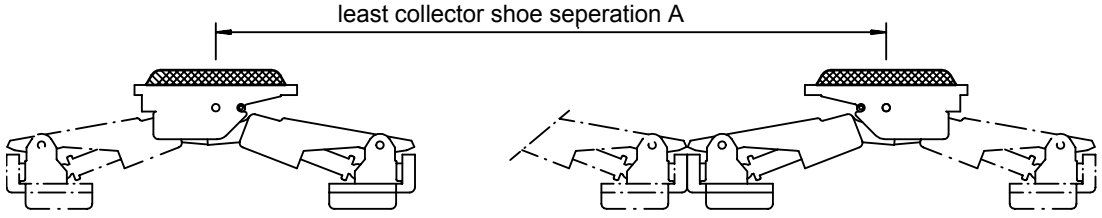
3.b) Feed cable **with shielding** = state length when ordering **Order-No. 241 040 497**
Design:one side with plug; single-core, highly flexible; standard shielding;
outer-∅ 5.1 (PVC grey); impedance 75 Ohm.

- with pick up guides for larger conductor rail interruptions Section IS 100 U.

Current collector: Principally use a one-arm data current collector with **silver collector carbon.**

- Current collector connection cables without or with shielding corresponding to Section IS 100 B;
- For traveling speeds up to 40 m/min or 0.67 m/sec usually only **one current collector is required for each conductor rail;**
- For higher traveling speeds we recommend to provide **2 current collectors for each rail** to maintain a continuous contact. Spacing of collectors depends on travelling speed.
- Two current collectors are to be located in such a way that the following minimum distances from the center of the collector shoe to the opposite collector shoe are maintained, whether pulling or pushing is unimportant

Please Note: *type HF shielded coaxial cable available upon request*



Traveling speed [m/sec]					
to 2	3	4	5	6	7
110	190	270	340	420	500

Collector shoe center sep. min. A [mm]

Please consult the factory for traveling speeds above 500 m/sec.

I S 1 0 0 K

Hanger Assembly

General

Hanger clamps serve to fasten the conductor rails to a beam. Screw-type hanger clamps for general use are listed under components in Section IS 100 B. Other types of hanger assemblies have been developed and are described in this section.

Technical Information

- Valid for all hanger clamps shown in this list- unless stated otherwise :
- Body of clamp one unit, made of polycarbonate plastic, color orange.
- For conductor rail centre separation 15 mm.
- Permissible ambient temperatures - 30°C to + 80°C.
- The clipped-in conductor rails slide in the hanger clamps allowing expansion in length.
- **Important :** Hanger clamps with adhesive tape can only be stored for approx. 1½ years.
- The hanger clamps shown this section have largely been developed for special profiles of various electric monorails, for the most part they are clipped-in. We forego to state detailed measurements because the perfect fit can only be determined with a profile from the original application.

Planning Instructions

- The assembly height has to be observed at all times.
- For assembly heights of 32 mm or more, control cables can be installed through openings in the hanger clamps.
- The rails (ground) may be located at arbitrary points.
- Hanger distances : In straight sections max. 800 mm, in bends max. 400 mm; to the ends of the conductor rails min. 100 mm, max. 300 mm, also refer to the Basic Diagram in section IS 100 B.

Installation Instructions

- Depending on the installation, the hanger clamps are fastened directly or by means of consoles to the track/ rail; they have to align correctly.
- The conductor rails are simply pressed into the hanger clamps until they audibly snap-in.
- The conductor rail can be taken out of the hanger clamp at any time. Push the sides of the clamp apart ; for extensive installations we recommend to use the rail removal wedge – refer to Section IS 100 B, Hanger Clamps.

Hanger-Clamp **screw-type assembly**

Figure 1

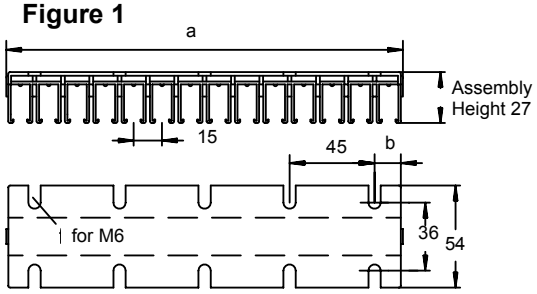


Figure 2

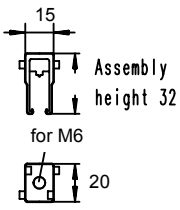


Figure 5 **Figure 6** **Figure 7** **Figure 8**

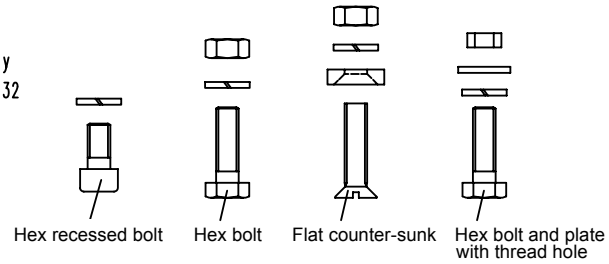


Figure 3

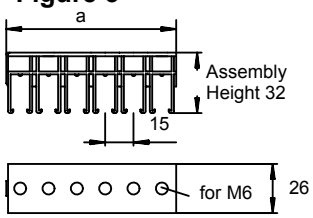


Figure 4

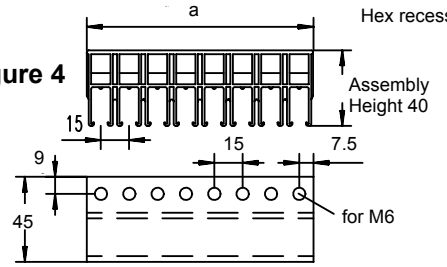


Abb. 9

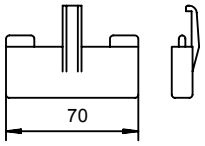
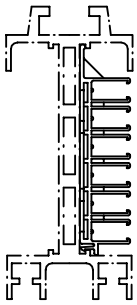


Table 1: Hanger Clamp-screw type

Order-No.	Figure	Identification		a	b	Assembly	Weight
241 006 128	1	Hanger-clamp Height 27mm	4-poles	60	30		0.015
241 006 127			5-poles	75	15		0.019
241 006 137			6-poles	90	30		0.023
241 006 126			7-poles	105	30	One piece	0.026
241 006 130			8-poles	120	15		0.030
241 006 131			9-poles	135	30		0.034
241 006 132			10-poles	150	30		0.038
241 006 133			11-poles	165	15	Plastic-orange	0.042
241 006 134			12-poles	180	45		0.045
241 006 135			13-poles	195	45		0.049
241 006 136			14-poles	210	15		0.053
241 003 000	2	32 mm	1-pole	continues		One piece; Plastic-orange	0.004
241 009 211	3	Hanger-clamp Height 32mm	2-poles	30		One piece; Plastic-orange	0.006
241 009 212			3-poles	45			0.009
241 009 213			4-poles	60			0.012
241 009 214			5-poles	75			0.015
241 009 215			6-poles	90			0.018
241 009 216			7-poles	105			0.021
241 009 217			8-poles	120			0.024
241 009 218			9-poles	135			0.027
241 009 219			10-poles	150			0.030
241 009 220			11-poles	165			0.033
241 009 210			12-poles	180			0.036
241 009 223	4	Hanger-clamp Height 40 mm	4-poles	60		One piece; Plastic-orange	0.020
241 009 224			5-poles	75			0.025
241 009 225			6-poles	90			0.030
241 009 226			7-poles	105			0.035
241 009 227			8-poles	120			0.040

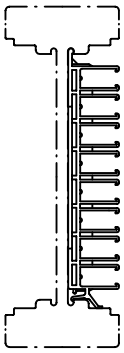
241 013 000	5	Screw Set M6 x 12	for threaded hole	with spring washer;		0.005
241 013 001	6	Screw Set M6 x 20	for through hole	with spring washer and nut;		0.008
241013 003	7	Screw Set M6 x 25	For Fig. 1	with washer orange, spring washer and nut	set; zinc-plated, in bag	0.010
241 013 022	8	Screw set M6 x 12	For Fig. 3	with washer, spring washer and plate with thread hole		0.008
241 013 023		Screw set M6 x 16				0.009
241 013 024		Screw set M6 x 20				0.010
241 046 021	9	Dismantling wedge	For removing rail from hanger ; plastic-orange			0.014

Hanger - Clamp **Clip-type - Assembly height 27 mm**



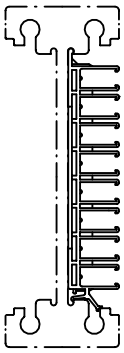
6 poles

Best.-Nr. 241 000 423



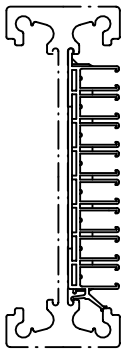
8 poles

Best.-Nr. 241 007 010



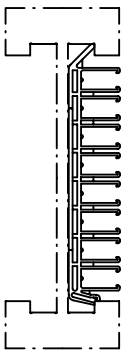
8 poles

Best.-Nr. 241 007 020



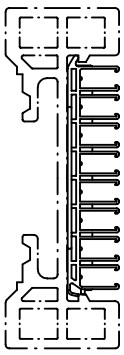
8 poles

Best.-Nr. 241 007 020



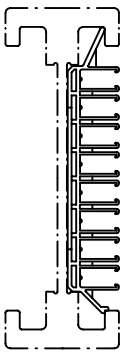
8 poles

Best.-Nr. 241 007 091



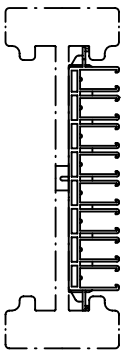
8 poles

Best.-Nr. 241 007 065



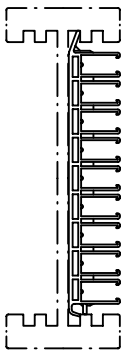
8 poles

Best.-Nr. 241 007 098



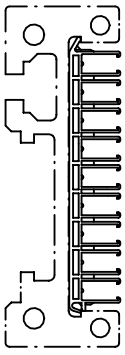
8 poles

Best.-Nr. 241 006 050
(without adhesive strip)



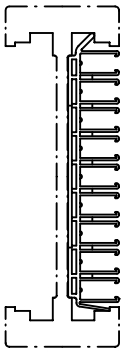
9 poles

Best.-Nr. 241 007 102



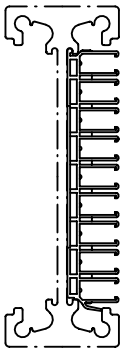
9 poles

Best.-Nr. 241 007 099



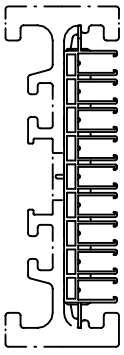
9 poles

Best.-Nr. 241 007 104



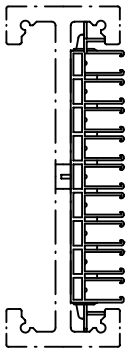
9 poles

Best.-Nr. 241 007 107



9 poles

Best.-Nr. 241 006 147
(without adhesive strip)



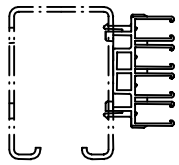
9 poles

Best.-Nr. 241 008 000
(without adhesive strip)

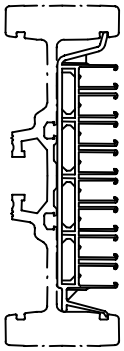
Technical Information

All hanger clamps are precisely matched to the AMS-profile ; the backsides are provided with a durable adhesive strip at the factory , to prevent lateral slip in the AMS-profile (AMS = Automated Monorail System). Hanger clamps with adhesive strip can only be stored for max. 1 ½ years.

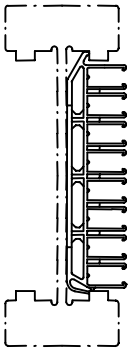
Hanger - Clamp **Clip-type - Assembly height 32 mm**



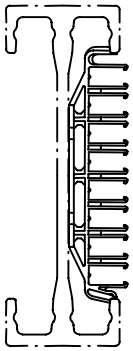
4 poles
Best.-Nr. 251 003 605
(without adhesise strip)



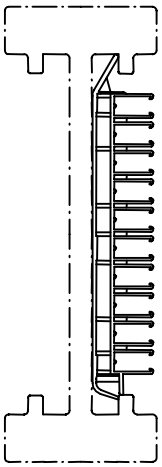
8 poles
Best.-Nr. 241 007 106



8 poles
Best.-Nr. 241 006 030



8 poles
Best.-Nr. 241 007 050

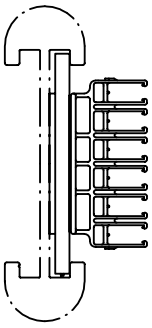


10 poles
Best.-Nr. 241 009 107

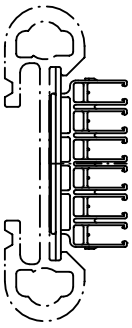
Technical Information

All hanger clamps are precisely matched to the AMS-profile ; the backsides are provided with a durable adhesive strip at The factory , to prevent lateral slip in the AMS-profile (AMS = Automated Monorail System). Hanger clamps with adhesive tap can only be stored for maximum. 1 ½ years.

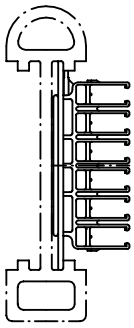
Hanger - Clamp Clip-type - Assembly height 40 mm



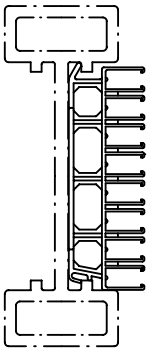
6 poles
Best.-Nr. 241 004 023



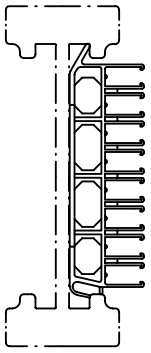
6 poles
Best.-Nr. 241 004 016



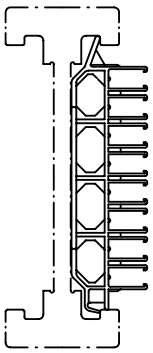
6 poles
Best.-Nr. 241 004 015



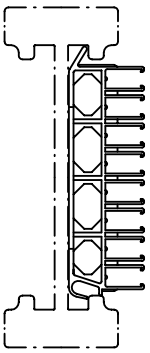
8 poles
Best.-Nr. 241 007 092



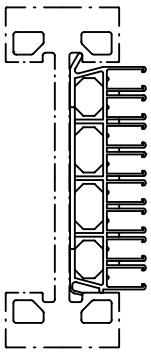
8 poles
Best.-Nr. 241 007 015



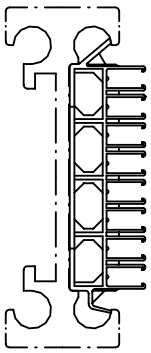
8 poles
Best.-Nr.
241 007 093



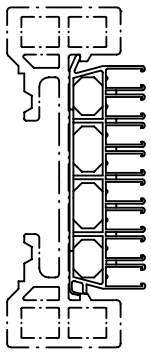
8 poles
Best.-Nr.
241 007 105



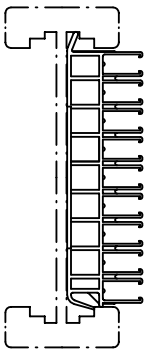
8 poles
Best.-Nr.
241 007 085



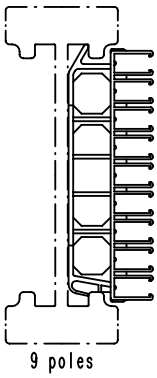
8 poles
Best.-Nr.
241 007 094



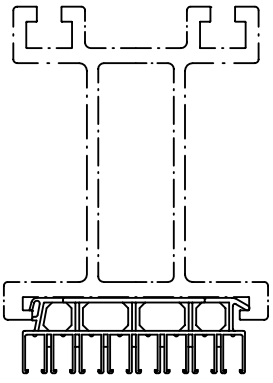
8 poles
Best.-Nr.
241 007 111



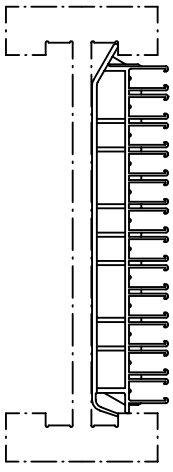
9 poles
Best.-Nr.
241 007 110



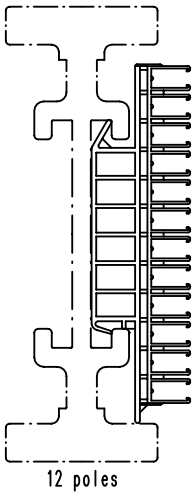
9 poles
assembly height 45 mm
Best.-Nr. 241 007 097



8 poles Best.-Nr. 241 007 092
9 poles Best.-Nr. 241 007 025



12 poles
Best.-Nr. 241 009 108

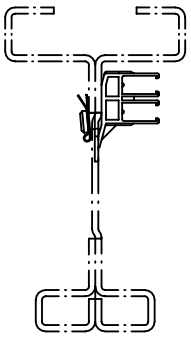


12 poles
assembly height 52 mm
Best.-Nr. 241 009 106

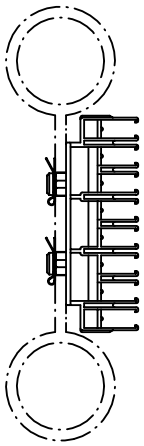
Technical Information

All hanger clamps are precisely matched to the AMS-profile ; the backsides are provided with a durable adhesive strip at The factory , to prevent lateral slip in the AMS-profile (AMS = Automated Monorail System). Hanger clamps with adhesive tap can only be stored for maximum. 1 ½ years.

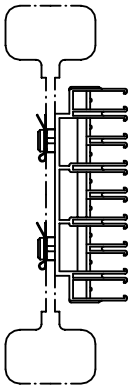
Hanger – clamp Stud – mounting with spring clip



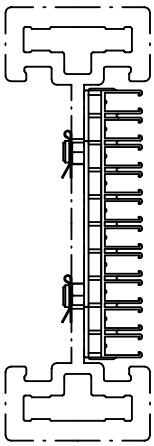
2 poles
assembly height 32 mm
Order No. 241 000 422



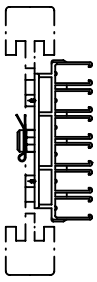
8 poles
assembly height 40 mm
Order No. 241 007 055



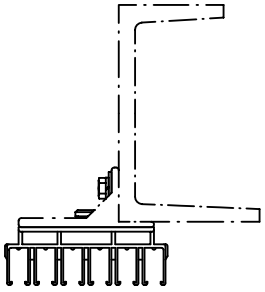
8 poles
assembly height 40 mm
Order No. 241 007 005



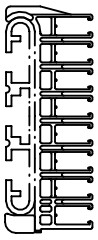
10 poles
assembly height 32 mm
Order No. 241 009 005



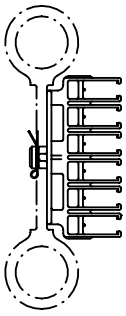
6 poles
assembly height 32 mm
Order No. 241 004 022



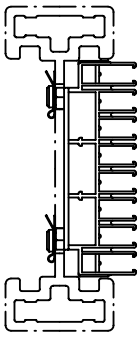
6 poles
assembly height 32 mm
Order No. 241 013 012



8 poles
assembly height 32 mm
Order No. 241 006 005



6 poles
assembly height 40 mm
Order No. 241 000 418



8 poles
assembly height 40 mm
Order No. 241 007 000

2 poles
assembly height 32 mm
Order No. 241 000 421

Technical Information

The hanger clamps are fastened with their bolts to the AMS-rail-web by means of spring clips (except item number 241 006 005).

Fastening-Examples

In the following diagrams are a few examples on the fastening of hanger clamps developed for particular applications. Shown are insertion- /quick-mounting and screw types (depending on local conditions) and may be employed in a similar way .

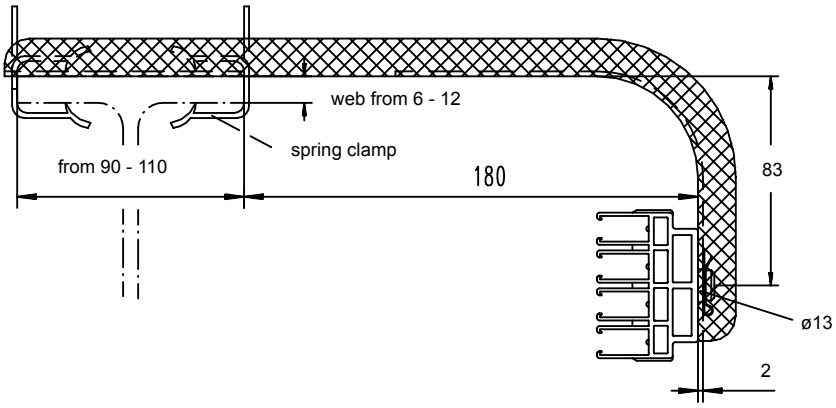


Figure 1:

Fastening with solid sheet-metal console for quick installation Hanger-clamp e.g. 4 poles

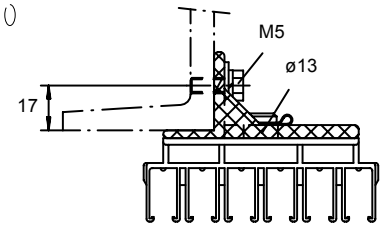


Figure 2:

Fastening with a plastic console screwed to a girder

Hanger clamp e.g. 6 poles

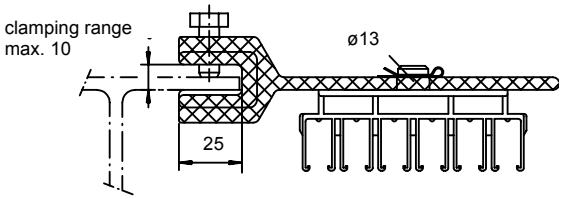
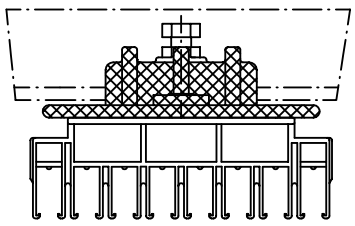


Figure 3:

Fastening with Al –cast console clamped to a girder.Hanger clamp e.g. 6 poles



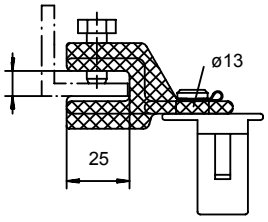


Figure 4:

Fastening with Al –cast console clamped to a traverse.

Hanger clamp e.g. 8 poles

I S 1 0 0 M

Collector Shoe Inspection Station

Introduction

The collector shoes of the different current collectors are to be considered one single replacement part since they are subject to operational wear.

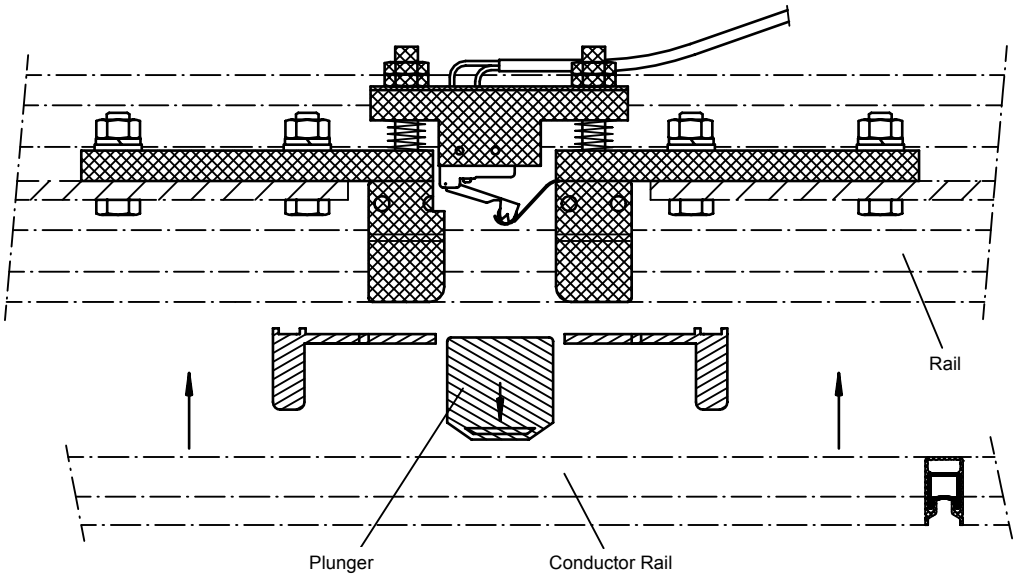
This **wear varies** from installation to installation, because it is influenced by a multitude of criteria (e.g. ambient temperatures, heat caused by the transmission of currents, the humidity of the air, traveling speeds, the frequency of "stop-and-go", the number and type of curves traversed, the number of rail-interruptions such as expansion points, the electric separations, switches, lifts etc.). This shows that, even with a single installation, the collector shoes experience different degrees of wear. Even the collector shoes of the same drive unit will show different wear characteristics because the ground-collectors do not have to pass any electric separations.

So, statements concerning the "parking time / active performance" regarding collector shoes very generally can be given the values of 15000 to 20,000 km. Many factors impact the life of collector shoes, consider that the collector shoes wear a lot faster on a new installation than they do later on when the metal rails have become smooth and the splices/transfers have been driven in. In certain cases there is an advantage when patina has formed and has coated the conductor surface, giving a smooth running surface for the shoes. To avoid disturbances caused by worn out / broken collector shoes **they must be monitored** :

a) Constant manual inspections of the individual collector shoe is in most cases very uneconomical and requires additional bookkeeping. This leads to unwarranted precautionary measures of "collector shoe replacement", even though the wear limit has not been reached. On the other hand, manual inspections do not prevent failures caused by collector shoes worn down too far. Such disturbances not only lead to undesirable disruptions of the operation, but the conducting surface of the conductor rails may be strongly affected because burns or bumps may develop in stretches with insufficient contact/power transmission. If this is the case, the conducting surfaces of the complete installation have to be inspected and the burns/bumps removed, because even with a new collector shoe, insufficient power transmission can be expected, at least an increased wear is to be expected. However, elaborate manual inspection and control can be omitted by implementing automatically operating inspection stations.

b) On passing such an inspection station the condition of the collector shoes is automatically and reliably monitored; manual action is thus obsolete. Unduly worn or even broken collector shoes or fleece of the cleaning collector are recognized by the equipment and is reported instantly. This report may be evaluated in different forms causing a pre-determined result (e.g. in simple installations by shutting down the following rail section, in branched installations, as is usual for the electric monorail, that the switch turns sending the carrier into a maintenance area). Generally the location of one inspection station is sufficient for each installation as long as all vehicles/current collectors are routed through the station.

Collector Shoe - Inspection Station - mechanical



The collector shoe inspection station will be manufactured individually according to the local conditions or operating requirements, please consult the factory. With the request we require the following information :

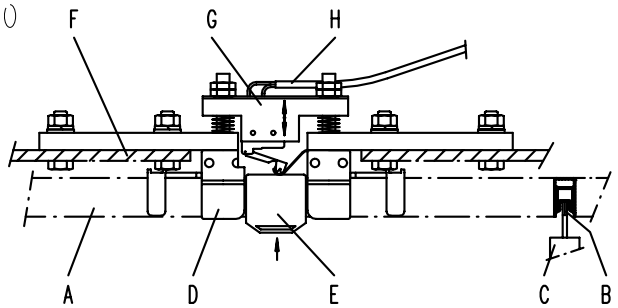
- Which current collectors will be used.
- How large is the conductor rail center separation (usually 15 mm).
- Which type of hanger clamp is used for the installation or what is the assembly height.
- If AMS, what shape has the track;
- If no AMS, what are possibilities of fastening or what type of fastenings will be chosen.
- Number of poles to be monitored.
- Length of connecting cable (usually 2 m).

Method of operation

At the inspection station, the plunger, clipped over the continuous conductor rail, will be mechanically pushed up by the passing current collector or its head. The more worn the collector shoe is, the more the plunger will be pushed up. If a predetermined value is surpassed (the collector shoe is worn down to the permissible values) the microswitch is activated and leads, for example, to turn a switch to a shunting track.

The cleaning collectors are also monitored in this way. The figure in Planning Instructions, shows the assembly principle. The location of one plunger each for each one of the neighboring conductor rails may be chosen. We recommend monitoring all collector shoes because the wear may be quite different on the individual conductor rails.

This mechanically/electrically operating station is relatively simple to assemble, operates efficiently if correctly assembled and is easy to service.



A = conductor rail, continuous

B = collector shoe

C = head of the current collector

D = clip for the conductor rail(s)

E = plunger; 1 unit per pole / conductor rail; is pushed up by C and springsback into the initial position

F = fastening: e.g. conductor rail of AMS; with recess and bolt-holes

G = adjustment facility; adjustable; 1 microswitch per pole/conductor rail

H = connecting cable; permanently connected, 2 x 0.75 mm², H03VV - F for 230 V

Technical Information

- The inspection station is principally suitable for all listed current collectors (also for the cleaning-collector).
- The switches or the component wiring is of protection type IP 4X (only for use in dry indoor spaces).
- The permissible ambient temperature is – 30°C to + 70°C (a slight deviation from the heat-resistant insulation).
- The chemical resistance is the same as our standard components.
- Suitable for traveling speeds up to 75 m/min., for one way traffic as well as for reversible traffic.
- Suitable for conductor surfaces facing down or sideways.

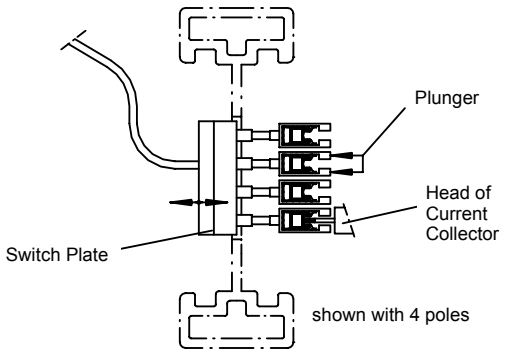
Planning Instructions

Generally, the location of a single inspection station per installation is immediately preceding a shunting/maintenance track (if possible) at a point which is passed by all current collectors.

Then if one of the microswitches is activated, the switch can be turned to one of the maintenance tracks and the vehicle can be taken out.

For the AMS, it should be installed on the web of the rail. On one side the conductor rails are installed and the plungers clipped on; on the opposite side the adjustment facility is bolted on. The switches probe the plungers through a relatively large opening.

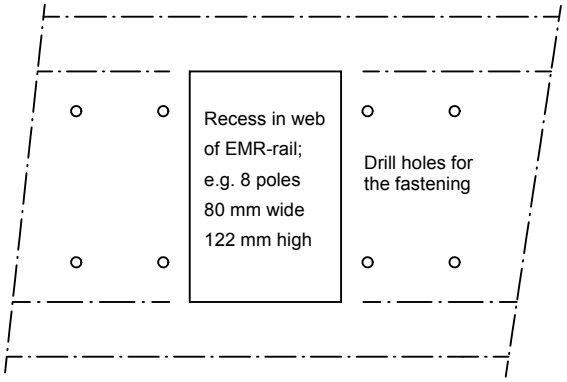
The continuous conductor rails slide in the inspection station, hence the distance to the rail splice and simmilar must be at least 100 mm.



Installation Instructions

Each collector-shoe -inspection station is accompanied by specific instructions, which address the recess and drill holes.

Careful assembly is the pre-requisite for its operation.



Maintenance

A regular functional-examination is required. Especially the unhindered movement of the plungers, they must not twist and/or jam!

Are the springs pushing back the plungers?
Are the microswitches operating satisfactorily?

Fouling is to be avoided. We recommend using the cleaning device, refer to section IS 100 S.

I S 1 0 0 S

Dust Removal

Introduction

Dust collecting over a period of time - even though our plastic components are largely antistatic - make the system comparably unsightly, i.e. the orange signal color looses its brilliance, which, in general, does not influence the quality of the conductor rail system. One has to distinguish between system- and externally generated dusts.

Dusts generated by the system are those caused by the wear of the collector shoes.

The collector shoes of the current collectors contain a large amount of copper or silver, as for the case of data transfer. However, they contain an appreciable amount of graphite, which is released during the wearing process and advantageously collecting in form of a patina on the surface of the conductor, reducing the friction, as well as graphite particles being raised by the moving current collectors or vehicles and subsequently being deposited on various components. It often comes to pronounced deposits of graphite especially at mechanical interruptions of the conductor rails (expansion points, separation- and transfer caps). This blackening of the components must not be a cause for alarm, - apart from the optics - **it does not negatively affect** the technique of the conductor rail system.

Externally generated dusts are those generated outside the conductor rail system - mostly through production processes. As floating particles they deposit themselves on the FABA-system, and are partly blown up again by the wind of moving equipment (e.g. AMS) and can in time be distributed throughout the complete system. Since these dusts are of different sizes and may consist out of the most diverse materials, It has to be determined in the individual case whether detrimental effects to the conductor rail system are to be expected; usually, dusts generated by the system, do not have a negative effect on the technical components.

However, **harmful dusts** do indeed exist; from our experience over many years we name in particular:

a) unusually strong emissions,

b) if they are also very conductive and

c) if they are fibrous, perhaps even relatively long.

Especially the dusts mentioned under c) may be very light, thus may be raised quite easily; they deposit themselves also on the conductor surface, for example, and - since they are mostly non-conductive – lead to contact problems.

It has to be mentioned that the dusts generated by the system as well as the dusts from external sources, depending on the type of operation and intensity, may be detrimental :

a) to the personnel,

b) as deposits on finished products and

c) to the reliability of the conductor rail system.

As a solution we offer our Dust-Removal-System, - which may also be applied in other conductor-rail-systems.

Remark: We view the possibility of cleaning the conductor rail system of dusts by blowing or brushing as being of superficial use only because in most cases the dust, after having been raised, will deposit itself on the conducting rail system again.

Our recommendation, however more elaborate, is quite clear. We consider the best method is to **vacuum and collect the deposits**.

Vacuum and accessories

A = (Figure 1) motor protection-switch
B = connection cable, length 1.5 m
C = exhaust-air screen opening
D = suction nozzle, removable for cleaning the filter
E = (Figure 1) C-rails, 28 x 15, for fastening / supporting; location on two sides
F = (Figure 2) fastening / supporting, M10
G = (Figure 2) on- / off switch

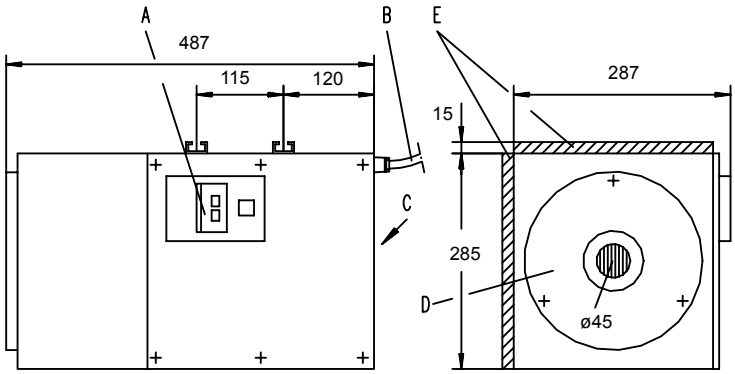


Figure 1

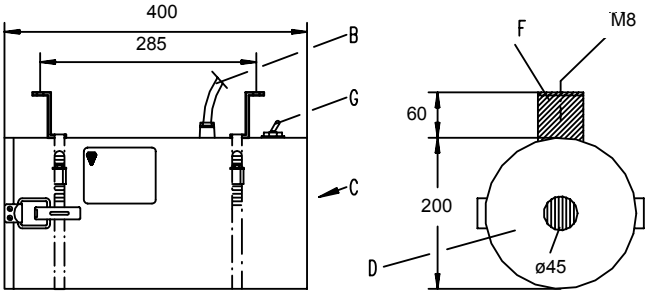


Figure 2

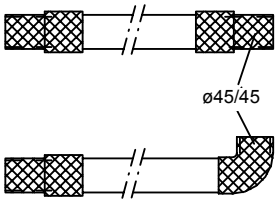


Figure 3

Figure 4

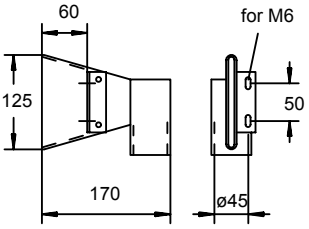


Figure 5

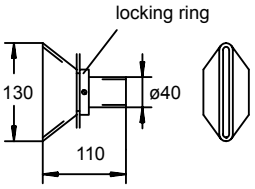


Figure 6

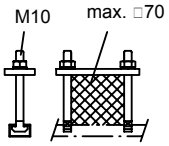


Figure 7

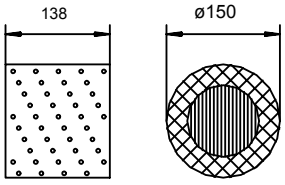


Figure 8

Table 1: Vacuum and Accessories

Order-No.	Fig.	Identification			Weight
241 047 ***	1	Vacuum, angular	Suction 20 m³/h	*** State operating- and control voltage	appr. 21.0
241 047 955	2	Vacuum, round	Suction 155 m³/h	Operating voltage 230 V, 1 ~, 50/60 Hz	appr. 5.7
241 047 951	3	Suction hose	Plastic; flexible; length 1.5 m, can be shortened;		0.610
241 047 950	4	Suction hose	(other lengths on request)		0.700
241 047 924	5	Suction nozzle	Hard-PVC; example shown, 8-pole	(different no. of poles and	0.310
241 047 960	6	Suction nozzle		different mounting on request)	0.150
241 047 200	7	Fastening	for mounting of vacuum, fig. 1; 4 bolts, 2 clamps		0.800
241 047 901	8	Filter	Permanent filter; fits vacuum of figs. 1 and 2	as spare	0.810
241 047 903	no	Carbon	1 set for vacuum motor, corresponding. to fig. 2	only	0.036

Procedure

The vacuum is mounted on the mobile equipment, the suction nozzle is located in front of the conductor rails. While moving through the installation, the dust deposited as well as the dust generated by the current collector will be sucked off.

To keep the system clean, we recommend a regular vacuuming, so that from this point of view no disrupters are to be expected. The vacuum takes its electrical power from the conductor rails.

The angular vacuum corresponding to Figure 1 may be controlled such that it only vacuums during movement; it is designed for continuous operation. Its major application is found in branched systems, automated operation, or, if descending dust effects the production below and / or computer aided transfer of data takes place.

Technical Information

a) Vacuum, angular corresponding to Figure 1:
- Power 0.55 kW; 100 % duty cycle; 1200 mm water column
- Operating voltage, preferably 42/230/400 V, 3 ~, 50 Hz;
- other voltages, also 1-phase, also 60 Hz by request
- Control voltage, preferably 24 V = or 24/42/220/380 V ~ 50 Hz;
- other direct- or alternating currents, also 60 Hz,
- also without control, by request
- Figure 9 shows a common type of wiring;
- Remark: For operating voltages up to 42 V a soft-start will
- be installed to reduce the otherwise high start-up currents
- containing an externally accessible motor protection switch with operating indicator

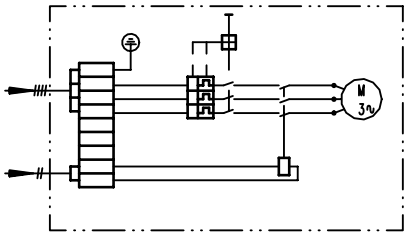
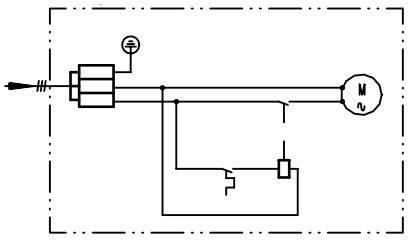


Figure 9

Figure 10



b) Vacuum, round corresponding to Figure 2:
- Power 0.9 kW; 60 % duty cycle; 2300 mm water column
- Operating voltage 220 V, 1 ~, 50/60 Hz
- Fig. 10 shows the corresponding wiring
- with on/off switch

c) for both vacuums
- Permissible ambient temperatures – 20°C to + 50°C; i.e. slight deviation as compared with our other components.
- Chemical resistant as for our other components.
- Suitable for use with all traveling speeds.
- Protection type IP 42
- with impact-resistant housing, grey sound absorbing finish
- connection diagram will be supplied

d) Suction nozzle:
- of impact-resistant plastic
- Figures 5 and 6 show standard designs. Because the equipment/drives, mounting environment and the local conditions may be quite different from case to case, we offer other types of suction nozzles. Should you experience difficulties with standard-nozzles, please consult the factory and provide details such as: number of poles of the conductor rail; sketch containing the available space and the types of fastening required

e) Fastening/support:
- Vacuum, angular corresponding to Figure 1: With our standard-design we offer the solution shown in fig. 7; the 4 clamping bolts with the 2 clamps are inserted into the C-rail of the vacuum (location selected on one of the two sides); they are suitable to be clamped to a AMS carrier-girder for example; other types of mounting by request
- Vacuum, round corresponding to Figure 2: Two Alu-brackets are fastened to the vacuum, complete with nuts and bolts M8

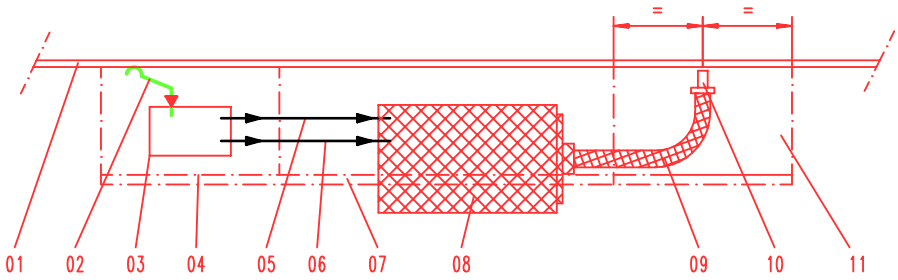
f) Filter :
- Both vacuums are shipped complete with installed filter; it holds approx. 1 Liter.
- The filter has been designed for continuous operation; it consists of a metal bottom and a metal basket with a protectively inserted pleated filter cloth.
- For cleaning purposes the plate with the hose connection has to be removed (no tools required).

- Beware that the dust does not fall out prematurely !
- The filter **is to be emptied dry/suck out with small household vacuum cleaner**
- We recommend to obtain a spare filter for direct exchange and also because damage over a period of use cannot be excluded.

Planning Instructions

- The equipment usually remains on the installation.
- The location is carried out in accordance with local conditions. For instance, for electric monorail applications, located perhaps on a spare or production vehicle, below or on the side of the load girder or above the rail.
- In principal the vacuum can be operated in every mounting position, with one exception, the suction nozzle "D" (Figures 1 and 2) must not be located underneath (as the dust falls back into the nose when not vacuuming).
- Care has to be taken for the exhaust-air screen opening remains unobstructed, that the suction hose is not kinked, and the plate with the hose connection remains accessible to change the filter as well as the motor protection switch or the on/off switch.

Figure 11: Principle-Location e.g. on an AMS (Automated Monorail System)



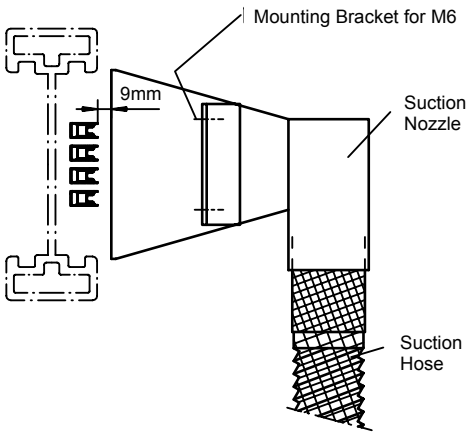
01 = Conductor rail
02 = Current collector
03 = Switch box on EMR-vehicle
04 = AMS-drive
05 = Operating voltage to vacuum - at the switch box "03" to be plugged if possible
Important: The additional power required by the vacuum is to be considered in the layout of the switch box and especially the current collectors.
06 = Control voltage for turning the vacuum on / off - also refer to fig. 9
07 = Load girder
08 = Vacuum; mounted to load girder
09 = Suction hose
10 = Suction nozzle = center support / idler roll, 9 mm distance to conductor rail
11 = AMS - follower

Installation Instructions

a) Vacuum, angular corresponding to fig. 1: is equipped with C-profiles for individual mounting / support, fitting for bolts M10 (Figure 7).

b) Vacuum, round corresponding to Figure 2: has two metal brackets including nuts and bolts M8 for mounting / support.

c) Suction nozzle: Mounting on mobile equipment with a distance of 9 mm to the conductor rails. Care must be taken that, for installations containing bends, the nozzle is to be located at center of a guide roller if possible. Prepared for individual mounting. Care must be taken that the nozzle opening is not pinched and restricted when bolted on.



I S 1 0 0 U

Transfer Sections

Introduction

This section supplements the Section "Standard Components" IS 100 B where the standard transfer caps for mechanical conductor rail separations are also described.

Mechanical separations of the conductor rails on shunting stages, switches and lift sections for example, are usually accomplished with transfer caps; larger rail separations with pick-up guides for the ascent and descent of the current collectors.

Contents

Conductor-Rail-Transfer, multi-pole with straight caps for shifts according to Figures 1, 2 and 3

Figure 1

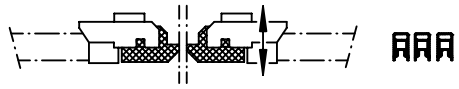


Figure 2

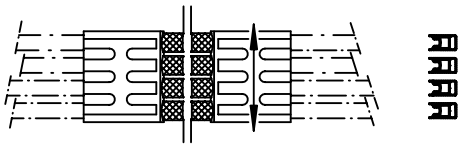
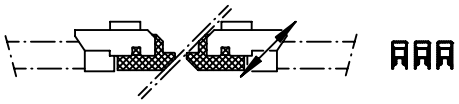


Figure 3



Conductor-Rail-Transfer, multi-pole with bevel-cut caps for shifts according to Figures 4 and 5

Figure 4

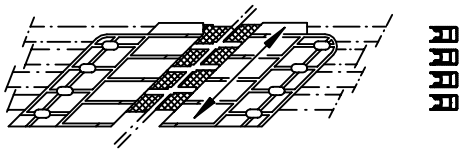
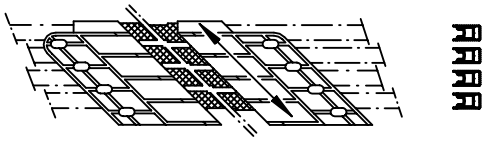


Figure 5



Conductor-Rail-Transfer, multi-pole with pick-up guides to Figure 6

Fig.6

Mechanical Separations, For Individual Selection, multi-pole, with straight caps

Maximum vertical and horizontal deviation ± 2 mm. Requires 1 collector to bridge

Mounting Possibilities

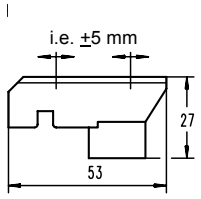
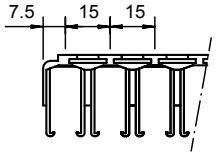


Figure 1



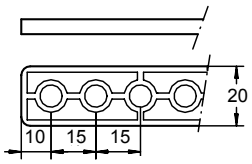


Figure 2

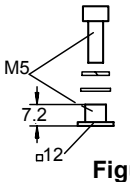


Figure 3

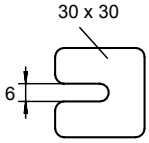


Figure 4

Transfer Caps for FABA 100 Conductor Rail

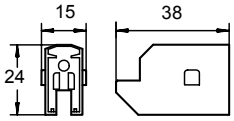


Figure 5

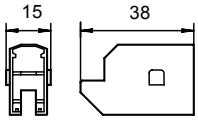


Figure 6

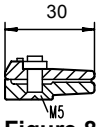


Figure 8

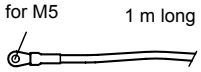


Figure 9

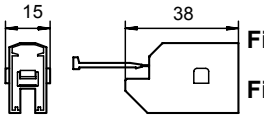


Figure 7

Figure 10

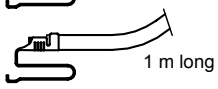


Figure 11

Table 1: Mechanical Separation, multi-pole, straight caps

Item No.						Weight		
Height 27	**Height 32**	**Height 40**	**Poles**	**Figure**	**Consisting of:**	**H 27**	**H 32**	**H 40**
241 006 250	241 006 260	241 006 270	4	Figures 1, 2, 3, 4 Transfer Unit less caps and feeds	complete; individual parts in bag; consisting of : 1 piece girder, Figure 1 1 piece spacer, Figure: H 27 = without H 32 = 5 thick H 40 = 13 thick Bolting Figure 3 for thickness 5-8 mm to 9 pole, 2 pieces from 10 pole, 3 pieces Each 1 piece plate Figure 4 (1 a. 2 thick)	0.038	0.046	0.050
241 006 251	241 006 261	241 006 271	5			0.042	0.051	0.057
241 006 252	241 006 262	241 006 272	6			0.046	0.056	0.064
241 006 253	241 006 263	241 006 273	7			0.050	0.061	0.071
241 006 254	241 006 264	241 006 274	8			0.054	0.066	0.078
241 006 255	241 006 265	241 006 275	9			0.058	0.071	0.085
241 006 280	241 006 290	241 006 300	10			0.072	0.086	0.102
241 006 281	241 006 291	241 006 301	11			0.076	0.091	0.109
241 006 282	241 006 292	241 006 302	12			0.080	0.096	0.116
241 006 283	241 006 293	241 006 303	13			0.084	0.101	0.123
241 006 284	241 006 294	241 006 304	14			0.088	0.106	0.130

Item No.	Figure	Description				Weight
241 017 045	5	Transfer cap tap on type Without feed			Plastic orange	0.004
241 017 055	6 + 8	Adjustable transfer cap With feed		Screw type for cable max. 2.5 mm²		0.025
241 017 151	6 + 8 + 9	Adjustable Transfer cap with 1 m cable	1.5 mm²	Cap, feed clamp and cable with terminal on end included. Other lengths on request		0.055
241 017 152			2.5 mm²			0.069
241 017 153			2.5 mm²			0.061
241 017 154			1.5 mm²	Shielded grey		0.063
241 017 175	7 + 10	Adjustable Transfer cap with clip	Clip can be fed if required Clip must be installed with cap. Cap and connecting clip included.			0.008
241 017 176	7 + 11	Adjustable Transfer cap with 1m cable	1.5 mm²	Dia -Ø 4,0 1 kV black	Cap and cable included	0.036
241 017 177			2,5 mm².	Dia -Ø 4,5 1 kV black	Flexible cable	0.049
241 017 178			2.5 mm²	Dia -Ø 4,0 Ground	Green / yellow	0.042
241 017 179			1.5 mm²	Dia -Ø 5,1 **Data** grey	Other lengths on request	0.038

Conductor-Rail-Transfer Complete

Multi-pole, with straight caps maximum vertical and horizontal deviation ± 2 mm. Requires 1 collector to bridge

Mounting Possibilites

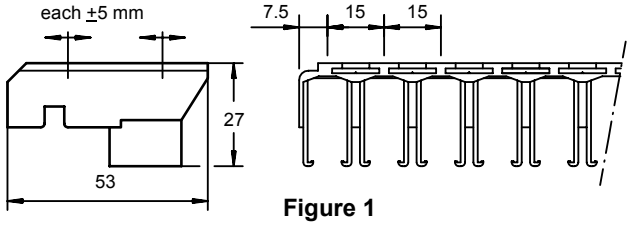
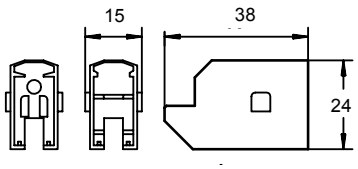


Figure 1



a **b** **Figure 2**

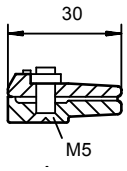


Figure 3

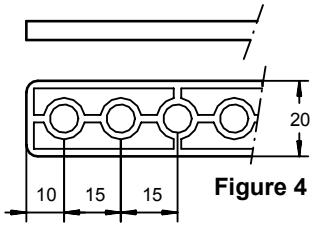


Figure 4

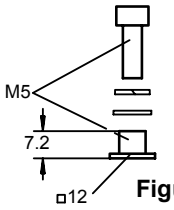


Figure 5

Figure 6

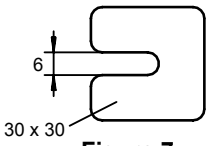


Figure 7

Table 2: Transfer, multi-pole with straight caps

Assembly height 27	Assembly height 32	Assembly height 40	Poles	Description		Weight H27	Weight H32	Weight H40
241 031 068	241 031 078	241 031 088	4	Transfer complete with tap on caps	complete; individual parts in bag; consisting of : 1 piece girder, Figure 1.. piece caps, Figure 2a 1 piece spacer, Figure 4 H 27 = without H 32 = 5 thick H 40 = 13 thick Bolting, Figure 5 for thickness. 5-8 mm to 9 poles 2 pieces, from 10 poles 3 pieces each 1 piece plate, Figure 7 (1 a. 2 thick)	0.054	0.062	0.066
241 031 069	241 031 079	241 031 089	5			0.062	0.071	0.077
241 031 067	241 031 077	241 031 087	6			0.070	0.080	0.088
241 031 066	241 031 076	241 031 086	7			0.078	0.089	0.099
241 031 061	241 031 071	241 031 081	8			0.086	0.098	0.110
241 031 145	241 031 155	241 031 165	9			0.094	0.107	0.121
241 031 140	241 031 150	241 031 160	10			0.122	0.126	0.142
241 031 141	241 031 151	241 031 161	11			0.120	0.135	0.153
241 031 142	241 031 152	241 031 162	12			0.128	0.144	0.164
241 031 143	241 031 153	241 031 163	13			0.136	0.153	0.175
241 031 144	241 031 154	241 031 164	14			0.144	0.162	0.186
241 031 038	241 031 048	241 031 057	4	Transfer complete with feed caps	complete; individual parts in bag; consisting of : 1 piece girder, Figure 1.. piece caps, Figure 2b piece screw-clamps, Figure 3 1 piece spacer, Figure 4 H 27 = without H 32 = 5 H 40 = 13 thick Bolting, Figure 5 for thickness. 5-8 mm to 9 poles 2 pieces, from 10 poles 3 pieces each 1 piece plate, Figure 7 (1 a. 2 thick)	0.138	0.146	0.150
241 031 039	241 031 049	241 031 058	5			0.167	0.176	0.182
241 031 037	241 031 047	241 031 056	6			0.196	0.206	0.214
241 031 036	241 031 046	241 031 055	7			0.225	0.236	0.246
241 031 031	241 031 041	241 031 050	8			0.254	0.266	0.278
241 031 185	241 031 195	241 031 205	9			0.283	0.296	0.310
241 031 180	241 031 190	241 031 200	10			0.322	0.336	0.354
241 031 181	241 031 191	241 031 201	11			0.351	0.366	0.384
241 031 182	241 031 192	241 031 202	12			0.380	0.396	0.416
241 031 183	241 031 193	241 031 203	13			0.403	0.426	0.448
241 031 184	241 031 194	241 031 204	14			0.438	0.456	0.480

Item No.	Figure	Description				Weight
241 040 421	Figure 6	Feed cable 1 m long	2,5 mm² outer-∅ 4,5	1 kV black	single-cored; highly flexible; one end with cable lug for M5; (other lengths by request)	0.044
241 040 400			1,5 mm² outer-∅ 4,0	1 kV black		0.030
241 040 408			2,5 mm² outer-∅ 4,0	Ground green-yellow		0.036
241 024 052	Figure 7	Shim	each 15 pieces 1 mm and 2 mm thick, for height adjustment			0.042
241 046 030	not shown	drill template	for even no. of poles;	for AMS-track 180 x 60		0.820
241 046 080			for odd no. of poles;	for AMS-track 180 x 60		0.700
241 017 045	Figure 2a	Transfer cap	Tap on type			0.004
241 017 035	Figure 2b		Screw on type for clamp Figure 3			0.004
251 022 010	Figure 3	Screw-clamp	with square nut and Philips screw M5			0.021
241 017 055	Figure 2b & 3	Transfer cap	without cable,orange cap with screwable clamp in bag			0.025
241 013 090	Figure 5	Bolting	for H 27; M5 x 10	with nut, washer, spring washer; in bag		0.010
241 013 091			for H 32; M5 x 14			0.012
241 013 092			for H 40; M5 x 22			0.014

Technical Information

- The permissible displacement of heights and/or sides of two opposing caps is maximum ± 2 mm relative to each other.
- The conductor rail center separation is 15 mm.
- Design with "plug-type caps": without feed possibility; caps are not remountable.
- Design with "clip-type caps": with possibility to connect feed cables 1.5 or 2.5 mm².
- Permissible ambient temperatures – 30°C to + 80°C.
- Suitable for traveFigureling speeds up to 300 m/min.
- Position of collector surfaces selectively facing down or sideways.
- The spacer shims, Figure 7, are inserted between the bolting if required, to achieve the correct transfer height from cap to cap.

Planning Instructions

- The prerequisite for the correct functioning of the conductor rail transfers is, that the mechanics (e.g. switch/lift section) correctly fulfills the requirements even with a loaded carrier; particularly the air-gap, the displacement of height and side at the transfers is to be kept.
- The passage of one current collectors bridges both metal conductor rails with its collector shoe, hence, only **one current collector** will be required **per rail**.
- The ground conductor rail may be located at an arbitrary point.
- Combinations - plug-type and clip-type caps are possible at the same transfer point or the same holder.
- If required, please order appropriate parts or submit a corresponding request.
- These transfers arrest the conductor rail in longitudinal direction, Hence, they are "fixed points" with the advantage that the correctly adjusted transfer air-gap remains fixed.
- Only position transfers in the area of the bend if the radius of the conductor rails is at least 750 mm.

Installation Instructions

- Drill the monorail web or bracket "C" (possibly use a template); per transfer up to 9 poles = 2 holes, from 10 poles = 3 holes. For dimensions refer to Figures 8 and 10.
- Insert the square nuts into the slots of the girder.
- Insert spacers for assembly heights of 32 and 40.
- Loosely bolt on the holder - without caps.
- Prepare all transfers in this manner.
- Cut the conductor rails - bends also - to exact length; deburr very carefully, on the inside also.
- Install the cap, Figure 2a according to Figure 11, with light blows of the hammer.
- Mount cap, Figure 2b according to Figure 12, (perhaps with feed cable):
  - Loosely connect the cable to the screw terminal (Figure 3)
  - Insert the screw terminal into the cap
  - Together push them onto the conductor rail
  - Loosely tighten the Philips-screw.
- All caps must absolutely embrace both sides of the conductor rail.
- Clip the conductor rails with the installed caps into the holders; both sides of the conductor rail have to be embraced under all circumstances.
- **Carefully line-up the caps** with the **transfer air-gap:** especially the caps corresponding to Figure 12 may be adjusted by 3 mm!
- **Bolt the holder** to the track / traverse.
- **Screw down the caps** (Figure 12)(Philips-screw).
- Check all transfers, also required during the shifting process.
- For unequal heights from cap to cap (Figure 7) insert spacer plates, if required, at the bolting to the track.

Figure 8

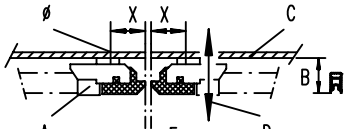


Figure 9

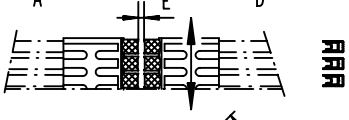
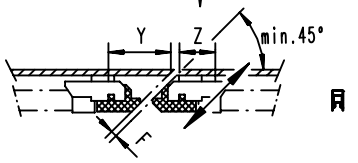


Figure 10



A	=	conductor rail transfer, complete	
B	=	assembly height 27 or 32 or 40	
C	=	AMS-track or other traverse	
D	=	direction of displacement	
E	=	Figure 8 and 9 transfer air-gap:	
		max. 5 mm between the caps	
F	=	Figure 10 transfer air-gap:	
		max. 3 mm between the caps	
Fastening measures:			
Figure 8 and 9 : x = 28 ± 5 or 55 ± 5 (selectively)			
Figure 10 for 45° displacement:			
		Assembly height 27 : Y = 50 ± 5;	Z = 38 ± 5
		Assembly height 32 : Y = 55 ± 5;	Z = 33 ± 5
		Assembly height 40 : Y = 63 ± 5;	Z = 25 ± 5
ý	=	Bore in "C" :	Assembly height 27=7.2 + 0.3
			Assembly height 32=5.0 + 0.5

Figure 11

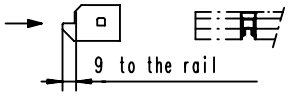
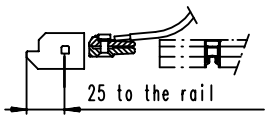


Figure 12



Conductor-Rail-Transfer

Multi-pole, with straight caps maximum vertical and horizontal deviation ± 4 mm. Requires 2 collectors to bridge

Mounting Possibilites

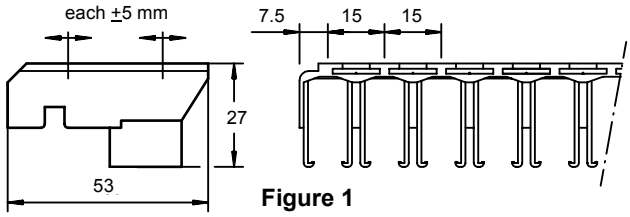
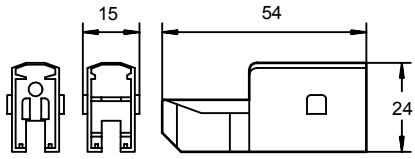


Figure 1



a b Figure 2

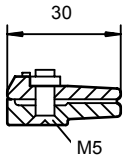


Figure 3

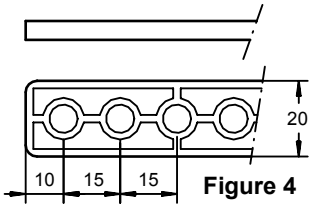


Figure 4

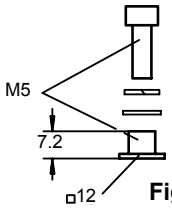


Figure 5

Figure 6

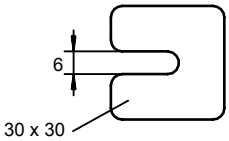


Figure 7

Table 3: Transfer, multi-pole with straight caps

Assembly height 27	Assembly height 32	Assembly height 40	Poles	Description		Weight		
						H 27	H 32	H 40
241 031 601	241 031 611	241 031 621	4	Transfer complete With tap on caps	consisting of :	0.058	0.066	0.070
241 031 602	241 031 612	241 031 622	5		1 piece girder, Figure 1	0.067	0.076	0.082
241 031 603	241 031 613	241 031 623	6		.. piece caps, Figure 2a	0.076	0.086	0.094
241 031 604	241 031 614	241 031 624	7		1 piece spacer, Figure 4 :	0.085	0.095	0.106
241 031 551	241 031 561	241 031 571	8		H 27 = without	0.094	0.106	0.118
241 031 552	241 031 562	241 031 572	9		H 32 = 5 thick	0.103	0.116	0.130
241 031 553	241 031 563	241 031 573	10		H 40 = 13 thick	0.122	0.136	0.152
241 031 554	241 031 564	241 031 574	11		complete; individual parts in bag; poles 2 pieces, from 10 poles 3 pieces	0.131	0.146	0.164
241 031 555	241 031 565	241 031 575	12			0.140	0.156	0.176
241 031 556	241 031 566	241 031 576	13		each 1 piece plate, Figure 7 (1 a. 2 thick)	0.149	0.166	0.188
241 031 557	241 031 567	241 031 577	14			0.158	0.176	0.200
241 031 631	241 031 641	241 031 650	4	Transfer complete With feed caps	complete; individual parts in bag; consisting of :	0.142	0.150	0.154
241 031 632	241 031 642	241 031 651	5		1 piece girder, Figure 1	0.172	0.181	0.187
241 031 633	241 031 643	241 031 652	6		.. piece caps, Figure 2b	0.202	0.212	0.220
241 031 634	241 031 644	241 031 653	7		.. piece screw-clamps, Figure 3	0.232	0.243	0.253
241 031 501	241 031 511	241 031 521	8		1 piece spacer, Figure 4 :	0.262	0.274	0.286
241 031 502	241 031 512	241 031 522	9		H 27 = without	0.292	0.305	0.319
241 031 503	241 031 513	241 031 523	10		H 32 = 5	0.332	0.346	0.364
241 031 504	241 031 514	241 031 524	11		H 40 = 13 thick	0.362	0.377	0.395
241 031 505	241 031 515	241 031 525	12		Bolting, Figure 5 for thickness. 5-8 mm to 9	0.392	0.408	0.428
241 031 506	241 031 516	241 031 526	13		poles 2 pieces, from 10 poles 3	0.416	0.439	0.461
241 031 507	241 031 517	241 031 527	14		pieces; each 1 piece plate, Figure 7 (1 a. 2 thick)	0.452	0.470	0.494

Item No.	Figure	Description				Weight
241 040 421	Figure 6	Feed cable 1 m long	2,5 mm² outer-∅ 4,5	1 kV black	single-cored; highly flexible; one end with cable lug for M5; (other lengths by request)	0.044
241 040 400			1,5 mm² outer-∅ 4,0	1 kV black		0.030
241 040 408			2,5 mm² outer-∅ 4,0	Ground green-yellow		0.036
241 024 052	Fig 7	Shim	each 15 pieces 1 mm and 2 mm thick, plastic-orange; in bag			0.042
241 046 030	Not shown	Drill template	for even no. of poles;		for AMS-track 180 x 60	0.820
241 046 080			for odd no. of poles;		for AMS-track 180 x 60	0.700
241 017 045	Figure 2a	Transfer cap	Tap on type			0.004
241 017 035	Figure 2b		Screw on type for clamp Figure3			0.004
251 022 010	Figure 3	Screw-clamp	with square nut and Philips screw M5			0.021
241 017 055	Figure 2b & 3	Transfer cap	without cable;			0.025
			orange cap with screwable clamp in bag			
241 013 090	Figure 5	Bolting	for H 27; M5 x 10			0.010
241 013 091			for H 32; M5 x 14	with nut, washer, spring washer; in bag		0.012
241 013 092			for H 40; M5 x 22			0.014

Technical Information

- The permissible vertical and horizontal deviation of two opposing caps is max. ± 4 mm relative to each other.
- The conductor rail center separation is 15 mm.
- Design with "plug-type caps": without feed possibility; caps are not remountable.
- Design with "clip-type caps": with possibility to connect feed cables 1.5 or 2.5 mm².
- Permissible ambient temperatures – 30°C to + 80°C.
- Suitable for traveling speeds up to 300 m/min.
- Position of collector surfaces down or sideways.
- The shims, Figure 7, are inserted between the bolting if required, to achieve the correct transfer height from cap
  to cap.

Planning Instructions

- The prerequisite for the correct functioning of the conductor rail transfers is, that the mechanics (e.g. switch/lift section) correctly fulfills the requirements even with a loaded carrier; particularly the air-gap, the displacement of height and side at the transfers is to be kept.
- For installations equipped with these transfers, the equipment has to be equipped with **two current collectors for each conductor rail** - also ground (exception collectors with double heads).
- The ground conductor rail may be located at an arbitrary point.
- Combinations - plug-type and clip-type caps are possible at the same transfer point or the same girder.
  If required, please order appropriate parts or submit a corresponding request.
- These transfers fix the conductor rail in longitudinal direction, Hence, they are "fixed points" with the advantage that the correctly adjusted transfer air-gap remains fixed.
- Only position transfers in the area of a bend if the radius of the conductor rails is at least 750 mm.

Installation Instructions

- Drill the monorail web or bracket "C" (possibly use a template); per transfer up to 9 poles = 2 holes, from 10 poles = 3 holes. For dimensions refer to figs. 8 and 10.
- Insert the square nuts into the slots of the girder
- Insert spacers for assembly heights of 32 and 40.
- **Loosely** bolt on the holder - without caps.
- Prepare all transfers in this manner.
- Cut the conductor rails - bends also - to exact length; deburr very carefully, ends and insides also.
- Install the cap, Figure 2a according to fig 11, with light blows of the hammer.
- Mount cap, Figure 2b according to Figure 12, (perhaps with feed cable):

  Loosely connect the cable to the screw terminal (Figure 3)

  Insert the screw terminal into the cap

  Together push them onto the conductor rail.

  Loosely tighten the Philips-screw.
- All caps have to absolutely embrace both sides of the conductor rail.
- **Carefully line-up the caps** with the **transfer air-gap:** especially the caps corresponding to Figure 12 may be adjusted by 3 mm! Figure 8 and 9 : x = 44 ± 5 or 55 ±5 (selectively)
- **Bolt the holder** to the track / web. Figure 10 for 45° displacement: :
- **Screw down the caps** (Figure 12), (Philips-screw).
- Check all transfer, also required during The shifting process .

Fig.8

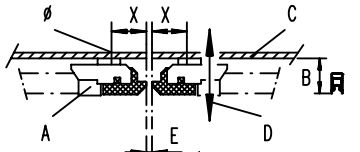


Fig.9

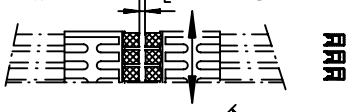


Fig.10

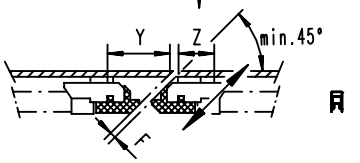


Table 4:

A = conductor rail transfer, complete
B = assembly height 27 or 32 or 40
C = AMS-track or other traverse
D = direction of displacement
E = Figure 8 and 9 transfer air-gap:
min. 2 mm, max. 8 mm between the caps
F = Figure 10 transfer air-gap:
max. 3 mm between the caps

Fastening measures:

Figure 8 and 9 : x = 44 ± 5 or 55 ±5 (selectively)

Figure 10 for 45° displacement: :

Assembly height 27 : Y = 68 ± 5; Z = 54 ± 5

Assembly height 32 : Y = 73 ± 5; Z = 49 ± 5

Assembly height 40 : Y = 81 ± 5; Z = 41 ± 5

ý = Bore in "C" : Assembly height 27=7.2 + 0.3

Assembly height 32=5.0 + 0.5

- For unequal heights from cap to cap, insert shims, Figure 7, if required, at the bolting to the track.

Fig.11

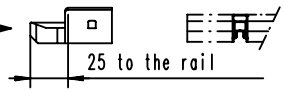
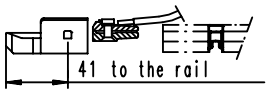
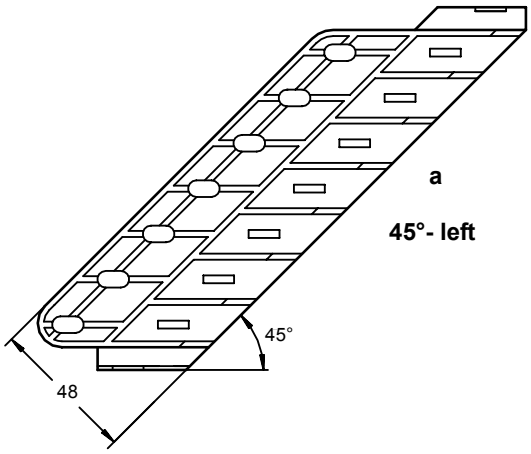


Fig.12



Conductor Rail Transfer

Multi-pole, 45°. For conductor rails facing downwards



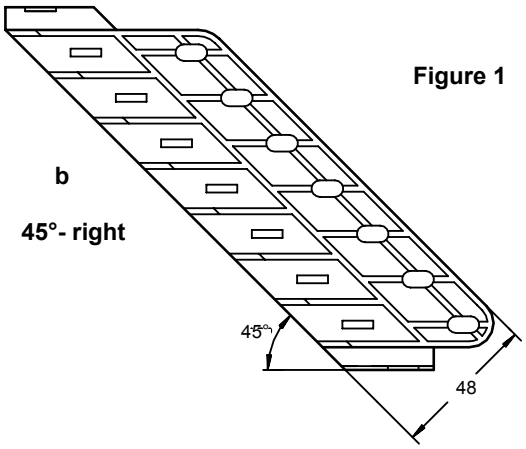
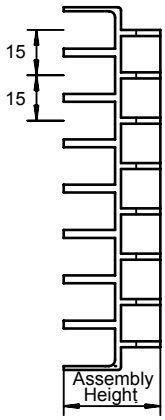


Figure 1



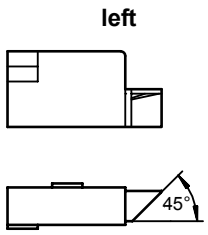
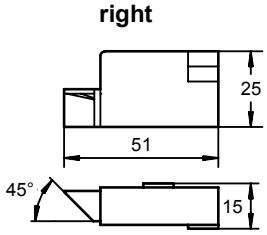


Figure 2 a



b

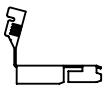


Figure 3

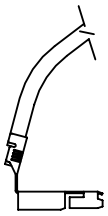


Figure 4

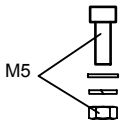


Figure 5

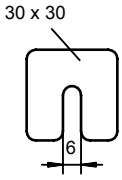


Figure 6

Table 5: Transfer, Multi-pole

Assembly height 32	Assembly height 40	Poles	Description		Weight AH 32	Weight AH 40
241 031 465	241 031 461	4	Transfer 45° - **left**	Complete; individual parts in bag; **Consisting of:** 1 piece girder, Figure 1a; piece caps, Figure 2a; piece plug, Figure 3; 2 pieces bolting, Figure 5 for thickness. up to 10 mm; each 1 piece spacer plate, Figure 6 (1 and 2 mm thick)	0.084	0.086
241 031 463	241 031 459	5			0.092	0.094
241 031 334	241 031 338	6			0.100	0.102
241 031 360	241 031 457	7			0.108	0.110
241 031 332	241 031 330	8			0.116	0.118
241 031 395	241 031 391	4	Transfer 45° - **right**	Complete; individual parts in bag; **consisting of**: 1 piece girder, Figure 1b; piece caps, Figure 2b; piece plug, Figure 3; 2 pieces bolting, Figure 5, for thickness. up to 10 mm; each 1 piece spacer plate, Figure 6 (1 and 2 mm thick)	0.084	0.086
241 031 393	241 031 389	5			0.092	0.094
241 031 344	241 031 348	6			0.100	0.102
241 031 350	241 031 387	7			0.108	0.110
241 031 342	241 031 340	8			0.116	0.118

Item No.	Figure	Description				Weight
241 040 492	Figure 4	Feed cable 1 m long	2,5 mm² outer-∅ 4,5	1 kV black	single-core; highly flexible; one side with plug; (other lengths by request)	0.045
241 040 490			1,5 mm² outer-∅ 4,0	1 kV black		0.032
241 040 491			2,5 mm² outer-∅ 4,0	**Ground** green-yellow		0.038
241 024 052	Figure 6	Shim	each 15 pieces, 1 mm and 2 mm thick, plastic-orange; in bag			0.042
241 017 070	Figure 2a	Cap - **left**	plastic-orange; fitting plug, Figure 3			0.005
241 017 065	Figure 2b	Cap **- right**	plastic-orange; fitting plug, Figure 3			0.005
241 026 020	Figure 3	Plug	bronze; for cross-sections 1.5 and 2.5 mm²			0.003
241 013 096	Figure 5	Bolting	for AH 32 mm M5 x 20	with nut, washer, spring washer; in bag		0.007
241 013 097			for AH 40 mm M5 x 30			0.008

Technical Information

- The permissible vertical and horizontal deviation of two opposing caps is max. ± 2 mm relative to each other.
- The incline of the transfer lies at **45° to the line of the conductor rail**. Other inclines by request.
- The conductor rail center separation is 15 mm.
- One plug belongs to each cap; it is discarded if a connecting cable is used.
- Permissible ambient temperatures – 30°C to + 80°C.
- Suitable for traveling speeds up to 200 m/min.
- Position of collector surfaces down or sideways.
- Assembly height 27 and design of more than 8 poles by request.
- The shims (Figure 6) are inserted between the bolting if required, to achieve the correct transfer height from cap to cap.

Planning Instructions

- Basically: On passage of one of our current collectors, the collector shoe bridges both metal conductor rails, hence**, only one current collector** will be generally required.
- The ground conductor rail may be located at an arbitrary point.
- These transfers fix the conductor rail in longitudinal direction, Hence, they are "fixed points" with the advantage that the correctly adjusted transfer air-gap remains fixed.
- Only position transfers in the area of a bend if the radius of the conductor rails is at least 750 mm.

Installation Instructions

- Drill web or beam "C".
- Loosely bolt down the holder.
- Prepare all transfers.
- Cut conductor rails - bends also - to exact length; deburr carefully also the inside.
- Install the cap according to Figure 10 (with or without cable):
  - plug into the end of the rail until positive stop
  - bend the end of the plug - refer to arrow
  - push on cap until positive stop.
- All caps to embrace both sides of the conductor under all circumstances.
- Clip the conductor rails - with the installed caps - into the holders.
- Carefully line-up the caps with the transfer air-gap.
- Bolt the holder to the track / web.
- Check all transfer, also required during the shifting process .
- For unequal heights from cap to cap, insert shims (Figure 6) if required.

Figure 7

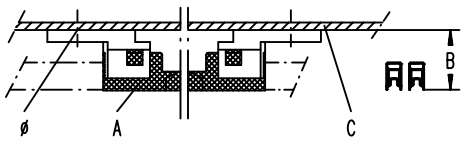


Figure 8

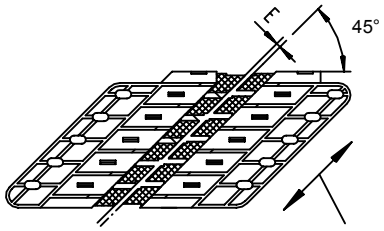
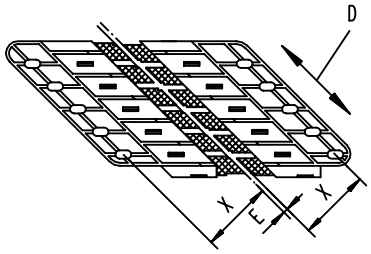


Figure 9



A = conductor rail transfer, complete
B = assembly height 32 or 40
C = AMS-track or other traverse
D = direction of displacement
E = transfer air-gap max. 3 mm between the caps

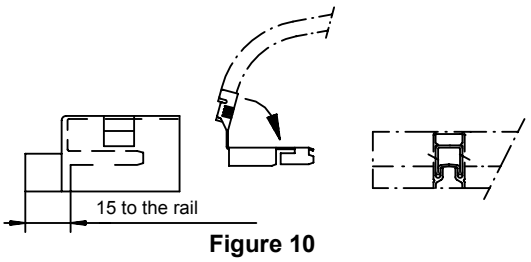


Figure 10

Fastening measure:x = 48 ± 3 mm
ý = bore in "C" = 5,5 + 0,5 mm

Conductor-Rail-Separations pick-up guide for current collectors

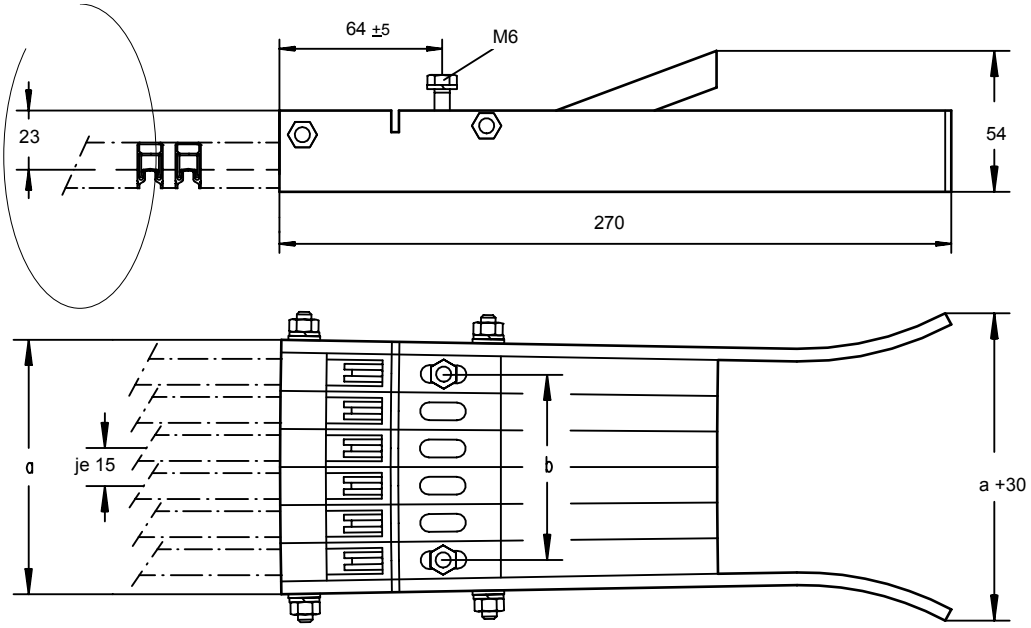


Table 6: Pick Up Guide

Item No.	Description	Poles	Dim. a	Dim. b = mounting		weight
241 030 040		4-poles	70	45		0,350
241 030 045		5-poles	85	60		0,400
241 030 050		6-poles	100	75	completely premounted;	0,450
241 030 055	Pick-up guide	7-poles	115	90		0,500
241 030 056		8-poles	130	105	plastic-orange;	0,550
241 030 057		9-poles	145	120		0,600
241 030 058		10-poles	160	135	(other number of poles by request)	0,650

Technical Information

- Suitable for installations which operate with current collectors (all types).
- The conductor rail center separation is 15 mm.
- Suitable for collector surfaces facing down or sideways; for a back and forth operation.
- The conductor bar connecting point to the pick up must be without electrical current as the air gap ionization will cause sparking problems , a rail with a separation piece should be connected then a feed.
- Traveling speed of max. 100 m/min.
- The ends of the conductor cannot be fed. Feeds must be located further back.
- Permissible ambient temperatures – 30°C bis + 50°C, i.e. here is a restriction as compared with the remaining list.
- Chemical resistivity comparable to other components.
- The pick-up guide is not remountable, i.e. it cannot be mounted several times over.

Planning Instructions

- Pick-up guides are required for larger conductor rail interruptions and serve the ascent- and descent of the current collectors.
- To assure a continuous supply of power or data transfer, at least two current collectors are to be located on each mobile carrier at the appropriate distance for each conductor rail (also ground - for bridging).
- The current collector or the live collector shoes have to be protected against contact in the area of the interruption by confinements or covers.