MISIA

INSTRUCTION MANUAL FOR
END CARRIAGES

MANUAL FOR INSTALLATION
OPERATION AND MAINTENANCE

CE

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1. GENERAL SAFETY REQUIREMENTS

ATTENTION!
The technical data of each end carriage is given in its CE certificate - a separate document to which the present Manual is enclosed.

1.1 GENERAL REQUIREMENTS TO THE USER

ATTENTION!
Read and study the present document before assembly!

To ensure the safe and reliable working operations of the articles strictly follow the requirements for maintenance and operation given in this Manual.

- Keep strictly to the requirements for safe operation in order to prevent dangers for the personnel and damages of the articles.
- Perform the repairs only with original spare parts supplied by the manufacturer.
- Connection of the end carriages to the power supply network shall be performed by qualified electricians only.
- Assembly, disassembly and commissioning of the end carriages must be performed by authorized personnel only.
- Apart from this manual during assembly and operation the requirements of the corresponding country's normative documents requirements for safe operation of electrical and lifting appliances must be observed.

The end carriages and this Manual comply with the following documents:

- **ISO12100-1:2004** "Safety of machines. Basic terms, general principles of design. Part 1: Basic terminology, methodology" **ISO12100-2:2004** "Safety of machines. Basic terms, general principles of design. Part 2: Technical principles and specifications"
- **EN 60204-1:1992** "Safety of machines. Electrical equipment of machines. Part 1: General requirements"
- **IEC 34-1** "Rotary electric machines"
- **IEC 34-5 IP** "Classes of protection"
- **VBG 8;VBG 9a** "Safety instruction for lifting machines"
- **DIN 15020** "Material handling machines. Elements of driving. Calculation of their design."
- **FEM 9.511** "Bases for calculation of serial lifting mechanisms. Classification of mechanisms"
- **FEM 9.661** "Bases for calculation of serial lifting mechanisms. Sizes and quality of driving elements for pulley systems (reeving) with ropes"
- **FEM 9.682** "Bases for calculation of serial lifting mechanisms. Selection of lifting motors"
- **FEM 9.755** "Serial lifting devices. Measures for achievement of safe periods of operation of serial production of lifting mechanisms, driven by motors"
- **FEM 9.811** "Serial lifting mechanisms. Rules for electric hoists (wire rope and chane hoists)".

1.2 GENERAL REQUIREMENTS FOR SAFE OPERATION

ATTENTION!
Nevertheless that in the corresponding sections there are given some directions for safe operation the following specific requirements shall be observed:

- Lifting and moving of loads over the personnel is not allowed.
- Daily, before starting work, check the operation of the brake and the limit switch.
- Do not leave the lifted load unobserved.
- Do not exceed the rated capacity.
- Do not lift loads at an angle and do not drag them.
- Check the state of the rope and if necessary discard it.
- After each rope replacement as well as after repair and re-assemblage of the electric hoist check the phasing and the limit switch adjustment for upper and lower end position of the loading hook.
- While carrying maintenance and repair activities on the crane trolley, make sure that: there is no load on the hook; the power supply switch is turned off and unauthorized switching-on is eliminated.
- Check the loading hook for cracks and deformations as well as the good working order of the fuse for self-release of the load.
- Check the bearing screw joints for avoiding their eventual self-unwinding.
- Check the reliable connection of cable protective conductors to the grounding terminals in the electric board as well as the transformer and the electric.
- In all cases of disassembly of the push button cover the outer surfaces of the metal screws which fasten its housing with electrical insulating material.
- Do not use the limit switch as an operational one in any case.
- Do not try to detatch firmly fixed loads (e.g. frozen to the ground).
- End positions in vertical and horizontal movement can be used only if an operating limit switch is provided.

2. PURPOSEFUL UTILIZATION

2.1 DESIGNATION

The end carriages are designed to manufacture single or double girder bridge cranes.

The end carriages are material handling equipment, designed to operate indoors or outdoors under shelter while keeping the operation conditions as per the technical data of the product as described in the passport.

The end carriages are not designed to operate in chemically aggressive and explosive environment.

Observe the following:

- Use the end carriages in compliance with its designation and the technical data as given in its passport. Each deviation from its purposeful utilization represents a residual risk.
- Observe the prescribed operation modes. Do not engage in heavier mode than prescribed.
- Do not allow persons, not complying with the requirements of the relevant country's normative documents for operation with material handling equipment, to perform maintenance and servicing of the end carriages.
- Observe all safe operation requirements and the related assembly, commissioning, maintenance and service conditions as described in: this Manual, the European rules documents; the normative documents of the country wherein the item operates.
- Observe the prescribed operation modes. Do not engage in heavier mode than prescribed.

2.2 CLIMATIC MODIFICATIONS

The end carriages are of climatic modification intended for normal climatic zone N-II (for operation indoors or outdoors under shelter-fig.3.3) according to EN 60721-2-1.

The term "under shelter" denotes that the following climatic factors' influence is available: lack of or substantially reduced direct sun radiation and rainfalls over the item. The end carriages can operate in premises too. The influence of the climatic factors is: lack of direct or substantially reduced environment influence: sun radiation, rainfalls, dust and sand, wind, sharp temperature changes, etc. In many cases the air temperature is lower than outdoors or under shelter. The climatic modification is written in article.

2.3 ENVIRONMENTAL CONDITIONS

The articles for normal climatic zone operate in the following environmental conditions: air temperature from -20ºC to + 40ºC; relative air humidity - from 30% to 95% (90% at +20ºC and 50% at +40ºC); sea level - up to 1000 m. These conditions correspond to the requirements of EN60204-32, p.4.4.3, 4.4.4 and 4.4.5.

3. TECHNICAL DESCRIPTION

The end carriage is a steel pipe beam; at the ends of which the flanges with the bearing nests are mounted, wherein the shafts with the driving and idle travel wheels lie. It joins to the main girder of the crane with plates.
The gear motor is mounted to the end carriage as its hollow output shaft is attached to the driving shaft of the end carriage, and its upper end is attached, by means of a special lug, to stand, fixed to the end carriage.

3.1 TYPE OF STANDARD END CARRIAGES

3.1.1 END CARRIAGES FOR STANDARD SIDE GIRDER BRIDGE CRANES

End carriages for single and double girder bridge cranes.
Main components are shown on figure 3.1.1.

1. End carriage
2. Rail driving wheel
3. Rail idle wheel
4. Long travel motor
5. Connection plate
6. Buffer
7. Derailment support

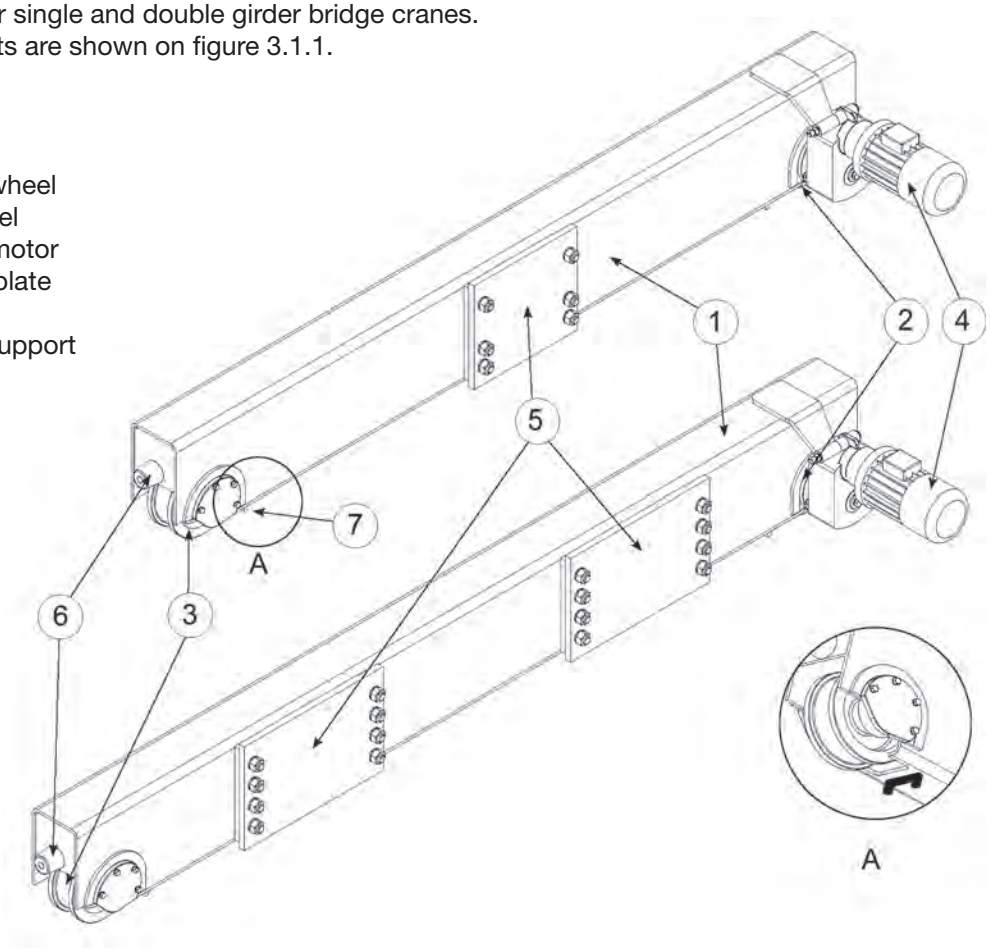


Figure 3.1.1

3.1.2 END CARRIAGES FOR STANDARD SUSPENDED GIRDER BRIDGE CRANES

End carriages for single girder cranes. Two possible section types of end carriages - box and profile.
Main components are shown on figure 3.1.2.

1. End carriage
2. Rail driving trolley
3. Rail idle trolley
4. Travelling motor
5. Connection plate

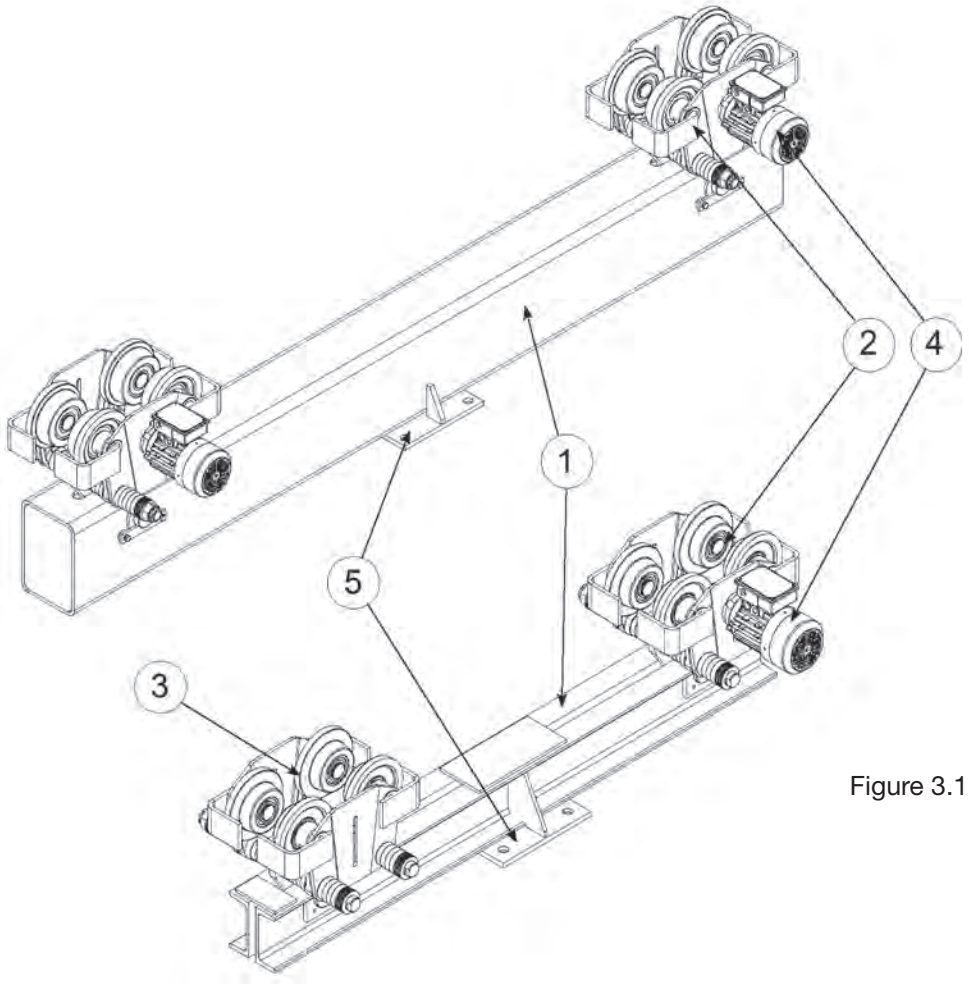


Figure 3.1.2

3.1.3 END CARRIAGES FOR STANDARD TOP GIRDER BRIDGE CRANE

End carriages for single top girder cranes.
Main components are shown on figure 3.1.3.

1. End carriage
2. Rail driving wheel
3. Rail idle wheel
4. Long travel motor
5. Connection plate
6. Buffer
7. Derailment support

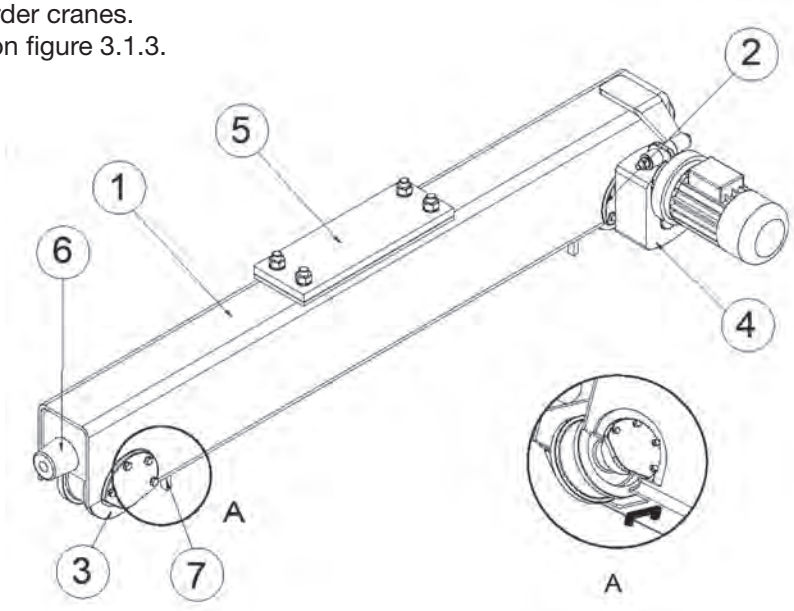
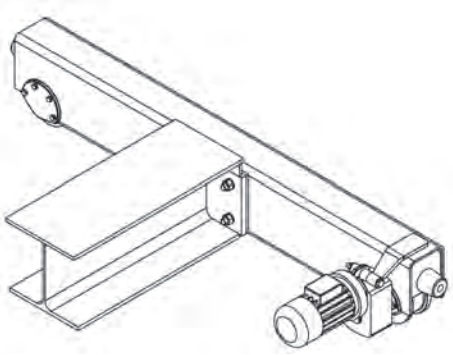


Figure 3.1.3

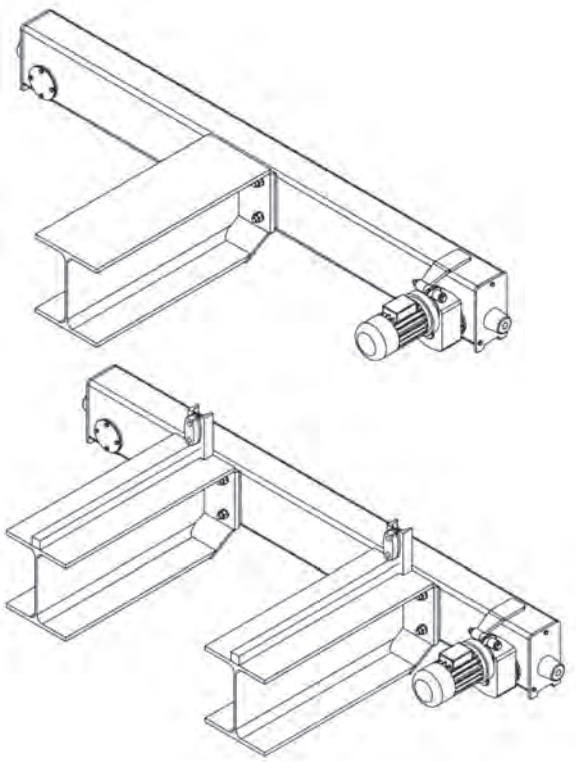
3.2 TYPE OF STANDARD MAIN GIRDER PROFILES

The main girder is welded to connection plate. Connection plate is locked to the end carriage with bolts. The bolts are pre-assembled, final tightening have to be done when assembled on crane.

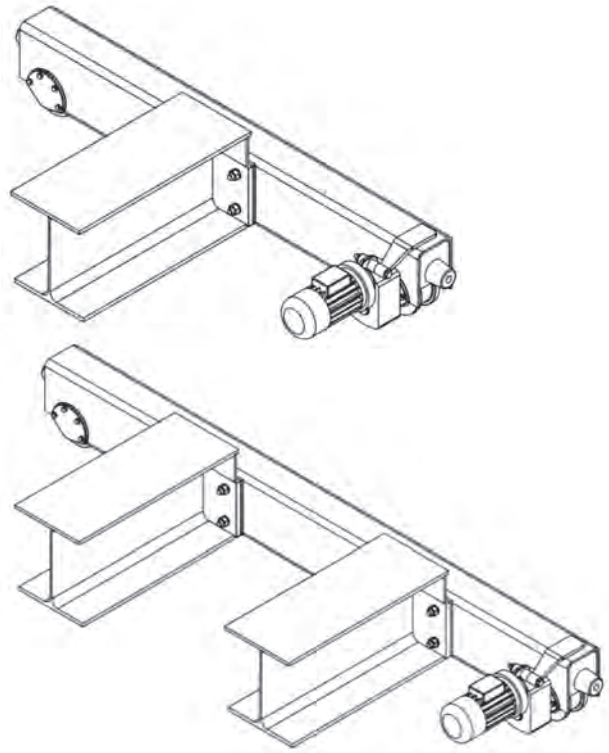
3.2.1 SIDE CONNECTION TO GIRDER



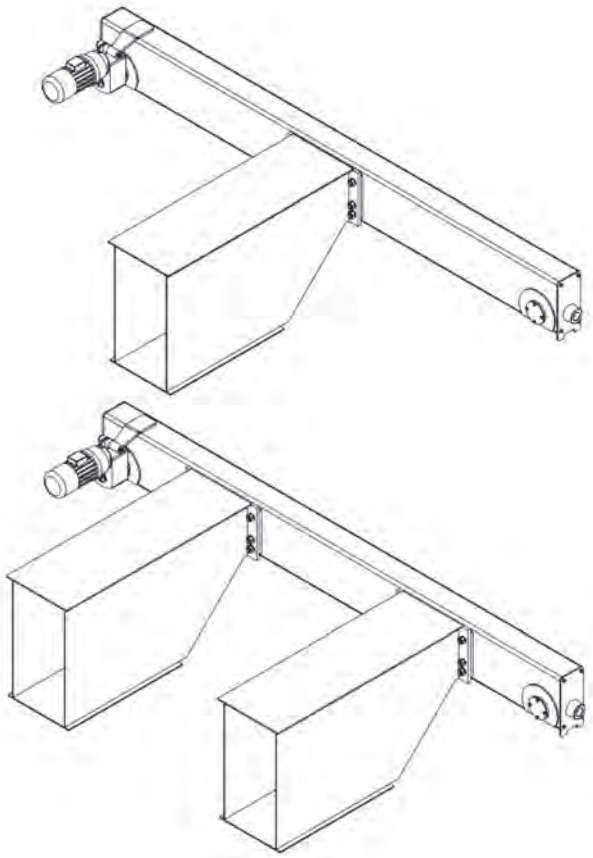
Main girder, side joint, standard, profile, for single girder bridge crane



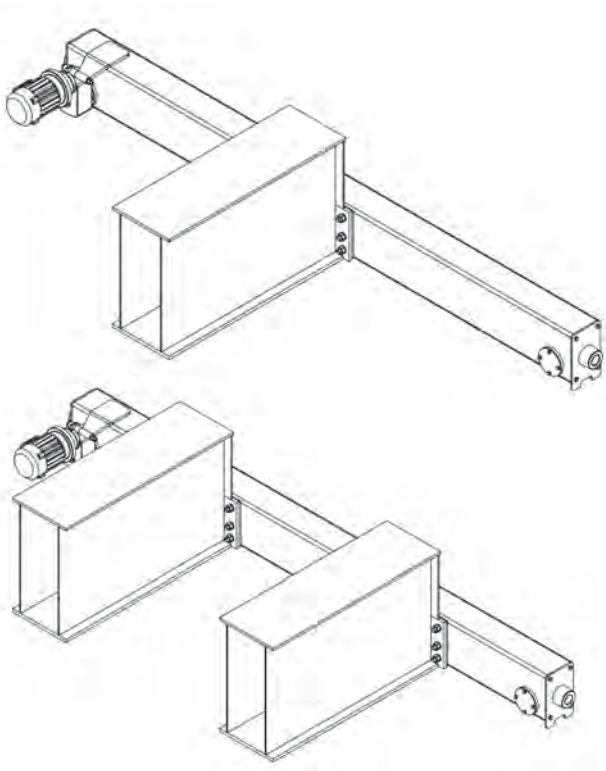
Main girder, side joint, standard, profile, cut bottom corner for single and double girder bridge crane



Main girder, side connection, standard, profile, rised corner for single and double girder bridge crane

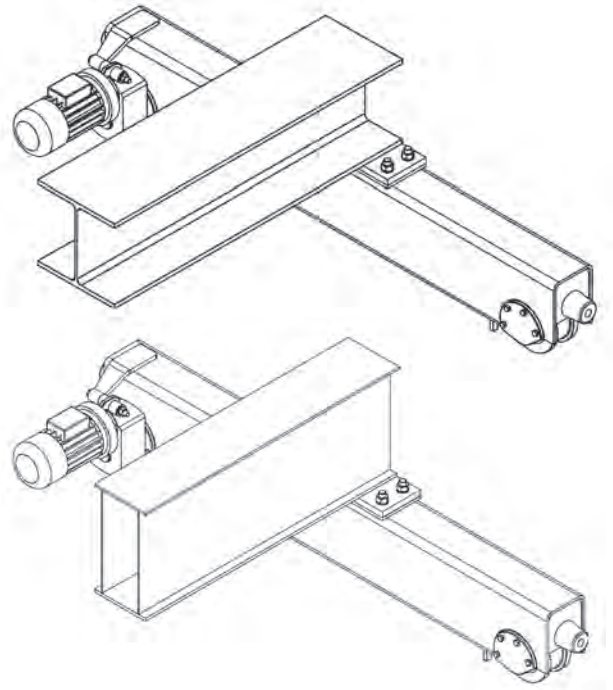


Main girder, side connection, standard, box, cut bottom corner for single and double girder bridge crane



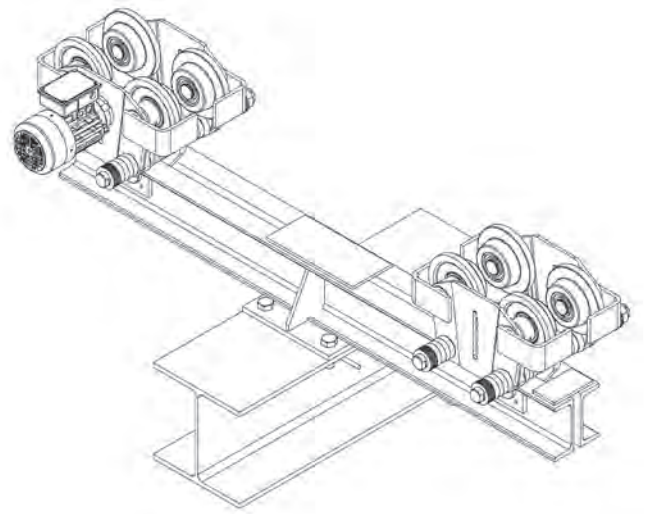
Main girder, side connection, standard, box, rised corner for single and double girder bridge crane

3.2.2 TOP CONNECTION TO GIRDER



Main girder, bottom joint, standard, profile, for single suspended girder bridge crane.

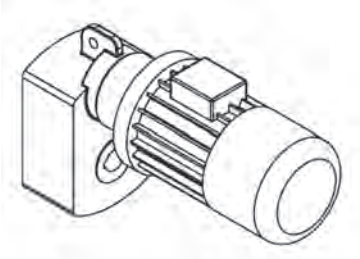
3.2.3 UNDERSLUNG CONNECTION TO GIRDER



Main girder, top connection, standard, profile or box, for single girder bridge crane.

3.3 GEARED MOTORS

The implemented gear motor consists of asynchronous motor with cylindrical rotor with built in electromagnetic brake, compensating clutch and cylindrical three-stage reducer. The brakes are DC-power supplied.
The brake activates when the power supply of the motor is switched off and provides the necessary brake moment to the motor rotor. When DC voltage is fed to the coil of the electromagnet, electromagnetic force develops, which overcomes the force of the springs which press the brake disk, the anchor is attracted to the magnetic core, the brake opens and the motor may rotate again.
The type and features of the motors used are given in the passport of the gear motors.



3.4 ELECTRICAL EQUIPMENT

The standard power supply network of the end carriage is three-phase AC, with rated voltage 380V and rated frequency 50 Hz.

- voltage: ±10% of its rated value and frequency ± 5% of its rated value;
- in case of simultaneous deviation of voltage and frequency, the sum of the absolute values of the deviations shall not exceed 10%.

3.5 CONNECTION WITH ELECTRICITY NETWORK

Prior to start connecting, check if the voltage and frequency ratings from the company nameplate correspond to the ratings of the local electricity network.
The connection must be performed by authorized personnel, having the necessary qualifications and experience, while observing all technical safety requirements.

4. TRANSPORTATION

4.1 PACKING

The wooden packing protects the articles against mechanical damages and the influence of the climatic factors during shipment and storage.
The packing is in accordance with the type of the vehicle and the climatic zones of the countries (classified according to EN60721-1-2), across which the machine is shipped.

When handling the packed article observe the following requirements: The boxes shall lie only on their base; shall be stored in dry premises only; shall be gripped at the indicated places (when using load-gripping devices). These requirements are indicated on the box sides by relevant signs (figure 4.1.). The signs indicate: a) fragile; b) keep from rain; c) do not turn around; d) do not place on top; e) indication for suspension; f) indication for lifting direction.

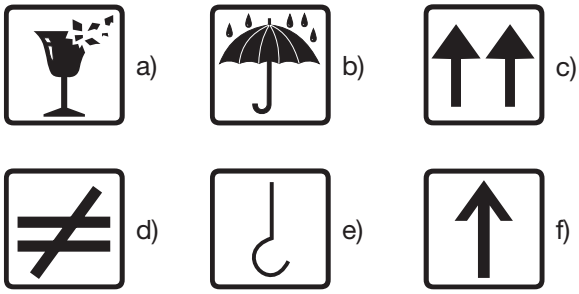


Figure 4.1

4.2 TRANSPORTATION

When shipping the end carriages do not put other loads on top.
Place the units tightly in the vehicle or fasten them by additional means. When a lot of space is free additional fastening is required.
The road vehicles shall be covered.
The shipping and storage conditions are in accordance with EN 60204-32 and GOST15150: temperature from -20°C to +45°C, as for a short period (up to 24 hours) it can be + 70°C.

4.3 UNLOADING, UNPACKING AND DE-PRESERVING

1. Unload the end carriages using cranes and equipment of the necessary capacity and observing the packing indications.
2. Unpacking sequence - carefully release from the wooden platform the two bands fixing the polythene stuff to the article. Remove the polythene stuff. Unscrew the screws fixing the article to the wooden base. Make sure that the gear motors will not be damaged.
3. De-preserving consists in removing the packing. Perform simultaneously with a visual check for damaged coatings, rust and greased areas.

5. ASSEMBLY OF THE END CARRIAGE TO THE CRANE

- Prior to starting the assembly carefully checks if all the units and assemblies of the product are available, including the accompanying documents.
- Prior to assembly check the state (mechanical damages) of all units and details of the end carriages.
- Check the state of the travel wheels and the tightness of the bolt joints.
- Check for available bumpers and their reliable functioning.
- Check the state of the motors. Check the insualtion resistance between the stator windings of the motors and the housing with megaohmmeter of voltage 1000V. The resistance shall not be less than 5 MΩ.
- Check the parameters of the power supply network.

End carriages assembly

- Set a delimited and adequate area, with floor or flat bottom, for crane ground assembly operations.

- Prepare adequately wooden beams of suitable size as placed below the beams and heads, in this case consider the height of the entire head (including wheels).

- Align and separate the crane beams from each other so that the distance between the tracks corresponds to that of the hoist or winch that is to be supported. (figure 26).

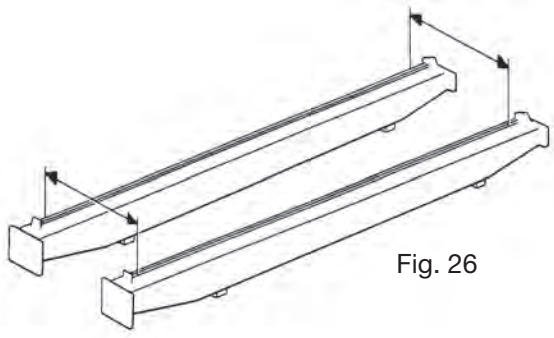


Fig. 26

- Wheelbase can be verified directly on the hoist trolley or on the technical documentation.

- Proceed as follow to assemble the head beams (wheel carriers) to the bridge beams:

  - Remove the plastic caps (figures 27 and 28) and carefully clean the seats where the calibrated bushes are placed, eliminating any traces of paint or dirt.

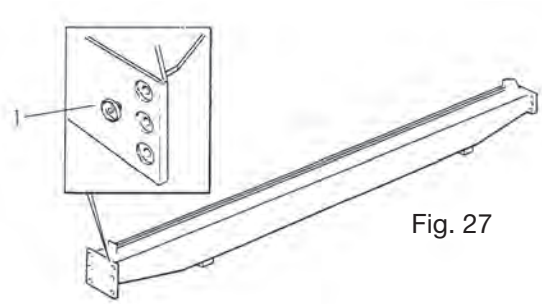


Fig. 27

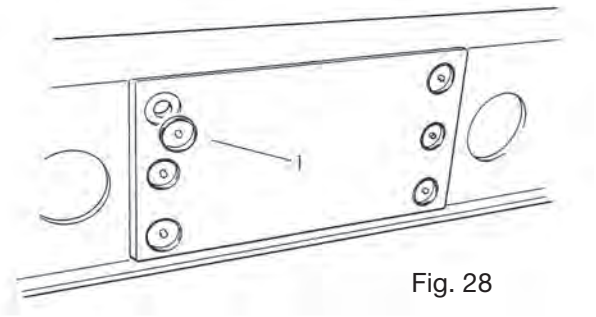


Fig. 28

  - Clean the bushes carefully and check that they are not rusty in case of long storage.

  - Insert the bushes in the housings of the header beams or of the bridge beams by rotary movements (figure 30).

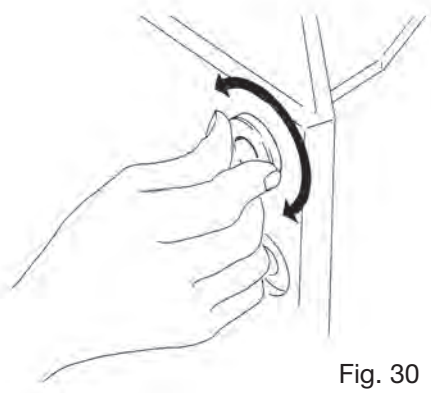


Fig. 30

- Tighten all the bolts with the torque wrench respecting the values shown in table 6.3 page 15.

- Make sure that once the bolts are tightened, a space (min 2.5-3 mm) remains between the headboard beam plate and the bridge beam attachment plate (figure 33).

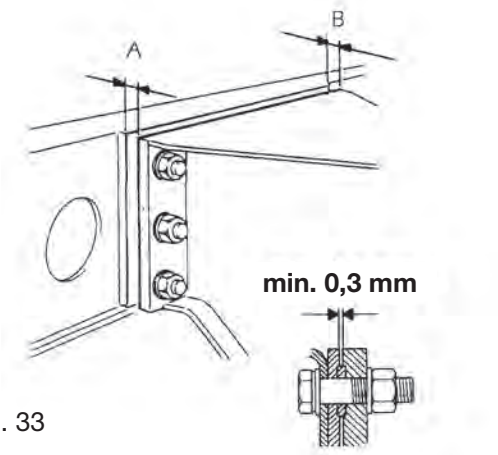


Fig. 33

The dimensions A and B (shown in fig 33) may be different from each other; this difference does not affect the alignment between the wheel axles of the heads and the orthogonality between the heads themselves and the beams, which is determined by the machining of the alignment bush seats.

IMPORTANT
THE TWO PLATES IF THEY HAVE
THE COMPASSES NEVER TOUCH

5.1 RAILWAY STRUCTURE

The end carriages are designed for movement on rail track.
The design and execution of the railway assembly shall be made by authorized personnel only, in accordance with the applicable normative documents for the relevant country.

- There shouldn't be any obstacles to the movement of the travelling mechanism like beam suspending elements, joining plates; bolt heads, etc.
- Do not paint the surfaces where the travel wheels roll as the paint hinders the good engagement between the wheels and the track.
- To ensure normal operation of the travelling mechanisms regularly cleanse the railway track from oils, greases, ice, etc.
- During operation observe for cracks and wear of the rail track and, if available, proceed according to the requirements of the relevant country's normative documents.

Despite the rubber bumpers the travel mechanism's hits in the limiting plates influence negatively its operational life.

5.2 COMMISSIONING OF THE END CARRIAGES

Prior to commission of the end carriages the following control activities must be performed by authorized competent persons:

- Check of mechanism fastening;
- Check for available bumpers and their reliable functioning;
- Check of the adjustment of all electrical devices, necessary for the operation;
- Check of the bearing construction.

6. MAINTENANCE PLAN

The General maintenance plan is worked out for operation in normal conditions according to the end carriages duty mode (FEM 9.511) and is given in Table 6.

Table 6

N°	On commissioning	Daily, prior to starting work	After first 3 months	After first 12 months	Every 12 months	Type of check and maintenance
1	•	•	•	•	•	Check the electric hoist of the crane – perform in accordance with the maintenance plan as stated in the Assembly and Operation Manual of the relevant type of electric hoist, mounted on the crane
2	•	•	•	•	•	Check the gearmotor of the crane – perform in accordance with the maintenance plan as stated in the Assembly and Operation Manual of the relevant type of gearmotor, mounted on the crane end carriages
3						Maintenance of travel wheels
4			•		•	Bearing screw joints
5			•		•	Welded joints
6					•	The state of the bumpers. Replace them if mechanical damages are observed.
7				•		Check and, if necessary, improve the anti-corrosion protection
8						Control block

Especially for the end carriages, the check includes:
- Bearing screw joints - after first 3 months and every 12 months;
- Welded joints - after first 3 months and every 12 months;
- The state of the bumpers. Replace them if mechanical damages are observed - every 12 months;
- Check and, if necessary, improve the anti-corrosion protection - after first 12 months.

6.1 MAINTENANCE REPETITION PERIOD

ATTENTION!
- **The unit must be checked at least once a year by experts. As experts may be called persons from the Technical Surveillance Services and experts, authorized to carry out the inspections.**
- **During repairs only original manufacturer's spare parts shall be used.**

6.2 MAINTENANCE OF THE TRAVEL WHEELS

Double-flanged travel wheels are used in the end carriages. The discard norm for these travel wheels is 2% from the relevant diameter.
Check the diameter of rolling of the travel wheels. The difference between the relevant diameters of both wheels shall not exceed 0,5%.

6.3 DISASSEMBLY OF THE TRAVEL WHEELS

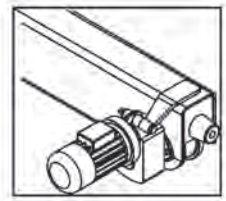
First, secure the crane against unexpected movement.

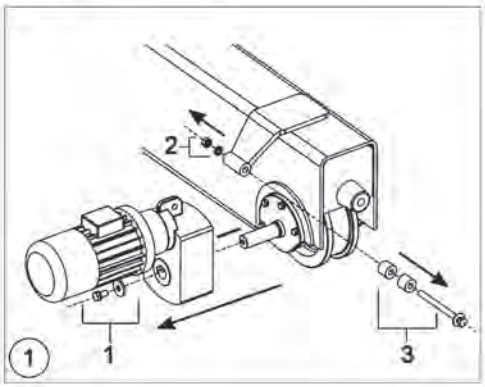
- Step 1 - remove the bolt and washer, which keep the motor reducer and wheel's shaft together.
- Step 2 - unfold the nut and remove the bolt with pad
- Step 3 - Remove the motor reducer.
- Step 4 - unfold the bolts and remove them from the wheel's cap. Take off the wheel as shown with arrow on picture 2
- Step 5 - Disassembly the cap, bearings and washers from the driving wheel.

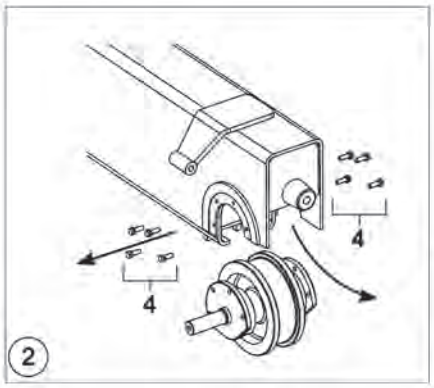
For assembly follow the same steps in opposite way.

Tightening torque

The bearing bolt joints require regular checks and if you find some looseness, tight them with the respective torque, mentioned in Table 6.3.







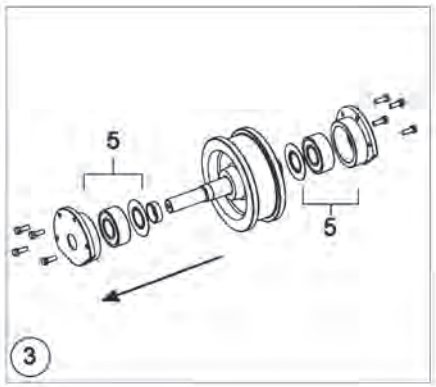


Table 6.3

Joint strength class		M8	M10	M12	M14	M16	M18	M20	M24	M30	M36
Bolt	**Nut**	Tightening torque, Nm									
8.8	**8**	22	40	75	120	180	250	350	580	1200	1600
10.9	**10**	30	60	100	160	250	350	550	800	1800	2300

6.4 LUBRICATION

Table 6.4. shows the lubrication places and table 6.4.1. – the lubrication materials.

Table 6.4

Lubrication point	• On initial commissioning	• After 3 months of operation	• After 12 months of operation	• Every 12 months	• Every 36 months		Type of lubrication
Electric hoist	•	•	•	•	•	Perform according to the lubrication plan in the Assembly and Operation Manual of the relevant type of electric hoist mounted on the crane.	
Travel mechanisms	•	•	•	•	•	Perform according to the lubrication plan in the Assembly and Operation Manual of the relevant type of gearmotor.	
Travel wheels' bearings					•	Change grease	Grease

Table 6.4.1

Place to lubricate	Type of lubricant	Materials	Recommended materials	Amount of lubricant per position
Bearings of travel wheels	Consistent grease	Dripping temperature ≥180°C	Operation temperature -25°C - + 80°C	Fills up to 2/3 of the bearing area with grease
			K3 BDS 1415-84, TSIATIM 202 GOST 11110-72, MOBIL-MOBILPLEX 48, BP Energrease HT 3.	
		Penetration: 220÷430 Dripping	Operation temperature -40°C - + 80°C	
			TSIATIM 202 GOST 11110-72, MOBIL-MOBILLUX 2, Fuchs RenoLit FLM 2.	

7. END CARRIAGE CODES AND DIMENSIONS

7.1 END CARRIAGE CODE DESCRIPTION

SG 16 15

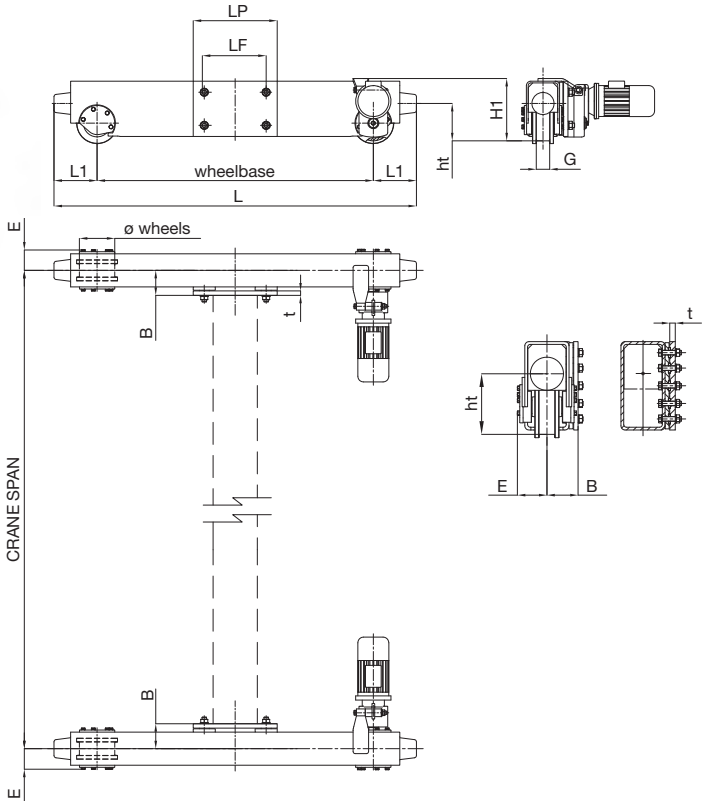
- 15 – Base of the End carriage (mm)
- 16 – Wheel diameter (mm)
- SG

7.2 END CARRIAGE VALUES AND DIMENSIONS

SG - Single girder end carriages

Table 7.2.1

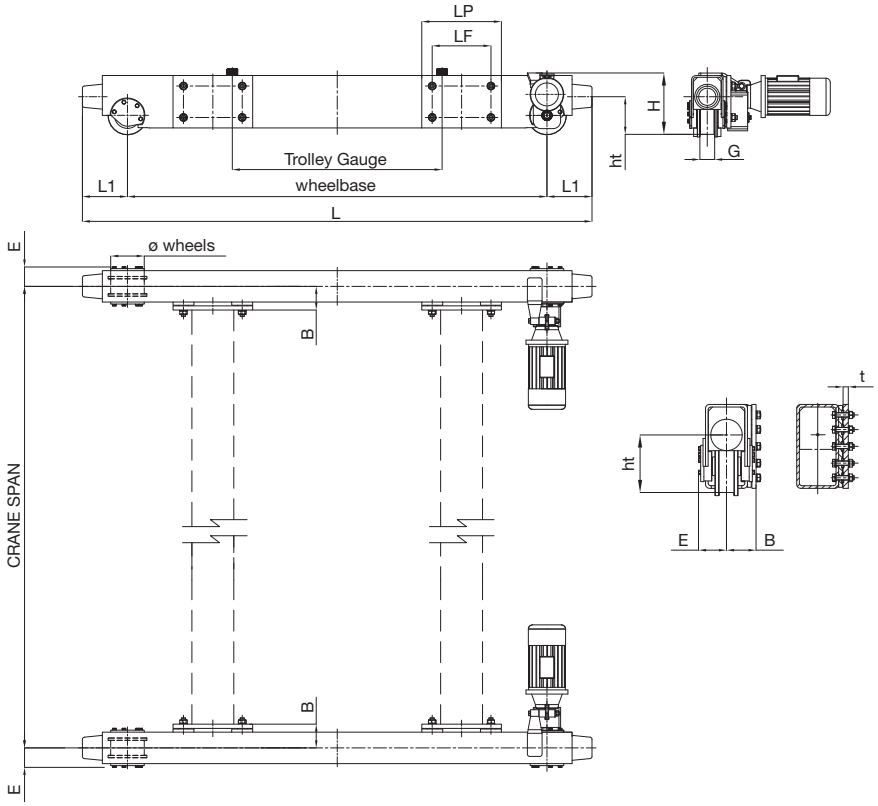
Type	Max wheel load	Max span of crane	Wheel diameter	Wheel groove (G)	Wheelbase	L1	L	LP	LF	Plate thicknees (t)	H	ht	E	B	Weight
SG	kg	m	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
SG1612	3.800	9,38	160	60	1250	215	1640	380	280	20	290	180	95	113	350
SG1616	3.800	12,00		60	1600		2030					180			400
SG1620	3.800	15,00		70	2000		2430					180			460
SG1625	3.800	18,00		70	2500		2930					180			533
SG1630	3.800	22,50		70	3000		3430					180			627
SG1635	3.800	26,00		70	3500		3930					180			679
SG1640	3.800	30,00		70	4000		4430	480	380			180			752
SG2012	5200	9,00	200	70	1250	245	1740	380	280	20	340	220	135	138	633
SG2016	5200	12,00		70	1600		2090					220			698
SG2020	5200	15,00		70	2000		2490					220			772
SG2025	5200	18,00		70	2500		2990					220			865
SG2030	5200	22,50		70	3000		3490					220			985
SG2035	5200	26,00		70	3500		4030					220			1050
SG2040	5200	30,00		70	4000	265	4530	480	380			220			1143
SG2512	8400	9,00	250	70	1250	260	1770	380	280	20	440	280	135	141	1134
SG2516	8400	12,00		70	1600		2120					280			1213
SG2520	8400	15,00		70	2000	280	2560					280			1302
SG2525	8400	18,00		70	2500		3060					280			1414
SG2530	8400	22,50		70	3000		3560					280			1560
SG2535	8400	26,00		70	3500	265	3990	480	380	25		280		146	1638
SG2540	8400	30,00		70	4000		4530			25		280		146	1750
SG3116	12.940	12,00	315	80	1600	235	2170	380	280	25	480	280	170	171	949
SG3120	12.940	15,00		80	2000		2570					280			1083
SG3125	12.940	18,00		80	2500		3110					280			1250
SG3130	12.940	22,50		80	3000		3610	480	380			280			1467
SG3135	12.940	26,00		80	3500		4040					280			1584
SG3140	12.940	30,00		80	4000		4570					280			1751



DG - Double girder end carriages

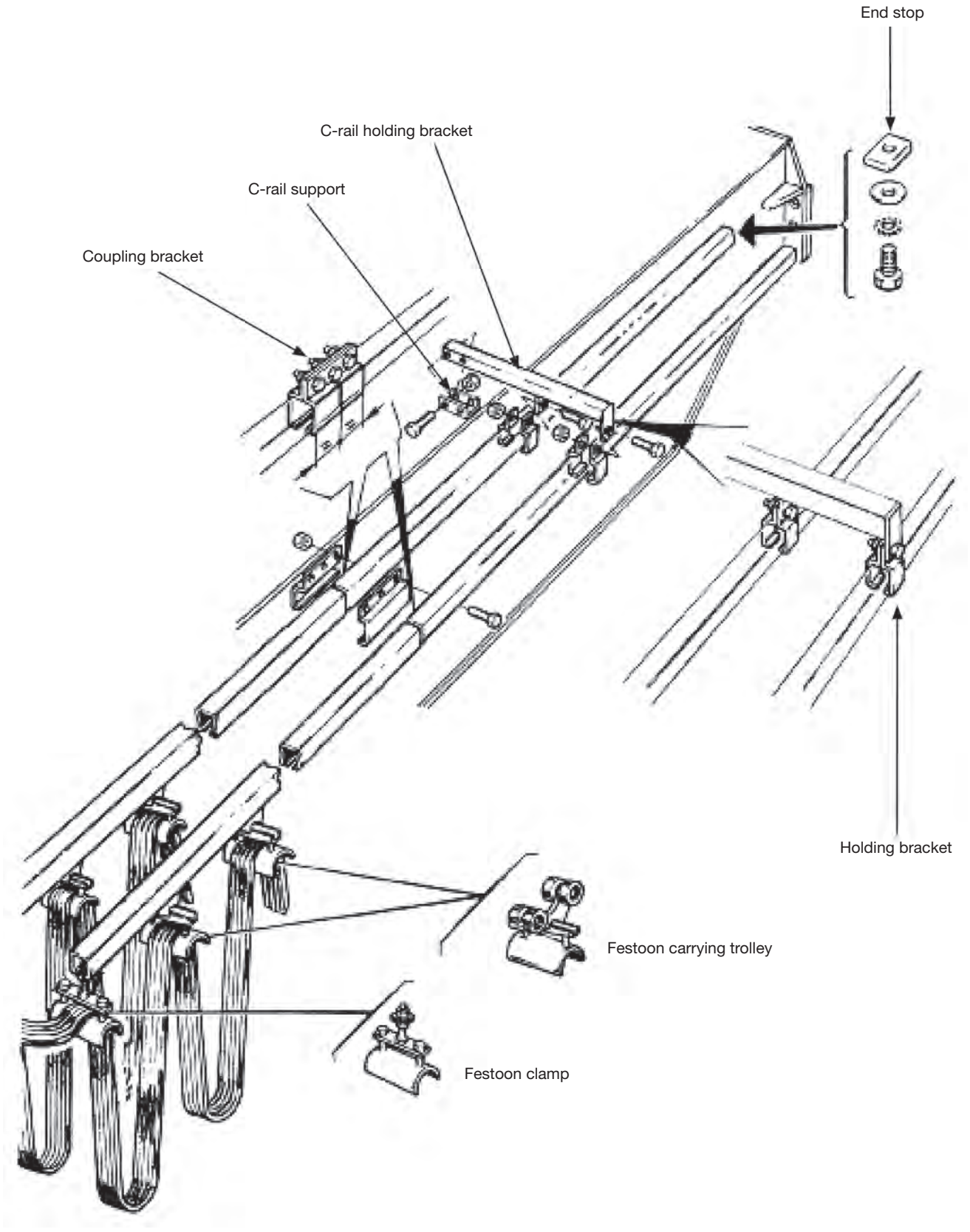
Table 7.2.2

Type	Max wheel load	Max span of crane	Wheel diameter	Wheel groove (G)	Wheelbase	L1	L	Gauge	LP	LF	Plate thicknees (t)	H	ht	B	E	Weight
DG	kg	m	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
DG1620	3.800	15,00	160	70	2000	215	2430	1000	380	280	20	290	180	113	95	460
DG1625	3.800	18,00		70	2500		2930						180			560
DG1630	3.800	22,50		70	3000		3430						180			620
DG1635	3.800	26,00		70	3500		3930						180			680
DG2025	5.200	18,00	200	70	2500	245	2990	1000	380	280	20	340	220	138	135	790
DG2030	5.200	22,50		70	3000		3490						220			890
DG2035	5.200	26,00		70	3500		3990						220			1065
DG2040	5.200	30,00		70	4000		4530		480	380			220			1130
DG2045	5.200	33,50		70	4500	265	5030						220			1200
DG2525	8.400	18,00	250	70	2500	280	3060	1000	480	380	25	440	280	146	135	1130
DG2530	8.400	22,50		70	3000		3560						280			1240
DG2535	8.400	26,00		70	3500	244	3988		580	480			280			1380
DG2540	8.400	30,00		70	4000	260	4520						280			1480
DG2545	8.400	33,50		70	4500	265	5020		680	580			280			1680
DG2550	8.400	37,50		70	5000	265	5520						280			1980
DG3125	12.940	18,00	315	80	2500	285	3070	1200	480	380	25	480	280	171	170	1430
DG3130	12.940	22,50		80	3000		3570		580	480			280			1770
DG3135	12.940	26,00		80	3500		4070						280			1930
DG3140	12.940	30,00		80	4000		4570		680	580			280			2120
DG3145	12.940	33,50		80	4500		5070						280			2160
DG3150	12.940	37,50		80	5000		5570						280			2360
DG4030	21.200	22,50	400	90	3000	335	3670	1400	580	480	25	525	309	199	200	2520
DG4035	21.200	26,00		90	3500		4170						309			2700
DG4040	21.200	30,00		90	4000		4670		680	580			309			3270
DG4045	21.200	33,50		90	4500		5170				28		315	202	210	3200
DG4050	21.200	37,50		90	5000		5670						315			3370

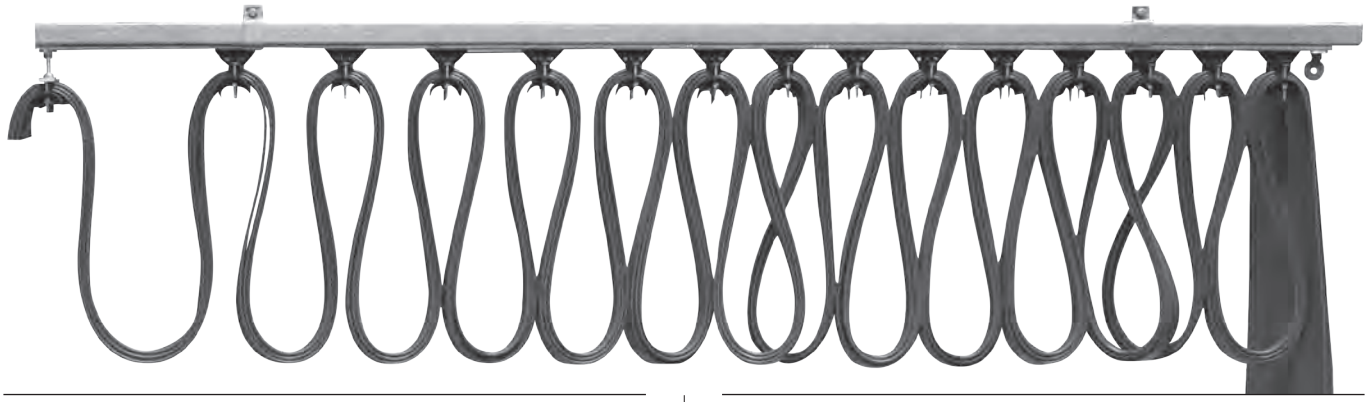


8. FEEDING LINE

8.1 INSTALLATION OF C-RAILS OF THE FESTOON SYSTEM



8.2 OMEGA LEGGERA CP1 SERIE - FESTOON SYSTEM



OMEGA LEGGERA Profile (bars)

- Material: galvanized steel
- Permissible load: 100 kg/m

Holding bracket

- For wall fixing (2 pcs)
- Nuts and bolts included
- Material: galvanized steel
- Recommended mounting pitch between two adjacent brackets: 1 m

Conjunction bracket

- For connecting a bar with the next
- Material: galvanized steel

Steel trolley

- Material: galvanized steel
- Long travel: by means of ball bearings
- Saddle 70 mm

Light-series trolley

- Body, saddle, plastic wheels for smooth sliding
- Capacity: 10 kg
- Saddle 70 mm

Festoon clamp with metal saddle

- Nuts and bolts included
- Material: galvanized steel
- Saddle: 70 mm

Festoon clamp with plastic saddle

- Nuts and bolts included
- Material: galvanized steel + plastic
- Saddle: 70 mm

Metal cable drag saddle

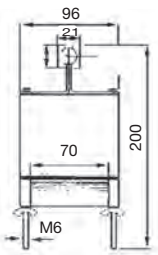
- With screws and nuts
- Material: galvanized steel
- Saddle: 70 mm

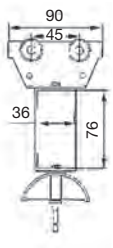
Plastic cable drag saddle

- With screws and nuts
- Material: plastic
- Saddle: 70 mm

Cable drag saddle with trolley

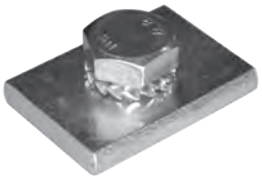
- Material: galvanized steel
- Long travel: by means of ball bearings
- Saddle: 70 mm





End stop

- Material: galvanized steel



U-shaped support in black plate 30/10

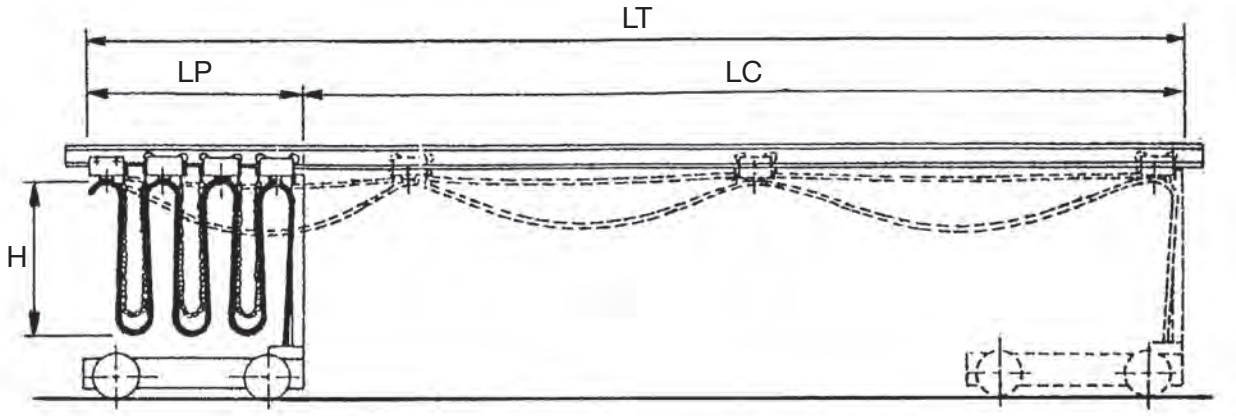
- With 2 screws and 2 nuts
- To be welded on site on the beam

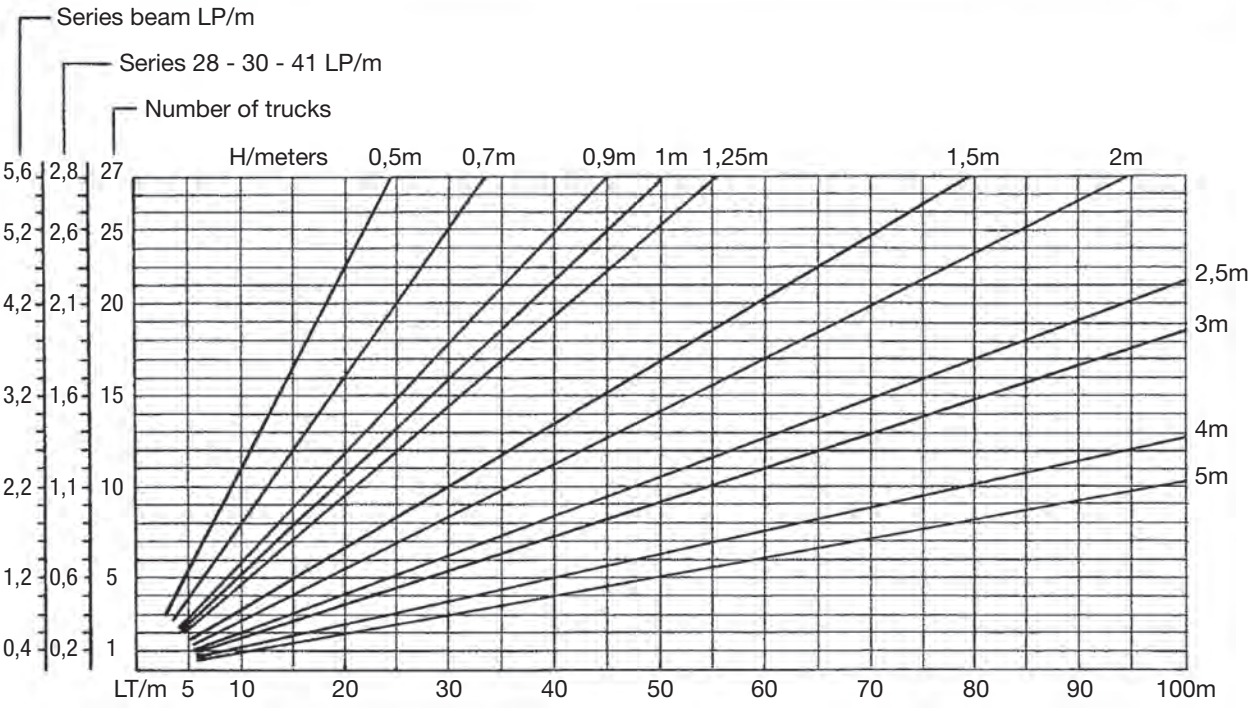
Supporting shelves 2 C-rails

- Material: galvanized steel
- Length: 500 mm

8.2.1 CP1 - CP2 FESTOON TYPE SERIES - STAINLESS STEEL AND ON BEAM - ASSEMBLY EXAMPLE

The diagram is used to determine the number of trucks necessary for the formation of the line, depending on its length. The height of the loop determines how many trucks are needed and thus their parking area. Where the parking area is too long at the expense of running real user, it must increase the height of the loops, thus decreasing the number of trucks required and therefore the parking area. To determine the cable length of a garland to increase by 10% the total length of the line and add enough to connect the two ends of the fixed and mobile users.





LT= Total length
H= Height

LP= Parking zone length
LC= Race length

8.3 ATOLLO® INSULATED CONTACT LINE

8.3.1 FEATURES

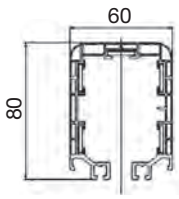
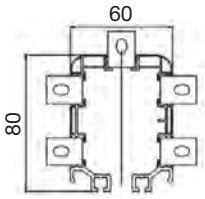
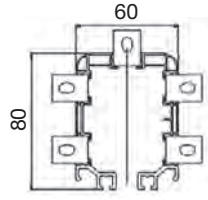
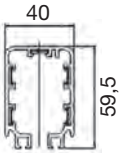
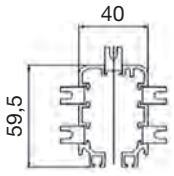
The insulated contact line **ATOLLO®** represents the best solution for the electrical feeding of cranes, hoists, bridge cranes, monorails, elevators, automated warehouses and several other mobile machine.
It is patented, and in conformance with CE standard and certificated by LOVAG.

The insulated contact line **ATOLLO®** differs from other feeding systems for its several advantages:

- **High safety:** it is in conformance with the most severe international standards for safety requested to the latest-state-of-the-art electrical feeding system: impact protection against accidental contacts is guaranteed. Moreover the earth conductor has been marked with the relevant symbol, printed on the PVC housing;
- **High solidity:** the insulating housing and all components are compact, strong and corrosion-resistant;
- **Versatility:** it is suitable for straight rails as well as curves. Ideal for all applications either indoor or outdoor;
- **Quick and easy installation:** thanks to the design and development of all components (joint box, sectioning and inspection points, support release hangers etc.) a quick and easy installation con be assured, even in critical conditions;
- **Maintenance free:** thanks to the careful study of alla components, the maintenance of the line is extremely reduced;
- **Minimal encumbrance:** the space necessary for the installation is particularly reduced;
- **Foreseen conductors:** up to 5.

8.3.2 AVAILABLE VERSIONS

The insulated contact line ATOLLO® is available in the following versions

Amperage (A)	**CONTINUOUS CONDUCTORS (line type C)** the housing and the relevant conductors are supplied separately.	**PRE-MOUNTED CONDUCTORS (line type P)** conductors have already been inserted in the housing before the shipment.
ATOLLO® 70 - 100 - 140 Ampere		
ATOLLO® 200 Ampere	- - - -	
MINI ATOLLO® 40 - 60 Ampere		

8.3.3 TECHNICAL SPECIFICATIONS

Operating voltage/frequency		600 V 5060 Hz
Insulating voltage IEC 60439/2		3750 V
Trolley travel speed	maximum admissible	250 m/1'
	tested	180 m/1'
Admissible environmental temperature at rated load		-30°C +40°C
Maximum admissible temperature for the housing		+60°C
Storing temperature for the housing		-30°C +60°C
Short time withstand current:		
Line MINI ATOLLO® 40 ÷ 60 A	complete with 20 A trolley	500A x 1s
Line ATOLLO® 70 ÷ 200 A	complete with 35 A trolley	800A x 1s
Line ATOLLO® 70 ÷ 200 A	complete with 70 A trolley	2000A X 1s
PROTECTION DEGREE IP:		
without closing strip (for installation of the line out of possible hand contact) tested according to CEI EN 60529 standard		IP 13
completed with closing strip (for installation of the line in zone with possible hand contact) tested according to CEI EN 60529 standard		IP 23
Self extinguishing CEI EN 60695-1 standard:	insulated housing and trolley	850 °C
	other accessories	650 °C
Distance between supports:	MINI ATOLLO® 40 ÷ 60 A	1,33 m MAX
	ATOLLO® 70 ÷ 200 A	2 m MAX

Amperage and sections

Amperage	Conductor section	Resistance a 20° C	Impedance a 50 Hz
A	mm^2	$\Omega/m\ 10^{-4}$	$\Omega/m\ 10^{-4}$
40	10	17,80	17,87
60	15	11,87	11,96
70	16	11,16	11,25
100	24	7,44	7,57
140	32	3,58	5,72
200	48	3,72	4

8.3.4 CALCULATION FOR VOLTAGE DROP

In case of very long lines, it is necessary to verify the voltage drop.
If the value is particularly high, more feeding points must be foreseen or as alternative, it's better to use a line with a higher voltage than the one previously foreseen.
For the calculation some data, such as motor power/ type, coefficient of utilisation and current (inverter, squirrel cage, slip ring motor etc.) are necessary. As soon as these data are known, the following formula helps verifying the voltage drop rate:

$$\Delta V_{\%} = \frac{\sqrt{3} \cdot I \cdot l \cdot (R \cdot cos\varphi + X \cdot sen\varphi)}{V} \cdot 100$$

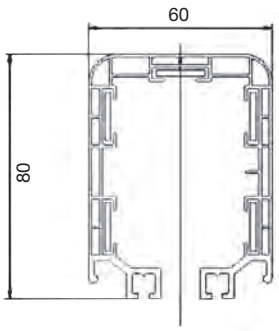
Where
- I: running current at the beginning
- l: line length (in case of end feeding point, it is equal to the total line length; on the other hand in case of intermediate feeding, this value is equal to the half total length of the line)
- R: line resistance
- X: line reactance
- $cos\varphi$: hypothetical value of the power coefficient (average 0.7-0.8)
- V: voltage

8.3.5 LINE TYPE C: CONTINUOUS CONDUCTORS

The contact conductors, cut according to the requested length, are inserted inside the housing as soon as it has been installed.
In this way an electrical line with continuous conductors has been realised with a considerable reduction of mounting time. This version guarantees also a minimum voltage drop as well as reduced wear and tear on the contact shoes.
Inside the housing, a nib has been foreseen in order to avoid a wrong insertion of the trolley.

LINE TYPE C:
INSULATED HOUSING WITH CONTINUOUS CONDUCTORS

L (m)	Conductors N°	Code		
		70 A	100 A	140 A
4	4	03.03244.91	03.03244.92	03.03244.93
	5	03.03245.91	03.03245.92	03.03245.93
2	4	03.03254.91	03.03254.92	03.03254.93
	5	03.03225.91	03.03225.92	03.03225.93

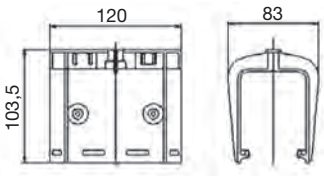


8.3.6 ATOLLO® PARTS COMPONENTS

All plastic components are made by insulating and self-extinguishing material.

JOINT BOX FOR HOUSING **LINE TYPE C**

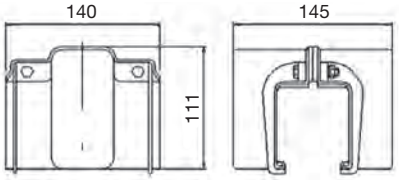
It serves to connect two sections of the insulated housing. The release application is very easy and can be carried out without screws and it's equipped with 4 nibs, which guarantee a safe fixing on the housing.



JOINT BOX FOR HOUSING **LINE TYPE C**

It serves to connect two sections of the insulated housing with joined conductors. Used in cases of extension of existing lines or with very long lines, where the conductor cannot be inserted in a single operation. Fixinf on the junction made with 2 screws and nuts M6.

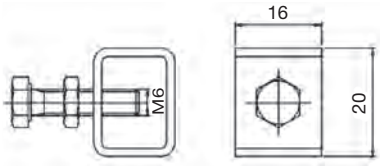
(to be used if conductor junctions are provided)



JOINT CLAMP

LINE TYPE C

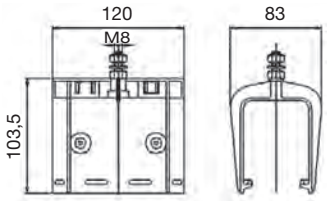
It serves for the junction of conductors in case of extension of existing lines or of lines particularly long, where the conductors cannot be inserted in a single operation.



JOINT BOX FOR FIXED POINT

LINE TYPE C

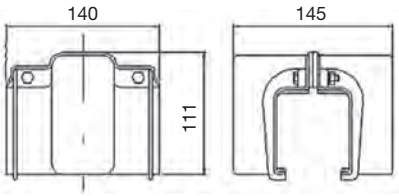
Applied on the joint point of two sections of housing and fixed to a support bracket in order to ensure the correct distribution of the expansion of the line.



JOINT BOX FOR HOUSING

LINE TYPE P

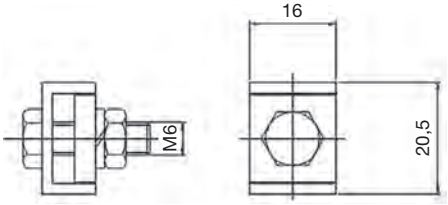
It serves to connect two sections of the housing in case of lines TYPE P (pre-mounted conductors).
Fixing on the junction made with 2 screws and nuts M6.



JOINT CLAMP

LINE TYPE P

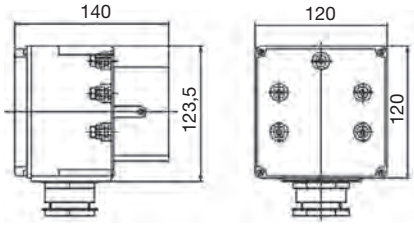
It is necessary in case of junction of the contact conductors for the lines TYPE P (pre-mounted conductors). It is mounted on the copper already prepared for the assembling.



END FEEDER BOX

LINE TYPE C

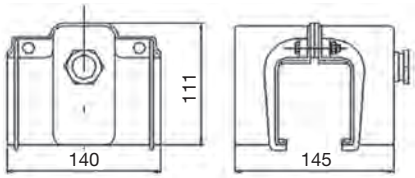
It is mounted at the end of the line. The removal of the back cover allows an easier installation.



LINE FEEDER BOX

LINE TYPE C/P

It can be mounted on each point of the line nearby the junction of 2 housing sections.



TERMINAL CONNECTOR FOR FEEDER CABLE

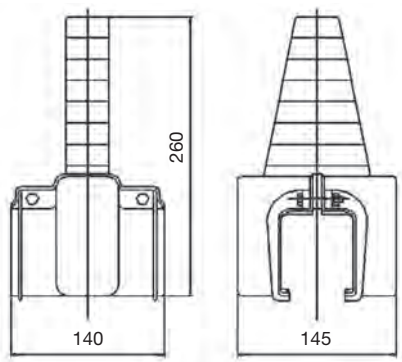
LINE TYPE C/P

Inserted in the joint clamp, it serves to connect the cable (max. section 10 mm^2) to the conductor, inside the line feeder box.

LINE FEEDER BOX FOR LINE WITH LOAD 200 A

LINE TYPE P

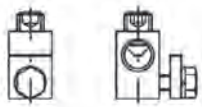
It can be mounted on each point of the line nearby the junction of 2 housing sections.



FEEDER CLAMPS FOR LINE WITH LOAD 200 A

LINE TYPE P

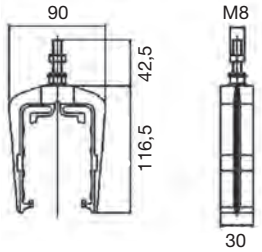
It serves to connect the cable (max. section 50 mm^2) to the conductor, inside the line feeder box 03.08017.99.



SUPPORT HANGER

LINE TYPE C/P

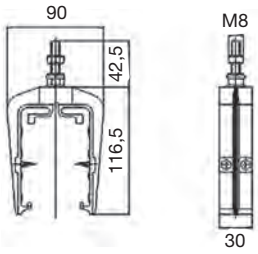
Necessary to support the insulating housing and fixed to the support brackets, it permits the creep of the insulating housing due to expansion. The installation distance between 2 contiguous hangers must be max. 2 m.



FIXED POINT HANGER

LINE TYPE C/P

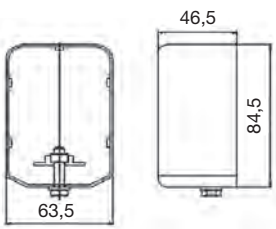
Locked to the housing through 2 lateral screws it serves to obtain a fixed point in order to ensure an even distribution of the expansion.



END CLOSURE BOX

LINE TYPE C/P

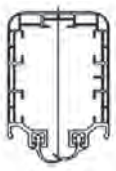
Fixed to the insulating housing, it serves to close the end of the line.



SIMPLE STRIP FOR CLOSURE

LINE TYPE C/P

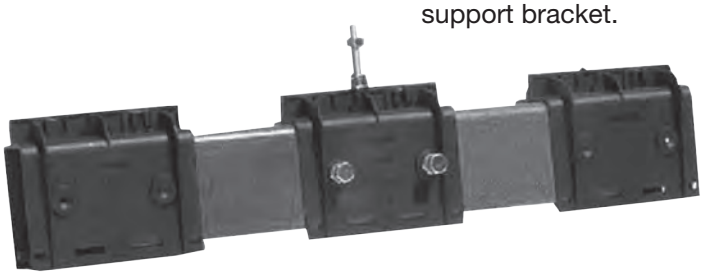
Two flexible sealing strips, passed through the side grooves of the housing, ensure an additional protection of the insulating housing of the contact line from IP 13 to IP 23.

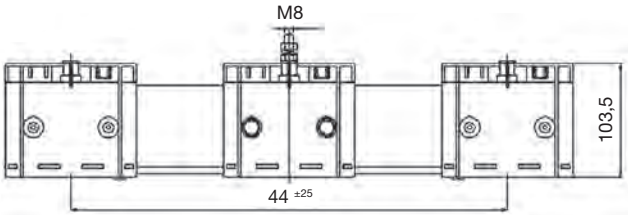


EXPANSION JOINT

LINE TYPE C

Used in case of lines particularly long to compensate the insulating housing expansion. Installed between 2 fixed points, it is necessary to foresee a further support bracket.

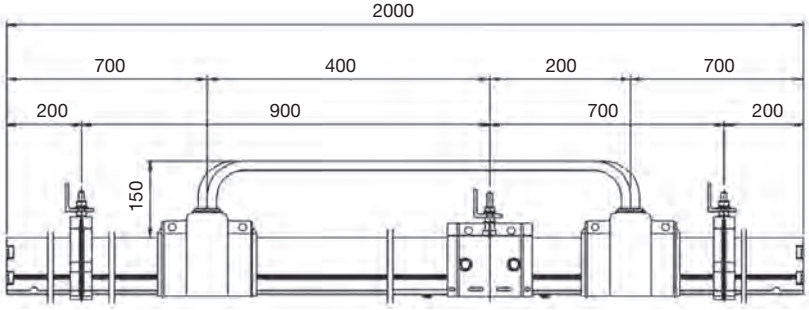




EXPANSION JOINT

LINE TYPE P

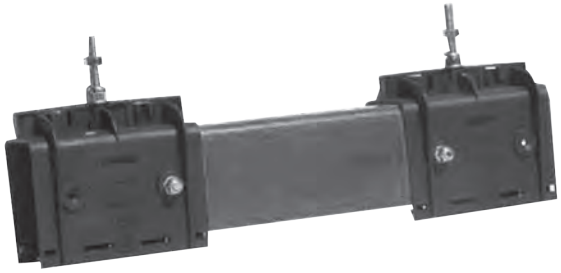
Used in particularly long lines to compensate the expansion of the insulating housing. Installed between 2 fixed points. It is necessary to foresee a further support bracket.

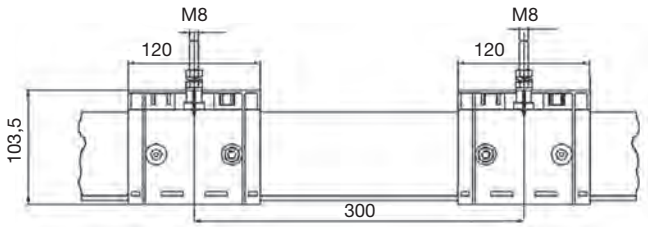


INSPECTION POINT

LINE TYPE C

It consists in a removable section of insulating housing, that allows the inspection and the eventual extraction of the collar trolley. For the installation, it's necessary to foresee 2 further support brackets.





ALIGNMENT PLATES

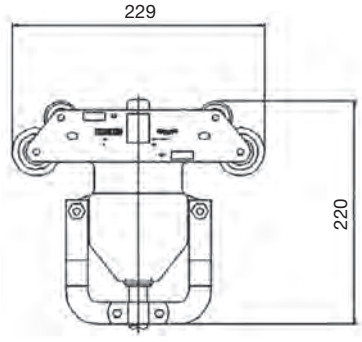
LINE TYPE C/P

Inserted in the side grooves of the housing, they ensure a perfect alignment nearby the junctions and an optimization of the current collector sliding.

CURRENT COLLECTOR TROLLEY WITH CONTACT SHOES 35 A

LINE TYPE C/P

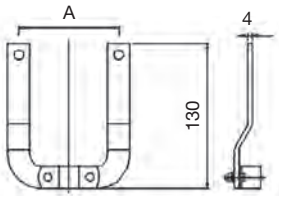
The body is completely insulated and the contact shoes are made of metal carbon. Equipped with 5 m cable and towing arm attachment (the towing arm code 03.08026.91 is not included).
Inside there is a terminal box, that can be easily reached for any eventual maintenance, without removing the current collector from the insulating housing.
In case of Amperage more than 35 A, a parallel connection with 2 or more collectors is necessary or, in alternative, a current collector trolley for higher amperages.



TOWING ARM ATTACHMENT

LINE TYPE C/P

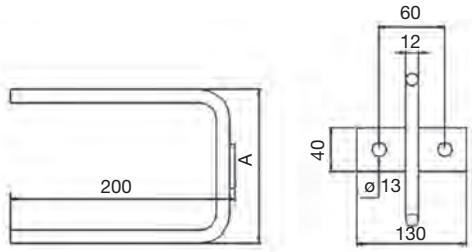
Fixed to the trolley, it allows the coupling with the towing arm.



TOWING ARM

LINE TYPE C/P

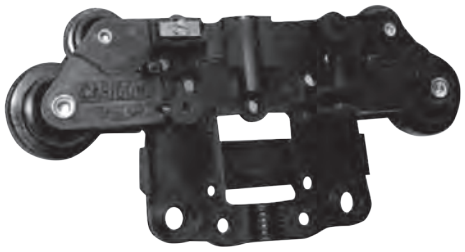
Fixed to the mobile machine it serves to tow the current collector trolley.

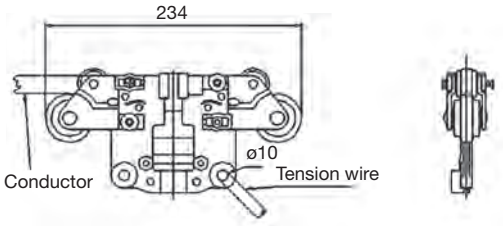


TROLLEY FOR THE INSERTION OF THE CONDUCTOR (Optional upon request)

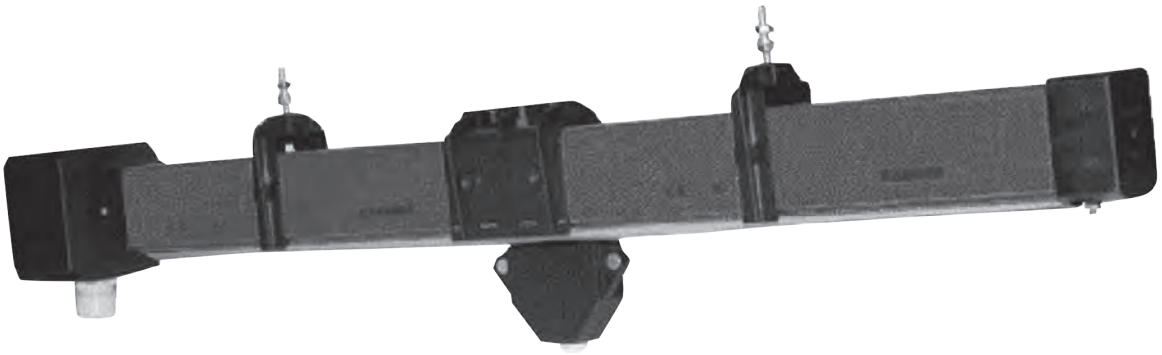
LINE TYPE C

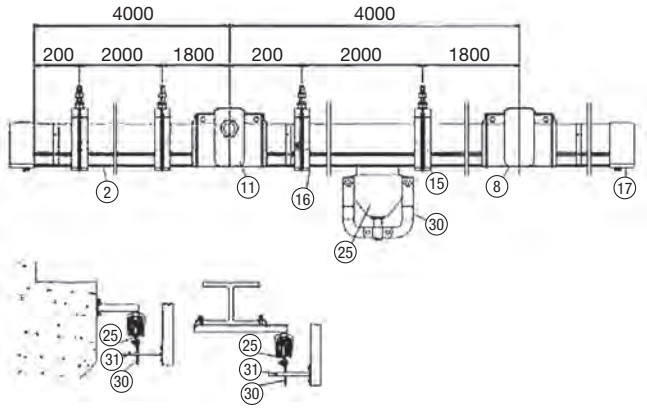
Through a tension wire it serves to slide easily the conductor into the insulating housing.

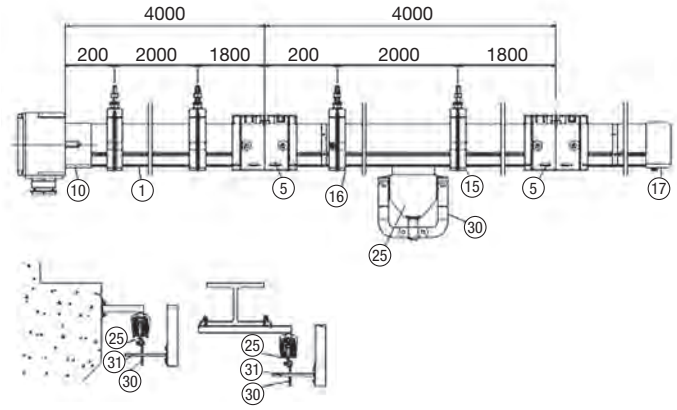




8.3.7 EXAMPLE OF A POSSIBLE INSTALLATION







② Insulating housing
⑧ Joint box
⑪ Feeding box
⑮ Support hanger
⑯ Fixed point hanger
⑰ End closure box
㉕ Current collector trolley
㉚ Towing arm attachment
㉛ Towing arm

① Insulating housing
⑤ Joint box
⑩ Feeding box
⑮ Support hanger
⑯ Fixed point hanger
⑰ End closure box
㉕ Current collector trolley
㉚ Towing arm attachment
㉛ Towing arm

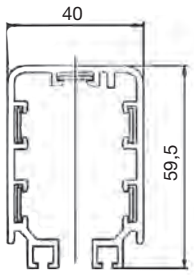
8.4 MINI ATOLLO® 40-60 AMPERE

8.4.1 LINE TYPE C: CONTINUOUS CONDUCTORS

The contact conductors, cut according to the requested length, are inserted inside the housing as soon as it has been installed.
In this way an electrical line with continuous conductors has been realised with a considerable reduction of mounting time. This version guarantees also a minimum voltage drop as well as a reduced wear and tear on the contact shoes.
Inside the housing, a nib has been foreseen in order to avoid a wrong insertion of the trolley.

LINE TYPE C:
INSULATED HOUSING WITH CONTINUOUS CONDUCTORS

L (m)	Conductors N°	Code	
		70 A	140 A
4	4	03.04044.90	03.04044.91
	5	03.04045.90	03.04045.91
2	4	03.04024.90	03.04024.91
	5	03.04025.90	03.04025.91

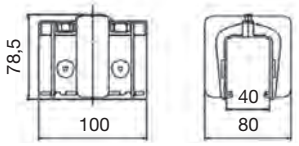


8.4.2 MINI ATOLLO® PARTS COMPONENTS

All plastic components are made by insulating and self-extinguishing material.

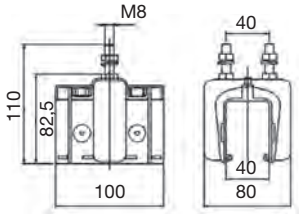
JOINT BOX FOR HOUSING — **LINE TYPE C**

It serves to connect two sections of the insulated housing. The release application is very easy and can be carried out without screws and it's equipped with 2 nibs, which guarantee a safe fixing on the housing.



JOINT BOX FOR FIXED POINT — **LINE TYPE C**

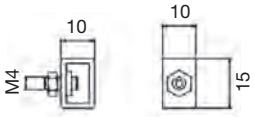
It serves to connect two sections of insulating housing. Fixed to the support bracket to ensure an even distribution of the expansion.



JOINT CLAMP

LINE TYPE C

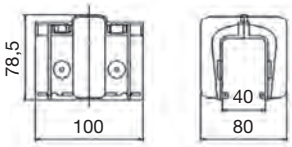
Used for the connection of conductors in case of extension of existing lines or of lines particularly long, where the conductor cannot be inserted in one operation.



JOINT BOX FOR HOUSING

LINE TYPE P

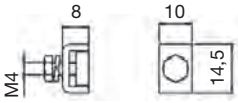
It serves to connect two sections of the insulating housing in case of line TYPE P (pre-mounted conductors)



JOINT CLAMP

LINE TYPE P

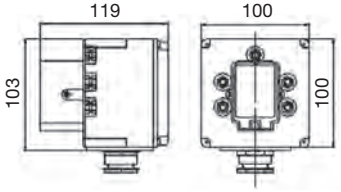
It serves to join the contact conductors in case of line TYPE P (pre-mounted conductors). It is inserted in the copper, which has already been prepared for the assembling.



END FEEDER BOX

LINE TYPE C

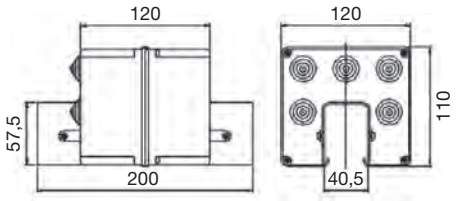
It is mopunted at the end of the line. The removal of the back cover allows an easier installation.



LINE FEEDER BOX

LINE TYPE C/P

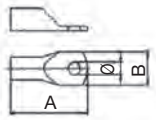
It can be mounted on each point of the line nearby the junction of 2 housing sections.



TERMINAL CONNECTOR FOR FEEDER CABLE

LINE TYPE C/P

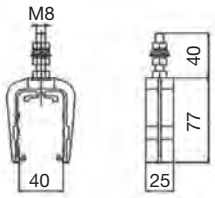
Inserted in the joint clamp, it serves to connect the cable to the conductor, inside the line feeder box.



SUPPORT HANGER

LINE TYPE C/P

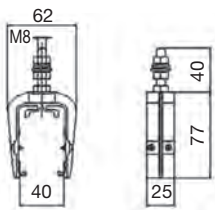
It permits the creep of the insulating housing due to expansion. The installation distance between two support hangers must be max. 1,33 m.



FIXED POINT HANGER

LINE TYPE C/P

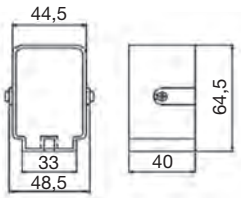
Locked to the housing with two lateral screws, it serves to obtain a fixed point so to ensure an even distribution of the expansion.



END CLOSURE BOX

LINE TYPE C/P

It serves to close the end of the line and is fixed to the insulating housing.



SIMPLE STRIP FOR CLOSURE

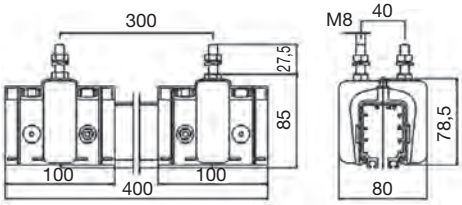
LINE TYPE C/P

Two flexible sealing strips, passed through the side grooves of the housing, will give an additional protection of the contact line from IP 13 to IP 23.

INSPECTION POINT

LINE TYPE C

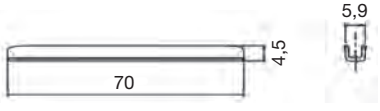
It consists in a removable housing section, which allows the inspection and the eventual removal of the collector trolley. For the mounting 2 further support brackets must be foreseen.



ALIGNMENT PLATES

LINE TYPE C/P

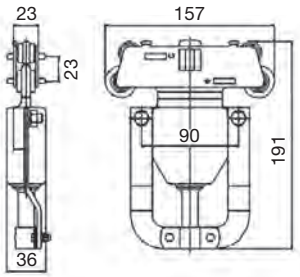
Inserted in the side grooves of the housing, they ensure a perfect alignment nearby the junctions and an optimization of the current collector sliding.



CURRENT COLLECTOR TROLLEY WITH CONTACT SHOES 25 A

LINE TYPE C/P

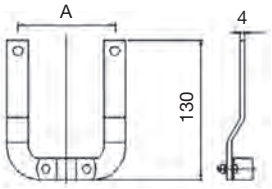
The body is completely insulated and the contact shoes are made of metal carbon. Equipped with 5 m. cable and towing arm attachment (the towing arm code 03.08026.90 is not included).
Inside there is a terminal box, that can be easily reached for any eventual maintenance, without removing the current collector from the insulating housing.
In case of Amperage more than 25 A, a parallel connection with 2 or more collectors is necessary or, as alternative, a current collector trolley for higher amperages.



TOWING ARM ATTACHMENT

LINE TYPE C/P

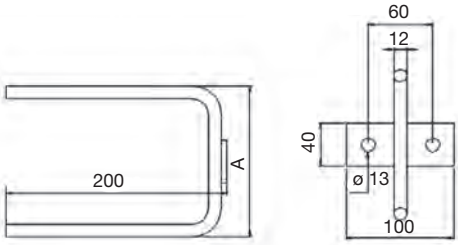
Fixed to the trolley, it allows the coupling with the towing arm.



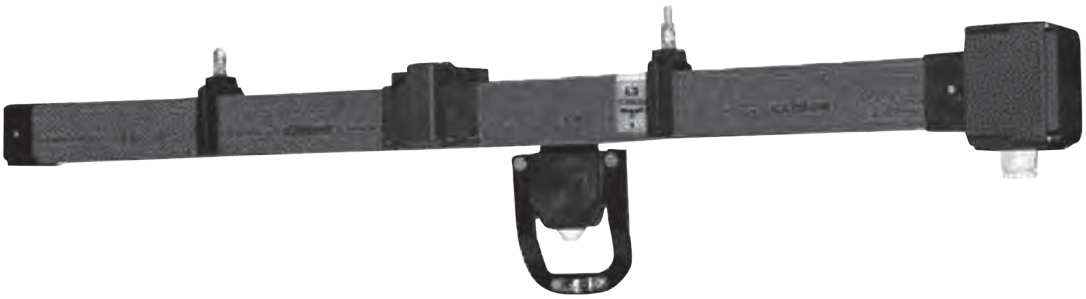
TOWING ARM

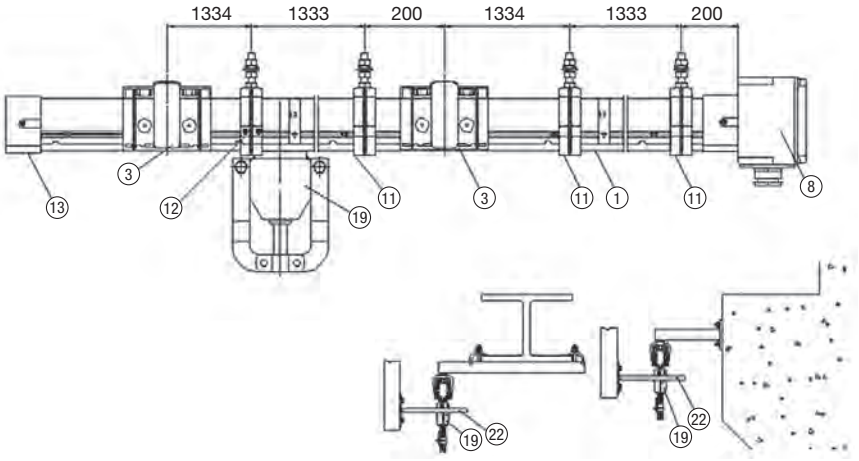
LINE TYPE C/P

Fixed to the mobile machine it serves to tow the current collector trolley.



8.4.3 EXAMPLE OF POSSIBLE INSTALLATION





① Insulating housing
③ Joint box
⑧ Feeding box
⑪ Support hanger
⑫ Fixed point hanger
⑬ End closure box
⑲ Current collector trolley
㉒ Towing arm

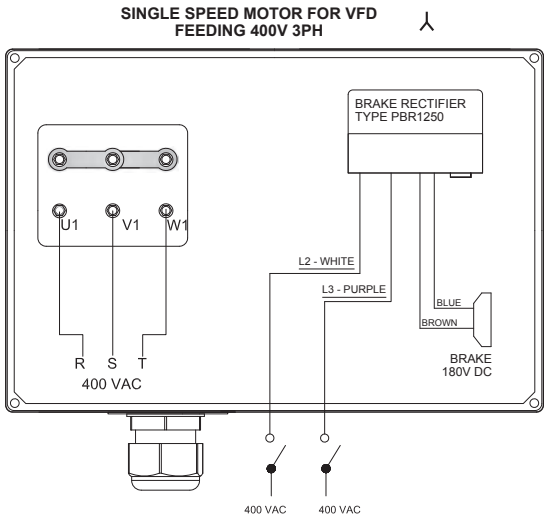
9. WIRING DIAGRAMS

LONG TRAVEL MOTOR DATAS POWER

Table 8.1

Motor		Rated nominal current (A)	"aM" type protection fuses accompanying the motor
N° of poles	Power kW	400 VA	400 VA
2	0,25	0,7	2
2	0,37	1,1	2
2	0,55	1,4	2
2	0,75	1,9	4
2	1,10	2,6	4
2	1,50	3,5	7
2	2,20	5,0	10
2/8	0,24 / 0,06	0,8 / 0,8	2
2/8	0,30 / 0,075	1,2 / 1,2	2
2/8	0,55 / 0,13	1,9 / 1,4	4
2/8	0,75 / 0,18	2,0 / 1,8	4
2/8	1,1 / 0,25	2,7 / 2,4	4
2/8	1,5 / 0,37	3,4 / 4,5	8
2/8	2,2 / 0,55	4,0 / 5,1	8

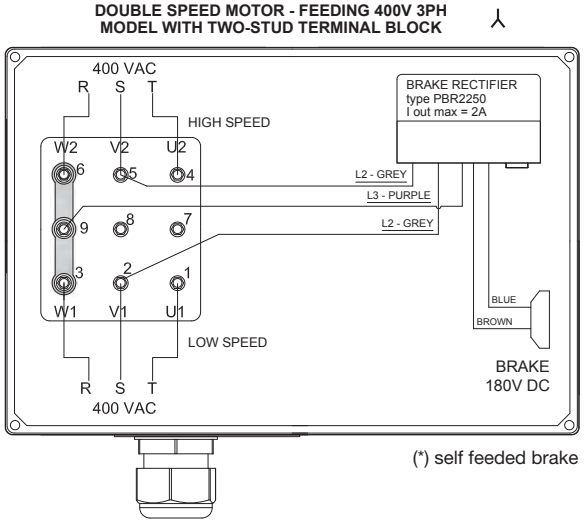
WIRING DIAGRAM LONG TRAVEL MOTOR FOR VFD



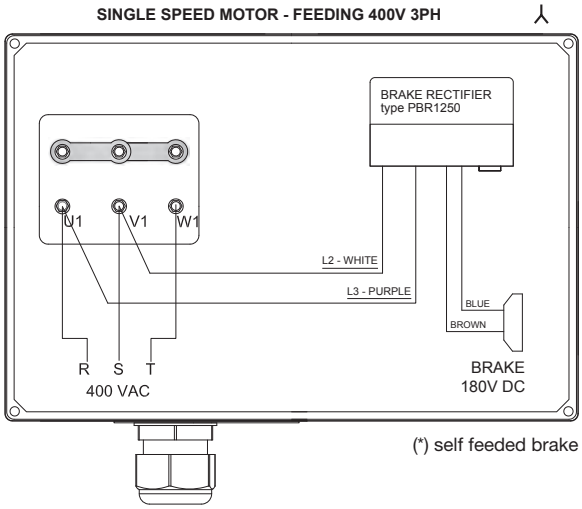
Separated brake feeding 400VAC monophase
Brake 180V DC

WIRING DIAGRAM LONG TRAVEL MOTOR 1 OR 2 SPEEDS T MODEL

Star connection 人 400 VAC - Brake 180V DC

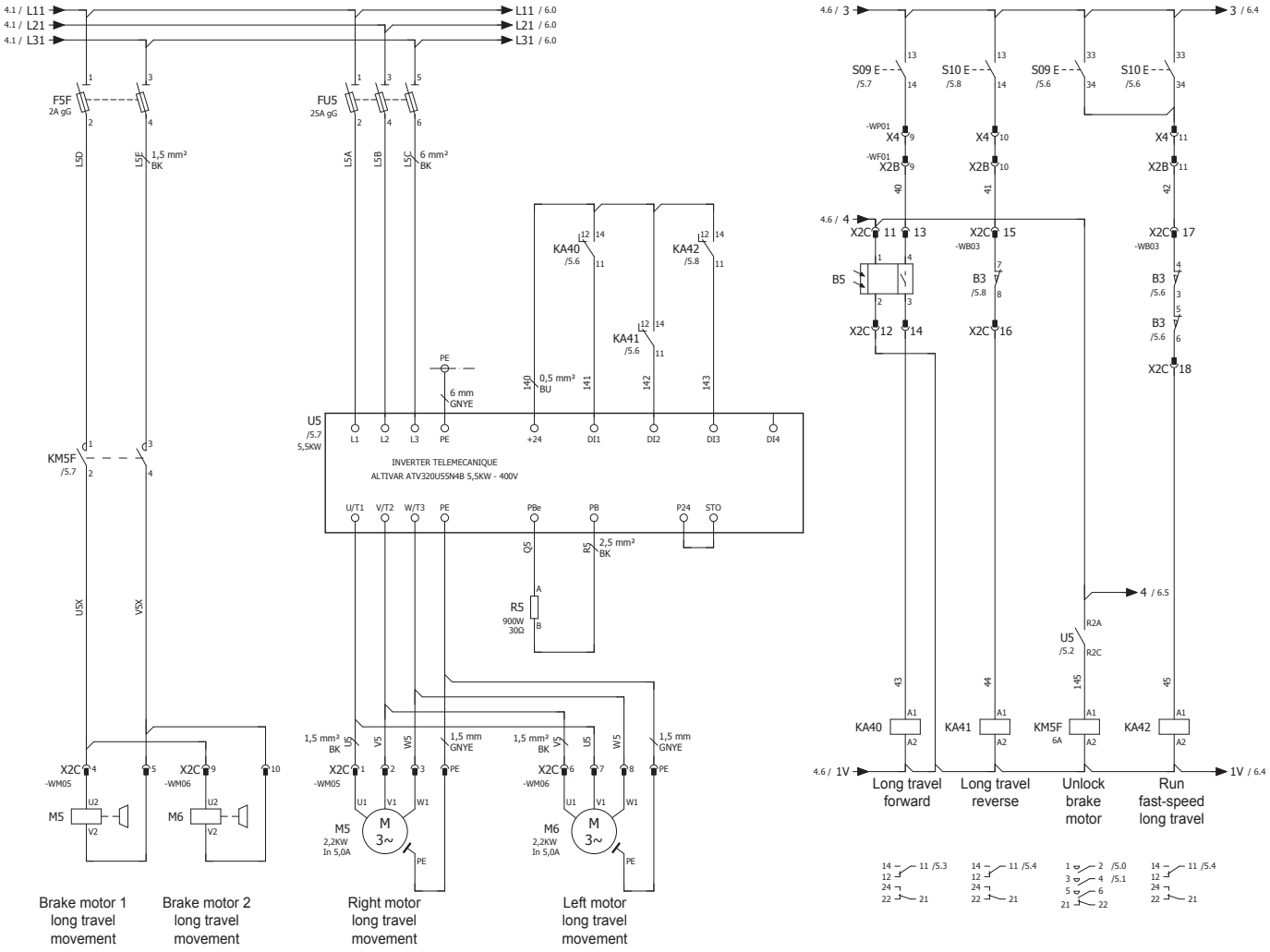


(*) self feeded brake

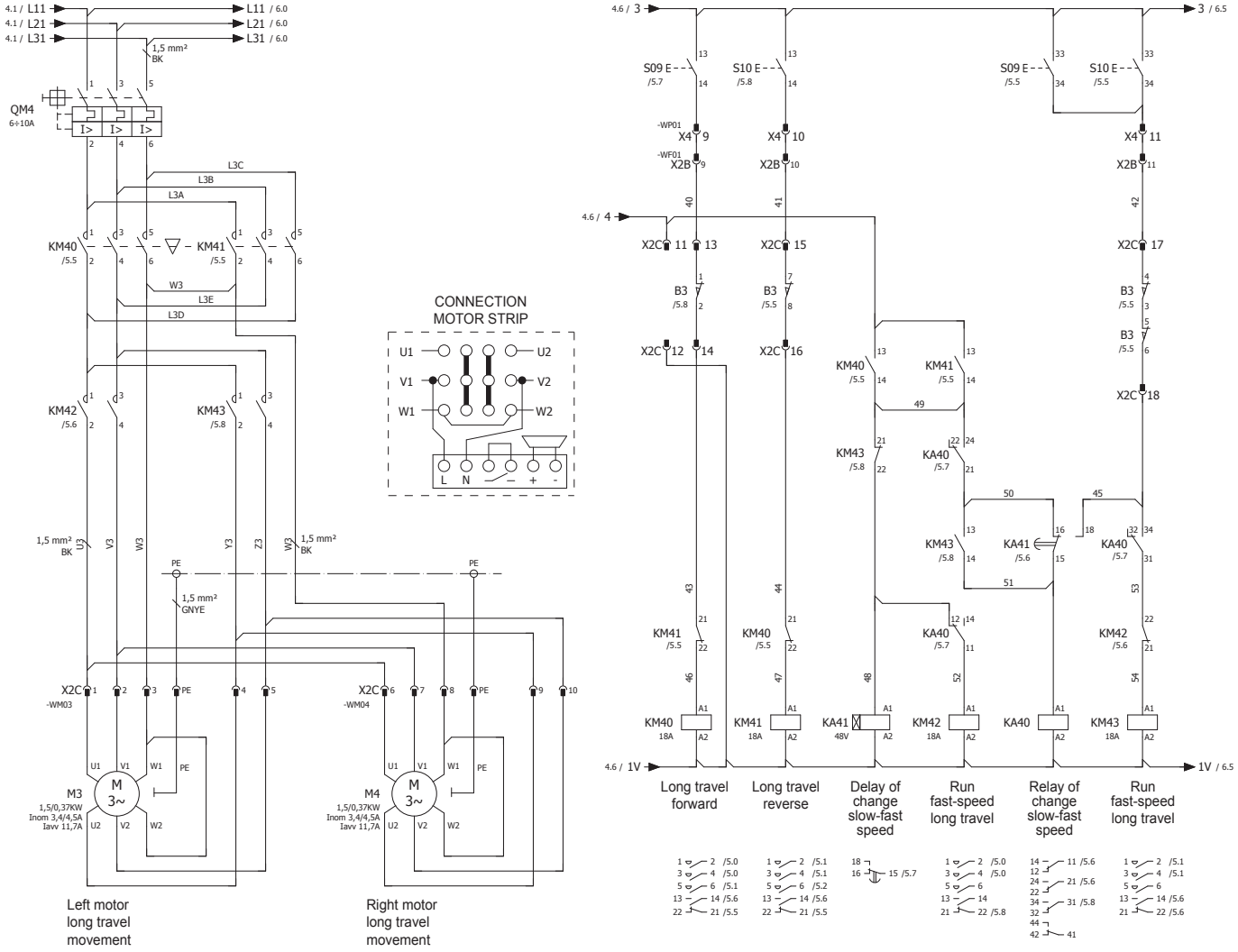


(*) self feeded brake

WIRING CONNECTION EXAMPLE BY VFD



WIRING CONNECTION EXAMPLE DOUBLE SPEED MOTORS



NOTES

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