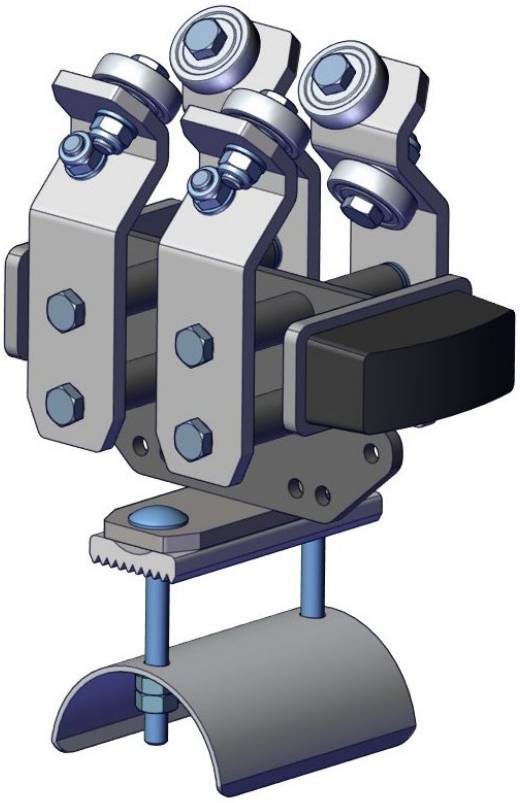
Operating Instructions

Festoon Systems for Square Bar Rails for potentially explosive atmospheres

Program 0270EX/0280EX



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1 General Information

1.1 Information about these operating instructions

These operating instructions enable safe and efficient use of the festoon system (Program 0270EX/0280EX).

The operating instructions are a part of the festoon system and must be kept accessible to personnel at all times in the immediate vicinity of the festoon system. Personnel must read these instructions carefully and understand them before starting any work. Compliance with all safety and handling instructions provided in these operating instructions is a basic requirement for safe work.

Local accident protection regulations and general safety guidelines for the area of application of the festoon system also apply.

Illustrations are provided for basic understanding and may deviate from the actual implementation of the festoon system.

In addition to these operating instructions, the instructions located in the appendices for the individual assembled components also apply.

1.2 Limitation of liability

All data and information in these operating instructions have been compiled while taking the valid standards and regulations as well as the state of the art and our many years of experience and knowledge into consideration.

The manufacturer accepts no liability for damage resulting from:
- Failure to comply with the operating instructions
- Unintended use
- Use by untrained personnel
- Unauthorized modifications
- Technical changes
- Use of unauthorized replacement parts or accessories

The actual scope of delivery may differ from the explanations and descriptions provided here if the model in question is a special one, if additional equipment has been ordered or due to recent technical changes.

The obligations agreed upon in the Delivery Agreement and our General Terms and Conditions of Business apply, as do the delivery conditions of the manufacturer and the legal regulations applicable at the time the contract was concluded.

All products are subject to technical changes within the context of improvement of function and further development.

1.3 Copyright

1.4 Replacement parts

WARNING!

Incorrect replacement parts are a safety hazard!

Incorrect or faulty replacement parts can impair safety and result in damage, malfunctions or complete failure.

→ Always use original replacement parts from the manufacturer!

Order replacement parts from your contracted dealer or directly from the manufacturer. See the last page of these operating instructions for the address.

1.5 Material defects

The terms governing material defects can be found in the General Terms and Conditions of Business.

1.6 Technical support

Our Customer Support staff is available for technical support. See the last page of these operating instructions for contact information.

We are also always interested in new information, experiences and feedback from the field that can help us improve our products.

2 Safety Instructions

2.1 Explanation of symbols

Safety and hazard information is identified in these operator instructions using symbols. Safety instructions are introduced by signal words that indicate the degree of the hazard. Always observe safety and hazard instructions and work carefully to avoid accidents, bodily injury and damage to property!


DANGER!

... indicates an immediately hazardous situation, which if not avoided, may result in death or serious injury.


DANGER!

... indicates an immediately hazardous situation due to electricity, which if not avoided, may result in death or serious injury.


WARNING!

... indicates a possibly hazardous situation, which if not avoided, may result in death or serious injury.


WARNING!

… indicates a potential fire risk if not avoided.


WARNING!

… indicates a potential explosion if not avoided.


WARNING!

... indicates a possibly hazardous situation due to electricity, which if not avoided, may result in death or serious injury.


CAUTION!

... indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury.


CAUTION!

... indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury.

Tips and recommendations:

... refers to useful tips and recommendations as well as information for efficient and trouble-free operation.


ATTENTION!

... indicates actions that will help you prevent material damage.

2.2 Personnel requirements

2.2.1 Qualifications

WARNING!

Inadequately trained persons are at risk of injury!

Unintended use can result in serious injury to persons and property.

→ All activities must only be performed by qualified personnel!

The following qualificationa for the various levels of activities are indicated in these operating instructions:

- **Trained personnel/operator**
  have been instructed by the operator regarding the tasks assigned to them and the possible dangers due to improper behavior.
- **Specialist personnel**
  consists of persons capable of performing assigned tasks and independently identifying and avoiding potential hazards based on their specialist training, knowledge and experience as well as their understanding of the applicable regulations.
- Only persons who can be expected to perform their work reliably are acceptable personnel. People whose reactions are impaired by drugs, alcohol or medications, for example, are not authorized.
- When selecting personnel, all age- and occupation-specific regulations applicable at the place of use must be observed.

2.2.2 Unauthorized persons

WARNING!

Hazard due to unauthorized persons!

Unauthorized personnel who do not meet the requirements described here are not acquainted with the dangers in the work area.

→ Keep unauthorized personnel away from the work area
→ In case of doubt, address such persons and direct them away from the work area
→ Stop working as long as unauthorized personnel are in the work area

2.2.3 Training

Before commissioning, personnel must be trained by the operator. For better traceability, log the implementation of the training as follows

Date	Name	Type of training	Training provided by	Signature

Fig. 1: Training log example

2.3 Personal protective equipment

Always to be worn	During all work
	**Protective headgear** For protection against falling or flying parts and materials.
	**Protective gloves** For the protection of hands against friction, scrapes, puncture or deeper wounds, as well as against contact with hot surfaces.
	**Protective clothing** Primarily for protection against entrapment by moving machine parts. Work clothing must be close fitting with a low resistance to tearing; it must have close-fitting sleeves and no protruding parts.
	**Protective footwear** For protection against heavy falling parts and slipping on slippery floors.
To be worn for special work	**Specific protective equipment is required when executing special work. Separate reference to this is made in the individual sections.**
	**Protective eyewear** For eye protection against harmful influences such as strong light, chemicals, dust, splinters or weather effects.
	**Hearing protection** For protection against loud noises and to prevent acoustic trauma.
	**Protective breathing mask (FFP-3 — in accordance with country-specific requirements)** For protection against materials, particles, and organisms. In this case, for protection against the dust produced by the abrasion of carbon brushes and the PVC insulation of the conductor rail.

2.4 Intended use

The festoon system is exclusively designed and built for the intended use described here.
The Festoon System Program 0270EX/0280EX and its components are used exclusively for the installation and operation of an electrical energy supply for track-based mobile consumers such as cranes and lifting gear in industrial applications in potentially explosive atmospheres Zones 1 and 21 (see Overview).
Other applications are only permitted with the written approval of Conductix-Wampfler.

Area of application for Conductix-Wampfler Festoon Systems Program 0270EX/0280EX

Mines susceptible to fire-damp:

No categorization into zones	-	**WARNING! Application not permitted**

Other potentially explosive atmospheres – Gas

Zone 0	Potentially explosive atmosphere occurs continuously, for long periods of time or frequently.	**WARNING! Application not permitted**
Zone 1	Potentially explosive atmosphere occurs occasionally.	**Application permitted**
Zone 2	A potentially explosive atmosphere occurs rarely or for a short period of time.	**Application permitted**

Other potentially explosive atmospheres – Dust

Zone 20	Potentially explosive atmosphere occurs continuously, for long periods of time or frequently.	**WARNING! Application not permitted**
Zone 21	Potentially explosive atmosphere occurs occasionally.	**Application permitted**
Zone 22	A potentially explosive atmosphere occurs rarely or for a short period of time.	**Application permitted**

Note: The zone definition comes from ATEX 137 on explosion protection (Directive 99/92/EC)

Labeling for gas acceptance testing on the end clamp nameplate:

h IIB T4 Gb X

Letter "h":	Indicates non-electrical equipment.
Gas group IIB:	The equipment is suitable for use in gas atmospheres with a minimum ignition energy ≥ 0.02 mJ.
Temperature class T4:	The equipment is suitable for use in gas atmospheres with a minimum ignition temperature of ≥ 135° C. At the same time, the manufacturer guarantees that the temperatures of the surfaces that can come into contact with the potentially explosive atmosphere do not exceed 130° C when the equipment is in operation.
Equipment protection level Gb (Gas):	Specific types of protection were used that take ignition sources into account that can occur in normal operation and in the event of expected malfunctions.
Additional identifiers X:	Special ambient temperatures must be observed (the standard defines a temperature range of -20° C to +40° C as standard).

Labeling for gas acceptance testing on the end clamp nameplate:

h IIIC T135° C Db X

Letter "h":	Indicates non-electrical equipment.
Dust group IIIC:	The equipment is suitable for use in atmospheres with conductive dust.
Maximum surface temperature T135° C:	The equipment is suitable for use in gas atmospheres with a minimum ignition temperature of ≥ 135° C. At the same time, the manufacturer guarantees that the temperatures of the surfaces that can come into contact with the potentially explosive atmosphere do not exceed 135° C when the equipment is in operation.
Equipment protection level Db (Dust):	Specific types of protection were used that take ignition sources into account that can occur in normal operation and in the event of expected malfunctions.
Additional identifiers X:	Special ambient temperatures must be observed (the standard defines a temperature range of -20° C to +40° C as standard).

WARNING!

Hazard due to unintended use!

Any application that deviates from or goes beyond the intended use of the festoon system can result in a hazardous situation.

Only use the festoon system for its intended use.

→ Strictly follow all information in these operating instructions
→ Refrain from the following uses of the festoon system

Unintended use particularly includes the following:

→ Use of the festoon system with accessories not permitted and not authorized by the manufacturer
→ Operation of the festoon system by untrained personnel
→ Operation of the festoon system without its being installed on a proper foundation/base
→ Exceedance of rated load-bearing capacities
→ Exceedance of projected speeds
→ Excessive acceleration
→ Use of unsuitable cables

Change in atmospheric conditions (spatial changes to the planned installation site)

Claims of any kind due to damage resulting from unintended use are excluded.

The operator bears sole liability for all damage that results from unintended use.

2.4.1 Unintended use

Unintended use particularly includes the following forms of use:

- Exceedance of projected loads
- Exceedance of projected speeds
- Higher accelerations than projected
- Use of unsuitable cables
- Change in atmospheric conditions (spatial changes to the planned installation site)
- Overloading of electrical components
- Bridging and/or disconnection of electrical sensors or switches
- Use of technically unsuitable guide systems (such as dimensionally inaccurate or corroded track beams, poorly aligned beam joints, etc.)
- Presence of projecting edges at an insufficient clearance on the crane structure surrounding the cable trolley

2.5 Protective measures to be taken by the operator/user

The festoon system is to be used in an industrial setting. The operator of the festoon system is thus subject to legal requirements related to workplace safety. In addition to the safety guidelines in these installation and operating instructions, the safety, accident protection and environmental protection regulations applicable to the area of application of the festoon system must be followed. Therefore, the following particularly applies:

- The operator must ensure that the festoon system will only be used for its intended purpose.
- The operator must be informed of applicable workplace safety regulations and carry out a risk assessment to detect additional dangers resulting from the specific working conditions in the place of operation of the festoon system. This must be implemented in the form of operating instructions for the operation of the festoon system.
- For the entire time of use of the festoon system, the operator must check whether the operating instructions prepared correspond to the current state of regulations and update the operating instructions as needed.
- The operator must clearly manage and define responsibilities for installation, operation, troubleshooting and maintenance.
- The operator must ensure that all employees involved with the festoon system have read and understood these operating instructions. In addition, the operator must also train the personnel at regular intervals and inform them of the dangers.
- The operator must provide personnel with the necessary protective equipment.

Furthermore, the operator is responsible for ensuring that the festoon system is always in a technically perfect condition. The following therefore applies:

- The operator must ensure that the maintenance intervals described in these operating instructions are observed.

- The operator must have all safety systems regularly inspected for functionality and completeness.

The operator must observe the following ordinances, directives and regulations when operating the festoon system:

BetrSichV	German Ordinance on Industrial Safety and Health
GefStoffV	German Ordinance on Hazardous Substances
Directive 1999/92/EC	ATEX 137 on explosion protection
German Social Accident Insurance Rule 113-001	Explosion protection rules

2.6 Special hazards

The following section lists residual risks determined on the basis of a risk assessment.

- Follow the safety instructions listed here and the warnings in other sections of these operating instructions in order to reduce health hazards and avoid dangerous situations.

WARNING!

Risk of death due to suspended loads!

When lifting loads, there is a risk of death due to parts falling or swinging out of control.

- → Never walk under suspended loads
- → Only move loads under supervision
- → Observe the specifications for the attachment points provided
- → Do not fasten to protruding machine parts or eyes on attached components Ensure that lashing components are properly seated
- → Use only authorized lifting gear and lashing components with sufficient load capacity
- → Do not use torn or worn ropes and belts
- → Do not attach ropes or straps at sharp corners and edges and do not knot or twist them
- → Set loads down when leaving the workplace

WARNING!

Risk of injury due to moving components!

Incautious handling of the festoon system can lead to severe injury or damage to the festoon system.

- → Ensure that the festoon system cannot start on its own
- → While it is moving, do not reach into moving parts, particularly the interface between the buffer and buffer plate
- → Block off the danger zone under the system

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

- → The system engineer/operator must ensure that no projecting contours near the festoon system are able to damage the cables
- → Regularly check cables for wear
- → Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!
- → Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws
- → Provide electrical protection measures in accordance with the regulations for the system

WARNING!

Fire hazard!

Fire hazard if undersized cables are used!

- → Do not overload cables
- → The required cable cross-sections must be observed
- → System engineers must design the dimensioning and protective electrical devices in accordance with the permissible load capacity of the cables.
- → Connections may only be made by specialist electricians

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

→ When walking in the work areas and danger zones, be careful of projections and depressions in the floor. Loose objects must not be left on the floor

CAUTION!

Risk of crushing!

With the complete installation of the festoon system, there is a risk of crushing extremities between load carriers and track profiles.

When moving the festoon system, there is a risk of crushing extremities between the buffer and buffer plate, as well as between the carriage and track profiles.

→ Do not enter the danger zone of the festoon system when the system is moving or during installation

DANGER!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

→ Do not enter the danger zone of the festoon system when the system is moving

2.6.1 Special hazards when used in potentially explosive atmospheres

The following section names residual risks that were determined on the basis of an ignition risk assessment in accordance with DIN EN 15198:2007.

- Follow the safety instructions listed here and the warnings in other sections of these operating instructions in order to reduce health hazards and avoid dangerous situations.

WARNING!

Risk of explosion due to inadequate grounding!

The ball bearings of the rollers can have an electrically insulating effect due to the lubricating grease.

Due to the effects of friction inside the rollers, the cable trolley can become electrostatically charged with respect to the running rail during operation.

Equipotential bonding is affixed between two cable trolleys. In addition, the running rail is grounded.

→ Install equipotential bonding in accordance with the specifications in these operating instructions

→ Before commissioning, check that the equipotential bonding has been correctly installed

WARNING!

Risk of explosion due to exceedance of the permissible operating speed!

The ATEX festoon systems from Conductix-Wampfler are designed in accordance with DIN EN ISO 80079-36 for a maximum operating speed of **1 m/s**.

If this speed limitation is exceeded, explosion protection **no longer** exists!

→ Do not exceed the speed limitation of 1 m/s when operating the system

WARNING!

Risk of explosion due to unapproved equipment attachments!

Equipment attachments to be mounted by the client, such as terminal boxes on control trolleys and control converters, must be suitable for use in the respective Ex zone. The system engineer/operator are responsible for the suitable selection.

→ Only mount suitable equipment attachments

→ When selecting the equipment attachments, take the specific conditions into account (zone, potentially explosive atmosphere, ambient temperature ...)

WARNING!

Risk of explosion if unsuitable cables are used for ATEX festoon systems!

When equipping the system with cables, the requirements of DIN EN 60079-14 must be observed.

The cables must have an outer sheath made of the following materials:

- → Heavy polychloroprene or other equivalent synthetic elastomer
- → Heavy rubber hoses or connecting cables with an equally robust composition

Do not use PVC cables!

Each unused core cable in multi-core cables must either be connected to grounding at the end or be adequately insulated by means of suitable termination.

WARNING!

Risk of explosion when cleaning the cables, rubber buffers and clamping pieces!

When cleaning the cables, rubber buffers and clamping pieces, these can become electrostatically charged and therefore become a potential source of ignition.

- → Only clean cables, rubber buffers and clamping pieces with a damp cloth
- → Only clean cables, rubber buffers and clamping pieces if no potentially explosive atmosphere is present

WARNING!

Risk of explosion due to incorrect clamping of the cables!

If the clamping of the cables is not sufficiently affixed, the cables can become electrostatically charged due to friction during operation of the system and therefore become a potential source of ignition.

- → Clamp the cables in accordance with the specifications in these operating instructions
- → Check that the cables are clamped before commissioning and after maintenance work

WARNING!

Risk of explosion due to undersized cables!

If the cable has been incorrectly laid and the limit of the permissible transmittable current is exceeded, the cable will heat up and the sheath may be damaged. Hot, exposed wires are a potential source of ignition.

- → In the course of commissioning the system, whether the cable cross-sections meet the requirements must be checked

WARNING!

Risk of explosion due to manual operation!

When operating the festoon system manually, friction sparks can arise from pulling/pushing too hard or pulling/pushing from the wrong direction.

→ Fundamentally, careful operation of the system must be ensured when operating the system manually

→ Manual operation of the system is prohibited in the presence of a potentially explosive atmosphere

WARNING!

Risk of explosion due to spark formation during installation or service work!

The use of metallic tools during installation or service work can create mechanical sparks which can ignite potentially explosive atmospheres.

→ Conducting installation and service work is prohibited in the presence of a potentially explosive atmosphere

→ Further safety information can be found in TRBS 1112 Part 1 (Explosion hazards during and due to service work – Assessment and protective measures)

WARNING!

Risk of explosion due to incorrect connection of cables!

If the cables are not laid in the middle and the moment equilibrium is not maintained, the cable trolley will run at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Lay the cables in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect installation of the running rail!

If the cross arm is incorrectly installed and the rail is suspended at an angle as a result, the cable trolleys move at an angle on the rail due to the weight. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the cross arms and running rails in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect installation of the towing arms!

If the towing arm is incorrectly installed, this can lead to the towing trolley moving at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the towing arm in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect cable trolley arrangement!

Always arrange trolleys so that there is at least one rubber buffer between 2 adjacent trolleys.

WARNING!

Risk of explosion due to dust layers!

If dust layers are deposited on hot surfaces, the dust can ignite at temperatures that are below the minimum ignition temperature of the dust.

→ If dust layers are present, the limitation of the maximum surface temperature according to DIN EN 60079-14 (Section 5.6.3.3) must be taken into account

2.6.2 Conduct in the event of accidents and malfunctions

Measures in the event of accidents:

- Secure the location of the accident
- Take first-aid measures
- Remove persons from the danger zone
- Inform responsible persons on the operation site
- Alert the rescue services
- Make access available to rescue vehicles

Measures in the event of malfunctions:

- Secure the work area against entry
- Consult qualified personnel when analyzing the fault
- Involve authorized personnel for service and repair
- Shut down the system and secure it against unauthorized, unintentional and/or erroneous activation
- If injury to persons or property occurs during a fault incident, Conductix-Wampfler must be informed immediately

3 Technical Data

3.1 General information

Specification	Value	Notes
Max. load capacity	25 to 36 kg	Depending on the festoon program selected
Max. travel speed	60 m/min.	According to DIN EN ISO 80079-36, Sections 6.4.2 and 6.4.3

3.2 Interfaces

- **Mechanical:**
  Track installation (Conductix-Wampfler) with supporting framework (Operator)
  Ideal control trolley (Conductix-Wampfler) for control box (Operator)

- **Electrical:**
  Cables (Conductix-Wampfler) to cable connector on end clamp side (Operator)
  Cables (Conductix-Wampfler) to cable connector on drive link side (Operator)

- **Delineation of responsibilities for assemblies/components:**
  The main assemblies and components are manufactured and supplied by Conductix-Wampfler.
  Purchased parts such as cable screw connectors, terminal boxes and cables from other suppliers are used and partly installed by the operators themselves. Suitable selection is the responsibility of the system engineer/operator.

- **Delineation of responsibilities for work in setup, installation and commissioning:**
  Unless otherwise agreed, the setup, final installation, and commissioningare the responsibility of the system engineer/operator.

3.3 Operating conditions

Environment:

For use in enclosed areas, open areas under cover and outdoors. However, whether ATEX zones can occur in open spaces and outdoors is questionable.

Specification	Value	Notes
Max. temperature range	-20° to +50° C	
Relative humidity	20% to 80%	

Note: No corrosive environment

4 Product Description and Functional Principle

4.1 Festoon system overview

The following image is a model illustration. Deviations, depending on the design, are possible. Please observe the order-specific documentation.

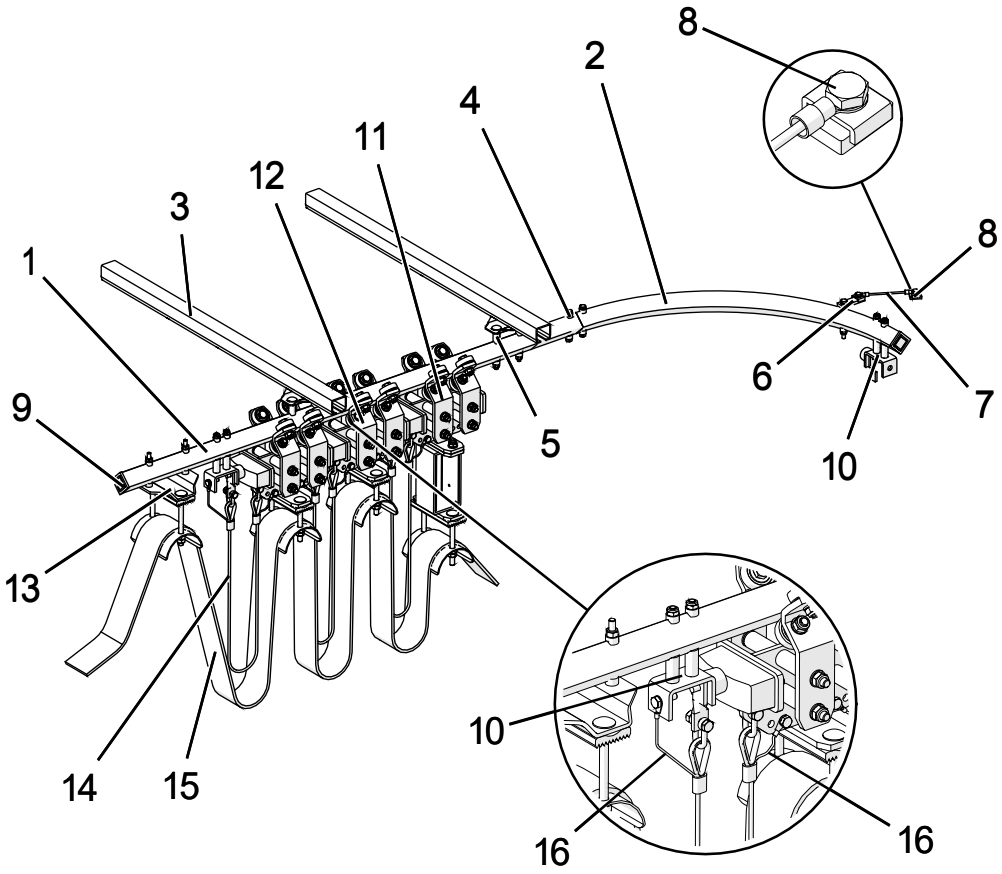


Fig. 2: Overview of festoon system with towing trolley

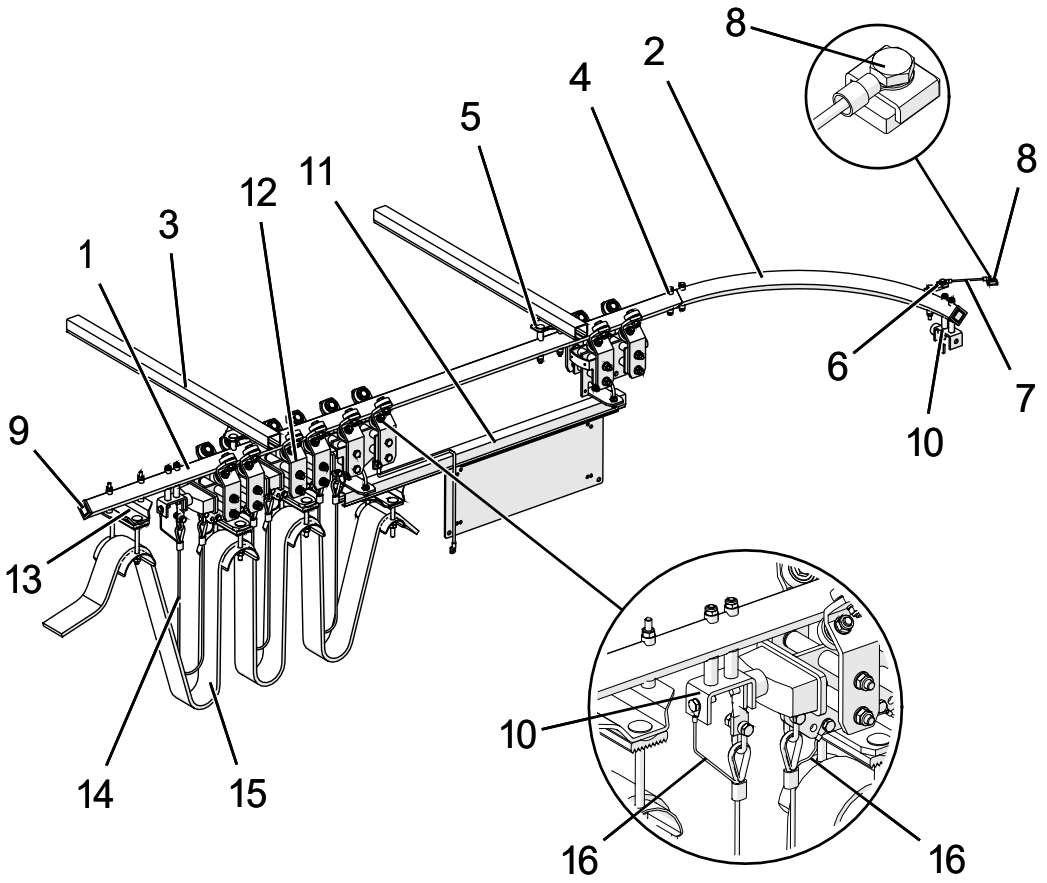


Fig. 3: Overview of festoon system with moving controllers

Pos.	Name	Piece	Comment
1	Square bar rail		Quantity depends on the system design
2	Rail bend		Quantity depends on the system design
3	Cross arm		Quantity depends on the system design
4	Rail connector		Quantity depends on the system design
5	Hanger clamp		Quantity depends on the system design
6	Ground terminal clamp	1	
7	Protective conductor	1	
8	Protective conductor connection	1	
9	End cap	2	
10	End stop	2	
11	Towing trolley EX/control trolley upper part EX	1	
12	Cable trolley EX		Quantity depends on the system design
13	End clamp EX	1	
14	Towing rope/equipotential bonding		Quantity depends on the system design
15	Cable		Quantity depends on the system design
16	Additional steel rope	2	Two pieces per towing rope

ATTENTION!

Use only cables suitable for festoon systems!

→ Double insulation

→ Flexible design for frequent alternating bending stress

→ Robust outer sheaths

→ Use cables suitable for the application and ambient conditions

WARNING!

Risk of explosion if unsuitable cables are used for ATEX festoon systems!

When equipping the system with cables, the requirements of DIN EN 60079-14 must be observed.

The cables must have an outer sheath made of the following materials:

→ Heavy polychloroprene or other equivalent synthetic elastomer

→ Heavy rubber hoses or connecting cables with an equally robust composition

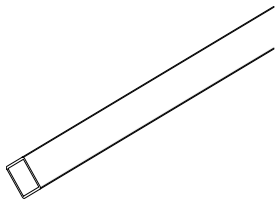
Do not use PVC cables!

Each unused core cable in multi-core cables must either be connected to the grounding at the end or be adequately insulated by means of suitable termination.

4.2 Brief description

A festoon system consists of square bar rail, rail fastening material, end clamps, cable trolleys, towing trolleys and cables. The towing trolley is coupled to the mobile consumer by a towing arm. The towing trolley pulls and/or pushes the following cable trolley.
The design with moving controllers also has a separate running rail parallel to the hosting device track. The system is controlled using a control button (not included in delivery) coupled to the control trolley.
Towing ropes are mounted as standard in the ATEX product lines of the festoon systems. Modified towing ropes are used here, which also provide equipotential bonding between the towing trolley, cable trolley and running rail.
The dimensions of the festoon system are to be taken from the project-specific dimension sheet.

4.3 Description of assemblies

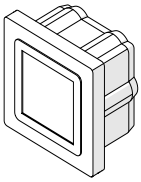


- Square bar rail

Fig. 4: Square bar rail

- Rail bend

Fig. 5: Rail bend



- End cap

Fig. 6: End cap

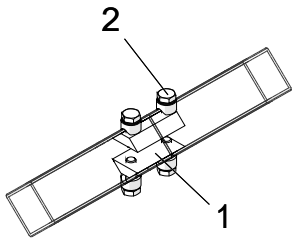


Fig. 7: Rail connector

- Rail connector, consisting of:
  1) Rail connector
  2) Locking screw

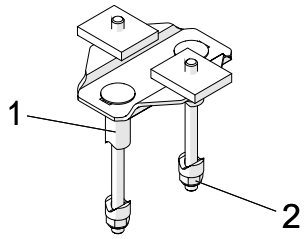


Fig. 8: Hanger clamp

- Hanger clamp, consisting of:
  1) Hanger clamp
  2) Locking screw

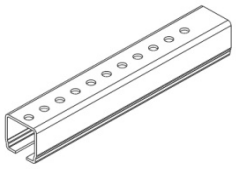


Fig. 9: Cross arm

- Cross arm

Fig. 10: Clamping bracket

- Clamping bracket
  For fastening the cross arms to the support structure

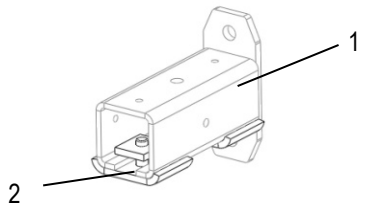


Fig. 11: Bracket for cross arms

- Bracket for cross arms, consisting of:
  1) Bracket
  2) Clamping piece

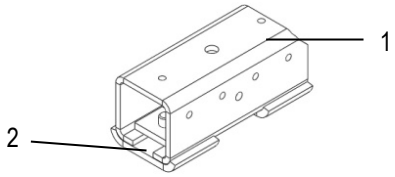


Fig. 12: Weld bracket for cross arms

- Weld bracket for cross arms, consisting of:
  1) Bracket
  2) Clamping piece

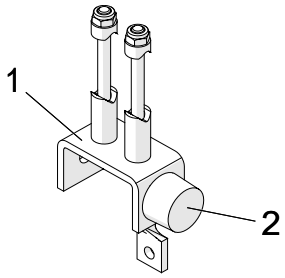


Fig. 13: End stop

- End stop, consisting of:
  1) End stop
  2) Rubber buffer

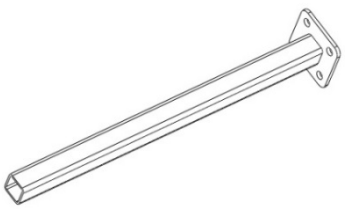


Fig. 14: Towing arm

- Towing arm

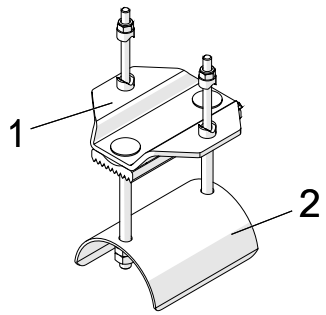


Fig. 15: End clamp

- End clamp, consisting of:
  1) End clamp, top part
  2) Support assembly

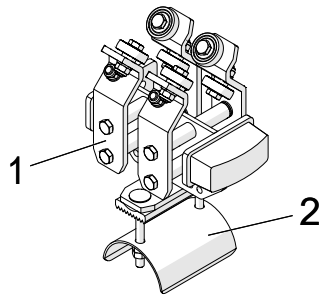


Fig. 16: Cable trolley

- Cable trolley, consisting of:
  1) Cable trolley, upper part
  2) Support assembly

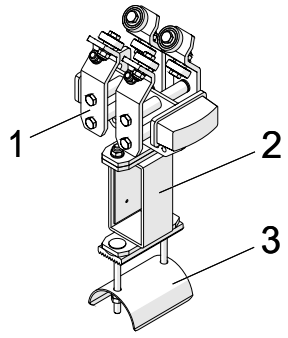
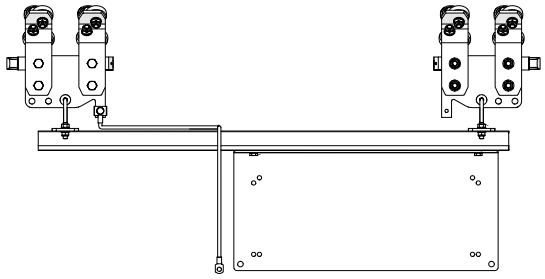


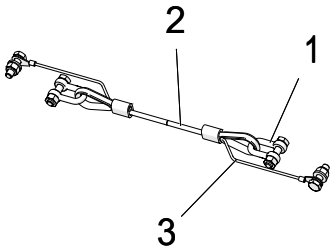
Fig. 17: Towing trolley

- Towing trolley, consisting of:
  1) Cable trolley, upper part
  2) Tow tube
  3) Support assembly



- Ideal control trolley, consisting of:
  1) Control trolley, upper part
  2) Plug connector (or terminal box)
  3) End clamp for strain relief
  4) Cable screw connectors
  5) Housing

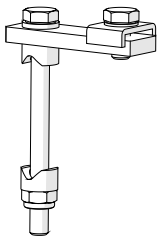
Fig. 18: Ideal control trolley with plug connector



- Towing rope/equipotential bonding, consisting of:
  1) Shackle
  2) Steel rope
  3) Additional steel rope including angled cable lug

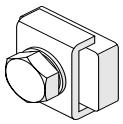
Fig. 19: Towing rope/equipotential bonding

When “equipotential bonding” is referred to in the following, the additional steel rope of the towing rope is meant. Since the towing rope and the equipotential bonding represent a module, the complete module must be replaced if there is a lack of equipotential bonding.



- Ground terminal clamp

Fig. 20: Ground terminal clamp



- Protective conductor connection

Fig. 21: Protective conductor connection

- Protective conductor

Fig. 22: Protective conductor

4.4 Work areas and danger zones

The following figure illustrates the festoon system work area. There is a risk of injury due to moving parts in this area.

The following figure is a basic representation of an ATEX festoon system. Deviations, depending on the design, are possible. Please observe the order-specific documentation.

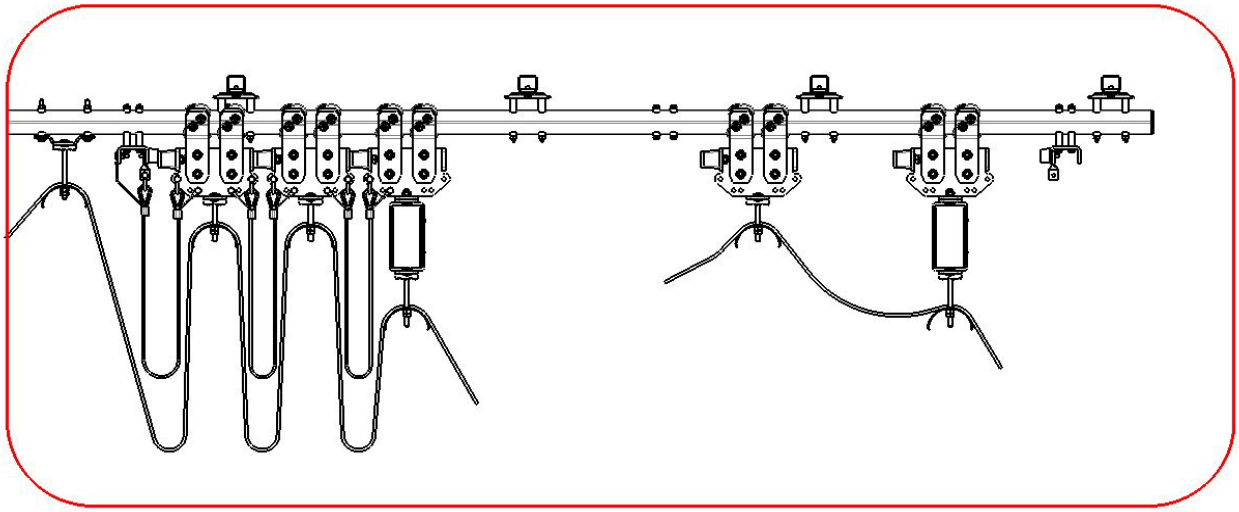


Fig. 23: Work area and danger zone

Work areas and danger zones:

- In the area under the festoon system
- Between cable trolleys
- Between cable trolleys and track rails
- Between load carriers and track rails
- In the vicinity of the cables

WARNING!

Risk of injury due to moving components!

Contact with the festoon system during operation can lead to severe injuries and damage to the festoon system.

→ During automatic operation, no one may be located in or under the work area of the festoon system
→ In manual operation, ensure that no one is in or under the work area of the festoon system
→ Block off the danger zone under the system

4.5 Modes of Operation

The festoon system can be operated in one of two modes

- Automatic operation
- Manual operation

4.5.1 Automatic operation

The standard operating mode is automatic operation, in which the festoon system is operated via the consumer's controller. In this mode, no person may be in or under the work area of the festoon system. The customer must block off the work area.

4.5.2 Manual operation

Manual operation is used for commissioning, maintenance and repair. It may be necessary to make adjustments directly at the festoon system and monitor them.

Note: Observe the safety instructions for manual operation of the ATEX festoon systems!

5 Transport, Packaging and Storage

5.1 Transport

5.1.1 Safety instructions for transport

WARNING!

Risk of death due to suspended loads!

When lifting loads, there is a risk of death due to parts falling or swinging out of control.

- → Never walk under suspended loads
- → Block off the danger zone under the system
- → Observe the specifications for the attachment points provided
- → Do not fasten to protruding machine parts or eyes on attached components Ensure that lashing components are properly seated
- → Use only authorized lifting gear and lashing components with sufficient load capacity
- → Do not use torn or worn ropes and belts
- → Do not attach ropes or straps at sharp corners and edges and do not knot or twist them

CAUTION!

Damage due to improper transport!

Improper transport can result in substantial property damage.

- → Act with care when unloading packaged parts upon delivery as well as during internal transport, and observe the symbols and the hazard information on the packaging
- → Only use the attachment points provided
- → Only remove packaging shortly before installation

CAUTION!

Risk of crushing!

There is a risk of crushing hands and feet when handling components during transport.

- → Secure the load during transport
- → Use appropriate means of transport (lifting gear)
- → Use personal protective equipment (protective gloves, protective headgear, protective footwear)

DANGER!

Risk of injury due to falling objects!

There is a risk due to falling objects in case of improper use (incorrect assembly, misuse, lack of maintenance).

→ Secure the load adequately during transport
→ Check the integrity of the packaging before transport
→ Use appropriate means of transport (lifting gear)
→ When packaging, ensure that the packing has the appropriate load-bearing capacity
→ Use personal protective equipment (protective gloves, protective headgear, protective footwear)

5.1.2 Transport inspection

Immediately upon receipt, check the delivery for completeness and transport damage.
In case of externally visible damage, proceed as follows:

- Do not accept delivery, or accept it only with reservations
- Note the scope of damage on the transport documents or on the transporter's delivery note
- File a complaint

ATTENTION!

File a complaint on each defect as soon as it is detected. Damage compensation claims may only be made within the applicable claim periods.

5.2 Packaging

The individual packages are packed appropriately for the expected transportation conditions. We have exclusively used environmentally sound packing material.
The packaging has the function of protecting the individual components against transport damage, corrosion and other damage until they are installed. Hence, do not destroy the packaging; remove it only shortly before installation.

Handling packaging materials:

Dispose of packaging material in accordance with applicable legal regulations and local guidelines.

CAUTION!

Environmental damage due to improper disposal!

Packaging materials are valuable resources and can be reused or usefully processed or recycled in many cases.

→ Dispose of packaging materials in an environmentally appropriate manner
→ Comply with locally applicable disposal guidelines; if necessary, engage a specialist to handle disposal

5.3 Storage of packaged parts

Store packaged parts under the following conditions:

- Do not store outdoors
- Store in a dry, dust-free place
- Do not expose to aggressive media
- Protect from direct sunlight
- Avoid mechanical vibrations
- Storage temperature: +5 to +50° C
- Relative humidity: Max. 50%
- In case of a storage time of more than 3 months, check the general condition of all parts at regular intervals. If necessary, refresh or replace the preservative.

ATTENTION!

In some cases, there may be instructions for storage on the packed parts that go beyond the requirements listed here. Comply with them accordingly.

6 Installation and Commissioning

6.1 Safety

Personnel:

- Installation and commissioning may only be conducted by specially trained technicians.

Wear the following protective equipment during all installation and commissioning work:

- Protective clothing
- Protective headgear
- Protective footwear
- Protective gloves

WARNING!

Risk of death due to suspended loads!

When lifting loads, there is a risk of death due to parts falling or swinging out of control.

→ Never walk under suspended loads
→ Block off the danger zone under the system
→ Only move loads under supervision
→ Observe the specifications for the attachment points provided
→ Do not fasten to protruding machine parts or eyes on attached components Ensure that lashing components are properly seated
→ Use only authorized lifting gear and lashing components with sufficient load capacity
→ Do not use torn or worn ropes and belts
→ Do not attach ropes or straps at sharp corners and edges and do not knot or twist them
→ Set loads down when leaving the workplace

WARNING!

Risk of injury due to improper installation and commissioning!

Improper installation and commissioning can result in serious injury to person and property.

→ Before starting work, ensure there is sufficient space for the installation
→ Handle open, sharp-edged components carefully
→ Ensure that the installation area is clean and tidy! Loosely stacked or scattered components and tools can cause accidents
→ Install components properly Comply with the prescribed screw tightening torques
→ Secure components so they cannot fall or topple

DANGER!

Risk of injury due to sharp edges!

The ends of the rail profiles can have sharp edges, particularly if they were cut to size at the installation site and not deburred.

→ Use personal protective equipment (protective gloves, protective headgear, protective footwear)

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

→ The system engineer/operator must ensure that no projecting contours near the festoon system are able to damage the cables
→ Regularly check cables for wear
→ Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!
→ Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws
→ Provide electrical protection measures in accordance with the regulations for the system

DANGER!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

→ Do not enter the danger zone of the festoon system when the system is moving
→ The customer must block off the danger zone of the system
→ Before starting work, shut down the system and secure it against accidental start

DANGER!

Risk of injury due to falling objects!

There is a risk due to falling objects in case of improper use (incorrect assembly, lack of attention).

→ Block off a generous area underneath the system!
→ Keep the time specialist installers spend in the danger zone to a minimum
→ Wear protective headgear!

CAUTION!

Risk of injury due to slipping and falling!

There is a risk of injury due to a dangerous environment or difficult installation conditions. For example, near cranes, in difficult-to-access locations, etc.

→ Use personal protective equipment (protective gloves, protective headgear, protective footwear)
→ Keep the location tidy
→ Only use secure scaffolding
→ Take appropriate safety measures

WARNING!

Unsafe operation of the system!

System components fail due to installation errors!

- → Do not stay in the danger zone under the system
- → Comply with the maximum load and speed limitations
- → After completing the installation, perform a test run of the system only at very low speed
- → Check the system in accordance with the maintenance plan and perform regular maintenance

6.2 Safety instructions for use in potentially explosive atmospheres

WARNING!

Risk of explosion due to unapproved equipment attachments!

Equipment attachments to be mounted by the client, such as terminal boxes on control trolleys and control converters, must be suitable for use in the respective Ex zone. The system engineer/operator are responsible for the suitable selection.

→ Only mount suitable equipment attachments
→ When selecting the equipment attachments, take the specific conditions into account (zone, potentially explosive atmosphere, ambient temperature ...)

WARNING!

Risk of explosion if unsuitable cables are used for ATEX festoon systems!

When equipping the system with cables, the requirements of DIN EN 60079-14 must be observed.

The cables must have an outer sheath made of the following materials:

→ Heavy polychloroprene or other equivalent synthetic elastomer
→ Heavy rubber hoses or connecting cables with an equally robust composition

Do not use PVC cables!

Each unused core cable in multi-core cables must either be connected to the grounding at the end or be adequately insulated by means of suitable termination.

WARNING!

Risk of explosion due to incorrect clamping of the cables!

If the clamping of the cables is not sufficiently affixed, the cables can become electrostatically charged due to friction during operation of the system and therefore become a potential source of ignition.

→ Clamp the cables in accordance with the specifications in these operating instructions
→ Check that the cables are clamped before commissioning and after maintenance work

WARNING!

Risk of explosion due to undersized cables!

If the cable has been incorrectly laid and the limit of the permissible transmittable current is exceeded, the cable will heat up and the sheath may be damaged. Hot, exposed wires are a potential source of ignition.

→ In the course of commissioning the system, whether the cable cross-sections meet the requirements must be checked

WARNING!

Risk of explosion due to incorrect cable trolley arrangement!

Always arrange trolleys so that there is at least one rubber buffer between 2 adjacent trolleys.

WARNING!

Risk of explosion due to manual operation!

When operating the festoon system manually, friction sparks can arise from pulling/pushing too hard or pulling/pushing from the wrong direction.

→ Fundamentally, careful operation of the system must be ensured when operating the system manually

→ Manual operation of the system is prohibited in the presence of a potentially explosive atmosphere

WARNING!

Risk of explosion due to spark formation during installation or service work!

The use of metallic tools during installation or service work can create mechanical sparks that can ignite potentially explosive atmospheres.

→ Conducting installation and service work is prohibited in the presence of a potentially explosive atmosphere

→ Further safety information can be found in TRBS 1112 Part 1 (Explosion hazards during and due to service work – Assessment and protective measures)

WARNING!

Risk of explosion due to incorrect connection of cables!

If the cables are not laid in the middle and the moment equilibrium is not maintained, the cable trolley will run at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Lay the cables in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect installation of the running rail!

If the cross arm is incorrectly installed and the rail is suspended at an angle as a result, the cable trolleys move at an angle on the rail due to the weight. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the cross arms and running rails in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect installation of the towing arms!

If the towing arm is incorrectly installed, this can lead to the towing trolley moving at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the towing arm in accordance with the specifications in these operating instructions

6.3 Preparation

Required tools:

- Drill
- Drilling jig
- Metal drill
- Open-end wrench
- Corrosion protection
- Lubricant
- Calipers

6.4 Installation

Personnel:

- May only be conducted by trained technicians
- Min. 2 persons

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

→ When walking in the work areas and danger zones, be careful of projections and depressions in the floor. Loose objects must not be left on the floor

CAUTION!

Risk of crushing!

With the complete installation of the festoon system, there is a risk of crushing extremities between load carriers and track profiles.

When moving the festoon system, there is a risk of crushing extremities between the buffer and buffer plate, as well as between the carriage and track profiles.

→ Do not enter the danger zone of the festoon system when the system is moving or during installation

6.4.1 Installing the track rails

6.4.1.1 General information

ATTENTION!

→ Before installing the square bar rails, the rail segments and any rail bends must be dimensioned to fit the track layout. There is a rail connector at each rail joint.

→ Observe the hanger spacing in the specifications within the product catalog for each system. On curves, the distance is reduced to 2/3 of the distance on straight rails. Please see the system documentation for the recommended hanger spacing.

6.4.1.2 Drill the rail for the connector, hanger clamp, end clamp, end stop and ground terminal clamp

ATTENTION!

→ A drilling jig is used to drill holes for the rail connectors, hanger clamps, end clamp, end stop and ground terminal clamp to the rail.

→ For Program 0270EX; drill bit Ø6.5 mm

→ For Program 0280EX; drill bit Ø8.5 mm

Holes for rail connector:

To drill the holes for the rail connector, the rail is inserted in the drilling jig so that the rail end and the outer edge of the drilling jig are aligned. Then drill the first hole from the outer edge. .

Holes for hanger clamp, end clamp, end stop, and terminal box:

After the center of the first hole has been marked on the rail and drilled using the drill jig, the jig must be offset by the center spacing to the second hole.

6.4.1.3 Rail installation on ceiling and wall structures

ATTENTION!

→ When installing square bar rails on ceiling and wall structures at the customer's site, suitable hanger clamps must be used

→ The direct fastening of square bar rails by drilling and screwing the rails without the use of hanger clamps should be avoided in all cases. The restriction of the gap profile of the square bar rails by screw heads, etc. would mean that the operability of the cable trolleys could no longer be assured.

6.4.1.4 Rail installation on I-beams using cross arms

The cross arms are fastened first to steel beams using clamping brackets and then the hanger clamps are pushed onto the cross arms and screwed in place.

ATTENTION!

→ The distance between the outer edge of the cross arm and the steel beam must be a minimum of 60 mm

→ The distance between the outer edge of the cross arm and the middle of the steel beam must be at least 60 mm

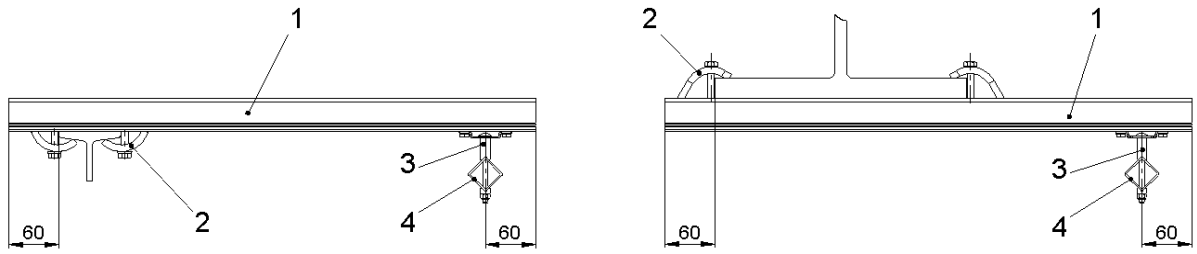


Fig. 24: Rail installation using cross arms on the upper or lower side of an I-beam

Pos.	Name
1	Cross arm
2	Clamping bracket
3	Hanger clamp
4	Square bar rail

6.4.1.5 Rail mounting on steel beams using weld brackets

The weld brackets are firmly welded to the steel beams. Then the cross arms are screwed to the weld brackets and the hanger clamps to the cross arms. The welding process and implementation – in a manner appropriate to the local conditions – are the responsibility of the operator!

ATTENTION!

→ The distance between the outer edge of the cross arm and the middle of the steel beam must be at least 60 mm!

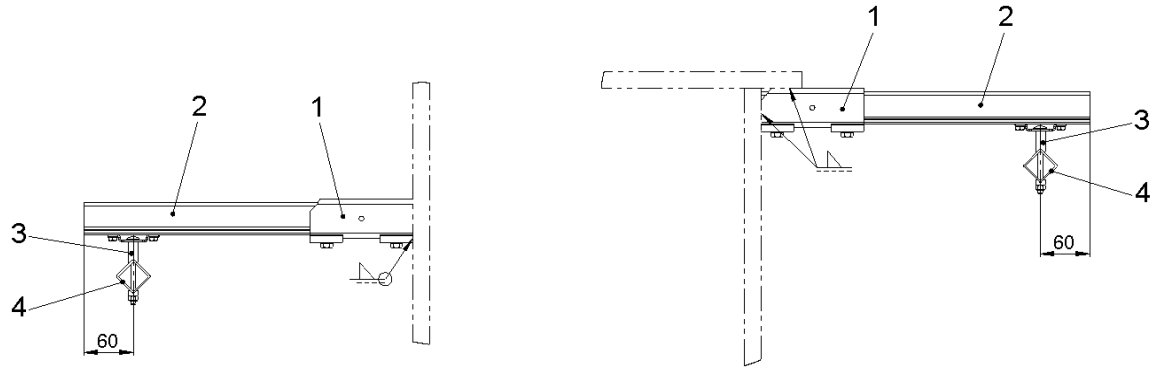


Fig. 25: Rail installation using a weld bracket on a support structure

Pos.	Name
1	Weld bracket
2	Cross arm
3	Hanger clamp
4	Square bar rail

6.4.1.6 Hanger clamp

The hanger clamps are fastened to the rail and then fastened to the beam structure together with the rail. Alternatively, the hanger clamps can first be fastened to the beam structure and then the rail segments can be fastened to the hanger clamps.

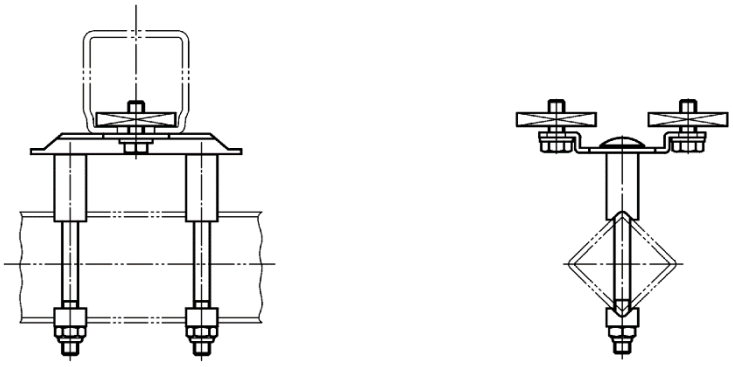


Fig. 26: Hanger clamp

6.4.1.7 Rail connector

The rail connector is fastened to the ends of the two rail segments. It is important to ensure that the rails are not offset during installation and that both rails remain fully aligned.

ATTENTION!

→ The square bar rails must be at right angles and free of burrs

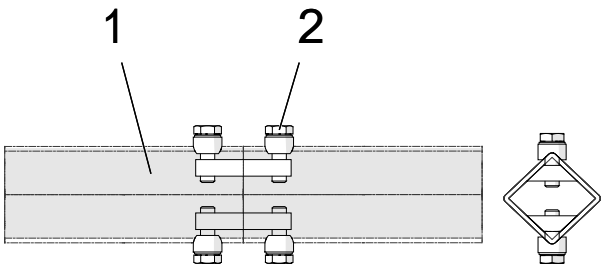


Fig. 27: Rail connector

Pos.	Name
1	Square bar rail
2	Rail connector

6.4.1.8 Ground terminal clamp

The ground terminal clamp is firmly screwed to the end of the rail. The protective conductor connection piece is firmly welded to the steel structure. The clamp and the connection piece are connected using a protective conductor.

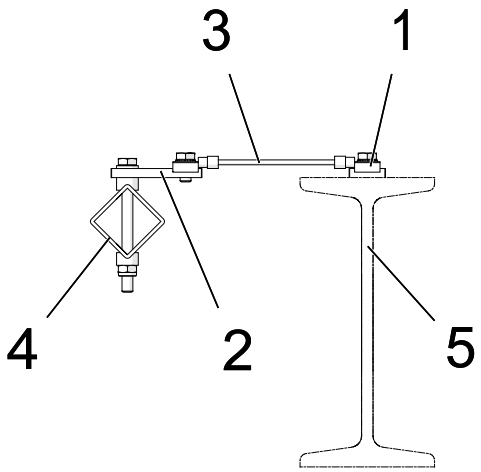


Fig. 28: Ground terminal clamp

Pos.	Name
1	Protective conductor connection piece
2	Ground terminal clamp
3	Protective conductor
4	Square bar rail
5	Steel structure (customer side)

6.4.2 End clamp and end stop

The end stop is fitted to the square bar rail to limit travel. Space is left at the rail end for the end clamp.
The end clamp is fastened behind the end stop on the rail.

ATTENTION!

The distance "E" between the middle of the end clamp and the end stop must be at least one cable trolley length.

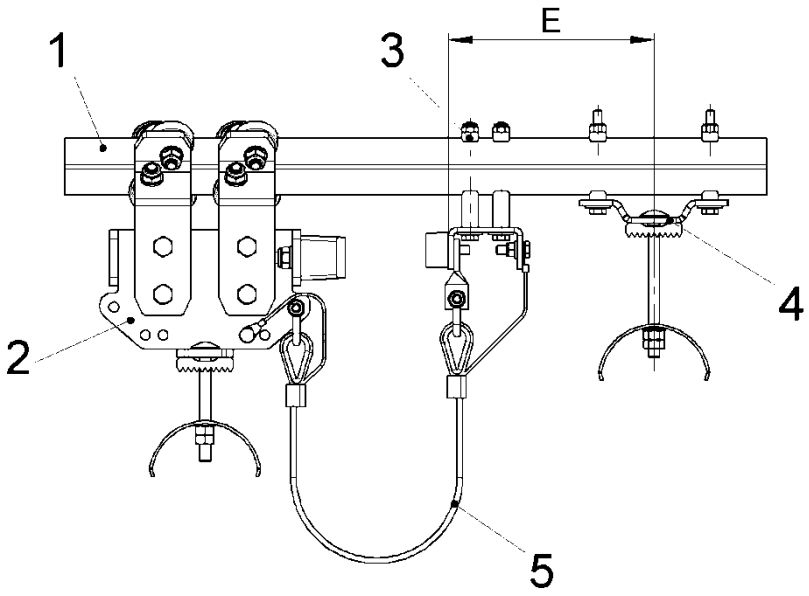


Fig. 29: End clamp and end stop

Pos.	Name
1	Square bar rail
2	ATEX cable trolley
3	End stop
4	ATEX end clamp
5	ATEX towing rope

6.4.3 Cable trolley

Cable trolleys are pushed into the front of the track rail.

ATTENTION!

- The festoon system is adjusted at the factory for the corresponding track profile. Subsequent adjustment is not necessary.
- Arrange the cable trolleys with a buffer on one side such that there is at least one rubber buffer between two adjacent trolleys

6.4.4 Towing trolley

ATTENTION!

→ The towing arm must have sufficient play in all directions within the towing window
→ The towing arm should aligned such that it is in the center of the towing window

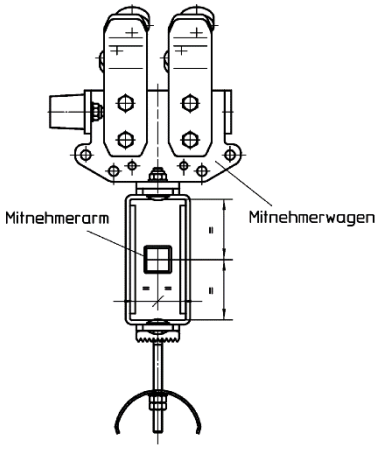


Fig. 30: Towing arm alignment **(Image Above L = Towing Arm R = Towing Trolley)**

6.4.5 Laying round cables

ATTENTION!

Only use suitable cables!

The cables must meet the specified criteria (see Section 4.1)

WARNING!

Fire hazard!

Fire hazard if undersized cables are used!

→ The required cable cross-sections must be observed

WARNING!

Danger due to improper cable installation!

Incorrect arrangement of the cables in the cable bundles and the loop may result in cable damage and electric shocks.

→ Use only specialist electricians to connect cables
→ Check the cables regularly for signs of wear or damage

Comply with the cable layout projected for the festoon system. The following rules apply:

- → Place the cable bundle in the middle of the track beam for moment equilibrium
- → Arrange cables with a large copper cross-section symmetrically and in the center of the trolley
- → For multi-level cable trolley cables, arrange the heaviest cable weights per meter on the uppermost supports
- → When using multi-level cable trolleys, the cables on the respective upper support should be laid with slightly less slack in terms of length than the cables laying on lower supports
- → The clamping braces of the supports must be screwed into place firmly enough to prevent thin cables from being pulled through during operation, while still not damaging the cables due to excessive clamping. If necessary, additional clamping pieces can be used.

ATTENTION!

Diameter differences:
Where possible, there should not be too great a difference in the diameter of round cables in order to ensure firm clamping to the cable supports.

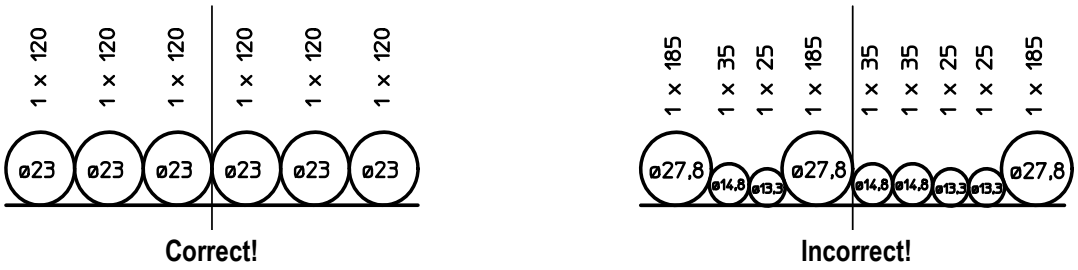


Fig. 31: Differences in diameter

ATTENTION!

Clamping pieces:
For differences in diameter of adjacent cables by more than 15 mm, additional clamping pieces should be used for firm clamping.

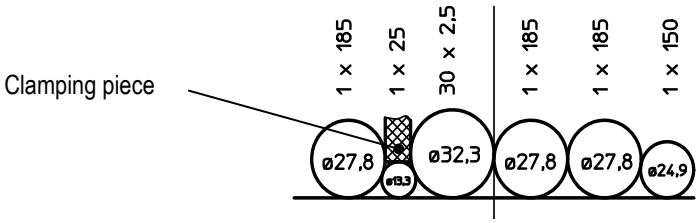


Fig. 32: Use of a clamping piece

ATTENTION!

Cable moment equilibrium:
When positioning the cables, it important to ensure moment equilibrium. Arrange the thicker, heavier cables in the middle.

Fig. 33: Cable moment equilibrium

6.4.6 Laying flat cables

ATTENTION!

Only use suitable cables!

The cables must meet the specified criteria (see Section 4.1)

WARNING!

Fire hazard!

Fire hazard if undersized cables are used!

→ The required cable cross-sections must be observed

WARNING!

Danger due to improper cable installation!

Incorrect arrangement of the cables in the cable bundles and the loop may result in cable damage and electric shocks.

→ Use only specialist electricians to connect cables

→ Check the cables regularly for signs of wear or damage

Comply with the cable layout projected for the festoon system. The following rules apply:

→ Place the cable bundle in the middle of the track beam for moment equilibrium

→ Where flat cables are laid in layers, each higher layer of cables should be laid with slightly less slack in terms of length than those below

→ When using multi-level cable trolleys, the cables on the respective upper support should be laid with slightly less slack in terms of length than the cables laying on lower supports

→ Cables with large copper cross-sections should be arranged symmetrically to the trolley centre and as the very top cable in the bundle

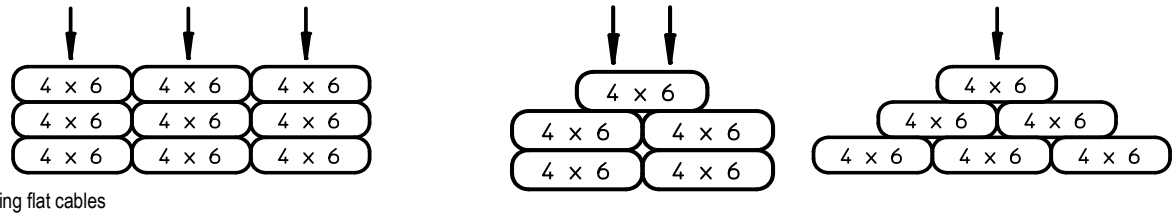


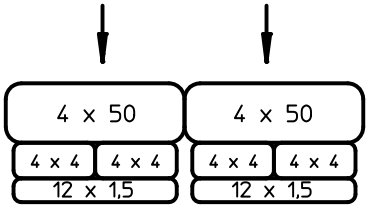
Fig. 34: Laying flat cables

Very good
100% clamping

Good
50% clamping

Poor

Thicker energy core cables (e.g. 4x50) are to be laid at the top of the cable bundle. This ensures a good heat dissipation and a firm clamping of smaller cables. Tensile forces that occur during movement can be absorbed by these cables.



6.4.7 Installing towing rope/equipotential bonding

With the ATEX festoon systems, the towing rope is also used for equipotential bonding. The ATEX Standard, DIN EN ISO 80079-36 (Section 6.7.2) requires the installation of a grounding connection if insulated metal parts can become charged. Electrostatic charges are thus dissipated via the towing rope. For this purpose, the towing rope has an additional steel rope that is screwed to the upper part of the cable trolley and ensures a permanent electrical connection.
The towing rope is installed between two cable trolleys, end clamps and cable trolley or between a towing trolley and a cable trolley. Also ensure that the shackle can be easily moved after tightening the lock nut. The shackles must serviced at regular intervals (see Section 8).

ATTENTION!

→ It is important to ensure that the shackles and thimbles can move freely after installation.
→ To attach the towing ropes, an additional eye must be installed between the end clamp and the end stop.
→ The additional steel rope with the cable lug is screwed to the upper part of the cable trolley using an additional hole. In the shortest upper part of the cable trolley, both steel ropes are mounted to a central hole for equipotential bonding. Two holes are provided for the longer upper part of the cable trolley (see Fig. 35).
→ It is important to ensure that the additional steel rope for equipotential bonding makes an upward bend (also see Fig. 37). This prevents the towing rope from being under tension and being pushed outward.

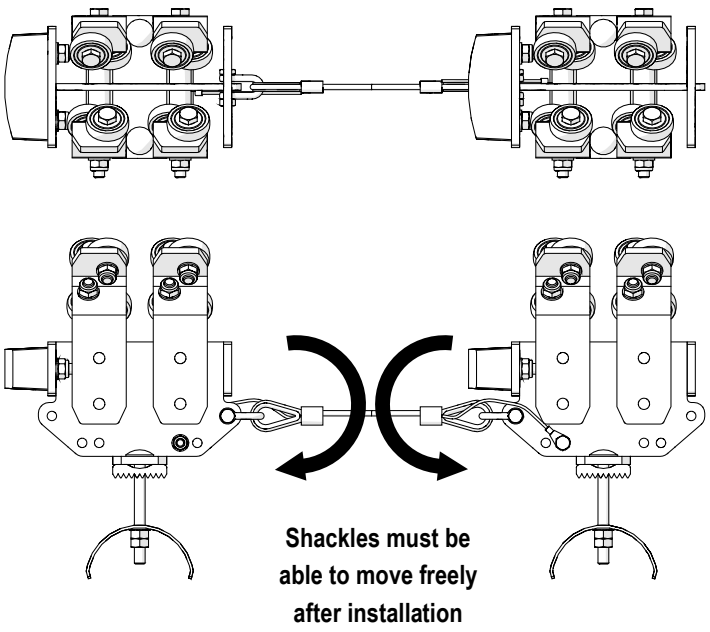


Fig. 35: Installation of the towing rope/equipotential bonding on the cable trolley

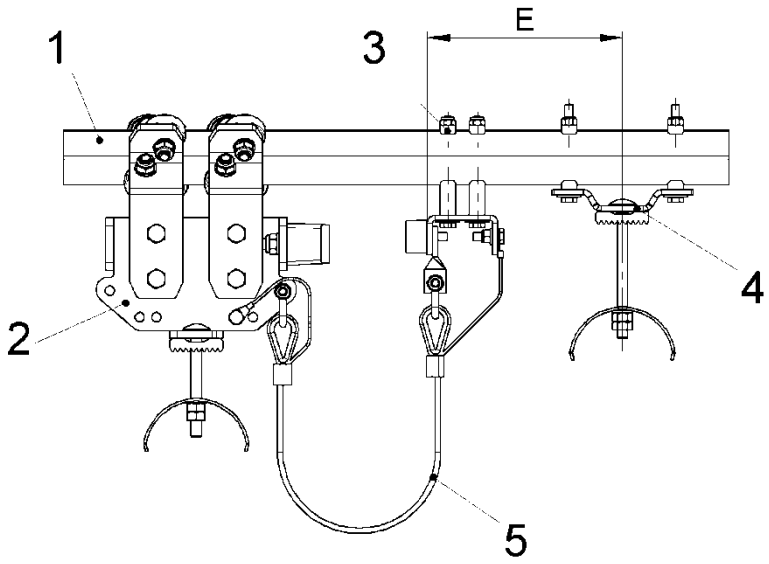


Fig. 36: Installation of the towing rope/equipotential bonding on the end stop

Pos.	Name
1	Square bar rail
2	ATEX cable trolley
3	End stop
4	ATEX end clamp
5	ATEX towing rope

6.5 Testing and commissioning

WARNING!

Risk of injury due to improper commissioning!

Improper commissioning can cause dangerous situations for the personnel.

- → Before commissioning, conduct the tests in the manufacturer's test list
- → Never start the festoon system without testing in accordance with the manufacturer's test list
- → Before commissioning, perform a visual inspection and conduct the prescribed testing work
- → Refrain from any unsafe work procedures
- → Notify the responsible person immediately of any damage to the festoon system
- → Secure the festoon system against accidental or unauthorized operation
- → Entering the operating area of the festoon system is forbidden!

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

- → When walking in the work areas and danger zones, be careful of projections and depressions in the floor. Loose objects must not be left on the floor.

CAUTION!

Risk of crushing!

When the festoon system is moving, there is a danger of crushing limbs between the buffer and buffer plate, as well as between the carriage and the track carrier.

- → Do not enter the danger zone of the festoon system when the system is moving

CAUTION!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

- → Do not enter the danger zone of the festoon system when the system is moving

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

- → Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!
- → Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws

CAUTION!

Risk of injury due to slipping and falling!

There is a risk of injury due to a dangerous environment or difficult installation conditions. For example, near cranes, in difficult-to-access locations, etc.

- → Use personal protective equipment (protective gloves, protective headgear, protective footwear)
- → Keep the location tidy
- → Only use secure scaffolding
- → Take appropriate safety measures

Commissioning of the festoon system is carried out together with the system operator and is documented. All necessary personnel for commissioning, such as operators, electricians and installation technicians, must be provided by the system operator for the duration of the commissioning. Free access to the system must be ensured. After commissioning is complete, Conductix-Wampfler will receive an authorized final acceptance protocol from the operator, in which it is logged that the system corresponds to the requirements.

6.5.1 Commissioning Checklist

CAUTION!	This checklist serves as a guideline to ensure safe operation of the festoon system. The operating instructions are intended for qualified specialists who install the festoon systems, operate them and who are familiar with the requirements regarding work safety and accident prevention. **If Conductix-Wampfler performed the commissioning, the final acceptance protocol on the last page should be filled out.**

Customer:		**Customer No.:**	
		Order No.:	
Purchaser:		**Order No.:**	
Commissioning Location:		**Zip Code:**	
Street:		**Country:**	
System Name:			
Start of Commissioning:		**Commissioner**	
End of Commissioning:		**Name:**	
		Date:	
		Signature:	

Commissioning Checklist

Checks with the system at a standstill			OK	NOK
A01	The consumer guideway corresponds to the project-specific technical documentation.		☐	☐
A02	The depot length of the festoon system corresponds to the project-specific technical documentation.		☐	☐
A03	All screws used are of sufficient length and are protected. The projecting ends of the screws are visible (min. 2 thread projection).		☐	☐
A04	The towing arm is mounted in the middle of the window of the towing trolley and has play on all sides.		☐	☐
A05	The festoon system track rails are installed in accordance with the installation instructions.		☐	☐
A06	The end clamp, end stop and ground terminal clamp are properly installed.		☐	☐
A07	All hanger clamps and rail connectors are secure.		☐	☐
A08	The grounding connection from the track rail to the support structure ground point has been properly executed.		☐	☐
A09	Cables are laid on supports in accordance with specifications in the cable layout recommendation (see project-specific technical documentation).		☐	☐
A10	Loop lengths of the cables correspond to the specifications of the project-specific technical documentation. The permissible length deviation is ± **50 mm.**	**Actual value** _____	☐	☐
A11	Cables are laid free of twists.		☐	☐

A12	Cables show **no** damage caused by transport or installation.	☐	☐
A13	The cables are mounted on the supports in such a way that the cable trolleys run horizontally on the track profile (cable moment equilibrium on the right and left supports). Cable clamps firmly tightened so that cables cannot be pulled out manually, but still with enough play that the cables are also not crushed.	☐	☐
A14	Cable ends (installation lengths) are arranged with sufficient strain relief and the correct length to the end or towing side.	☐	☐
A15	Unused core cables are either connected to grounding at the end or adequately insulated by means of suitable termination.	☐	☐
A16	The laid cables meet the requirements for ATEX festoon systems (see safety instructions in Section 4.1).	☐	☐
A17	The additional steel ropes of the towing ropes that realize the equipotential bonding are firmly screwed to the cable trolleys, the towing trolley and the end stop.	☐	☐
A18	Special component parts such as spacers, additional clamp pieces and guide rings are installed in accordance with the project-specific technical documentation.	☐	☐
A19	The length of the installed towing ropes for each cable loop corresponds to the project-specific technical documentation. The permissible length deviation is **± 50 mm.**	☐	☐
A20	Ensure that the shackles for fastening the towing rope can be freely moved after installation and lubrication.	☐	☐
A21	Towing ropes show **no** damage caused by transport or installation.	☐	☐
A22	The towing ropes are not twisted.	☐	☐

A23	Check steel structure for collision-free travel of the festoon system. No catching or snagging of cables and towing ropes.	☐	☐
A24	The track profile for the festoon system in alignment to the crane carrier is mounted straight in accordance with the tolerance requirements.	☐	☐
A25	Track beam joints have no height and side offset.	☐	☐
A26	The corrosion protection is undamaged and intact.	☐	☐
A27	Rubber buffers are present on the end stops/cable trolleys. The cable trolleys are aligned so that there is always at least one rubber buffer between 2 adjacent cable trolleys.	☐	☐
A28	All buffers strike one another or the deflector in the center - none are offset too high.	☐	☐
A29	The buffer of the final cable trolley meets the end stop in the center.	☐	☐
A30	There is a rubber shock absorber in the tow tube of the tow trolley.	☐	☐
A31	The nameplate with labeling in accordance with the ATEX Directive is present on the end clamp side or the towing side.	☐	☐

Inspection of running systems with 10 % consumer running speed: **Movement forward from cable trolley depot/end clamp side in direction of towing side until the cable train is fully extended.** **Movement backward from towing end in the direction of cable trolley depot/end clamp side until the end position is reached.**		**OK**	**NOK**
B01	Installed clearance between the cable trolley and the crane structure is sufficient throughout the entire route to ensure that no collisions with cable trolleys or their assemblies can occur.	☐	☐
B02	Inspection of the loop lengths at maximum extension festoon system corresponds to the project-specific technical documentation.	☐	☐
B03	All rollers run smoothly and without blocking.	☐	☐
B04	No catching or snagging of cables and towing ropes.	☐	☐
B05	No operation at speeds of > 1 m/s should be possible.	☐	☐

Inspection of running systems with 50 % consumer running speed: **Movement forward from cable trolley depot/end clamp side in direction of towing side until the cable train is fully extended. Movement backward from towing end in the direction of cable trolley depot/end clamp side until the end position is reached.**		**OK**	**NOK** .
C01	Installed clearance between the cable trolley and the crane structure is sufficient throughout the entire route to ensure that no collisions with cable trolleys or their assemblies can occur.	☐	☐

C02	Inspection of the loop lengths at maximum extension festoon system corresponds to the project-specific technical documentation.	☐	☐
C03	All rollers run smoothly and without blocking.	☐	☐
C04	No catching or snagging of cables and towing ropes.	☐	☐
C05	No operation at speeds of > 1 m/s should be possible.	☐	☐

Inspection of running systems with 100 % consumer running speed: **Movement forward from cable trolley depot/end clamp side in direction of towing side until the cable train is fully extended.** **Movement backward from towing end in the direction of cable trolley depot/end clamp side until the end position is reached.**		**OK**	**NOK**
D01	Installed clearance between the cable trolley and the crane structure is sufficient throughout the entire route to ensure that no collisions with cable trolleys or their assemblies can occur.	☐	☐
D02	Inspection of the loop lengths at maximum extension festoon system corresponds to the project-specific technical documentation.	☐	☐
D03	All rollers run smoothly and without blocking.	☐	☐
D04	No catching or snagging of cables and towing ropes.	☐	☐
D05	No operation at speeds of > 1 m/s should be possible.	☐	☐

Commissioning Checklist

Inspection of running systems in operating mode over 30 minutes.		OK	NOK
E01	Installed clearance between the cable trolley and the crane structure is sufficient throughout the entire route to ensure that no collisions with cable trolleys or their assemblies can occur.	☐	☐
E02	Inspection of the loop lengths at maximum extension festoon system corresponds to the project-specific technical documentation.	☐	☐
E03	All rollers run smoothly and without blocking.	☐	☐
E04	No catching or snagging of cables and towing ropes.	☐	☐
E05	No operation at speeds of > 1 m/s should be possible.	☐	☐

Documentation			
F01	Project-specific documentation such as the technical data, system diagrams, cable layout recommendation and round/flat cable clamping layouts is available and complete at the customer's facility.	☐	☐

Comments/Other

7 Operation

7.1 Safety

WARNING!

Risk of death due to suspended loads!

When lifting loads, there is a risk of death due to parts falling or swinging out of control.

- → Never walk under suspended loads
- → Block off the danger zone under the system
- → Only move loads under supervision
- → Observe the specifications for the attachment points provided
- → Do not fasten to protruding machine parts or eyes on attached components Ensure that lashing components are properly seated
- → Use only authorized lifting gear and lashing components with sufficient load capacity
- → Do not use torn or worn ropes and belts
- → Do not attach ropes or straps at sharp corners and edges and do not knot or twist them
- → Set loads down when leaving the workplace

WARNING!

Risk of injury due to improper operation!

Improper operation can result in serious injury to persons and property.

- → Conduct all operating steps in accordance with the specifications of these operating instructions
- → Before starting work, ensure that all covers and safety systems are installed and working properly
- → Never disable the safety systems during operation
- → Maintain order and cleanliness in the work area! Loosely stacked or scattered components and tools can cause accidents

WARNING!

Unauthorized personnel are at risk!

Unauthorized personnel who do not meet the requirements described here are not acquainted with the dangers in the work area.

- → Keep unauthorized personnel away from the work area
- → In case of doubt, address such persons and direct them away from the work area
- → Stop working as long as unauthorized personnel are in the work area

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

→ When walking in the work area and danger zone, be careful of projections and depressions in the floor. Loose objects must not be left on the floor

CAUTION!

Risk of crushing!

When the cable trolleys move, there is a risk of crushing hands between two cable trolleys or between a cable trolley and an end stop.

→ The customer must cordon off the danger zone of the system or have it installed in an inaccessible area

→ Use personal protective equipment (protective gloves, protective headgear, protective footwear)

DANGER!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

→ Do not enter the travel area of the festoon system when the system is moving

→ The customer must block off the danger zone of the system

DANGER!

Risk of injury due to falling objects!

There is a risk due to falling parts in case of improper use (incorrect assembly, misuse, lack of maintenance).

→ Perform maintenance on a regular basis!

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

→ The system engineer/operator must ensure that no projecting contours near the festoon system are able to damage the cables

→ Regularly check cables for wear

→ Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!

→ Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws

→ Provide electrical protection measures in accordance with the regulations for the system

DANGER!

Risk of burns!

Burns can be caused by:

- Live components
- Overload
- Components that have become live due to a fault
- Short circuits

Remedial measures:

→ Do not overload cables!
→ System engineers must design the dimensioning and protective electrical devices in accordance with the permissible load capacity of the cables
→ Connections may only be made by specialist electricians

WARNING!

Fire hazard!

Fire hazard if undersized cables are used!

→ Do not overload cables
→ The required cable cross-sections must be observed
→ System engineers must design the dimensioning and protective electrical devices in accordance with the permissible load capacity of the cables
→ Connections may only be made by specialist electricians

WARNING!

Unsafe operation of the system!

System components fail due to installation errors!

→ Do not stay in the danger zone under the system
→ Comply with the maximum load and speed limitations
→ After completing the installation, perform a test run of the system only at very low speed
→ Check the system in accordance with the maintenance plan and perform regular maintenance

WARNING!

Breakage during operation due to an installation error!

Breakage of a load-bearing roller axle and other festoon system components or the track suspension can be caused by installation errors!

→ Do not stay in the danger zone under the system
→ Comply with the maximum load and speed limitations
→ Check the system in accordance with the maintenance plan and perform regular maintenance

Personnel:

- Operation only by trained personnel!

7.2 Safety instructions for use in potentially explosive atmospheres

WARNING!

Risk of explosion due to inadequate grounding!

The ball bearings of the rollers can have an electrically insulating effect due to the lubricating grease.

Due to the effects of friction inside the rollers, the cable trolley can become electrostatically charged with respect to the running rail during operation.

Equipotential bonding is affixed between two cable trolleys. In addition, the running rail is grounded.

→ Install equipotential bonding in accordance with the specifications in these operating instructions

→ Before commissioning, check that the equipotential bonding has been correctly installed

WARNING!

Risk of explosion due to exceedance of the permissible operating speed!

The ATEX festoon systems from Conductix-Wampfler are designed in accordance with DIN EN ISO 80079-36 for a maximum operating speed of **1 m/**s.

If this speed limitation is exceeded, explosion protection **no longer** exists!

→ Do not exceed the speed limitation of 1 m/s when operating the system

WARNING!

Risk of explosion due to dust layers!

If dust layers are deposited on hot surfaces, the dust can ignite at temperatures that are below the minimum ignition temperature of the dust.

→ If dust layers are present, the limitation of the maximum surface temperature according to DIN EN 60079-14 (Section 5.6.3.3) must be taken into account

WARNING!

Risk of explosion due to incorrect connection of cables!

If the cables are not laid in the middle and the moment equilibrium is not maintained, the cable trolley will run at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Lay the cables in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect clamping of the cables!

If the clamping of the cables is not sufficiently affixed, the cables can become electrostatically charged due to friction during operation of the system and therefore become a potential source of ignition.

→ Clamp cable in accordance with the specifications in these operating instructions

→ Check that the cables are clamped before commissioning and after maintenance work

WARNING!

Risk of explosion due to incorrect installation of the running rail!

If the cross arm is incorrectly installed and the rail is suspended at an angle as a result, the cable trolleys move at an angle on the rail due to the weight. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the cross arms and running rails in accordance with the specifications in these operating instructions

WARNING!

Risk of explosion due to incorrect installation of the towing arms!

If the towing arm is incorrectly installed, this can lead to the towing trolley moving at an angle on the rail. This can lead to frictional effects between one or more rollers and the rail surface. As a result, the roller surface can heat up and friction sparks can form.

→ Install the towing arm in accordance with the specifications in these operating instructions

7.3 Function

The towing trolley is coupled to the mobile consumer by a towing arm. The towing trolley pulls and/or pushes the following cable trolley. The cables are held on the supports with clamping bars. For improved shock absorption when trolleys meet, buffers are placed on the festoon system.
Towing ropes are mounted as standard in the ATEX product lines of the festoon systems. Modified towing ropes are used here that also provide equipotential bonding between the towing trolley, cable trolley and running rail.

The dimensions of the festoon system are to be taken from the project-specific dimension sheet.

During operation, the system should be monitored for any changes in operating noise and irregularities.

If irregularities are identified during operation, the system must be shut down immediately. The cause of the fault is to be determined using the Fault Table (see Section 9).

The Fault Table includes the cause of faults as well as the recommendations for their remedy. If the cause cannot be identified, or a repair cannot be affected using the operator's own resources, we recommend that a customer service engineer be called from one of our customer service points.

8 Maintenance and Service

8.1 Safety

WARNING!

Risk of injury due to improper maintenance works!

- → Improper maintenance can cause serious injuries to persons or damage to property
- → Before starting work, ensure there is sufficient space for the installation
- → Ensure that the installation area is clean and tidy! Loosely stacked or scattered components and tools can cause accidents
- → If components have been removed, be careful to reinstall them properly, replace all fastening elements and comply with screw tightening torques

WARNING!

Risk of injury due to moving components!

Incautious handling of the festoon system can lead to severe injury or damage to the festoon system.

- → Ensure that the festoon system cannot start on its own
- → While it is moving, do not reach into moving parts, particularly the interface between the buffer and buffer plate
- → Block off the danger zone under the system

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

- → When walking in the work areas and danger zones, be careful of projections and depressions in the floor. No loose objects may be left on the floor.

CAUTION!

Risk of crushing!

With the complete installation of the festoon system, there is a risk of crushing extremities between load carriers and track profiles.

When moving the festoon system, there is a risk of crushing extremities between the buffer and buffer plate, as well as between the carriage and track profiles.

- → Do not enter the danger zone of the festoon system when the system is moving or during installation

DANGER!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

- → Do not enter the danger zone of the festoon system when the system is moving
- → The customer must block off the danger zone of the system
- → Before starting work, shut down the system and secure it against accidental start

DANGER!

Risk of injury due to falling parts!

There is a risk due to falling parts in case of improper use (incorrect assembly, lack of attention).

→ Block off a generous area underneath the system!
→ Keep the time specialist installers spend in the danger zone to a minimum
→ Wear protective headgear!

DANGER!

Risk of burns!

Burns can be caused by:

- Live components
- Overload
- Components that have become live due to a fault
- Short circuits

Remedial measures:

→ Do not overload cables!
→ System engineers must design the dimensioning and protective electrical devices in accordance with the permissible load capacity of the cables
→ Connections may only be made by specialist electricians

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

→ The system engineer/operator must ensure that no projecting contours near the festoon system are able to damage the cables
→ Regularly check cables for wear
→ Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!
→ Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws
→ Provide electrical protection measures in accordance with the regulations for the system

WARNING!

Fire hazard!

Fire hazard if undersized cables are used!

- → Do not overload cables
- → The required cable cross-sections must be observed
- → System engineers must design the dimensioning and protective electrical devices in accordance with the permissible load capacity of the cables
- → Connections may only be made by specialist electricians

CAUTION!

Risk of injury due to slipping and falling!

There is a risk of injury due to a dangerous environment or difficult installation conditions. For example, near cranes, in difficult-to-access locations, etc.

- → Use personal protective equipment (protective gloves, protective headgear, protective footwear)
- → Keep the location tidy
- → Only use secure scaffolding
- → Take appropriate safety measures

8.2 Safety instructions for use in potentially explosive atmospheres

WARNING!

Risk of explosion due to unapproved equipment attachments!

Equipment attachments to be mounted by the client, such as terminal boxes on control trolleys and control converters, must be suitable for use in the respective Ex zone. The system engineer/operator are responsible for the suitable selection.

- → Only mount suitable equipment attachments
- → When selecting the equipment attachments, take the specific conditions into account (zone, potentially explosive atmosphere, ambient temperature ...)

WARNING!

Risk of explosion if unsuitable cables are used for ATEX festoon systems!

When equipping the system with cables, the requirements of DIN EN 60079-14 must be observed.

The cables must have an outer sheath made of the following materials:

- → Heavy polychloroprene or other equivalent synthetic elastomer
- → Heavy rubber hoses or connecting cables with an equally robust composition

Do not use PVC cables!

Each unused core cable in multi-core cables must either be connected to the grounding at the end or be adequately insulated by means of suitable termination.

WARNING!

Risk of explosion when cleaning the cables, rubber buffers and clamping pieces!

When cleaning the cables, rubber buffers and clamping pieces, these can become electrostatically charged and therefore become a potential source of ignition.

- → Only clean cables, rubber buffers and clamping pieces with a damp cloth
- → Only clean cables, rubber buffers and clamping pieces if no potentially explosive atmosphere is present

WARNING!

Risk of explosion due to incorrect clamping of the cables!

If the clamping of the cables is not sufficiently affixed, the cables can become electrostatically charged due to friction during operation of the system and therefore become a potential source of ignition.

- → Clamp cable in accordance with the specifications in these operating instructions
- → Check that the cables are clamped before commissioning and after maintenance work

WARNING!

Risk of explosion due to manual operation!

When operating the festoon system manually, friction sparks can arise from pulling/pushing too hard or pulling/pushing from the wrong direction.

→ Fundamentally, careful operation of the system must be ensured when operating the system manually

→ Manual operation of the system is prohibited in the presence of a potentially explosive atmosphere

WARNING!

Risk of explosion due to spark formation during installation or service work!

The use of metallic tools during installation or service work can create mechanical sparks that can ignite potentially explosive atmospheres.

→ Conducting installation and service work is prohibited in the presence of a potentially explosive atmosphere

→ Further safety information can be found in TRBS 1112 Part 1 (Explosion hazards during and due to service work – Assessment and protective measures)

8.3 Maintenance/inspection plan

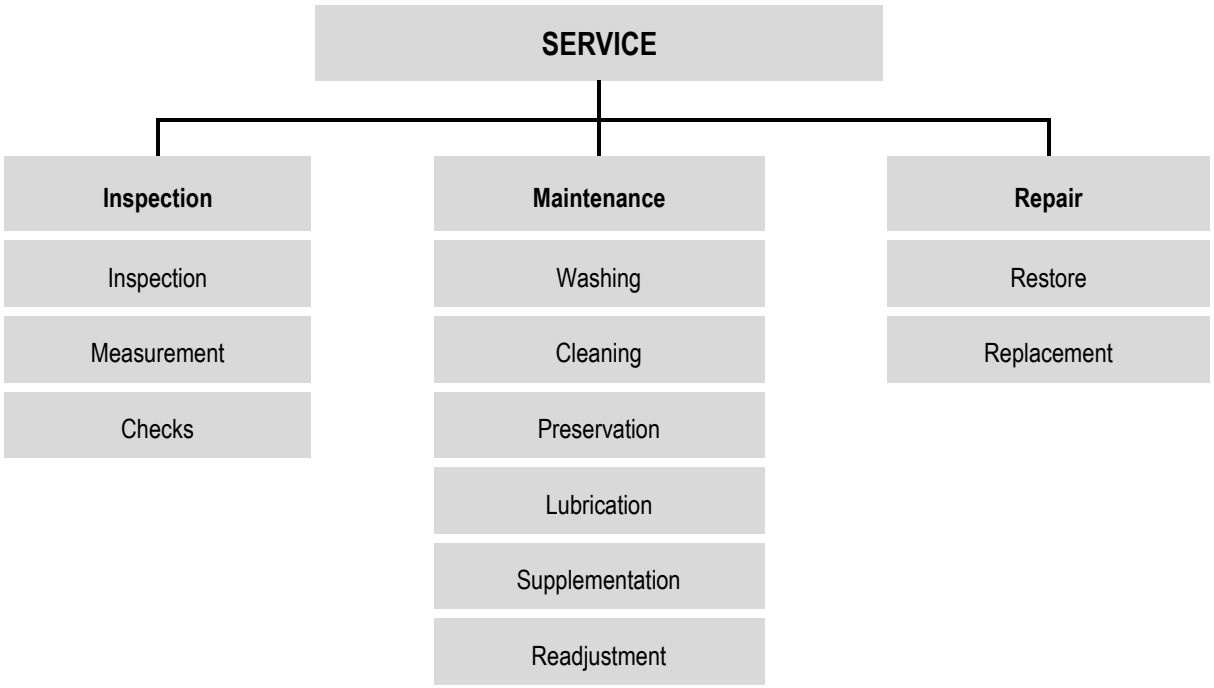
The following sections describe the maintenance work required for optimal, trouble-free operation. If signs of stronger abrasion are revealed during regular inspections, reduce the maintenance intervals in accordance with the actual sings of wear.
Contact the manufacturer with any questions regarding maintenance work or intervals.

In order to retain the warranty rights and to avoid damage, the system operator is responsible for conducting the following service work measures. Inspection, maintenance and repair measures are to be performed and documented by trained and qualified specialists.

ATTENTION!

The intervals indicated for service are dependent for the most part on operational conditions of the festoon system. Therefore, only mean values can be indicated here.

The following work falls under the category "Service":



8.3.1 Inspection with the system at a standstill

CAUTION!

→ Protect the festoon system against inadvertent activation
→ Any safety systems that have been removed during inspection of the system when at a standstill must be reinstalled and checked immediately upon completion of the work
→ Check measuring tools used after clean up/collection and inventory

Inspection measures

Interval		Component	Measure	Description
Every 14 days: 3rd and 4th shift operation at the latest, after 300 operational hours	**Every 30 days:** 2nd shift operation at the latest, after 300 operational hours	Rollers	Visual inspection	■ for proper condition ■ for proper function ■ for proper movement ■ for firm seating ■ for deformation ■ for wear ■ for damage ■ for degree of soiling ■ for corrosion
		Buffer		
		Center plate		
		Cable supports		
		Fasteners		
		Cables		
		Cable clamps		
		Fixed cabling		
		Installation connections		
		Towing ropes/equipotential bonding		
		Ground terminal clamp (Grounding of the running rail)		
		Towing devices		
		End stops		
		Track profile		

8.3.2 Towing rope check and discard criteria

ATTENTION!

→ Towing ropes must undergo checks at regular intervals
→ Conduct the check at intervals of no more than 12 months

CAUTION!

In cases of defects, towing ropes must be immediately withdrawn from further use. They must be discarded (replaced).

A towing rope must be discarded (replaced) when one or more of the following criteria is met:

1. Wire breakage
2. Structural changes
3. Corrosion
4. Abrasion

The following rope deformations are discard criteria:

- Corkscrew deformation: A towing rope must be replaced when it has corkscrew deformations with waves that measure more than 1/3 of the rope diameter.
- Fraying: Discard when fraying occurs.
- Loop formation: Discard when there is a significant change in the rope structure due to loop formation.
- Wire loosening: Discard when wire loosening caused by rust or abrasion occurs.
- Knot formation: Discard when knot formation occurs, e.g. localized thickening in the steel rope.
- Constrictions: Discard when severe constrictions occur.
- Curling deformations: Discard when towing ropes have suffered permanent deformations, e.g. due to being pulled over an edge.
- Kinking: Discard when kinks occur, e.g. tightened rope loops.
- Buckling: Discard when the towing ropes have buckles due to external influences.

8.3.3 Equipotential bonding check and discard criteria

ATTENTION!

→ Equipotential bonding must undergo checks on a regular basis
→ Conduct the check at intervals of no more than 12 months

CAUTION!

In cases of defects, towing ropes/equipotential bonding must be immediately withdrawn from further use. They must be discarded (replaced).

A towing rope/equipotential bonding must be discarded (replaced) when one or more of the following criteria is met:

1. Wire breakage
2. Corrosion
3. The steel rope slips out of the cable lug
4. The steel rope slips out of the pressure clamp

8.3.4 Inspection with the system moving

CAUTION!

→ Refrain from any unsafe work procedures!
→ The system should only be commissioned with functional protective gear and safety systems
→ Entering the operating area of the festoon system is forbidden

Inspection measures

Interval		Component	Measure	Description
Every 14 days: 3rd and 4th shift operation at the latest, after 300 operational hours	**Every 30 days:** 2nd shift operation at the latest, after 300 operational hours	Rollers	Functional check	Easy and tilt-free running of the rollers on the track profile. Visible wear, damage.
		Cable trolley		Proper entry and exit of the cable trolleys into and from the depot area.
		Towing device		Functionally reliable operation of the towing device under observation of the required horizontal and vertical compensating movements.
		Buffer unit cable trolley/towing trolley/towing clamp or end clamp		Effectiveness of the damping device, particularly when entering the depot.
		Towing ropes		Effectiveness of the towing ropes, particularly when the system is fully extended.
		Equipotential bonding		Mechanical connection of the equipotential bonding with the towing rope (pressure clamp) and the cable trolley/towing trolley/end clamp (screw connection cable lug). Examination of the connection points for corrosion effects.
		Track profile and system		Track profile and the entire system, whether soiling and corrosion influence functionality.

If problems are identified during the inspection, maintenance work must be conducted immediately.

8.3.5 Logging

The results of inspections as well as the measures undertaken are to be documented in written reports. Conductix-Wampfler must be informed immediately of defects and faults during the test phase and the warranty period.

8.3.6 Maintenance of the festoon system

CAUTION!

Use caution during festoon system maintenance!

- → Turn off power switch and secure against unauthorized switching on
- → Use proper climbing aids and work platforms for maintenance work that is to be conducted above eye level
- → Do not use machine components as climbing aids
- → Ensure the safe and environmentally friendly drainage, collection and disposal of operating and auxiliary materials
- → Safety systems that were removed for installation, maintenance or repair must be immediately reinstalled and checked after work is completed
- → Observe the inspection and maintenance intervals described in the maintenance instructions
- → Ensure that sufficient space for maintenance work (danger zone) is available
- → Secure the festoon system against inadvertent activation during service work
- → Secure detached parts against falling
- → Screw joints that are disconnected during service work are to be reattached (with appropriate torque) and secured as instructed
- → Fasteners and seals that cannot be reused are to be replaced (such as self-locking nuts, disks, splints, O-rings, glued or microencapsulated screws)
- → Lubrication points that are cleaned or wiped during maintenance and repair work must be re-lubricated as instructed
- → After finishing work, collect all tools and materials and check that all are present
- → Disassembled parts and components that were exchanged are to be collected, stored in a safe place, recycled, or returned

Maintenance measures

Interval		Component	Measure	Description
Every 14 days: 3rd and 4th shift Operation at the latest, after 300 operational hours	**Every 30 days:** 2nd shift operation at the latest, after 300 operational hours	Roller fastening	Maintenance measure	Tighten all fasteners.
		Cable fastening		Tighten all fasteners on clamping bars and cable clamps.
		Towing device		Replace wear parts, if necessary.
Every 3 months		Towing ropes/equipotential bonding		Tighten mounting screws
		Buffer unit towing clamp and end clamp		Tighten all fasteners. Replace wear parts, if necessary.
Annually (depending on external influences)		Surface/corrosion protection Corrosion coating	Restore/ Renew	Restore hot-dip galvanized surfaces with zinc coating. Restore lacquered surfaces.
		Ground terminal clamp (Grounding of the running rail)		Tighten mounting screws

8.3.7 Wear parts

Wear parts are excluded from the warranty. This includes:

- → All trolley rollers including main rollers, horizontal guide rollers, counter-pressure rollers
- → Special damping systems in the towing trolley window

- → Rubber or cellular buffers
- → Other definitions require written documentation

8.3.8 Wear limits

Component	Wear limit has been reached when
Rollers	→ The diameter of the roller has been reduced from the nominal diameter by 2 mm → Deep impressions are visible → Cracks, broken-off pieces or embrittlements have formed on Vulkollan or Adiprene rollers or when initial signs that the outer section is disengaging from the core appear → Increased bearing play occurs due to worn ball bearings → Significant lubrication leakage is visible → Rollers do not run smoothly
Buffer	→ Cracks, breaks or embrittlements are visible
Center plate and side plates	→ Corrosion protection is no longer present
Cable supports	→ Corrosion protection is no longer present → Initial signs of cracks in the supports are visible
Fasteners	→ Corrosion protection is no longer present → Connection integrity (screw connections, clamp connections, glued connections) is no longer ensured
Cables	→ Wire, shielding or jacket breakage is visible → Corkscrews have formed
Cable clamps	→ Corrosion protection is no longer present → Cracks and embrittlements are visible in the clamp rubber → Sufficient clamping of the cables is no longer ensured
Towing ropes	→ Wire breakage, structural changes, corrosion and abrasion occur
Equipotential bonding	→ Corrosion effects occur at the connection points → Additional wire rope slips out of the pressure clamp or the cable lug → Wire breakage occurs
Ground terminal clamp	→ Corrosion occurs

Component	Wear limit has been reached when
Towing devices	→ Corrosion protection is no longer present → Deformations of the towing window in the towing trolley appear → Cracks in the welding joints occur
End clamp	→ Corrosion protection is no longer present → Fastening to the track profile is no longer secure
Track profile	→ Corrosion protection is no longer present → Significant run marks or grooves from the rollers of the festoon system appear

8.3.9 Recurring inspections

ATTENTION!

Devices and systems must be periodically inspected by an expert. In general, visual and functional inspections are to be conducted whereby the condition of components with regard to damage, wear, corrosion or other changes is to be determined. Generally speaking, the completeness and functionality of the safety equipment is evaluated. Disassembly may be required to better evaluate the wear parts.
All periodic inspections are to be arranged by the operator!

Every operator is to record all inspection, maintenance and service work in a machine book in an orderly manner and allow these to be confirmed by a technical expert. In case of inaccurate or missing entries, the warranty is rendered null and void.

8.3.10 Repair

Always request a Conductix-Wampfler customer service technician for all repairs.
If qualified service technicians from the system operator conduct the repairs themselves, all points contained in these **operating instructions** must be observed.
Conductix-Wampfler accepts no liability or responsibility for damages and production faults that result from failure to follow these operating instructions.

For maintenance and repair, only use

- → Suitable tools in good working order
- → Only use original replacement parts from Conductix-Wampfler or replacement parts explicitly authorized by Conductix-Wampfler

9 Troubleshooting

WARNING!

Risk of injury due to improper fault elimination!

Improper fault elimination can result in serious injury to persons and property.

- → Contact the manufacturer in case of faults
- → Only allow fault elimination to be conducted by personnel from or authorized by the manufacturer

CAUTION!

Improper handling can result in serious injury to persons and property!

- → Faults are only to be eliminated by qualified personnel!

Faults	Source	Elimination
Towing rope torn	Excessive load wear [1)]	Replace towing rope
Steel rope (equipotential bonding) torn or slipped out (from the pressure clamp or from the cable lug)	Excessive load wear [1)]	Replace towing rope
Buffer defective	Excessive load wear [1)]	Replace buffer
Reduction in function of rollers	Excessive load wear [1)]	Replace rollers
Evident mechanical overload on components (deformation, cracks, abrasion)	Fault incident [2)]	Replace relevant components

[1)] The source of the excessive load must be identified and corrected.

[2)] If injury to persons and property occurs during fault incidents, Conductix-Wampfler must be informed immediately.

10 Disassembly and Disposal

10.1 Safety

DANGER!

Risk of injury due to electrocution!

Risk of severe injury or death due to electric current.

- → The system engineer/operator must ensure that no projecting contours near the festoon system are able to damage the cables
- → Regularly check cables for wear
- → Before working on the festoon system, the system must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous activation. In special cases where there is no main switch, the power disconnection must be conducted in accordance with the specifications of the system manufacturer. Check that parts disconnected from power are voltage free, then ground and short-circuit them. Insulate adjacent parts under voltage!
- → Before each commissioning, the crane manufacturer must perform an insulation test for the complete system in which the festoon system is installed in accordance with the local technical standards, regulations and laws
- → Provide electrical protection measures in accordance with the regulations for the system

WARNING!

Danger of injury due to improper disassembly!

Stored energy, sharp components, points and edges on and in the festoon system or the required tools can cause injury.

- → Ensure that there is sufficient space before starting work
- → Handle open, sharp-edged components carefully
- → Ensure that the work area is tidy and clean! Loosely stacked or scattered components and tools can cause accidents
- → Disassemble components properly. Be aware of the high dead weight of some components. Use lifting gear, if necessary.
- → Secure components so they cannot fall or topple
- → Consult the manufacturer in case of doubt

WARNING!

Risk of injury due to moving components!

Incautious handling of the festoon system can lead to severe injury or damage to the festoon system.

- → Ensure that the festoon system cannot start on its own
- → While it is moving, do not reach into moving parts, particularly the interface between the buffer and buffer plate
- → Block off the danger zone under the system

CAUTION!

Risk of tripping due to projecting parts!

There is a risk of tripping when working on the festoon system.

→ When walking in the work areas and danger zones, be careful of projections and depressions in the floor. Loose objects must not be left on the floor

CAUTION!

Risk of crushing!

With the complete installation of the festoon system, there is a risk of crushing extremities between load carriers and track profiles.

When moving the festoon system, there is a risk of crushing extremities between the buffer and buffer plate, as well as between the carriage and track profiles.

→ Do not enter the danger zone of the festoon system when the system is moving or during installation

DANGER!

Risk of entrapment!

There is a risk of entrapment when the festoon system is moving.

→ Do not enter the danger zone of the festoon system when the system is moving
→ Block off the danger zone of the system on the customer side
→ Before starting work, shut down the system and secure it against accidental start

DANGER!

Risk of injury due to falling parts!

There is a risk due to falling parts in case of improper use (incorrect assembly, lack of attention).

→ Block off a generous area underneath the system!
→ Keep the time specialist installers spend in the danger zone to a minimum
→ Wear protective headgear!

CAUTION!

Risk of injury due to slipping and falling!

There is a risk of injury due to a dangerous environment or difficult installation conditions. For example, near cranes, in difficult-to-access locations, etc.

→ Use personal protective equipment (protective gloves, protective headgear, protective footwear)
→ Keep the location tidy
→ Only use secure scaffolding
→ Take appropriate safety measures

10.2 Safety instructions for use in potentially explosive atmospheres

WARNING!

Risk of explosion when cleaning the cables, rubber buffers and clamping pieces!

When cleaning the cables, rubber buffers and clamping pieces, these can become electrostatically charged and therefore become a potential source of ignition.

→ Only clean cables, rubber buffers and clamping pieces with a damp cloth
→ Only clean cables, rubber buffers and clamping pieces if no potentially explosive atmosphere is present

WARNING!

Risk of explosion due to manual operation!

When operating the festoon system manually, friction sparks can arise from pulling/pushing too hard or pulling/pushing from the wrong direction.

→ Fundamentally, careful operation of the system must be ensured when operating the system manually
→ Manual operation of the system is prohibited in the presence of a potentially explosive atmosphere

WARNING!

Risk of explosion due to spark formation during installation or service work!

The use of metallic tools during installation or service work can create mechanical sparks that can ignite potentially explosive atmospheres.

→ Conducting installation and service work is prohibited in the presence of a potentially explosive atmosphere
→ Further safety information can be found in TRBS 1112 Part 1 (Explosion hazards during and due to service work – Assessment and protective measures)

10.3 Disassembly

After the system is no longer in use, the festoon system must be disassembled and an environmentally friendly disposal is to be undertaken.

Prior to starting the disassembly:

- Remove operating and auxiliary materials, as well as residual processing materials and dispose of them in an environmentally appropriate manner.
- Then clean assemblies and components properly and dismantle them in compliance with applicable local occupational safety and environmental regulations.

Personnel:

- May only be conducted by trained technicians
- Min. 2 persons

Required tools:

- Open-end wrench

- Tools for securing

DANGER!

Risk of injury due to lack of care when securing loads!

→ Loads are to be carefully fastened onto suitable lifing gear or load suspension devices that are technically intact and have sufficient load capacity

10.4 Disposal

In the absence of return and disposal agreements, recycle the disassembled components:

- Scrap metals
- Plastic elements must be sent for recycling
- Dispose of remaining components separately according the material properties

CAUTION!

Environmental damage due to improper disposal!

Electrical scrap, electronic components, lubricants and other auxiliary materials are hazardous waste and may only be disposed of by authorized specialist companies!

Local authorities or specialist disposal companies can provide information regarding environmentally appropriate disposal.

11 Further Documents

11.1 CE Declarations

For the ATEX festoon systems, there is a Declaration of Incorporation in accordance with the Machinery Directive and a Declaration of Conformity in accordance with the ATEX Directive. The CE Declarations are available as separate documents.

11.2 Documentation for electrical equipment

See separate electrical documentation.

11.3 Replacement parts list

ATTENTION!

Maintaining a stock of the most essential replacement and wear parts at the installation site is an important prerequisite for continual operational readiness of the system!

WARNING!

Incorrect replacement parts are a safety hazard!

Incorrect or faulty replacement parts can impair safety and result in damage, malfunctions or complete failure.

→ Always use original replacement parts from the manufacturer!

No liability is accepted or warranty given for damages that occur from the use of non-original replacement parts and accessories.

For replacement part orders, please indicate the following information:

- Order number
- Part number
- Description
- Unit count
- Desired mode of shipping (postal, freight, sea, air, express)
- Shipping address

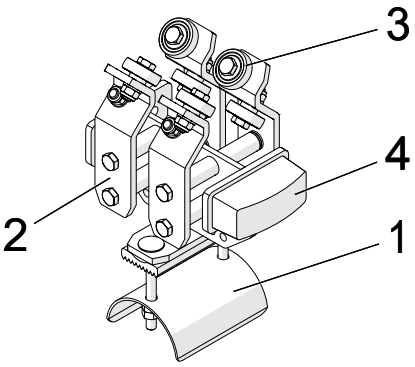


Fig. 37: Cable trolley

- Replacement parts available:

1) Support, complete with clamping bar and fasteners
2) Cable trolley upper part, complete with rollers and buffers
3) Roller pair
4) Buffer

The exact replacement part name can be found in the project-specific replacement parts list.

11.4 Product observations

We strive to observe our products after delivery in order to further improve them and better meet your needs.
Please use the form on the following pages to communicate your experiences and issues with us that could be of interest for our improvement process.
Thank you.

Please fax the filled out form to: +49 7621 662 284

For example:

- Changed configuration data
- Experiences with the festoon system
- Recurring faults
- Difficulties with documentation

Your contact data

Company:	Customer No.:
Department:	
Contact Person:	
Street:	Zip Code:
PO Box:	
City:	
Phone:	Fax:
Email:	

Your experiences and observations:

11.5 Final Acceptance Protocol

Customer:			Customer No.:
			Order No.:
			Supplier:
			Order Confirmation No:
Installation Location:	Project Name:		
	Address:		
	Zip Code:	City:	
	Contact Person/Phone No.:	Meeting Place:	
Start of Installation (on site):		End of Installation (on site)	
Installation Time Required (in hours):		Travel Time Required (in hours):	
Installation of the above project was concluded today by Conductix-Wampfler GmbH, Germany. Risk is transferred to the customer today.			
The acceptance was confirmed in the project-specific "Acceptance" protocol:		Yes ☐ Attachment:	
The maintenance instructions were provided:		Yes ☐	
CE label was attached:		Yes ☐	
Customer Comments:			
Supplier Comments:			
The following work included in the order could **not** be conducted:			

Installation Contact (Conductix-Wampfler GmbH)		**Construction Contact (Customer)**	
Name:		Name:	
Date:	Signature:	Date:	Signature:

Operating Instructions

Festoon Systems for Square Bar Rails for potentially explosive atmospheres

Program 0270EX/0280EX

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