Operating Instructions

Control for motorized festoon systems

Sinamics S120 with CXW PLC and relay or bus interface to crane PLC

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Contents

1 General advice

1.1 Information to these mounting and operating instructions

These mounting and operating instructions allow the safe and efficient handling of the equipment.

The operating instruction is part of the equipment and must be stored close to the equipment and always available to the personnel. The personnel must have read carefully and understood these mounting and operating instructions prior to starting any works. The basic requirement for safe working is the observance of all safety advice and guidelines specified in of these mounting and operating instructions.

Moreover you have to observe the local accident prevention guidelines and the general regulations for the application of the equipment.

Illustrations in this documentation are for basic comprehension and can deviate from the real design of the equipment.

Besides these mounting and operating instructions the enclosed instructions for installed components have to be observed as well.

1.2 Limitation of liability

All specifications and advice of these mounting and operating instructions have been made up with regard to the existing standards and prescriptions, the state-of-the-art and the many years of technical expertise and experiences.

The manufacturer does not take over any liability for damage due to:

- Non-observance of the mounting and operating instructions
- Application not in accordance with the regulations
- Employment of non-qualified staff
- Unauthorized reconstructions
- Technical modifications
- Application of unapproved replacement parts and accessories

The effective volume of delivery may deviate from these explanations and descriptions in case of special design, the utilization of additional order options or on account of to the latest technical modifications.

The commitments of the supply contract, the general terms and conditions as well as the manufacturer's terms of delivery and the legal regulations at the time of the contract conclusion have to be observed.

We reserve the right of technical modifications in the context of revision of useful properties and further developments.

1.3 Copyright

1.4 Replacement parts

WARNING!

Safety risk due to faulty replacement parts!
Faulty or defective replacement parts might affect the security and cause damage, malfunction or complete failure.

Therefore:
- Use only original replacement parts of the manufacturer!

Replacement parts have to be purchased via authorized dealers or directly from the manufacturer. Address see last page of these operating instructions.

1.5 Material defects

The regulations about material defects are listed in the general terms and conditions of business.

1.6 Technical support

For technical support please contact our staff from the Customer Support Department. Contact data see last page of these operating instructions.

Moreover our staff is constantly interested in new information and experiences, which will arise from the application and which might be valuable for the improvement of our products.

1.7 Applicable documents

These operation instructions are only valid together with the operating instruction for festoon systems BAL0300-0006 and BAL0300-0014 contenting additional notes for the use of festoon systems.

The operator must consider the following documents as supplements of the operating instructions (if applicable):

- Project-specific technical documentation
- Installation instructions
- Maintenance instructions
- Drawings
- Spare part lists
- Sketches

Detailed informations see chapter 11.2 Applicable documents.

2 Safety advice

2.1 Definition of the symbols

Safety advice in these mounting and operating instructions is marked by symbols. Safety advice start with signal words, that inform about the degree of danger. Safety advice must be absolutely observed. Exercise caution in order to avoid accidents, injuries of persons and damage to property!

DANGER!

… refers to an imminent danger, which might cause deathly or serious injuries if not avoided.

WARNING!

… refers to a possibly dangerous situation, which might cause deathly or serious injuries if not avoided.

CAUTION!

… refers to a possibly dangerous situation, which might cause minor or light injuries if not avoided.

CAUTION!

… refers to a possibly dangerous situation, which might cause damage to objects if not avoided.

ADVICE!

Advice and recommendations:
… gives advice and recommendations as well as information for an efficient and undisturbed operation.

2.2 Personnel requisition

2.2.1 Qualification

WARNING!

Risk of injury in case of insufficient qualification!
Incorrect handling can cause serious injuries to persons and heavy damage to property.
Therefore:
- All activities must be carried out by qualified staff!

The operating conditions indicate the following qualifications for the various fields of activity:

- **Instructed personnel/operators**
  have been instructed by the operator about the tasks assigned to them and the possible dangers due to improper behavior.

- **Specialized staff**
  is able to carry out the works assigned to them and realize and avoid any dangers in this regard, based on their training, knowledge, experiences and knowledge of the respective regulations.

- Only those persons are authorized for these works, who are expected to do their work properly. Persons with restricted responsiveness, e.g. due to drugs, alcohol or medication are not permitted.

- For the selection of personnel observe the age-specific and job-related prescriptions effective at the place of installation.

2.2.2 Unauthorized persons

WARNUNG!

Danger caused by unauthorized personnel!
Unauthorized personnel, who do not comply with the requirements described hereunder, are not familiar with the dangers that might occur within the working area.
Therefore:
- Keep unauthorized personnel away from the working area.
- In case of doubt talk to those people and dismiss them from the working area.
- Interrupt the works as long as there are unauthorized persons within the working area.

2.2.3 Instruction

Prior to commissioning the personnel must be instructed by the operator. For a better track reporting it is required to report the instructions as follows:

Date	Name	Type of instruction	Instructed by	Signature
05.11.2009	John Doe	First safety briefing for the personnel	John Doe	

Illustr. 1: Example for instruction report

2.3 Application in accordance with the regulations

The festoon system is designed exclusively for the intended purpose described an designed. The controls for the festoon system are only used for project specific requirements.

Festoon systems are used to operating a power supply for mobile consumer load, such as cranes, overhead cranes, pallet conveyors, etc.

WARNING!

Danger caused by application not in accordance with regulations!
Each application of the equipment not in accordance with and/or different from the regulations can result in dangerous situations.
Therefore:
- Only use the equipment in accordance with the regulations.
- An details of these mounting and operating instructions must be strictly observed.

The following applications of the equipment are prohibited. Applications not in accordance with regulations are as follows:
- Application of the equipment with accessories not permitted or authorized by the manufacturer.
- Operation of the equipment by not instructed personnel.
- Exceeding / be lower than projected supply voltages.
- Changing of the delivered software modules.
- Changing, bridging and/or deactivation of control circuits or interlocking.
- Bridging and/or deactivating electrical sensors or switches.
- Use of non-approved protective devices.
- Re-adjustment of protective devices.
- Changing atmospheric conditions (including a change to projected physical location).
- Main trolley speed higher than 50% of nominal speed in case of a fault.

Any claims due to improper application are excluded.

The operator is responsible for any damage due to improper application.

2.4 Safety measures by the operator

The equipment is used in the commercial sector. The operator is therefore responsible for occupational safety. Besides the safety advice of these mounting and operating instructions he must observe the safety, accident prevention and environmental protection regulations effective for the range of application of this equipment. Please note in particular:

- The operator must read the valid work safety regulations and determine any additional dangers in a risk assessment, dangers that might arise from special working conditions at the place of installation of the equipment. He then must work out the operating instructions for handling the equipment.
- During the complete operating time the operator must check if his operating instructions are in accordance with the state of technology of rules and standards and adapt them if required.
- The operator must clearly regulate and establish the responsibilities for installation, handling, fault repair and maintenance.
- The operator must ensure that all employees who are handling the equipment, have read and understood these mounting and operating instructions. Moreover he must instruct the personnel at regular intervals and inform them about any dangers.
- The operator must provide the required protective equipment.
- The operator must observe the following standards and regulations when operating a festoon system:

2006/95/EG 2004/108/EG	EC Low Voltage Directive EC EMC Directive
IEC 60204-32	Safety of electrical equipment of hoisting machines
IEC 60038	IEC standard voltages
IEC 60364	Electrical installations of buildings
IEC 60947	Low-voltage switchgear and control gear

Moreover it is in the responsibility of the operator, that the equipment is in perfect technical conditions, this means:

- The operator must ensure that the maintenance intervals described in the mounting and operating instructions are observed.
- The operator must have checked all safety devices regularly for their operational capability and completeness.

2.5 Special risks

The following chapter mentions some remaining risks that have been established by risk assessment.

The safety instructions and warning notes listed up in the following chapters of these mounting and operating instructions must be observed, in order to reduce health hazards and avoid dangerous situations.

WARNING!

Danger of life due to pending loads!
Lifting loads may involve danger of life due to falling objects or parts pending without control.
Therefore:
- Never stand below pending loads.
- Move loads only under supervision.
- Observe the information regarding the provided suspension points.
- Do not attach anything to projecting machine parts or to eyes of built-on components. Ensure that the fasteners have a tight fit.
- Only use hoist units and fasteners with sufficient load capacity.
- Do not use cracked or abraded ropes or belts.
- Do not place ropes and belts close to sharp edges and corners, do not fasten with knots and do not twist.
- When leaving the work to sell the load.

WARNING!

Risk of injury due to flexible components!
Careless operation of the motorized festoon system can cause heavy injuries and damage of the equipment.
Therefore:
- The motorized festoon system before maintenance and repair work switch off.
- Do not touch moving components during operation, particularly the interface between guide way beams and cable trolley.

CAUTION!

Risk of stumbling due to projecting components!
In committing the motorized festoon system, there is the danger of stumbling.
Therefore:
- In celebration of Labor and eighth paragraphs of danger areas and depressions in the ground. There must be no loose items are on the ground.

CAUTION!

Risk of crushing!
In the process of the motorized festoon system, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and road-makers, and between belt and pulleys.
Therefore:
- Occur when procedures are not in the danger area of the motorized festoon system.

CAUTION!

Risk of apprehension!
In the process of the motorized festoon system, the risk of apprehension.
Therefore:
- The procedure does not come into the danger area of the motorized festoon system.

WARNING!

Danger by electricity!
The electrical energy can cause severe injuries and even death. If damage to the insulation, or individual components, there is danger to life by electricity.
Therefore:
- Machinery and plant parts, which must be performed on maintenance switch, voltage before the start of the work and secure against restart.
- Part Unlocked consider first absence of voltage and cover adjacent cordon and live parts.
- Check electrical equipment regularly.
- Replace loose or damaged cables and wires at once.
- Replace a Blown fuses always matched by equivalent.
- Avoid contact with live parts.
- Use voltage insulated tools.

2.6 Safety devices

WARNING!

Danger of life non-functioning safety equipment!
The security is guaranteed only if the safety devices intact.
Therefore:
- Must be examined before starting work, whether the safety equipment is working order and properly installed.
- Use safety device never expire.

2.7 Behavior in case of accidents and disturbances

Measures to be taken in case of accidents:

- Start with first aid measures.
- Bring the people out of the danger zone.
- Inform responsible persons on the site of operation.
- Call the emergency medical services.
- Clear access routes for rescue vehicles.

Measures to be taken in case of faults:

- Analysis of fault.
- Fixing of fault cause.
- Check of correct functions after fault fixing.

3 Technical data

3.1 General

Motorized festoon systems for I-carrier systems, which serve to complete the erection and operation of an energy supply for mobile consumers, such as cranes, warehouse cranes, pallet conveyors, etc.. The precise specification of the motorized festoon systems are given in the order confirmation. The dimensions of each motorized festoon systems to be found in the dimension sheet.

3.2 Interfaces

Interface between the crane control system and control cabinet of the motorized festoon systems are provided in the control panel terminal block or the terminals of the supplied field devices.

The control cabinet is mounted in accordance with the customer in an enclosed, electrical equipment room.

CAUTION!

Keep designed power supply voltages!
Operation of the control beyond of the power supply voltage tolerances might cause to a breakdown of the control or damage of electrical components.
Power supply voltages lower as the nominal motor voltage might cause to high motor current, over temperature and drive disturbances because of too less motor torque!
That applies for the power supply voltage even during drive acceleration.

ADVICE!

Voltage range:
Only voltage and frequency ranges are named and will be specified in case of order.

Description and numbering of interface terminals order specific may differ from those in the BAL mentioned names.

For the control of the motorized cable trolleys customer supplies the following power supply:

Designation	Interface terminal	Voltage / frequency
Primary current		
Phase L1	-X1:L1	380-480 V 50/60 Hz
Phase L2	-X1:L2	380-480 V 50/60 Hz
Phase L3	-X1:L3	380-480 V 50/60 Hz
Earth conductor PE	-X1:PE	
Control voltage AC		
Phase L	-X1:1	110/230 V 50/60 Hz
Neutral conductor N	-X1:6	110/230 V 50/60 Hz
Earth conductor PE	-X1:PE	
Control voltage DC		
+ - Potential	-X1:11	24 VDC
0 – Potential (earthed!)	-X1:14	0 VDC
Earth conductor PE	-X1:PE	
Power supply for anti-condensation heaters		
Phase L	-XE:1	110/230 V 50/60 Hz
Neutral conductor N	-XE:4	110/230 V 50/60 Hz
Earth conductor PE	-XE:PE	

Permitted tolerances at input terminals of the panel according to IEC 60204-32:
Voltages ± 10%
Frequency ± 1%

Other voltages and frequencies are possible, inquiry is required.

The current required for each supply voltage are dependent on the interpretation and indicated in the circuit diagram of the control cabinet.

ADVICE!

Main switch:
Main switch for the power supply of the control has to be installed in customer distribution cabinet!

The main power supply of the festoon system has to be switched off by the customer if the crane operator leaves the crane and in case of emergency stop (e.g. by the crane main switch).
Leading switching-off (> 100 ms) of the release signal for on/off of the MCT control is requested.

ADVICE!

Line filter for category 2:
Line filter for limits according to category 2 of EN61800-3 are available for TN systems!

Conducted electromagnetic disturbances are limited according to the requirements of category 3 of EN61800-3. Limits according to category 2 of EN61800-3 are possible by using of an optional line filter (only for TN system available).

3.3 Operating conditions

CAUTION!

Damaged because of wrong operating conditions!
Operation conditions without the specified range cause damages because of short circuit and early aging and damage of electrical components!
- Dust and deposits
- Humidity
- Condensation
- High temperatures

Environment:

Designation	Value	Hints
Environmental temperature	+5 up to +40°C	
Humidity (relative), max.	≤ 85%, without condensation	

4 Description of control and operation

4.1 Overview

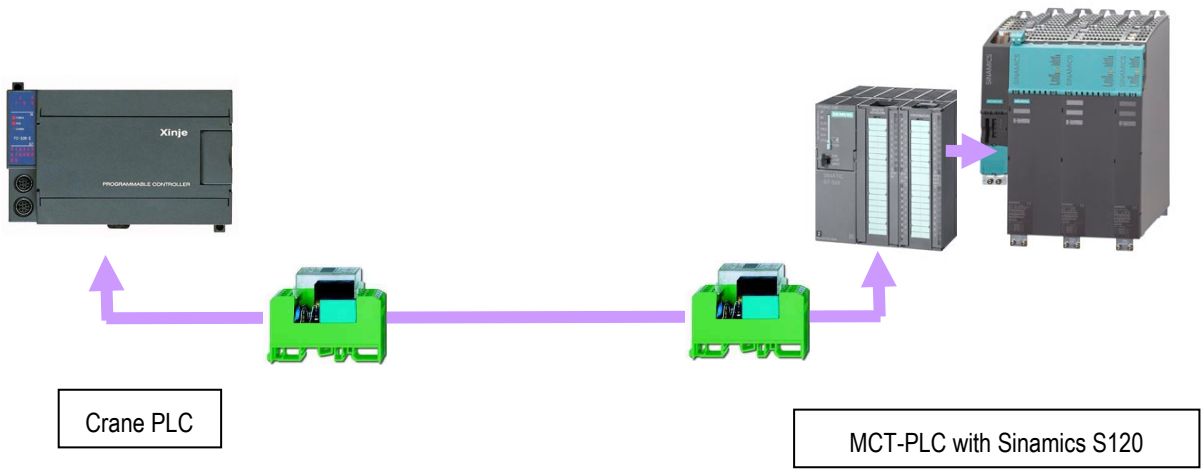
Each motorized cable trolley is controlled by its own frequency converter depending on the main trolley speed and the position of the cable trolley. When the land-side (optional: also water-side) final position is reached, the corresponding cable trolley will be switched-off by a limit switch.

In generator and brake operation the energy that is fed back by the motors will be recovered to the power supply source.

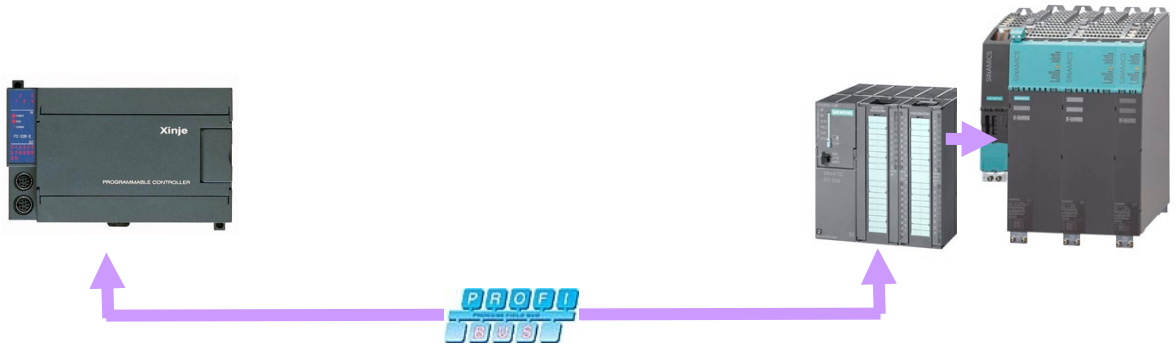
The frequency converters are controlled by a PLC Siemens S7-300 via Profibus DP connection included in the scope of supply. The control works in vector control operation without tachometer generator.

The signal transfer with the crane PLC is made by 24 VDC signals or by potential-free contacts (binary signals), alternatively signal exchange via Profibus DP is available.

Signal exchange via potential-free contacts:



Alternatively coupling via Profibus instead of potentialfree contacts is possible, too.



Crane PLC

MCT-PLC with Sinamics S120

4.2 Concept of frequency converter Siemens Sinamics S120

The frequency converter Siemens Sinamics S120 for MCR consists of 4 modules:

- Control Unit CU320: For communication and control functions for one or more Motor Modules and for the Line Module. Coupling to LM, MM and other components by DRIVE_CLIQ. Coupling to PLC by Profibus. All parameters are saved on a Compact Flash Card.
- Line Module LM: For DC-voltage generation for the Motor Module supply, with or without power recovery.
- Motor Module MM: Inverter for motor power supply (number according to the number of motors).

CU320

LM

MM

The complete drive System, consisting of CU320, Smart Line Module and Motor Module will be defined as „frequency converter“.

4.3 Scope of supply

The complete control is supplied in a switch cabinet, completely wired, including frequency converters with appropriate reactors and fuses, PLC, switching devices, coupling relays, panel lighting, heater and ventilator. It has to be installed in an air-conditioned electrical operating area.

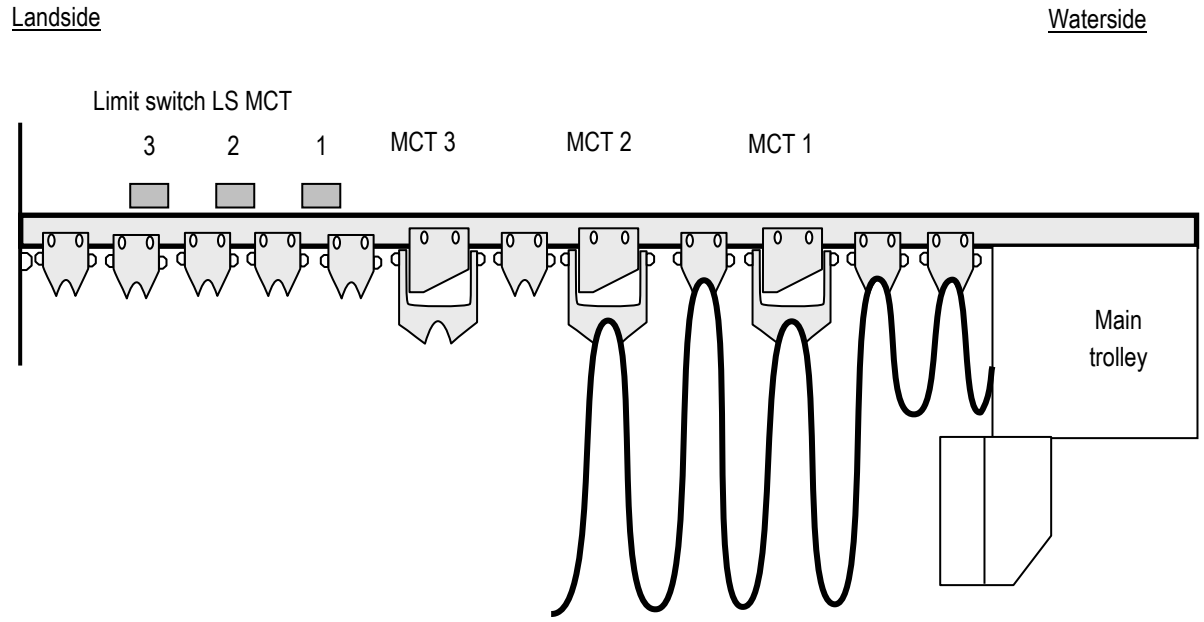
The frequency inverters are parameterized according to the system calculation.

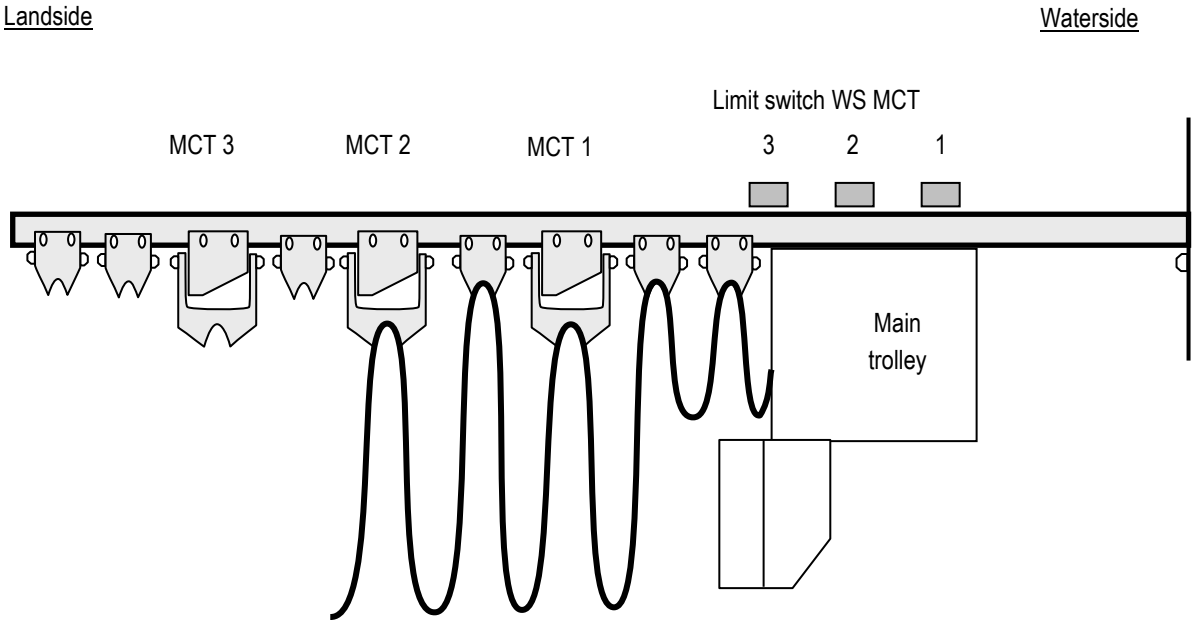
The dimensioning and manufacturing of the control is carried out according to the relevant instructions of DIN VDE / IEC.

All the electrical equipment is marked according to the circuit diagram, the wiring cables will be labeled according to the terminal designation on the equipment.

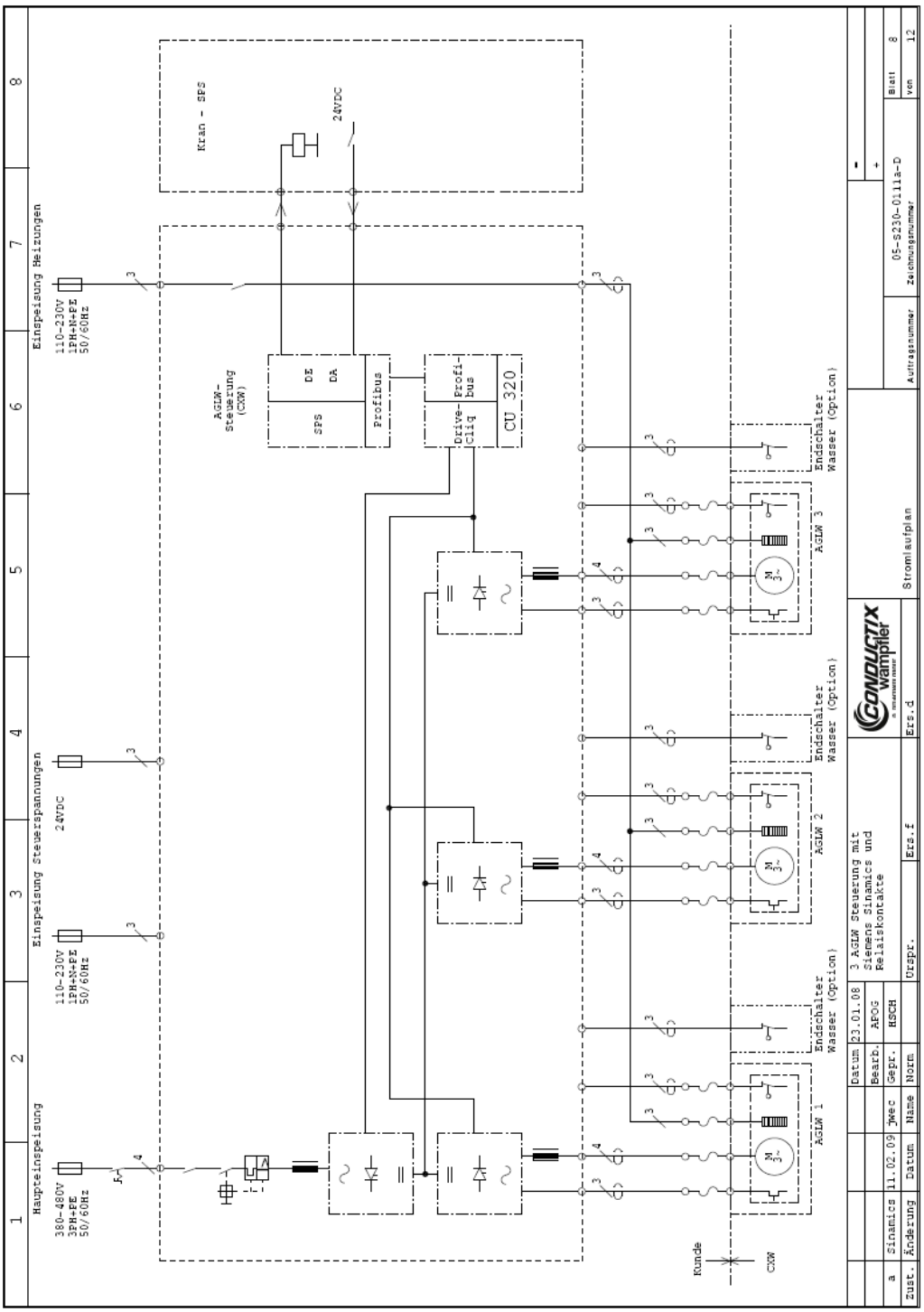
The documentation consisting of components scheme, circuit diagram, terminal diagram and cable list is made with the help of the E-CAD system WSCAD and supplied as PDF file. The frequency inverter parameters are supplied as data file.

4.4 Schematic sketch of festoon system





4.5 Schematic sketch of MCT control with relay interface



5 Transport, packing and storage

5.1 Transport

5.1.1 Safety advice for transport

WARNING!

Danger of life due to pending loads!
Lifting loads may involve danger of life due to falling objects or parts pending without control.
Therefore:
- Never stand below pending loads.
- Move loads only under supervision.
- Observe the information regarding the provided suspension points.
- Do not attach anything to projecting machine parts or to eyes of built-on components. Ensure that the fasteners have a tight fit.
- Only use hoist units and fasteners with sufficient load capacity.
- Do not use cracked or abraded ropes or belts.
- Do not place ropes and belts close to sharp edges and corners, do not fasten with knots and do not twist.
- When leaving the work to sell the load.

CAUTION!

Damage due to improper transport!
Improper transport may cause considerable damage to property.
Therefore:
- The cabinet lying for transport in the transport crate.
- Be careful when unloading the packages on delivery and on internal transport and observe the symbols and advice on the packing.
- Only use the provided fasteners.
- Do not remove packing material before starting the assembly.

5.1.2 Transport inspection

Delivered goods must be checked for completeness and transport damage immediately after arrival.
If any transport damage is recognizable from the outside, proceed as follows:

- Do not accept the delivery or only with reservation.
- Note extent of damage on the transport documents or on the delivery note of the carrier.
- Initiate complaint.

ADVICE!

Complain about each fault, as soon as you have noted it. Claims for damages can only be raised within the respective terms.

5.2 Packing

The individual packages have been packed according to the expected transport conditions. We have used environmentally sound packing material only.
The packing shall protect the individual components up to the assembly from transport damage, corrosion and other kind of damage. This is the reason why the packing material should not be destroyed and only be removed immediately before starting with the assembly.

Handling of packing material:

Dispose of packing material according to the respective legal regulations and local prescriptions.

CAUTION!

Damage caused to the environment by faulty disposal!
Packaging materials are valuable commodities and can in many cases continued to be use or useful will be processed and recycled.
Therefore:
- Dispose of packing materials.
- The commission noted local disposal laws, if required, a specialist with the disposal.

5.3 Storage

Store packages under the following conditions:

- Do not store in the open air.
- Keep in a dry and dust-free atmosphere.
- Do not expose to aggressive media.
- Protect from solar radiation.
- Avoid mechanical vibration.
- Storage temperature: -40 to +70°C.
- Relative humidity: max. 90% by 40°C.
- In case of a storage time of more than 3 months, check the general condition of all parts at regular intervals. If required, refresh and renew the preservation.

ADVICE!

You will possibly find some advice on the packages about storage, which is given additionally to the advice given here. These must be observed as well.

6 Assembly and commissioning

6.1 Safety

Personnel:

- Assembly and initial commissioning must only be executed by especially trained staff.

The following personal protective equipment has to be worn when carrying out assembly works and initial commissioning:

- Protection clothes
- Protective helmet
- Safety shoes
- Protective gloves

WARNING!

Danger of life due to pending loads!
Lifting loads may involve danger of life due to falling objects or parts pending without control.
Therefore:
- Never stand below pending loads.
- Move loads only under supervision.
- Observe the information regarding the provided suspension points.
- Do not attach anything to projecting machine parts or to eyes of built-on components. Ensure that the fasteners have a tight fit.
- Only use hoist units and fasteners with sufficient load capacity.
- Do not use cracked or abraded ropes or belts.
- Do not place ropes and belts close to sharp edges and corners, do not fasten with knots and do not twist.
- When leaving the work to sell the load.

WARNING!

Risk of injury due to improper assembly and initial commissioning!
Improper assembly and initial commissioning may cause heavy injuries and considerable damage to property.
Therefore:
- Prior to starting work make sure that the conditions to start the mounting are fulfilled.
- Be careful with open, sharp-edged components.
- Ensure that the workplace is clean and tidy! Loose components and tools, that are lying around may cause accidents.
- Components must be mounted properly. Observe the prescribed screw tightening torques.
- Secure the components, so that they will not fall down or turn over.

WARNING!

Uncontrolled device behavior by ineffective emergency stop circuit!
Effect-free emergency-stop circuit can cause serious injury to cause death.
Therefore:
- Observe the installation instructions.
- Install protective covers properly.
- To conduct installation only by trained personnel.

WARNING!

Electric shock caused by missing or defective protective cover!
Therefore:
- Install protective covers properly.
- To conduct installation only by trained personnel.
- Never use equipment without protective cover mounted in operation.

WARNING!

Electrocuted by power lines not covered!
Not Covered power connections can cause serious injury and even death.
Therefore:
- Install shock protection regulations.
- Take without ever mounted shock protection devices in operation.

WARNING!

Misconduct of the devices due to incorrect device setting!
Incorrect instrument settings can lead to serious injury and even death.
Therefore:
- Observe the operation instructions.
- To conduct installation only by trained personnel.
- Check the parameters and data sets.
- Use only for the function matching settings.

WARNING!

Electric shock caused by missing or defective safety device!
Missing or defective guards can cause serious injury and even death.
Therefore:
- Install protective regulations.
- To conduct installation only by trained personnel.
- Check the protection device.

WARNING!

Electric shock by disconnecting or plug connectors under voltage!
Activity of connectors under voltage can cause serious injury to cause death.
Therefore:
- Turn off the power supply voltage and DC-24-V supply voltage.
- Ensure freedom from stress of the device.
- Separate connectors never under voltage or combined.

The grounding of the equipment is mandatory regardless of the type of energy is required. Hold down while following rules that:

- Grounding of the unit by the shortest route.
- Use a grounding cable to the color green-yellow.

6.2 Preparations

Required tools:

- Insulated Electrical Screwdriver
- Insulated Side Cutters
- Stripping
- Press pliers for ferrules
- meter for voltage, current, isolation
- laptop with PLC and frequency converter software
- wrench

6.3 Assembly

DANGER!

Injury due to improper installation!
Improper installation can result in serious injury to person and property.
Therefore:
- The operation and maintenance personnel must have read and understood the operating instructions and in particular the guidelines on safety.
- Installation of the festoon system must be performed by sufficiently qualified and trained specialists.
- Protective gear for operation and maintenance personnel must be provided and used.
- The system operator or his/her representative is to supervise machine operation to ensure the safety of personnel when working on or with the system.

Personnel:

- Execution by qualified persons

Required tool:

- Insulated Electrical Screwdriver
- Insulated Side Cutters
- Stripping
- press pliers for ferrules
- wrench

The control panel has to be installed in an air-conditioned electrical room. The connection of the external equipment outside the control panel (motors, limit switches etc.) is made by the customer according to the information given in the documentation. Power and signal cables have to be installed in separate cable trays.

CAUTION!

Damage because of wrong cable connection!
Wrong connected cables might cause to damage of electrical components!

CAUTION!

Use screened cables!
Use of non-screened cables might cause to malfunctions and damage of electrical components!

CAUTION!

Avoid hum loops!
To avoid hum loops correct dimensioning and installation of earth system of all panels has to be considered for 24 VDC power supply!

ADVICE!

Voltage range:
Only voltage and frequency ranges are named and will be specified in case of order.

Description and numbering of interface terminals order specific may differ from those in the BAL mentioned names.

All field devices are connected according to the documentation. Description and numbering of interface terminals order specific may differ from those in the Operating Instruction mentioned names.

Signals from field devices to the MCT control as potential-free contacts (wired to the terminal strip):

Designation	Interface terminal	Signal level
Power supply L Magnetic limit switch	-X10:1	110/230 VAC
Magnetic limit switch MCT 1, water-side	-X10:5	110/230 VAC
Magnetic limit switch MCT 1, land-side	-X10:6	110/230 VAC
Magnetic limit switch MCT 2, water-side	-X10:7	110/230 VAC
Magnetic limit switch MCT 2, land-side	-X10:8	110/230 VAC
Magnetic limit switch MCT 3, water-side	-X10:9	110/230 VAC
Magnetic limit switch MCT 3, land-side	-X10:10	110/230 VAC
Power supply N	-X10:11	110/230 VAC

For the connection of the festoon cables the customer has to provide a terminal box with the appropriate dimensions. Screened cables have to be used for fixed installed motor and temperature sensor cables and for signal cables.

MCT No.	Connection	Interface terminal
1	Motor phase U	-5T1-X1:U
1	Motor phase V	-5T1-X1:V
1	Motor phase W	-5T1-X1:W
1	Motor PE	-5T1-X1:PE
1	Motor screen	-5T1-X1:S
1	Motor temperature sensor	-X10:2
2	Motor phase U	-6T1-X1:U
2	Motor phase V	-6T1-X1:V
2	Motor phase W	-6T1-X1:W
2	Motor PE	-6T1-X1:PE
2	Motor screen	-6T1-X1:S
2	Motor temperature sensor	-X10:3
3	Motor phase U	-7T1-X1:U
3	Motor phase V	-7T1-X1:V
3	Motor phase W	-7T1-X1:W
3	Motor PE	-7T1-X1:PE
3	Motor screen	-7T1-X1:S
3	Motor temperature sensor	-X10:4
1-3	Voltage temperature sensor [L]	-X10:1
1-3	Motor anti condensation heaters L	-XE:2
1-3	Motor anti condensation heaters N	-XE:6
1-3	Motor anti condensation heaters PE	-XE:PE

6.4 Interface signals with relays

CAUTION!

Keep maximum permitted signal delay!
Renege of maximum signal delay cause to a non-synchronized movement and to a damage or to an early abrasion of cable trolley components!

For the measuring and transmission of actual values and interface signals the customer has to consider that these are generated in correct order and are applied at the MCT control with a maximum permissible delay of 200 ms from the creation of the signals at the signal transmitter.

CAUTION!

Keep permitted signal levels!
Renege of signal levels might cause to malfunctions and damage of electrical components!

Definition of signal levels at terminals of the MCT panel:
Signal = 0 (Low): 0 … 5 VDC
Signal = 1 (High): 15 … 28,8 VDC

Signals from the crane-PLC to the MCT-control via binary 24VDC signals or potential free contacts:

Designation	Interface terminal	Signal level
Reference potential [0 V]	-X20:1	24 VDC
Crane switch on	-X20:2	24 VDC
Main trolley travel - water side	-X20:3	24 VDC
Main trolley travel - land side	-X20:4	24 VDC
Disturbance - reset	-X20:5	24 VDC
Actual value of the main trolley after the starting signal	-X22:1 (+) -X22:2(GND) -X22:S	+/-10 V

Drive direction to the waterside with full speed (100%) +10 V at the analog interface. Drive direction to the land side with full speed (-100%) results-10 V at the analog interface.

ADVICE!

The direction signals have to be derivated from the actual main trolley speed. Do not use joy stick contacts, it might be different signal level as the actual main trolley drive direction.

Signals from the MCT control to the main PLC via potential-free contacts:

Designation	Interface terminal	Signal level
Converter MCT 1 is ready for operation and without disturbance.	-X21:3	High
Converter MCT 2 is ready for operation and without disturbance.	-X21:4	High
Converter MCT 3 is ready for operation and without disturbance.	-X21:5	High
No fault MCT	-X21:2	High
Power supply for coupling relays [L]	-X21:1	<= 230 VAC/DC

6.5 Interface signal with Profibus

CAUTION!

Keep maximum permitted signal delay!
Renege of maximum signal delay cause to a non-synchronized movement and to a damage or to an early abrasion of cable trolley components!

For the measuring and transmission of actual values and interface signals the customer has to consider that these are generated in correct order and are applied at the MCT control with a maximum permissible delay of 200 ms from the creation of the signals at the signal transmitter.

Transfer size:

Customer to CXW = 10 words
CXW to customer = 10 words

For the hardware configuration of the ET200S is a free PPO-type with 10 words PZD receive and send data to be selected. A transfer in the PKW sector is not required and is therefore not provided.

6.5.1 Profibus interface signals crane -> MCT

First-Byte = 0
End-Byte = 19.7

Address Byte/Bit	Signal	Typ	Initial value	Comment
0.0	CRANE_SWITCH_ON	BOOL	FALSE	Input crane main switch is ON (base for the operation of the system).
0.1	POSITIONING_SIGNAL_OK	BOOL	FALSE	Input customers position measuring system is ok without fault
2	ACT_POS_MAIN_TROLLEY	REAL	0.000000e+000	Input actual main trolley position as 32 bit floating-point number (actual position on the complete distance in [mm])
6	ACT_SPEED	REAL	0.000000e+000	Input actual speed of main trolley, scaled to -100 to +100% of maximum speed -0% to -100% to mean drive direction land side 0% to 100% to mean drive direction water side
10.0	DRIVE_SWITCH_POS	BOOL	FALSE	Input crane moved into positive direction
10.1	DRIVE_SWITCH_NEG	BOOL	FALSE	Input crane moved into negative direction
10.2	ACKN_FAILURE	BOOL	FALSE	Input reset signal for fault reset
10.3	spare1	BOOL	FALSE	Reserve
10.4	spare2	BOOL	FALSE	Reserve
10.5	spare3	BOOL	FALSE	Reserve
10.6	spare4	BOOL	FALSE	Reserve
10.7	spare5	BOOL	FALSE	Reserve
12	spare6	WORD	W#16#0	Reserve
14	spare7	WORD	W#16#0	Reserve
16	spare8	REAL	0.000000e+000	Reserve

6.5.2 Profibus interface signals MCT -> crane (general)

First-Byte = 20
End-Byte = 27.7

Address Byte/Bit	Signal	Typ	Initial value	Comment
20.0	CABLE_TROLLEY_READY	BOOL	FALSE	Signal output MCT is ok and no fault. (Customer has to interlock trolley main drive with this signal: In case of Low-signal main trolley speed has to be limited to maximum 50%).
20.1	COLLECTIV_FAILURE	BOOL	FALSE	Signal output collective failure
20.2	FAIL_PROFIBUS	BOOL	FALSE	Signal Output failure Profibus between CXW-PLC and CXW Sinamics converter.
22	FAILURE_BUFFER_CU	WORD	W#16#0	Failure number of Control Unit.
24	FAILURE_BUFFER_SLM	WORD	W#16#0	Failure number of Smart Line Module, only on modules with drive cliq connection.
26	spare2	WORD	W#16#0	Reserve

6.5.3 Profibus interface signals MCT1 -> crane

First-Byte = 28
End-Byte = 31.7

Address Byte/Bit	Signal	Typ	Initial value	Comment
28	MCT1_ FAILURE_BUFFER_MOMO	WORD	W#16#0	Failure number of Motor Module.
30.0	MCT1_FAILURE_LIMIT_SWITCH_POS	BOOL	FALSE	Signal output fault limit switch positive direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
30.1	MCT1_FAILURE_LIMIT_SWITCH_NEG	BOOL	FALSE	Signal output fault limit switch negative direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
30.2	MCT1_FAILURE_FREQ_CONVERTER	BOOL	FALSE	Signal output fault frequency converter or fault communication to frequency converter
30.3	MCT1_FAILURE_TOOTH_BELT_BROKN	BOOL	FALSE	Signal output tooth belt broken
30.4	MCT1.spare	BOOL	FALSE	Reserve
30.5	MCT1.spare1	BOOL	FALSE	Reserve
30.6	MCT1.spare2	BOOL	FALSE	Reserve
30.7	MCT1.spare3	BOOL	FALSE	Reserve
31.0	MCT1-LIMIT_SWITCH_WATERSIDE	BOOL	FALSE	Info limit switch waterside signal from limit switch waterside
31.1	MCT1_LIMIT_SWITCH_LANDSIDE	BOOL	FALSE	Info limit switch landside signal from limit switch landside
31.2	MCT1.spare4	BOOL	FALSE	Reserve
31.3	MCT1.spare5	BOOL	FALSE	Reserve
31.4	MCT1.spare6	BOOL	FALSE	Reserve
31.5	MCT1.spare7	BOOL	FALSE	Reserve
31.6	MCT1.spare8	BOOL	FALSE	Reserve
31.7	MCT1.spare9	BOOL	FALSE	Reserve

6.5.4 Profibus interface signals MCT2 -> crane

First-Byte = 32
End-Byte = 35.7

Address Byte/Bit	Signal	Typ	Initial value	Comment
32	MCT2_ FAILURE_BUFFER_MOMO	WORD	W#16#0	Failure number of Motor Module.
34.0	MCT2_FAILURE_LIMIT_SWITCH_POS	BOOL	FALSE	Signal output fault limit switch positive direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
34.1	MCT2_FAILURE_LIMIT_SWITCH_NEG	BOOL	FALSE	Signal output fault limit switch negative direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
34.2	MCT2_FAILURE_FREQ_CONVERTER	BOOL	FALSE	Signal output fault frequency converter or fault communication to frequency converter
34.3	MCT2_FAILURE_TOOTH_BELT_BROKN	BOOL	FALSE	Signal output tooth belt broken
34.4	MCT2.spare	BOOL	FALSE	Reserve
34.5	MCT2.spare1	BOOL	FALSE	Reserve
34.6	MCT2.spare2	BOOL	FALSE	Reserve
34.7	MCT2.spare3	BOOL	FALSE	Reserve
35.0	MCT2_LIMIT_SWITCH_WATERSIDE	BOOL	FALSE	Info limit switch waterside signal from limit switch waterside
35.1	MCT2_LIMIT_SWITCH_LANDSIDE	BOOL	FALSE	Info limit switch landside signal from limit switch landside
35.2	MCT2.spare4	BOOL	FALSE	Reserve
35.3	MCT2.spare5	BOOL	FALSE	Reserve
35.4	MCT2.spare6	BOOL	FALSE	Reserve
35.5	MCT2.spare7	BOOL	FALSE	Reserve
35.6	MCT2.spare8	BOOL	FALSE	Reserve
35.7	MCT2.spare9	BOOL	FALSE	Reserve

6.5.5 Profibus interface signals MCT3 -> crane

First-Byte = 36
End-Byte = 39.7

Address Byte/Bit	Signal	Typ	Initial value	Comment
36	MCT3_ FAILURE_BUFFER_MOMO	WORD	W#16#0	Failure number of Motor Module.
38.0	MCT3_FAILURE_LIMIT_SWITCH_POS 1)	BOOL	FALSE	Signal output fault limit switch positive direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
38.1	MCT3_FAILURE_LIMIT_SWITCH_NEG 1)	BOOL	FALSE	Signal output fault limit switch negative direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
38.2	MCT3_FAILURE_FREQ_CONVERTER	BOOL	FALSE	Signal output fault frequency converter or fault communication to frequency converter.
38.3	MCT3_FAILURE_TOOTH_BELT_BROKN	BOOL	FALSE	Signal output tooth belt broken
38.4	MCT3.spare	BOOL	FALSE	Reserve
38.5	MCT3.spare1	BOOL	FALSE	Reserve
38.6	MCT3.spare2	BOOL	FALSE	Reserve
38.7	MCT3.spare3	BOOL	FALSE	Reserve
39.0	MCT3_LIMIT_SWITCH_WATERSIDE	BOOL	FALSE	Info limit switch waterside signal from limit switch waterside
39.1	MCT3_LIMIT_SWITCH_LANDSIDE	BOOL	FALSE	Info limit switch landside signal from limit switch landside
39.2	MCT3.spare4	BOOL	FALSE	Reserve
39.3	MCT3.spare5	BOOL	FALSE	Reserve
39.4	MCT3.spare6	BOOL	FALSE	Reserve
39.5	MCT3.spare7	BOOL	FALSE	Reserve
39.6	MCT3.spare8	BOOL	FALSE	Reserve
39.7	MCT3.spare9	BOOL	FALSE	Reserve

6.6 Test and initial commissioning

WARNING!

Risk of injury due to improper commissioning!
Improper commissioning may cause dangerous situations for the personnel.
Therefore:
- Carry out on the commissioning tests in accordance with the manufacturer's test list.
- Motorized festoon system never without testing in accordance with the manufacturer's testing list in operation.
- Before commissioning make visual inspection and audit work required.
- Refrain from any safety critical operation.
- Report damage to the driven cable trolley system once the appropriate person.
- Driven to secure cable carriage system against accidental or unauthorized use.
- Staying in the area of influence of the motorized festoon system is prohibited!

CAUTION!

Risk of stumbling due to projecting components!
In committing the driven cable trolley system, there is the danger of stumbling.
Therefore:
- In celebration of Labor and eighth paragraphs of danger areas and depressions in the ground. There must be no loose items are on the ground.

CAUTION!

Risk of crushing!
In the process of the motorized festoon system, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and road-makers, and between belt and pulleys.
Therefore:
- Occur when procedures are not in the danger area of the motorized festoon system.

CAUTION!

Risk of apprehension!
In the process of the motorized festoon system, the risk of apprehension.
Therefore:
- The procedure does not come into the danger area of the motorized festoon system.

The commissioning of the motorized festoon system is carried out together with the operator and documented. The same personnel needed for commissioning, as operators, electricians, fitters, etc., are the operator for the duration of the operation to make available. The free access to the system is guaranteed. After the successful startup of the company shall Conductix-Wampfler one authorized by the operator is logged in the final protocol is that the system meets the requirements.

6.7 Checklist initial commissioning

Activity	Checked
Mechanical control	
Visual control of correct mechanical installation of the magnetic limit switches	
Visual control of the correct arrangement of the trolleys on the road carrier. The trolley numbers from the driver terminal are numbered in the direction of end terminal.	
Visual control of the correct mounting height of the driver terminal and end terminal.	
Review of the steel- and rubber-bands	
Review assignment and .clamp of the wires on the cable-trolley	
Review recruitment and protection of the side guide rollers	
Review of the tooth belt tension.	
Electrical control	
Visual control of the cabinet or mounting plate for transport damage	
Check all screws firmly relay circuit breakers ….	
Check for correct wiring of the system (cabinet, limit switch, motor, …)	
Check for correct connecting the motor cable	
Check shield connections	
Check limit switch signals (simulation with additional magnets)	
PLC-Program integrated in the Crane-PLC	

6.8 Carry out initial commissioning

Activity	Checked
Interface signals between costumer and Conductix-Wampfler	
Control the the direction of rotation of the motors and the correct membership Frequency-Converter 1 = Motor 1	
Motor ID for all motors	
Test festoon system with 10% crane speed of correct function	
Control function of the waterside and landside limit switch	
Improve the crane speed of adjustment of the parameters for the speed factor of the motorized festoon system	
Test festoon system with 100% crane speed of correct function	

The failure of the motorized festoon system, the maximum crane speed limited automatically to 120 m/m.	

After completion of commissioning, the inverter current files and the complete Conductix-Wampfler AG PLC program to the following Conductix-Wampfler AG E-mail address must be sent.

commissioning.de@conductix.com

7 Operation

7.1 Safety

WARNING!

Danger of life due to pending loads!
Lifting loads may involve danger of life due to falling objects or parts pending without control.
Therefore:
- Never stand below pending loads.
- Move loads only under supervision
- Observe the information regarding the provided suspension points.
- Do not attach anything to projecting machine parts or to eyes of built-on components. Ensure that the fasteners have a tight fit.
- Only use hoist units and fasteners with sufficient load capacity.
- Do not use cracked or abraded ropes or belts.
- Do not place ropes and belts close to sharp edges and corners, do not fasten with knots and do not twist.
- When leaving the work to sell the load.

WARNING!

Risk of injury by improper handling!
Improper use may result in severe personal injury or damage.
Therefore:
- Perform all operating steps as specified in this manual.
- Before starting work ensure that all covers and safety devices are installed and working properly.
- Never put a safety device during operation suspended.
- - Pay attention to order and cleanliness in the work area! Lose successive parts and tools lying around or are sources of accidents.

WARNING!

Danger to unauthorized persons!
Unauthorized persons who do not meet those needs is to be ignorant of the dangers in the work area.
Therefore:
- Keep unauthorized persons from the work area.
- When in doubt, appeal to people and identify them from the workspace.
- The work to interrupt while staying trespassers in the workspace.

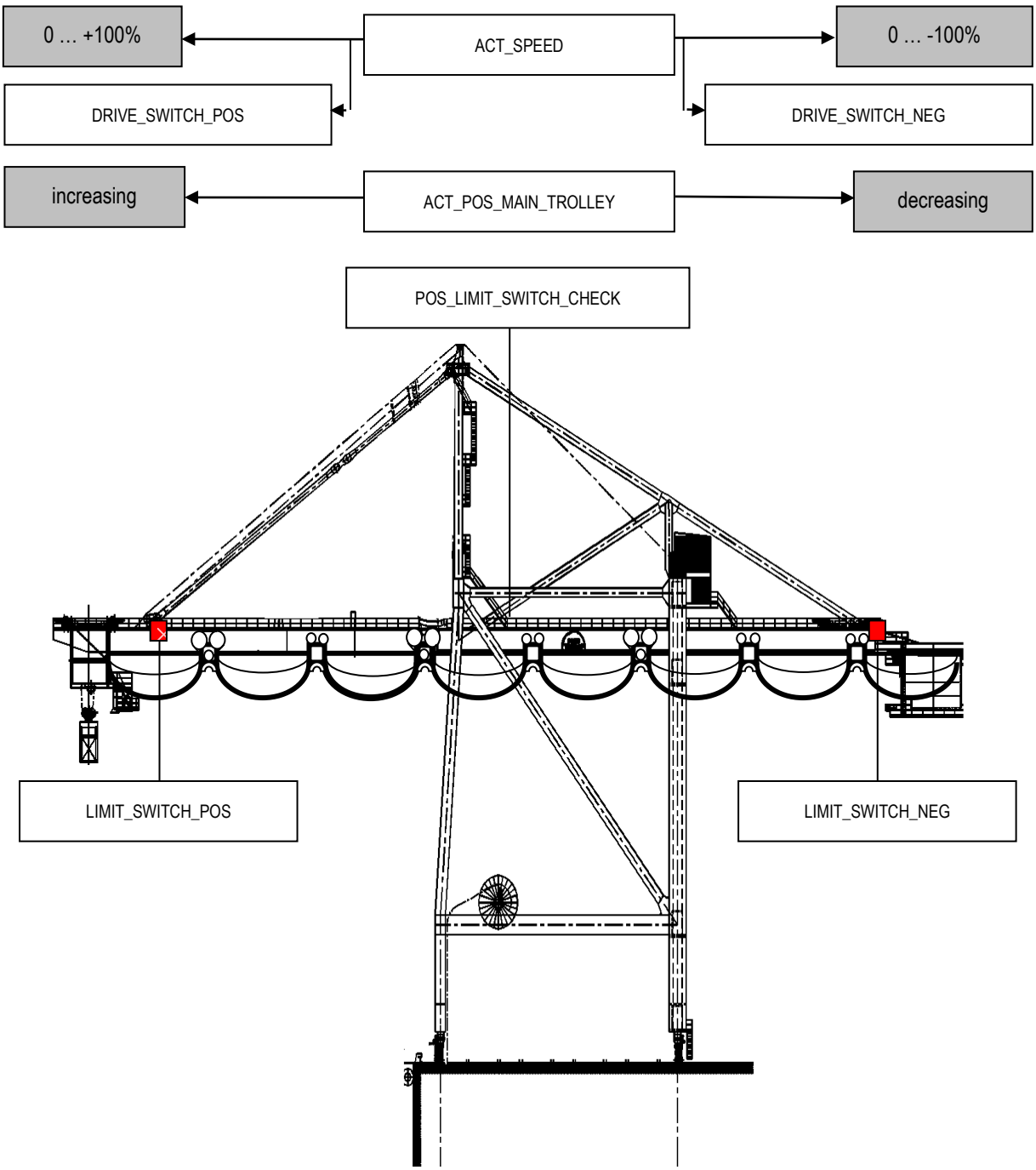
WARNING!

Misconduct of the devices due to incorrect instrument setting!
Incorrect instrument settings can lead to serious injury and even death.
Therefore:
- Not to change parameters and data sets without consulting the manufacturer.
- Settings of protective devices do not change.

Personnel:

- Operation by trained personnel only!

7.2 Overview and Definition



7.3 Description „starting and shutdown cycle of the control unit“

If the power supply is switched on the control is switched on and off by the signal “Crane switch on”. The main contactor will be switched on, the anti condensation heaters of the motors will be switched off.

When this process is completed and there is no disturbance the signals „Converter motorized cable trolleys 1; 2; 3 ready for operation and no disturbance” and „No fault MCT“ are set. The control is now ready for operation.

Signal “Crane switch on” for the drive of the motorized cable trolley mustn´t switch off before actual speed of main trolley is 0 to ensure motor deceleration of the motorized cable trolley according to the designated ramp-down time.

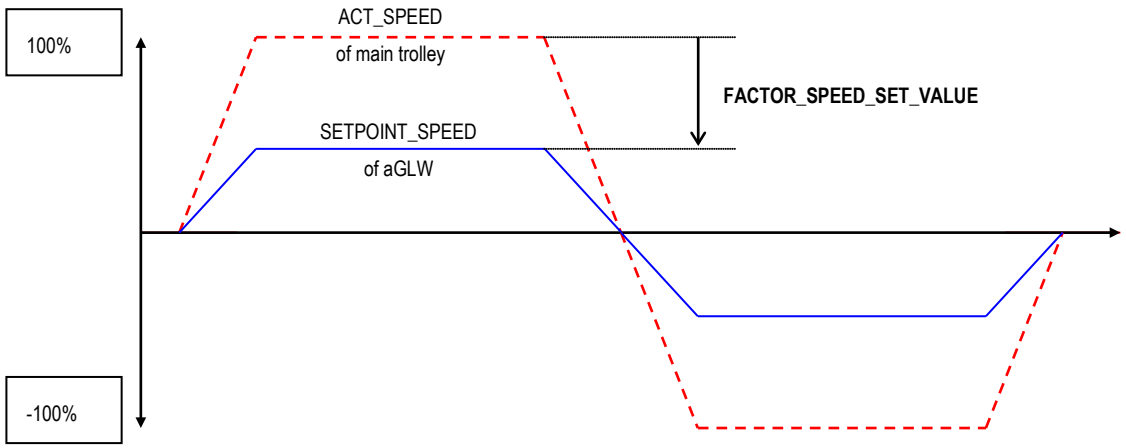
7.4 Analysis of crane signals

At lower speed range motorized cable reels are controlled by joy stick signals negative or positive direction. At higher speeds and for detection of acceleration and deceleration scaled main trolley speed is used.

7.5 Description „operation“

The control of the frequency converters respectively motors of the festoon system is made with analoque to the actual value of the main trolley speed. To adjust the speed of the motorized cable trolley (motor speed setpoint value) the actual main trolley speed has to be multiplied by a scaling factor. The scaling factor will be calculated for each drive by Conductix-Wampfler AG and has to be adjusted during commissioning of the festoon system.

If signal “CABLE_TROLLEY_READY”
is missed main trolley speed has to be limited to maximum 50%!



7.6 Monitoring overspeed

In case of pushing or pulling of the motorized cable trolley by the main trolley the speed setpoint value of the motorized cable trolley will be corrected by the control.

7.7 Switching off by limit switches

The speed setpoint value will be reduced according to the adjustable deceleration ramp up to the given stop frequency if the positive or negative direction limit switch is actuated by the motorized cable trolley.

8 Service and maintenance

8.1 Safety

WARNING!

Risk of injury due to improper maintenance works!
Improper maintenance works may cause heavy injuries to persons and damage to properties.
Therefore:
- Prior to starting work make sure that the conditions to start the mounting are fulfilled.
- Ensure that the workplace is clean and tidy! Loose components and tools, that are lying around may cause accidents.
- If components have been removed, ensure that they are mounted correctly, reinstall all fasteners and observe the screw tightening torques.
- Observe the protective covers and guards.
- Ensure proper coverage of power connections.

8.2 Maintenance schedule

The following chapters describe the maintenance works, which are required for an optimum and undisturbed operation.
The realized maintenance work must be recorded in writing.
If signs of stronger abrasion are found during regular controls, reduce the maintenance intervals in accordance with the actual sings of wear.
For questions concerning maintenance works and intervals contact the manufacturer, see service address on the last page.

Interval	Maintenance work	To be effected by
Half-yearly	Filters of panel ventilator have to be changed	Expert

9 Fault diagnosis

WARNING!

Risk of injury due to improper fault clearance!
Improper fault clearance may cause heavy injuries or damage to property.
Therefore:
- In case of disturbance contact the manufacturer.
- Fault clearance must only be carried out by workers of the manufacturer or by personnel authorized by the manufacturer.

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

Therefore:
All faults must be analyzed before remedying the problem.

WARNING!

Death due to electric shock!
Work on electrical systems or production equipment may only be performed by specialized electricians or persons under the supervision and direction of an electrician in accordance with electrical rules (qualified specialists).

All faults must first analyze and then resolve the interference will be. Work on electrical systems or production equipment may only be performed by specialized electricians or persons under the supervision and direction of an electrician in accordance with electrical rules (qualified specialists).

9.1 Procedure in case of alarms and faults

In case of a fault of a drive unit of the festoon system, it is required, through the superior control (crane control), to immediately restrict the speed of the crane main trolley to a max. of 50% of the rated crane main trolley speed. The speed must not exceed 120 m/min.
At the latest after the shift respectively completion of the loading/unloading cycle of the container ship, the fault has to be analyzed and corrected. Conductix-Wampfler AG has to be informed in writing without delay.

Please note: The operation during emergency modus longer than the loading respectively unloading cycle can cause mechanical overloading and damage of the festoon system.

A fault message **(Fxxx)** at a frequency inverter can be reset after the fault analysis and fault elimination by the control signal “reset fault”.

During operation the frequency inverter can generate sporadic alarm signals (**Axxx**), on the display. These are required for subsequent processing within the inverter program and do not have any influence on the operation of the system and can therefore be ignored.

9.2 Description fault with relay interface signals

9.2.1 Description fault „tooth belt break“

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

Break of tooth belts of the motorized cable trolley are controlled. If motor current value during movement of main trolley is lower as adjusted value (standard: 30%) motor run without load, both tooth belts are broken.

After analyzing of the fault signal reset is possible.

In case of a fault main trolley speed has to be limited to maximum 50%!

9.2.2 Frequency converter

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

Communication between PLC and frequency converter is carried out with Profibus.
In case of a frequency converter fault a general fault signal occurs, the signal “No fault MCT” will be switched off. The main drive has to be stopped. Reason of fault signal has to be analyzed and fixed before reset of the fault.

In case of a fault main trolley speed has to be limited to maximum 50%!

9.3 Description fault with Profibus interface signals

9.3.1 Monitoring limit switch function

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

By latching of the first priority signal (POSITIONING_SIGNAL_OK) and programming of the position value (ACT_POS_MAIN_TROLLEY) limit switch signals will be monitored during operation according to following criterias:

- Main trolley position (ACT_POS_MAIN_TROLLEY) higher programmed value (POS_LIMIT_SWITCH_CHECK) and negative limit switch signal (LIMIT_SWITCH_NEG) is OFF → fault signal (FAILURE_LIMIT_SWITCH_NEG) will be latched.
- Main trolley position (ACT_POS_MAIN_TROLLEY) lower programmed value (POS_LIMIT_SWITCH_CHECK) and positive limit switch signal (LIMIT_SWITCH_POS) is OFF → fault signal (FAILURE_LIMIT_SWITCH_POS) will be latched.

After having analyzed and corrected the reason of the wrong switching performance of the limit switch, reset is possible by the input (ACKN_FAILURE).

In case of a fault main trolley speed has to be limited to maximum 50%!

Formal operand	Format	Factory setting	Function
ACT_SPEED	REAL	-	Actual main trolley speed in %
DRIVE_SWITCH_POS	BOOL	-	Input joy stick of trolley positive direction
DRIVE_SWITCH_NEG	BOOL	-	Input joy stick of trolley negative direction
LIMIT_SWITCH_POS	BOOL	-	Input limit switch pos. (WATER) direction not activated
LIMIT_SWITCH_NEG	BOOL	-	Input limit switch neg. (LAND) direction not activated
ACT_POS_MAIN_TROLLEY	REAL	-	Actual main trolley position in mm
POSITIONING_SIGNAL_OK	BOOL		Position measuring system no fault
FAILURE_LIMIT_SWITCH_POS	BOOL		Output fault limit switch pos. (WATER)
FAILURE_LIMIT_SWITCH_NEG	BOOL		Output fault limit switch neg. (LAND)
ACKN_FAILURE	BOOL		Input reset fault

9.3.2 Monitoring tooth belts

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

Break of tooth belts of the motorized cable trolleys are controlled. If motor current value during movement of main trolley is lower as adjusted value (standard: 30%) motor run without load, both tooth belts are broken, fault signal (FAILURE_TOOTH_BELT_BROKN) will be latched.

After having analyzed and corrected the reason of the broken tooth belts, reset is possible by the input (ACKN_FAILURE).

In case of a fault main trolley speed has to be limited to maximum 50%!

Formal operand	Format	Factory setting	Function
FAILURE_TOOTH_BELT_BROKN	BOOL		Signal output tooth belt broken
ACKN_FAILURE	BOOL		Input reset fault

9.3.3 Frequency converter

WARNING!

System damage from continuation of operation!
- Damage of buffers
- Damage of tooth belts
- Possible injury from falling objects!

Communication between crane PLC and frequency converter is carried out with Profibus.

In case of a frequency converter fault a general fault signal (FAILURE_FREQ_CONVERTER) occurs, the signal (CABLE_TROLLEY_READY) will be switched off. The main drive has to be stopped. Reason of fault signal has to be analyzed and fixed before reset of the fault (ACKN_FAILURE).
Fault signal (FAILURE_FREQ_CONVERTER) can be used for fault identification system of the crane. At same time the alarm storage of the frequency converter (FAILURE_BUFFER_MOMO) or (FAILURE_BUFFER_CU) or (FAILURE_BUFFER_SLM) may be readout.

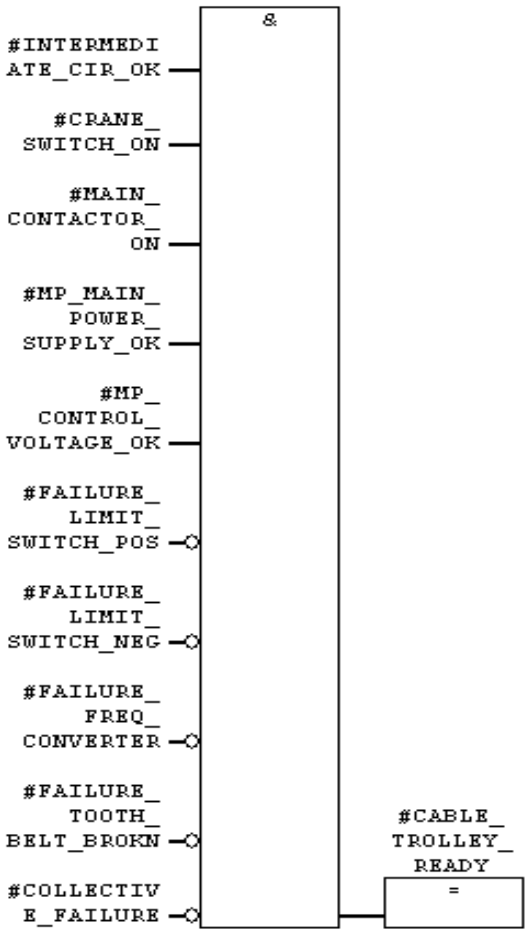
In case of a fault main trolley speed has to be limited to maximum 50%!

Formal operand	Format	Factory setting	Function
CABLE_TROLLEY_READY	BOOL		Signal output MCT ready for operation.
FAILURE_FREQ_CONVERTER	BOOL		Signal output fault frequency converter.
ACKN_FAILURE	BOOL		Input reset fault.
FAILURE_BUFFER_MOMO	WORD		Failure number of Motor Module.
FAILURE_BUFFER_CU	WORD		Failure number of Control Unit.
FAILURE_BUFFER_SLM	WORD		Failure number of Smart Line Module, only on modules with drive cliq connection.

9.3.4 Enabling operation

The status bit (CABLE_TROLLEY_READY) indicating the correct function of the motorized cable trolley has to be interlocked into the enabling sequence of the set point limiting of the main trolley speed. **If the signal is „0“ the main trolley speed has to be limited to maximum 50%.**

Following preconditions are necessary for enabling operation:


&
#INTERMEDIATE_CIR_OK
#CRANE_SWITCH_ON
#MAIN_CONTACTOR_ON
#MP_MAIN_POWER_SUPPLY_OK
#MP_CONTROL_VOLTAGE_OK
#FAILURE_LIMIT_SWITCH_POS
#FAILURE_LIMIT_SWITCH_NEG
#FAILURE_FREQ_CONVERTER
#FAILURE_TOOTH_BELT_BROKN
#COLLECTIVE_FAILURE
#CABLE_TROLLEY_READY
=

Formal operand	Format	Factory setting	Function
INTERMEDIATE_CIR_OK	BOOL	-	Input DC-link (braking unit, braking resistance) has no fault
CRANE_SWITCH_ON	BOOL	-	Main contactor crane ON Switch on main contactor and enable operation signal after time delay
MAIN_CONTACTOR_ON	BOOL	-	Output main contactor
MP_MAIN_POWER_SUPPLY_OK	BOOL	-	Input circuit breaker main power supply is ON
MP_CONTROL_VOLTAGE_OK	BOOL	-	Input circuit breaker control power supply is ON
FAILURE_LIMIT_SWITCH_POS	BOOL	-	Output fault limit switch pos. (WATER)
FAILURE_LIMIT_SWITCH_NEG	BOOL	-	Output fault limit switch neg. (LAND)
FAILURE_FREQ_CONVERTER	BOOL	-	Input frequency converter fault
FAILURE_TOOTH_BELT_BROKN	BOOL		Signal output tooth belt broken
COLLECTIV_FAILURE	BOOL		Signal output collective failure
CABLE_TROLLEY_READY	BOOL	-	Output MCT ok without fault

10 Disassembly and disposal

10.1 Safety

WARNING!

Risk of injury due to improper disassembly!
Stored residual energy, edged components, tips or corners at or in the device or at the required tools may cause injuries.
Therefore:
- Make sure there is enough room prior to starting works.
- Be careful with open, sharp-edged components.
- Ensure that the workplace is clean and tidy! Loose components or tools that are lying around may cause accidents.
- Dismount components properly. Note that some components have a heavy net weight. Use hoist units if required.
- Secure components, so that they cannot fall down or turn over.
- In case of questions, consult the manufacturer.

CAUTION!

Risk of stumbling due to projecting components!
In committing the motorized festoon system, there is the danger of stumbling.
Therefore:
- In celebration of Labor and eighth paragraphs of danger areas and depressions in the ground. There must be no loose items are on the ground.

CAUTION!

Risk of crushing!
In the process of the motorized festoon system, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and road-makers, and between belt and pulleys.
Therefore:
- Occur when procedures are not in the danger area of the motorized festoon system.

10.2 Disassembly

When the device has reached the end of its useful life, disassemble it and dispose of it in an environmentally compatible way.

Prior to starting the disassembly:

- Remove and dispose of operating and auxiliary material as well as remaining items in an environmentally compatible way.
- Voltage activation of the plant.

Then clean assemblies and components properly and decompose them with regard to the valid local instructions for operational safety and environmental protection.

10.2.1 Disassembly of the assembly group

WARNING!

Danger of life due to pending loads!
Lifting loads may involve danger of life due to falling objects or parts pending without control.
Therefore:
- Never stand below pending loads.
- Move loads only under supervision
- Observe the information regarding the provided suspension points.
- Do not attach anything to projecting machine parts or to eyes of built-on components. Ensure that the fasteners have a tight fit.
- Only use hoist units and fasteners with sufficient load capacity.
- Do not use cracked or abraded ropes or belts.
- Do not place ropes and belts close to sharp edges and corners, do not fasten with knots and do not twist.
- When leaving the work to sell the load.

WARNING!

Electric shock through non-voltage supplies to the final!
Power supplies cannot Scene serious injury to cause death.
Therefore:
- Test before begin dismantling absence of voltage.

CAUTION!

Loads attached properly to appropriate technical and proper lifting / lifting equipment with sufficient capacity.

Personnel:

- Execution by instructed personnel

Required tools:

- Insulated Electrical Screwdriver
- Insulated Side Cutters
- instrument for voltage
- wrench

10.3 Disposal

If return or disposal arrangements have not been made, use decomposed components for recycling:

- Scrap metals.
- Provide plastic elements for recycling.
- Dispose of remaining components separately according the material consistence.

CAUTION!

Environmental damage due to incorrect disposal!
Electronic scrap, electronic components, lubricants and other auxiliary material are considered as hazardous waste and may only be disposed off by authorized specialized service centers!

The local authority or specialized service centers for disposal give advice as to environmentally compatible disposal.

11 Further documents

11.1 Spare parts list

Number of individual parts and the type (power, voltage) are order specific!

- PLC Relay Socket
- Coupling relay
- Control
- Smart Line Module
- Single Motor Module
- ET 200S interface module
- Master interface module ET 200S
- ET 200S Power Module
- ET 200S terminal module
- ET200S digital input module
- ET200S digital output module
- ET200S analog input module
- Filter mat
- Lamp use
- Motor protection switch

11.2 Applicable documents

Listing of applicable documents

- BAL0300-0006
- BAL0300-0014
- ……..

Operating Instructions

Control for motorized festoon systems

Sinamics S120 with CXW PLC and relay or bus interface to crane PLC

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