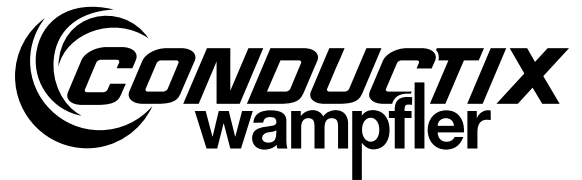


Operating Instructions



Control for motorized festoon systems

Yaskawa A1000 with bus interface to crane PLC Yaskawa 317M CPU



Control for motorized festoon systems

Yaskawa A1000 with bus interface to crane PLC Yaskawa 317M CPU

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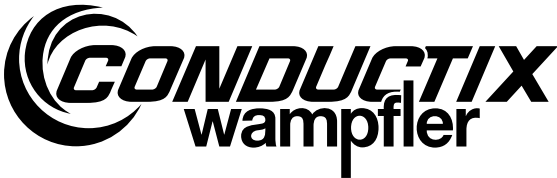
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1 General advice

1.1 About this document

This document facilitates safe and efficient handling and use of the equipment.

The document is an integral part of the equipment and must be kept in its immediately vicinity to allow access by personnel at any time. Prior to commencing any work, personnel must have carefully read through and understood this document. It is a basic requirement for safe working that all safety and procedural instructions contained in this document are complied with.

Local accident protection regulations and general safety guidelines for the area of use of the device or system also apply.

Illustrations in this documentation are provided for basic understanding and may deviate from the actual implementation of the unit or system.

In addition to these installation and operating instructions, attached instructions (if any) for installed components also apply.

1.2 Limitation of liability

All information and instructions in this document have been compiled with due regard to the standards and regulations in force, best engineering practice, and the findings and experience we have accumulated over many years.

The manufacturer is in no way liable for damages resulting from:

- failure to comply with this document,
- improper use,
- use by untrained personnel,
- unauthorized modifications,
- technical changes,
- use of unauthorized spare parts and accessories.

The actual scope of delivery may differ from the explanations and illustrations described here for special variants, if additional order options are utilized, or due to the latest technical changes.

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

All products are subject to technical modifications in the context of improvement of function and further development.

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1.3 Copyright

This document is copyrighted and intended for customer internal use only.

Handing over the document to third party, any type of copying - even in extracts - as well as utilization and/or communication of the contents are not permitted without written approval by the manufacturer, except for customer internal purposes.

Violations will cause indemnities. We reserve the right to further claims.

1.4 Spare parts



WARNING!

Safety risk due to faulty spare parts!

Faulty or defective spare parts might affect the security and cause damage, malfunction or complete failure.

Therefore:

→ Use only original spare parts of the manufacturer!

Order spare parts from your contracted dealer or directly from the manufacturer.

Contact data for spare parts orders: See the last page of this document.

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 for technical information: See the last page of these assembly instructions.

Our employees are also always interested in new information and experience from the field that can be valuable for the improvement of our products.

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1.7 Applicable documents

These operation instructions are only valid together with the following instructions for festoons:

- Mounting Instructions MAL0300-0004-E Festoons Systems for I-beam – 0365, 0370, 385
- Mounting Instructions MAL0300-0006-E Motorized Festoons Systems – 0380

These documents contain additional notes for the use of festoon systems.

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

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

For detailed information, see chapter 11.2 Applicable documents.

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2 Safety advice

2.1 Definition of symbols

Safety and hazard information is identified in these installation and operating instructions by symbols. Signal words are used to indicate the degree of hazard in these safety instructions. Always observe safety and hazard information and work carefully to avoid accidents, bodily harm or property damage!



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 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 and property damage.



ADVICE!

Advice and recommendations:

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

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2.2 Requirements concerning personnel

2.2.1 Qualification



Risk of injury in case of insufficient qualification!

Incorrect handling can cause serious injury 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.
Personnel are considered qualified if they have successfully concluded training, for example, as electricians, master electricians, electrical engineers, or electrical technicians. Personnel are also considered qualified who have been employed correspondingly for several years, have been educated in theory and practice during that time, and whose electrical knowledge and skills have been tested.
The operator of the electrical facility must document that the corresponding certification or other documentation of qualification are present or have been demonstrated.
- 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



Danger caused by unauthorized personnel!

Unauthorized personnel who do not meet the requirements described in Chapter 2.2 do not understand the danger in the working area.

Therefore:

- Keep unauthorized personnel away from the working area.
- In case of doubt, address the person and direct them away from the working area.
- Stop work as long as unauthorized personnel is in the working area.

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2.2.3 Instruction

Prior to commissioning the personnel must be instructed by the operator. Report the instructions as follows (example):

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

2.3 Application in accordance with the regulations

The festoon system is designed exclusively for the intended purpose described and 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.

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

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

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WARNING!

Possible injury resulting from improper use!

Any application that deviates from or goes beyond the intended use described here can result in a hazardous situation.

Therefore:

- The equipment may only be used as intended.
- Strictly comply with all specifications of these installation and operating instructions.
- Do not use the equipment for any other purpose than for the operation of the festoon system in the specific project environment described above.
- Do not use the equipment in any application other than the one it was designed for.

The **following use of the device is forbidden**. Non-intended use particularly includes the following:

- Using the equipment with unapproved accessories or accessories not authorized by the manufacturer.
- Operation of the equipment by untrained personnel.
- Operation of the equipment with supply voltages higher or lower than projected.
- Changing 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.
- Operation under conditions other than the agreed environmental and operating conditions
- Operating the equipment in a location other than the projected physical location.
- Main trolley speed higher than 50% of nominal speed in case of a fault

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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.

2006/95/EG	EC Low Voltage Directive
2004/108/EG	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.

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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 death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

- Never step under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.
- Be sure the connection elements are firmly seated.
- Use only authorized lifting accessories and connection elements with sufficient load capacity.
- Do not use torn or worn ropes or straps.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Move loads only under supervision.
- Set down loads before leaving the work area.



DANGER!

Risk of fatal injury from electric shock!

Death, heart failure, burns and injury by electric arc are likely to follow when touching electrically live parts. There is also a high risk of injury caused by overreaction after being shocked by electricity.

Therefore, before starting maintenance or repair work:

- Disconnect system from power using the main switch. Main switch: See facility circuit diagram.
- If there is no main switch, disconnect the energy source from the system according to the instructions of the system manufacturer.
- Secure system against reactivation,
- confirm that power has been disconnected,
- ground and short-circuit parts of the system disconnected from power,
- cover or block off neighboring parts still carrying electrical current.
- Before each time the device or system is started, test the insulation resistance according to locally applicable technical standards, directives, and law.

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WARNING!

Risk of potentially fatal injury from electric shock due to maintenance deficiencies!

When working on motorized festoon system components, there is a risk of death or injury from electric shock, burning, or electric arc if they are not properly inspected and maintained.

Therefore:

Disconnect the system from power as described above.

Inspect electrical equipment regularly.

Replace loose or damaged cables immediately.

Burned fuses must always be replaced with a fuse of identical specifications.

Use tools that are insulated against voltage.

Before each time the device or system is started, test the insulation resistance according to locally applicable technical standards, directives, and law.



WARNING!

Risk of injury due to flexible components!

Careless operation of the motorized festoon system can cause heavy injury and damage of the equipment.

Therefore:

→ Switch off the motorized festoon system before maintenance and repair work.

→ Do not touch moving components during operation, particularly the surface where the cable trolleys roll on the I-beams.



CAUTION!

Risk of crushing!

When the motorized festoon system operates, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and track beam, and between tooth-belt and pulleys.

Therefore:

→ Do not step into the danger area of the motorized festoon system when it is being operated.



CAUTION!

Risk of stumbling and falling due to projecting components!

When approaching the motorized festoon system, there is the danger of stumbling.

Therefore:

→ When moving inside the working- and danger area of the motorized festoon system, watch out for depressions or bumps in the ground.

→ There must be no loose items on the ground.



CAUTION!

Risk of getting caught in the festoon system!

When the motorized festoon system operates, there is a risk of getting caught by parts of the festoon system.

Therefore:

→ Do not step into the danger area of the motorized festoon system when it is being operated.

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2.6 Safety devices



Danger of death from malfunctioning safety systems!

Safety can only be guaranteed when the safety systems are intact. Therefore:

- Before starting work, check if the safety systems on the device, as well as all covers, are functional and properly mounted.
- Never disable safety systems.

2.7 Behavior in case of accidents and disturbances

Measures in case of accident:

- Secure the location of the accident.
- Evacuate personnel from of the danger area.
- Notify rescue services.
- Take first aid measures.
- Inform those responsible for the place of use.
- Free the access path for rescue vehicles.

Measures in case of malfunction:

- Involve qualified personnel for fault analysis.
- Fix the fault before restarting the system or continuing work
- Check for correct function after fault fixing.

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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.

ADVICE!

Keep designed power supply voltages!

Operation of the control beyond the power supply voltage tolerances might cause a breakdown of the control or damage to electrical components.

Power supply voltages lower as the nominal motor voltage might cause too 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:

Voltage and frequency ranges in this manual reflect exemplary system design. Specified voltage and frequency ranges that match project-related requirements are written down in separate, project-related documents (Technical data sheet electrical or circuit diagram).

Description and numbering of interface terminals are usually order specific and may therefore differ from the description and numbering in this document. See also Technical data sheet electrical or circuit diagram for the values relating to your project.

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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:L	110/230 V 50/60 Hz
Neutral conductor N	-X1:N	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	

Permitted tolerances at input terminals of the panel according to IEC 60204-32:

Voltages $\pm 10\%$

Frequency $\pm 1\%$

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.

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3.3 Operating conditions



Damage due to wrong operating conditions!

Operation conditions beyond the specified range cause damage due to short circuit and early aging and failure of electrical components!

Stress factors are

- Dust and deposits
- Humidity
- Condensation
- High temperatures

Environment:

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

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4 Description of control and operation

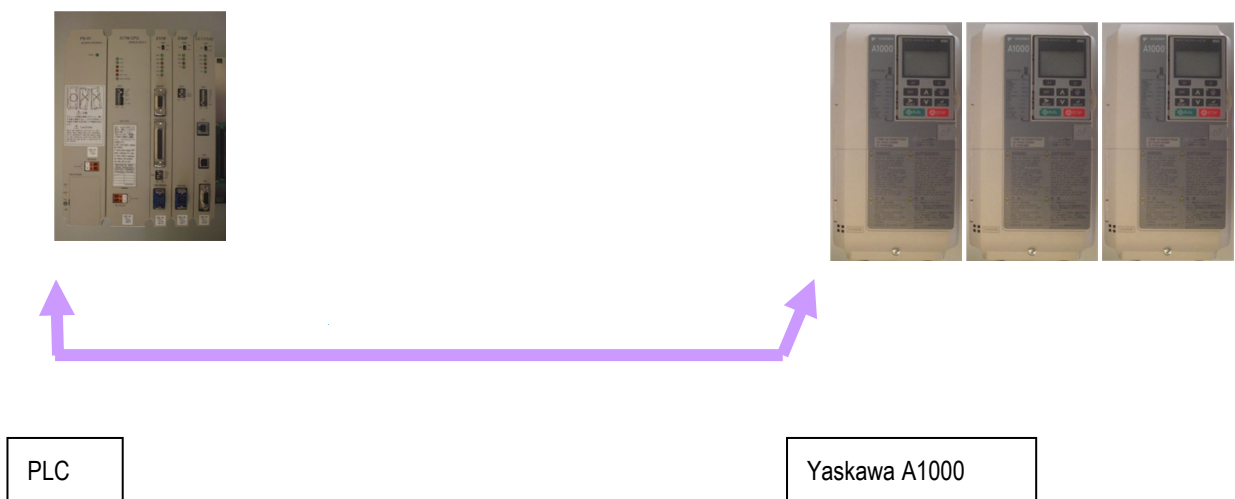
4.1 Overview

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 interface module supplied by Conductix-Wampler has to be integrated into the crane PLC. The frequency converters are controlled by the crane PLC via MEMOBUS / CP 216IF connection.

The control works in vector control operation without encoder.



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4.2 Scope of supply

The control is mounted in a switch cabinet, completely wired, including frequency converters with appropriate reactors and fuses, 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 software module for implementation into the crane PLC is included in the scope of supply, too.

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. Wiring cables will be labeled according to the terminal designation on the equipment.

The documentation consists of

- components scheme,
- circuit diagram,
- terminal diagram,
- cable list.

Documents are drawn with the help of the E-CAD system WSCAD and supplied as pdf file.

The frequency converter and PLC parameters are supplied as a data file.

The data file contains

- the constant table FB180_T1,
- the "Highscan" program H43

and these functions:

- FB181 for general use,
- FB180_1 for Trolley 1,
- FB180_2 for Trolley 2,
- FB180_3 for Trolley 3.



WARNING!

Injury due to wrong parameter adjustment!

Wrong parameter adjustment might cause malfunction of and damage to the festoon system. Parameter adjustment only according to manufacturer instruction and in short steps!



ADVICE!

Data block numbers:

By changing of the numbers of function and data blocks no interference to modules of other manufacturers or functions is allowed!

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4.2.1 Description of FB 180 inputs

Input variable of function block		
Formal operand	Format	Function
CS-ON	BOOL	Input crane main switch is ON (base for the operation of the system).
POS-OK	BOOL	Input customers position measuring system is ok without fault
POS-CR	REAL	Input actual main trolley position as 32 bit floating-point number (actual position on the complete distance in [mm])
SPEED	REAL	Input actual speed of main trolley, scaled to -100 to +100% of maximum speed
MS-POS	BOOL	Input joy stick of trolley moved into positive direction
MS-NEG	BOOL	Input joy stick of trolley moved into negative direction
RESET	BOOL	Input reset signal for fault reset
LS-POS ^{1) 2)}	BOOL	Input limit switch positive direction
LS-NEG	BOOL	Input limit switch negative direction
FC-A-IN ³⁾	WORD	Hardware Address Inverter Input
FC-A-OUT ³⁾	WORD	Hardware Address Inverter Output
DATA ⁴⁾	CAxxx	Start address of Constant Table

¹⁾ = Optional: Only if limit switches for positive direction (waterside) are installed

²⁾ = If not exists inputs have to be connected to „1“!

³⁾ = related to Hardware Setup 216IF

⁴⁾ = find assigned Block inside Constant table

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4.2.2 Description of FB 180 outputs

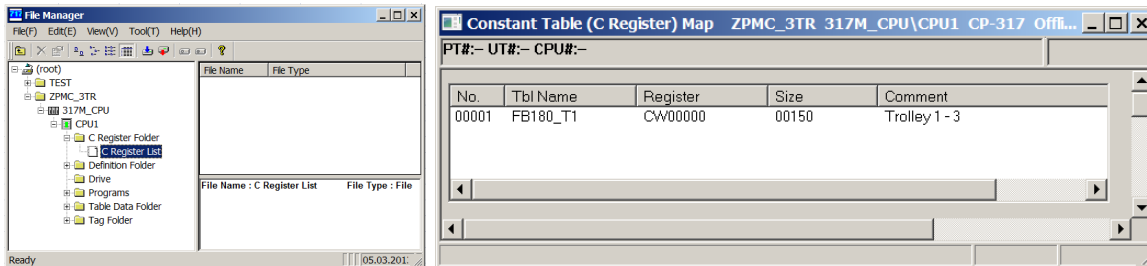
Output variables of function block		
Formal operand	Format	Function
CTR	BOOL	Signal output MCT is ok and no fault. (Cable Trolley Ready) (Customer has to interlock trolley main drive with this signal: In case of Low-signal main trolley speed has to be limited to maximum 50%).
F-LS-POS	BOOL	Signal output fault limit switch positive direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
F-LS-NEG	BOOL	Signal output fault limit switch negative direction. Limit switch was OFF at position „ POS_LIMIT_SWITCH_CHECK“!
F-TOOTH	BOOL	Signal output tooth belt broken
MC-ON	BOOL	Output main contactor of drive (additional wired to M1-M2 at Converter)
ACH-ON	BOOL	Output contactor motor anti condensation heater (ANTI CONDENSATION HEATING ON)
ERROR	BOOL	Signal output collective failure
F-DCB	BOOL	Signal output fault DC-Bus
F-FC	BOOL	Signal output fault frequency converter or fault communication to Frequency Converter
F-MF	BOOL	Signal output fault "Main Fuse"
F-BR	BOOL	Signal output fault "Break Resistor"
SIGNAL-1	WORD	Pass Trough "Error Alarm Signal 1" from Frequency Converter
SIGNAL-2	WORD	Pass Trough "Error Alarm Signal 2" from Frequency Converter
SIGNAL-3	WORD	Pass Trough "Error Alarm Signal 3" from Frequency Converter

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4.2.3 Description of Constant Table (C-Register)

One Constant Table must be available. In this table the parameters for all up to 3 Trolleys are stored.



The start address of each Trolley is required as input "DATA" at the function call of FB-180_1, FB-180_2 and FB-180_3. Please check the Crane-PLC Program for a free Block of 150 Words and change "SavePoint" Constant Table to your requirements.

Example starting with CW00000:

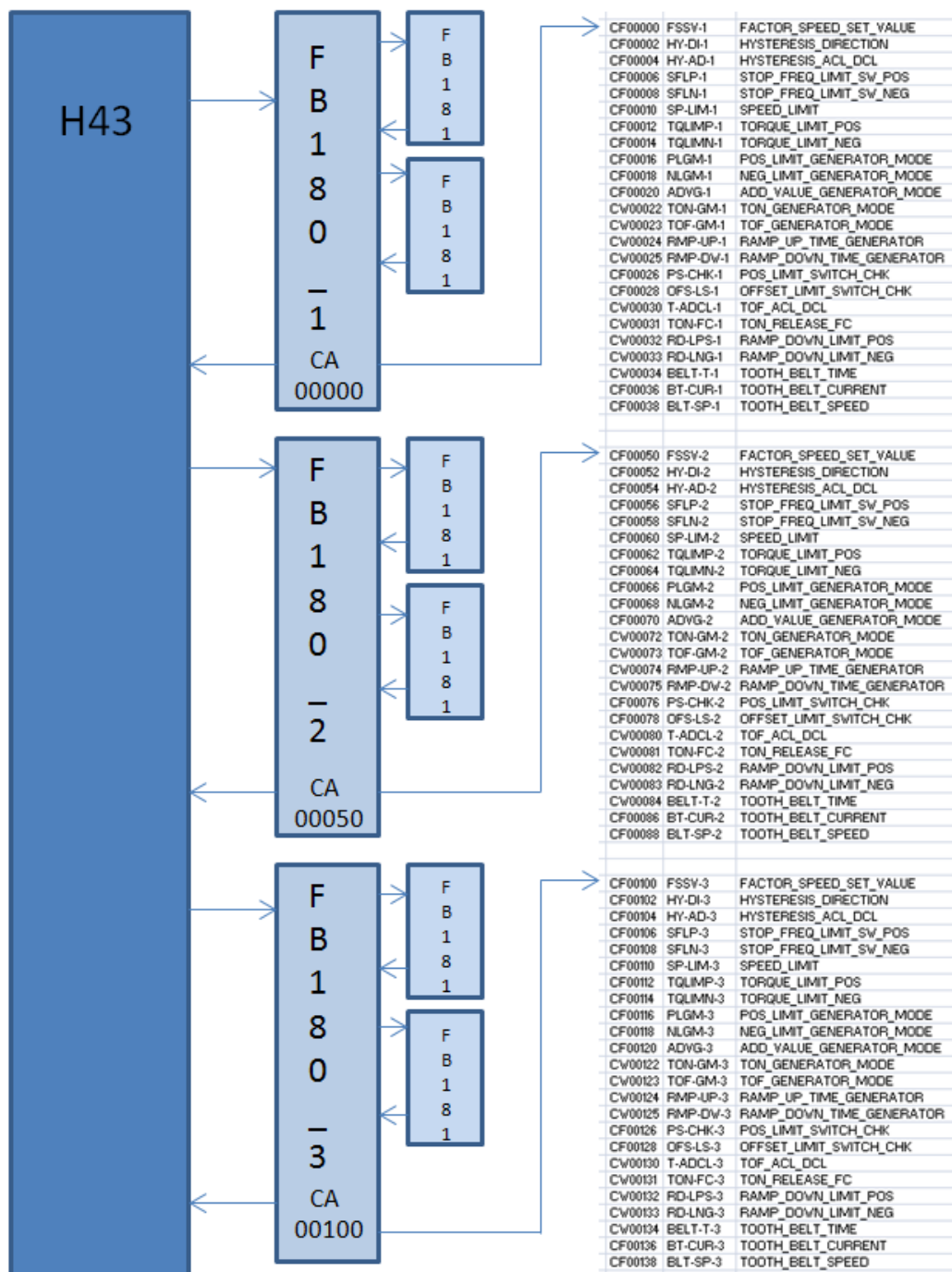
(Constant Table is provided as data file)

[FB180_T1] Constant Table (C Register) ZPMC_3TR 317M_CPU\CPU1 CP-317 Offline Local							
PT#:- UT#:- CPU#:-							
No.	Data Name	Symbol	SETVAL	Unit	Lower Limit	Upper Limit	SavePoint
1	FACTOR_SPEED_SET_VALUE	FSSV-1	4.4700E-001		0	100	CF00000
2	HYSTERESIS_DIRECTION	HY-DI-1	1.0000E+000		0	100	CF00002
3	HYSTERESIS_ACL_DCL	HY-AD-1	1.0000E+000		0	100	CF00004
4	STOP_FREQ_LIMIT_SW_POS	SFLP-1	1.0000E+000		0	1000	CF00006
5	STOP_FREQ_LIMIT_SW_NEG	SFLN-1	-4.0000E-001		-1.0000E+002	0	CF00008
6	SPEED_LIMIT	SP-LIM-1	1.9900E+002		0	200	CF00010
7	TORQUE_LIMIT_POS	TOLIMP-1	1.9900E+002		0	200	CF00012
8	TORQUE_LIMIT_NEG	TOLIMN-1	-1.9900E+002		-200	0	CF00014
9	POS_LIMIT_GENERATOR_MODE	PLGM-1	5.0000E+000		0	10	CF00016
10	NEG_LIMIT_GENERATOR_MODE	NLGM-1	-5.0000E+000		-10	0	CF00018
11	ADD_VALUE_GENERATOR_MODE	ADVGM-1	1.5000E+000		0	3	CF00020
12	TON_GENERATOR_MODE	TON-GM-1	210	ms	10	32000	CW00022
13	TOF_GENERATOR_MODE	TOF-GM-1	3000	ms	10	32000	CW00023
14	RAMP_UP_TIME_GENERATOR	RMP-UP-1	10	ms	10	32000	CW00024
15	RAMP_DOWN_TIME_GENERATOR	RMP-DW-1	10000	ms	10	32000	CW00025
16	POS_LIMIT_SWITCH_CHK	PS-CHK-1	5.1110E+004		0	100000	CF00026
17	OFFSET_LIMIT_SWITCH_CHK	OFS-LS-1	3.0000E+004		0	100000	CF00028
18	TOF_ACL_DCL	T-ADCL-1	150	ms	10	32000	CW00030
19	TON_RELEASE_FC	TON-FC-1	2000	ms	10	32000	CW00031
20	RAMP_DOWN_LIMIT_POS	RD-LPS-1	2000	ms	10	32000	CW00032
21	RAMP_DOWN_LIMIT_NEG	RD-LNG-1	2000	ms	10	32000	CW00033
22	TOOTH_BELT_TIME	BELT-T-1	10000	ms	10	32000	CW00034
23	TOOTH_BELT_CURRENT	BT-CUR-1	3.0000E+001		0	100	CF00036
24	TOOTH_BELT_SPEED	BLT-SP-1	4.0000E+001		0	100	CF00038
25							
26							
27	FACTOR_SPEED_SET_VALUE	FSSV-2	4.2200E-001		0	100	CF00050
28	HYSTERESIS_DIRECTION	HY-DI-2	1.0000E+000		0	100	CF00052
29	HYSTERESIS_ACL_DCL	HY-AD-2	1.0000E+000		0	100	CF00054
30	STOP_FREQ_LIMIT_SW_POS	SFLP-2	1.0000E+000		0	1000	CF00056

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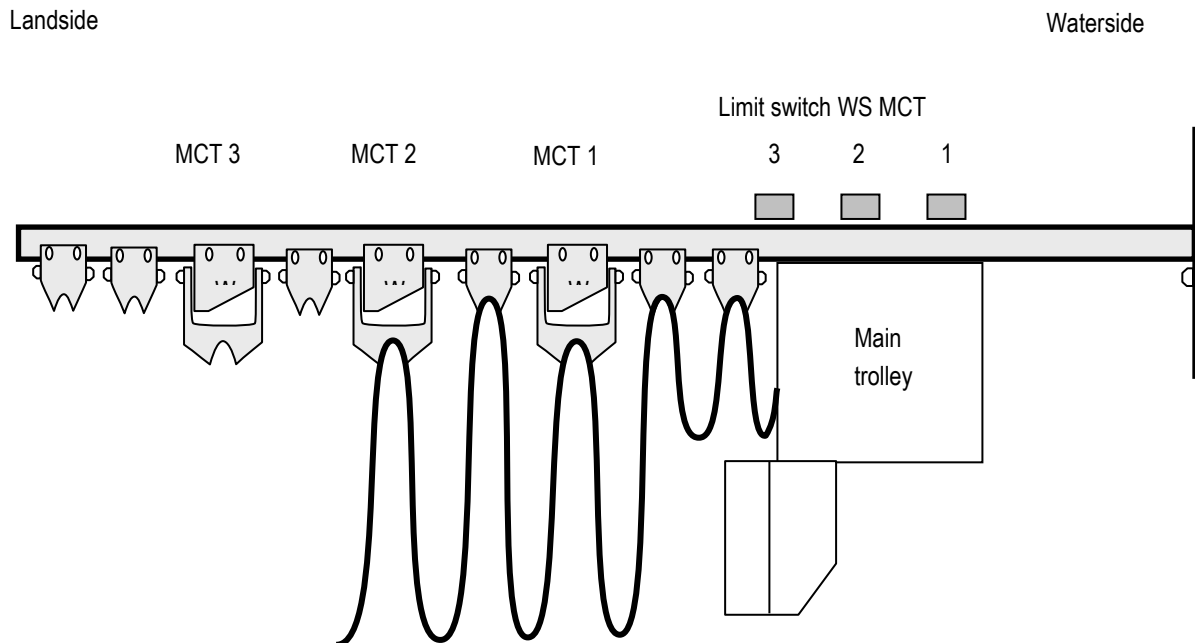
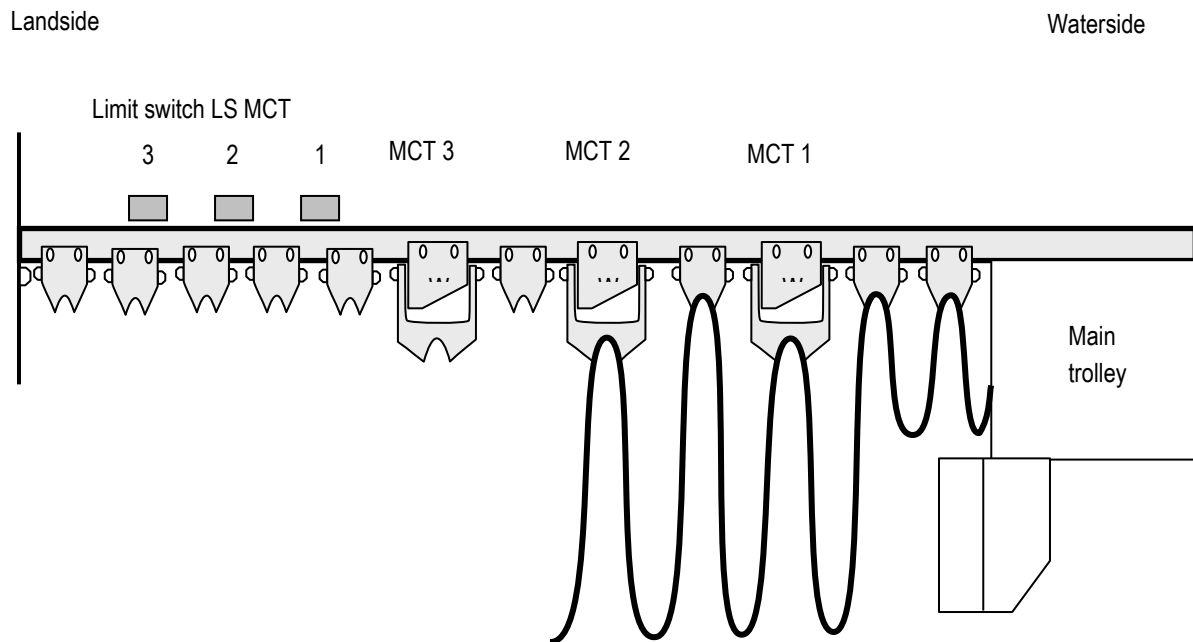
4.3 Program chart and implementation into PLC-Program



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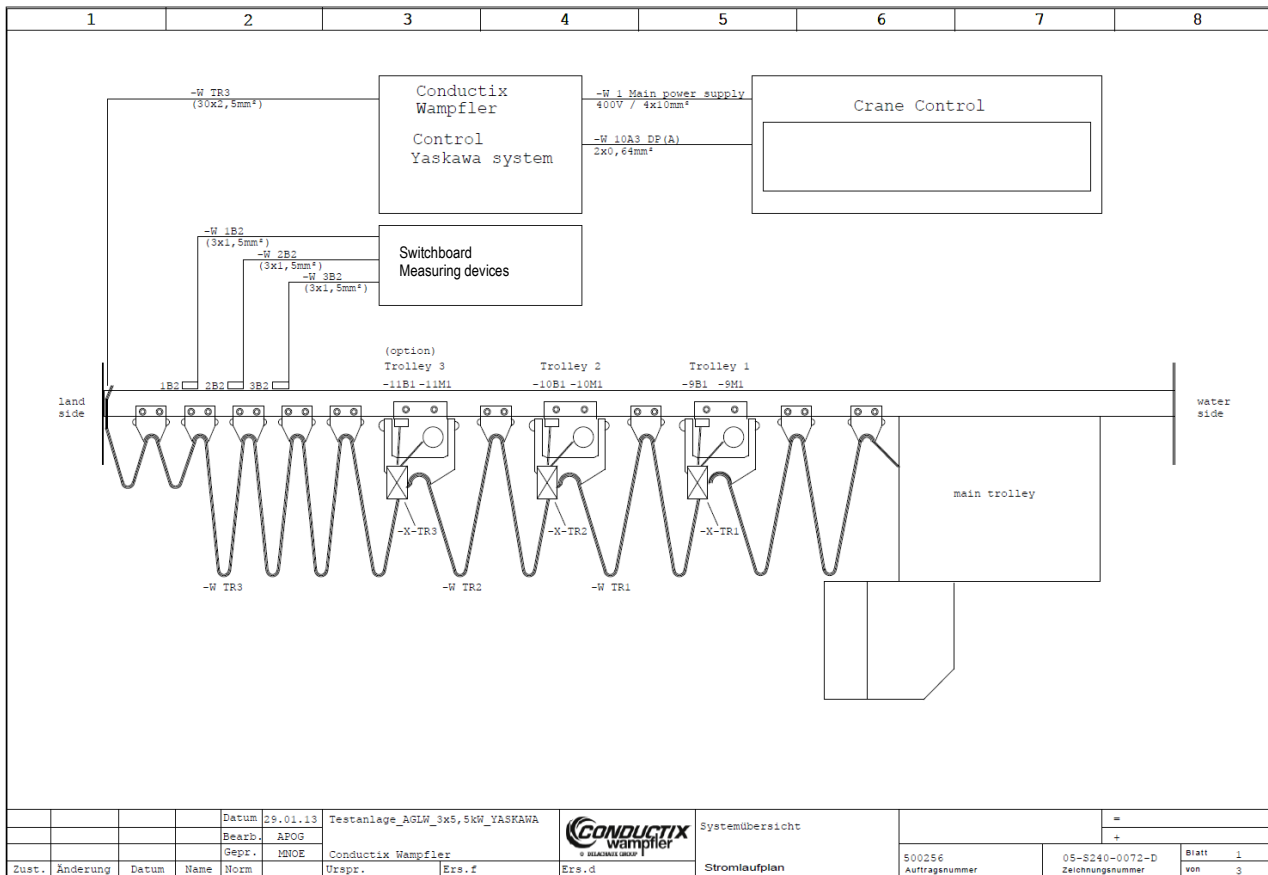
4.4 Schematic sketch of festoon system



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4.5 Schematic sketch of MCT control



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5 Transport, packing and storage

5.1 Transport

5.1.1 Safety advice for transport



WARNING!

Danger of death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

- Never step under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.
- Be sure the connection elements are firmly seated.
- Use only authorized lifting accessories and connection elements with sufficient load capacity.
- Do not use torn or worn ropes or straps.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Move loads only under supervision.
- Set down loads before leaving the work area.



CAUTION!

Damage from improper transport!

Improper transport can result in substantial property damage.

Therefore:

- Move the cabinet lying in the transport crate.
- Act with care when unloading the packaged unit as well as during internal transport, and observe the symbols and the hazard information on the packaging.
- Use only the attachment points provided.
- Remove packaging only shortly before installation.

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.

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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.



Environmental damage due to incorrect disposal!

Packaging material is a valuable resource and can be processed or recycled. In many cases, it can also be reused.

Therefore:

- Dispose of packaging material in an environmentally responsible manner.
- Follow all locally applicable disposal regulations; if necessary; engage a specialist company with 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: +5°C -+40°C
- Relative humidity: < 85%, without condensation
- 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.

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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 death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

- Never step under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.
- Be sure the connection elements are firmly seated.
- Use only authorized lifting accessories and connection elements with sufficient load capacity.
- Do not use torn or worn ropes or straps.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Move loads only under supervision.
- Set down loads before leaving the work area.



WARNING!

Risk of injury due to improper installation or commissioning!

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

Therefore:

- Before starting work, ensure sufficient installation room and that the conditions to start the mounting are fulfilled.
- Handle open, sharp components with care.
- Maintain order and cleanliness in the installation area. Loosely stacked or piled components and tools are sources of accidents.
- Mount components properly. Comply with specified screw tightening torques.
- Secure components so they cannot fall or tip over.

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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.
- Installation may only be performed by trained personnel.



WARNING!

Electric shock caused by missing or defective protective cover!

Therefore:

- Install protective covers properly.
- Installation may only be performed by trained personnel.
- Never use equipment without protective covers mounted.



WARNING!

Risk of electric shock when power line connections remain open!

Open power connections can cause serious injury and even death.

Therefore:

- Install protective covers properly.
- Never use equipment without protective covers mounted.



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.
- Installation may only be performed by trained personnel.
- Check the parameters and data sets.
- Use only settings which match the function intended.



WARNING!

Electric shock caused by missing or defective protection devices!

Missing or defective protection devices can cause serious injury and even death.

Therefore:

- Install protective devices according to regulations.
- Installation may only be performed by trained personnel.
- Check the protection device.

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WARNING!

Risk of electric shock when disconnecting or connecting connectors under voltage!

Disconnecting or connecting connectors under voltage can cause serious injury to cause death.

Therefore:

- Turn off the power supply voltage and DC-24-V supply voltage.
- Ensure the device is disconnected from power.
- Never separate or join connectors under voltage.

The grounding of the equipment is mandatory regardless of the type of energy transmission. Observe the following rules for grounding:

- Grounding of the unit by the shortest route
- Use a grounding cable colored 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.

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Personnel:

- Execution by qualified persons

Control panel installation

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.

Reset button position

It is recommended to position the reset button (e.g. for a reset after a fault signal followed by an inspection and corrective actions by authorized staff) near the storage of the festoon system.



CAUTION!

Damage because of wrong cable connection!

Wrong connected cables might cause damage to electrical components!



CAUTION!

Use screened cables!

Use of non-screened cables might cause malfunction of and damage to 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 V DC power supply!



ADVICE!

Voltage range:

Voltage and frequency ranges in this manual reflect exemplary system design. Specified voltage and frequency ranges that match project-related requirements are written down in separate, project-related documents (Technical data sheet electrical or circuit diagram).

Description and numbering of interface terminals are usually order specific and may therefore differ from the description and numbering in this document. See also Technical data sheet electrical or circuit diagram for the values relating to your project.

All field devices are connected according to the documentation. Description and numbering of interface terminals are usually order specific and may therefore differ from the description and numbering in this document.

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Signals from field devices to the customers crane PLC as potential-free contacts (wired to the terminal strip, signal level depends on PLC input module):

Designation	Interface terminal	Signal level
Power supply Magnetic limit switch	-X-PLC:L	110/230 VAC; 24 VDC
Magnetic limit switch MCT 1, water-side	-X-PLC:1	110/230 VAC; 24 VDC
Magnetic limit switch MCT 1, land-side	-X-PLC:2	110/230 VAC; 24 VDC
Magnetic limit switch MCT 2, water-side	-X-PLC:3	110/230 VAC; 24 VDC
Magnetic limit switch MCT 2, land-side	-X-PLC:4	110/230 VAC; 24 VDC
Magnetic limit switch MCT 3, water-side	-X-PLC:5	110/230 VAC; 24 VDC
Magnetic limit switch MCT 3, land-side	-X-PLC:6	110/230 VAC; 24 VDC

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

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6.4 Test and initial commissioning



WARNING!

Risk of injury due to improper commissioning!

Improper commissioning may cause dangerous situations for the personnel.

Therefore:

- Prior to commissioning, test equipment according to the manufacturer's test list.
- Never put motorized festoon system into operation without testing equipment according to the manufacturer's test list.
- Before commissioning, make visual inspection and audit work required.
- Refrain from any risky procedure.
- Report damage to the motorized cable trolley system to the person in charge instantly.
- Secure the motorized cable trolley system against accidental or unauthorized use.
- Staying in the area of influence of the motorized festoon system is prohibited!



CAUTION!

Risk of crushing!

When the motorized festoon system operates, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and track beam, and between tooth-belt and pulleys.

Therefore:

- Do not step into the danger area of the motorized festoon system when it is being operated.



CAUTION!

Risk of getting caught in the festoon system!

When the motorized festoon system operates, there is a risk of getting caught by parts of the festoon system.

Therefore:

- Do not step into the danger area of the motorized festoon system when it is being operated.

A festoon system is usually commissioned by Conductix-Wampfler (CXW) Commissioning Engineers together with the Crane Manufacturer/ Crane Control Manufacturer. A separate checklist is available for guiding through the full Mechanical and Electrical commissioning of a festoon system with motorized cable trolley (MCT) and a PLC.

After the commissioning has been successfully completed, a Final Acceptance Certificate (FAC) will be signed by both parties, certifying that the commissioning corresponds to all specified requirements.

- The completed and signed Checklist for Mechanical and Electrical Commissioning must be send by e-mail to:
service.de@conductix.com.
- This e-mail must include the following data:
 - Frequency converter parameters,
 - Complete actual PLC-Program with the latest parameter changes included.
- Safely store the signed original Checklist hardcopy together with the Final Acceptance Certificate (FAC).

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6.5 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	

6.6 Carry out initial commissioning

Activity	Checked
Interface signals between costumer and Conductix-Wamplfer	
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	
Check 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	
At failure of the motorized festoon system, the maximum crane speed limited automatically to 120 m/m	

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After the commissioning has been successfully completed, a Final Acceptance Certificate (FAC) will be signed by both parties, certifying that the commissioning corresponds to all specified requirements.

→ The completed and signed Checklist must be send by e-mail to: service.de@conductix.com.

→ This e-mail must include the following data:

- Frequency converter parameters,
- Complete actual PLC-Program with the latest parameter changes included.

7 Operation

7.1 Safety



WARNING!

Danger of death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

- Never step under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.
- Be sure the connection elements are firmly seated.
- Use only authorized lifting accessories and connection elements with sufficient load capacity.
- Do not use torn or worn ropes or straps.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Move loads only under supervision.
- Set down loads before leaving the work area.



WARNING!

Risk of injury due to improper operation!

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

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 disable safety systems.
- Maintain order and cleanliness in the installation area. Loosely stacked or piled components and tools are sources of accidents.

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WARNING!

Danger to life due to heavy weight, electric energy and moving machinery!

Unauthorized persons who do not meet the requirements described in Chapter 2.2 "Requirements concerning personnel" do not understand the danger in the working area. They might get run over, get crushed, they might touch electrically live parts or manipulate equipment in a dangerous way.

Therefore:

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



WARNING!

Misconduct of the devices due to incorrect instrument setting!

Incorrect instrument settings and might lead to uncontrollable behavior of devices, which can lead to serious injury and even death.

Therefore:

- Never change parameters and data sets without consulting the manufacturer.
- Do not change settings of protective devices.

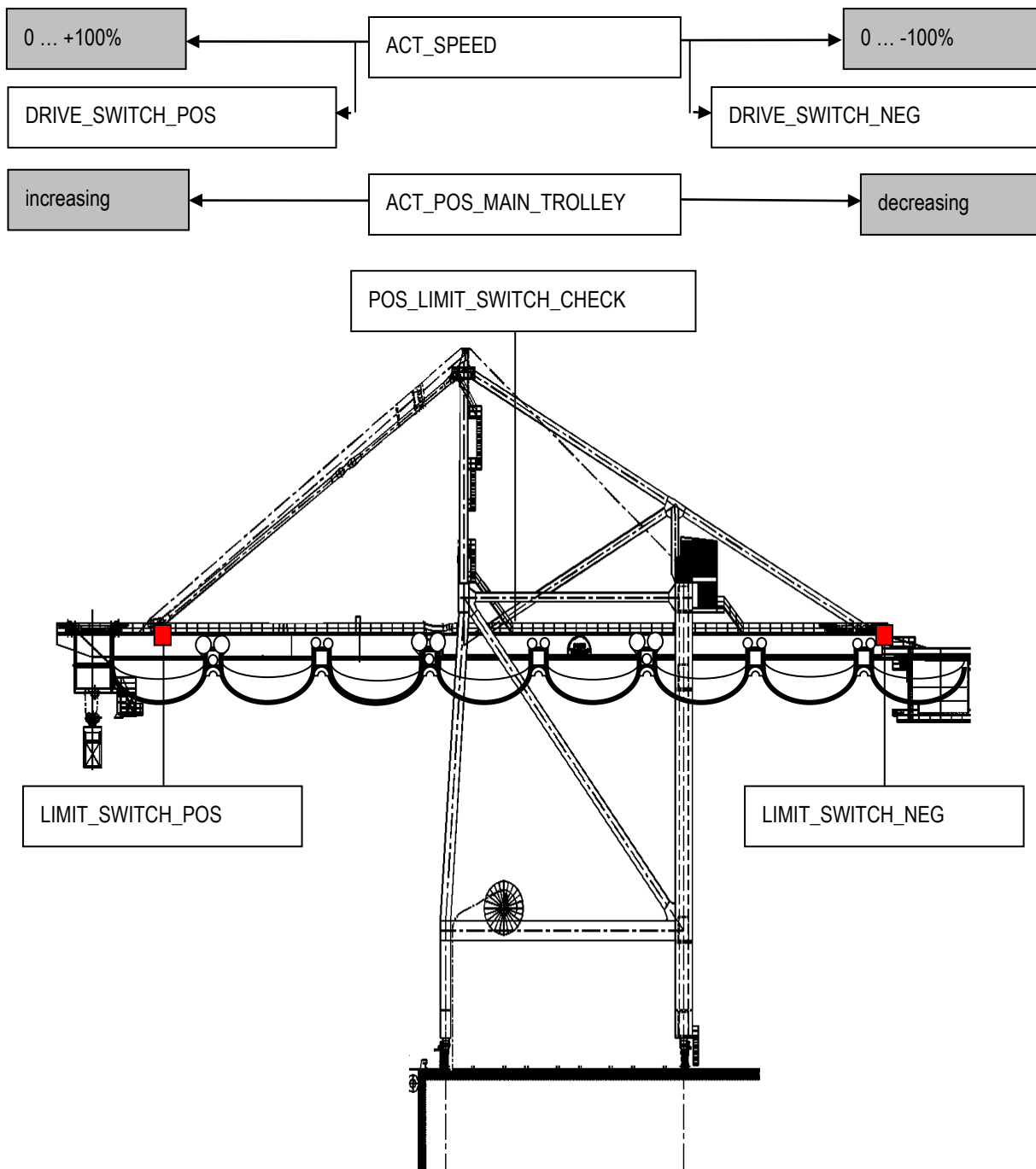
Personnel:

- Operation by trained personnel only!

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7.2 Overview and Definition



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7.3 Main contactor ON / Anti condensation heater ON

Signal (CS-ON) sets output for drive main contactor (MC-ON). At the same time output for the contactor of motor anti condensation heater (ACH-ON) will be switched off.

Signal (CS-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.

Formal operand	Format	Factory setting	Function
CS-ON	BOOL		Crane main switch ON
MC-ON	BOOL		Output main contactor of drive
ACH-ON	BOOL		Output contactor motor condensation heater

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.

Formal operand	Format	Factory setting	Function
MS-POS	BOOL	-	Input joy stick of trolley positive direction
MS-NEG	BOOL	-	Input joy stick of trolley negative direction
SPEED	REAL		Actual main trolley speed in %

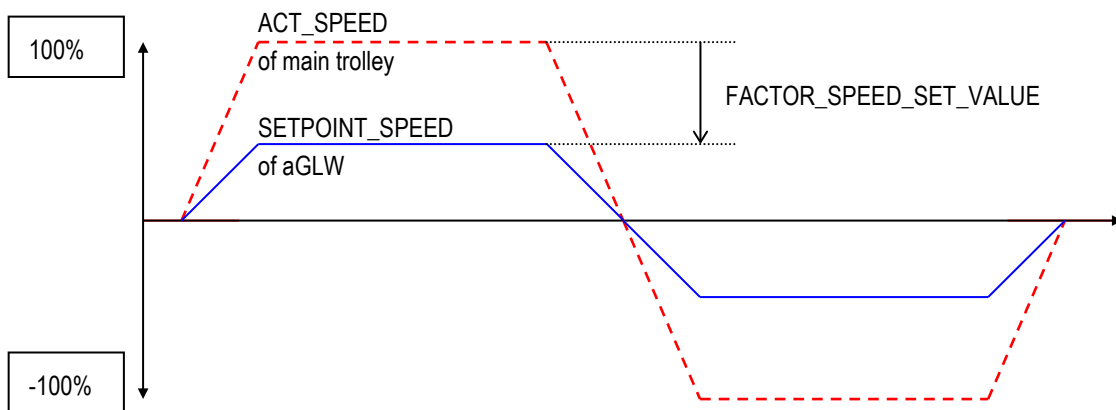
7.5 Scaling of speed set point value of motorized cable trolley

To adjust the speed of the motorized cable trolley (motor speed set point 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-Wampler and has to be incurred as a given constant by the customer during PLC programming. If necessary adjusting of scaling factor has to be done during commissioning of the festoon system.

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Formal operand	Format	Factory setting	Function
FACTOR_SPEED_SET_VALUE	REAL		Scaling main trolley speed to speed set point value of aGLW [0.0-1.0] (in Constant Table)



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.

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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 contact 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 signs 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



ADVICE!

Replace tooth-belts every 6000 operating hours

After 6.000 crane operating hours, both tooth-belts on the motorized trolleys must be replaced. This replacement must be triggered by the PLC/ CMS through a warning signal to the crane operator.

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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).

- Analyze faults
- and then resolve the interference.

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).

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9.1 Procedure in faults or alarms



Severe system damage from continuation of operation!

In case of any fault of a drive unit of a festoon system, it is required to immediately **restrict the speed of the crane trolley to a maximum of 50% or to less than 120 m/min** through the superior control/crane control and to visualize the fault in the CMS. Further crane operation in this emergency mode is only allowed temporary for maximum 1 shift until the completion of the ship loading/unloading cycle. The fault has to be analyzed followed by a visual inspection of all relevant parts. Conductix-Wamplfer has to be informed in writing without delay. After corrective actions as service or repair, the fault reset must only be given by authorized service staff.

It is recommended to position the reset button near the storage of the festoon system.

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

9.2 Monitoring limit switch function



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 (POS-OK) and programming of the position value (POS-CR) limit switch signals will be monitored during operation according to following criterias:

Main trolley position (POS-CR) < programmed value (POS_LIMIT_SWITCH_CHECK) and negative limit switch signal (LS-NEG) is OFF → fault signal (F-LS-NEG) will be latched.

Main trolley position (POS_CR) > programmed value (POS_LIMIT_SWITCH_CHECK) + (OFFSET_LIMIT_SWITCH_CHK) and positive limit switch signal (LS-POS) is OFF → fault signal (F-LS-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 (RESET).

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

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Formal operand	Format	Factory setting	Function
SPEED	REAL	-	Actual main trolley speed in %
MS-POS	BOOL	-	Input joy stick of trolley positive direction
MS-NEG	BOOL	-	Input joy stick of trolley negative direction
LS-POS	BOOL	-	Input limit switch pos. (WATER) direction not activated
LS-NEG	BOOL	-	Input limit switch neg. (LAND) direction not activated
POS-CR	REAL	-	Actual main trolley position in mm
POS-OK	BOOL		Position measuring system no fault
POS_LIMIT_SWITCH_CHECK	REAL	-	Position for monitoring limit switch signals (in Constant Table)
F-LS-POS	BOOL		Output fault limit switch pos. (WATER)
F-LS-NEG	BOOL		Output fault limit switch neg. (LAND)
RESET	BOOL		Input reset fault

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9.3 Monitoring tooth belts (Option)



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 (TOOTH_BELT_CURRENT) during movement of main trolley is lower as adjusted value (standard: 30%) motor run without load, both tooth belts are broken, fault signal (F-TOOTH) will be latched.



WARNING!

Severe system damage from continuation of operation!

In case of any fault of a drive unit of a festoon system, it is required to immediately **restrict the speed of the crane trolley to a max. of 50% or to less than 120 m/min** through the superior control/crane control and to visualize the fault in the CMS. Further crane operation in this emergency mode is only allowed temporary for max. 1 shift until the completion of the ship loading/unloading cycle. The fault has to be analyzed followed by a visual inspection of all relevant parts. Conductix-Wamplfer has to be informed in writing without delay. After corrective actions as service or repair, the fault reset must only be given by authorized service staff.

It is recommended to position the reset button near the storage of the festoon system.

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

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

Formal operand	Format	Factory setting	Function
TOOTH_BELT_TIME	TIME	10 sec	Input delay time for tooth belt control (in Constant Table)
TOOTH_BELT_CURRENT	REAL	30	Input motor current without load (1,1 – 100%) (in Constant Table)
F-TOOTH	BOOL		Signal output tooth belt broken
RESET	BOOL		Input reset fault



CAUTION!

After 6.000 crane operating hours both tooth-belts on the motorized trolleys must be replaced. This replacement must be triggered by the PLC/ CMS through a warning signal to the crane operator.

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9.4 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 Memobus.

In case of a frequency converter fault a general fault signal (F-FC) occurs, the signal (CTR) 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 (RESET).

Fault signal (F-FC) can be used for fault identification system of the crane. At same time the alarm storage of the frequency converter (SIGNAL 1) and (SIGNAL 2) and (SIGNAL 3) may be readout.

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

Formal operand	Format	Factory setting	Function
CTR	BOOL		Signal output MCT ready for operation
F-FC	BOOL		Signal output fault frequency converter
RESET	BOOL		Input reset fault
SIGNAL-1	WORD		Pass Trough "Error Alarm Signal 1" from Frequency Converter
SIGNAL-2	WORD		Pass Trough "Error Alarm Signal 2" from Frequency Converter
SIGNAL-3	WORD		Pass Trough "Error Alarm Signal 3" from Frequency Converter

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Frequency converter error code

SIGNAL-1:

Bit	Item
Bit 0	Unused
Bit 1	Undervoltage (Uv1)
Bit 2	Control Power Supply Undervoltage (Uv2)
Bit 3	Soft Charge Circuit Fault (Uv3)
Bit 4	Unused
Bit 5	Ground Fault (GF)
Bit 6	Overcurrent (oC)
Bit 7	Overvoltage (ov)
Bit 8	Heatsink Overheat (oH)
Bit 9	Heatsink Overheat (oH1)
Bit A	Motor Overload (oL1)
Bit B	Drive Overload (oL2)
Bit C	Overtorque Detection 1 (oL3)
Bit D	Overtorque Detection 2 (oL4)
Bit E	Dynamic Braking Transistor Fault (rr)
Bit F	Braking Resistor Overheat (rH)

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SIGNAL-2:

Bit	Item
Bit 0	External Fault at Input Terminal S3 (EF3)
Bit 1	External Fault at Input Terminal S4 (EF4)
Bit 2	External Fault at Input Terminal S5 (EF5)
Bit 3	External Fault at Input Terminal S6 (EF6)
Bit 4	External Fault at Input Terminal S7 (EF7)
Bit 5	External Fault at Input Terminal S8 (EF8)
Bit 6	Cooling Fan Error (FAn)
Bit 7	Overspeed (oS)
Bit 8	Excessive Speed Deviation (dEv)
Bit 9	PG Disconnected (PGo)
Bit A	Input Phase Loss (PF)
Bit B	Output Phase Loss (LF)
Bit C	Motor Overheat (PTC input) (oH3)
Bit D	LED Operator Connection Fault (oPr)
Bit E	EEPROM Write Error (Err)
Bit F	Motor Overheat Fault (PTC input) (oH4)

SIGNAL-3:

Bit	Item
Bit 0	MEMOBUS/Modbus Communication Error (CE)
Bit 1	Option Communication Error (bUS)
Bit 2	Unused
Bit 3	Unused
Bit 4	Control Fault (CF)
Bit 5	Zero Servo Fault (SvE)
Bit 6	Option External Fault (EF0)
Bit 7	PID Feedback Loss (FbL)
Bit 8	Undertorque Detection 1 (UL3)
Bit 9	Undertorque Detection 2 (UL4)
Bit A	High Slip Braking Overload (oL7)
Bit B	Unused
Bit C	Unused
Bit D	Unused
Bit E	Unused
Bit F	Hardware Fault (includes oF)

For more details refer to Yaskawa 216IF/1000 Control Pack CP-216 User's manual.

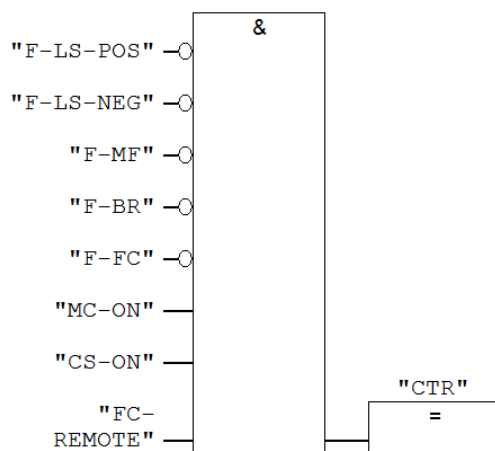
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9.5 Enabling operation

The status bit (CTR) 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:



Formal operand	Format	Factory setting	Function
CS-ON	BOOL	-	Main contactor crane ON, switch on main contactor and enable operation signal after time delay
MC-ON	BOOL	-	Output main contactor
F-LS-POS	BOOL	-	Output fault limit switch pos. (WATER)
F-LS-NEG	BOOL	-	Output fault limit switch neg. (LAND)
F-FC	BOOL	-	Output fault frequency converter fault
F-TOOTH	BOOL	-	Output tooth belt broken
FC-REMOTE	BOOL	-	Frequency converter in remote operation (internal Signal, check converter display))
CTR	BOOL	-	Output MCT ok without fault

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10 Disassembly and disposal

10.1 Safety



Risk of fatal injury from electric shock!

Death, heart failure, burns and injury by electric arc are likely to follow when touching electrically live parts. There is also a high risk of injury caused by overreaction after being shocked by electricity.

Therefore, before working on parts potentially under voltage:

- Disconnect system from power using the main switch.
- If there is no main switch, disconnect the energy source from the system according to the instructions of the system manufacturer.
- Secure system against reactivation,
- confirm that power has been disconnected,
- ground and short-circuit parts of the system disconnected from power,
- cover or block off neighboring parts still carrying electrical current.
- Before each time the device or system is started, test the insulation resistance according to locally applicable technical standards, directives, and law.



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.

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CAUTION!

Risk of stumbling and falling due to projecting components!

When approaching the motorized festoon system, there is the danger of stumbling.

Therefore:

- When moving inside the working- and danger area of the motorized festoon system, watch out for depressions or bumps in the ground.
- There must be no loose items on the ground.



CAUTION!

Risk of crushing!

When the motorized festoon system operates, there is a risk of bruising of the limbs between the buffer and buffer plate, suspension and track beam, and between tooth-belt and pulleys.

Therefore:

- Do not step into the danger area of the motorized festoon system when it is being operated.



WARNING!

Danger of death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

- Never step under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.
- Be sure the connection elements are firmly seated.
- Use only authorized lifting accessories and connection elements with sufficient load capacity.
- Do not use torn or worn ropes or straps.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Move loads only under supervision.
- Set down loads before leaving the work area.

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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.



DANGER!

Risk of fatal injury!

→ Pay attention to the safety instructions given in Chapters *Disassembly and disposal*, *Assembly and commissioning* and *Specific hazards* (see above).

Prior to starting the disassembly:

- Remove and dispose of operating and auxiliary material as well as remaining items in an environmentally compatible way.
- Disconnect the whole installation from power.
- Then clean assemblies and components properly and decompose them with regard to the valid local instructions for operational safety and environmental protection

Personnel:

- Execution by instructed personnel

Required tools:

- Insulated Electrical Screwdriver
- Insulated Side Cutters
- Voltage Meter
- Wrench

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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 to the material composition.



Environmental damage due to incorrect disposal!

Electric scrap, electronic components, lubricants and other auxiliary materials are subject to hazardous waste treatment and may only be disposed of by approved specialist companies!

- Dispose of electric scrap, electronic components, lubricants and other auxiliary materials in an environmentally responsible manner by handing these materials over to hazardous waste treatment authorities.
- Follow all locally applicable disposal regulations; if necessary, engage an approved, specialist company with disposal.

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

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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
- Single Motor Module
- Filter mat
- Lamp use
- Motor protection switch

11.2 Applicable documents

Listing of applicable documents

- Mounting Instructions MAL0300-0004-E Festoons Systems for I-beam – 0365, 0370, 385
- Mounting Instructions MAL0300-0006-E Motorized Festoons Systems – 0380
- Commissioning Checklist
- Yaskawa 216IF/1000 Control Pack CP-216 User's manual (delivered on CD-ROM, together with the control panel or downloadable at Supplier Website)

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