

English

Original instructions



OWNER'S MANUAL FOR FREQUENCY CONTROL SYSTEM

ControlMaster NXT

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1 GENERAL INTRODUCTION

1.1 Foreword: About This Manual

This manual offers guidance to enable safe and efficient operation of the crane.

As a **crane operator**, taking the time to read this manual will help you to prevent damage to the crane and load, and, most importantly, personnel situated close to the crane. The crane is designed to be safe when used correctly. However, there are many potential hazards associated with incorrect operation and these can be avoided when you know how to recognize and anticipate them.

This manual is not intended as a substitute for proper training but provides recommendations and methods for safe and efficient operation. The crane owner must ensure that operators are properly trained prior to crane operation and, at all times, comply with all of the applicable and prevailing safety and other standards, rules and regulations.

1.2 Symbols Used In This Manual

Readers should familiarize themselves with the following symbols which are used in this manual.

	<p>Indicates that the crane is slowing down or is moving at its slowest speed.</p>
	<p>Indicates that the crane is accelerating or moving at its highest speed.</p>
	<p>NOTE: Indicates items which require special attention by the reader. There is no obvious risk of injury associated with notes.</p>

1.3 Safety Alert Symbols and Signal Words

The following symbols are used in this manual to indicate potential safety hazards.

	<p>Obey all safety messages that follow this symbol to avoid possible injury for death.</p>
	<p>Indicates a potentially hazardous situation, which if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.</p>
	<p>Indicates a potentially hazardous situation, which if not avoided, COULD result in death or serious injury.</p>
	<p>INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.</p>



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NOTICE	Addresses situations not related to personal injury, such as likely or possible damage to equipment.
---------------	--

Shall	Indicates that a rule is mandatory and must be followed.
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Should	Indicates that a rule is a recommendation, the advisability of which depends on the facts in each situation.
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1.4 Questions And Comments

Any questions or comments relating to the content of this manual and/or the operation, maintenance and/or service of manufacturer products should be directed to: www.rmhoist.com

1.5 Exclusion Of Warranty

THE MANUFACTURER MAKES ABSOLUTELY NO WARRANTY WHATSOEVER WITH REGARD TO THE CONTENTS OF THIS MANUAL, EXPRESS OR IMPLIED, WHETHER ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

1.6 Manual Use

Every person exposed to the manufacturer's products must, prior to OPERATING, SERVICING AND/OR MAINTAINING SUCH PRODUCTS, read and understand the contents of this manual and strictly adhere AND CONFORM THEIR CONDUCT WITH AND TO THE INFORMATION, RECOMMENDATIONS AND warnings provided herein.



Note: Keep these instructions in a safe, accessible location for future reference by personnel operating the crane or exposed to crane operation.

	Read and understand the contents of this manual prior to operating, servicing, and or/maintaining the crane. Failure to do so can result in serious injury or death.
--	---

Manufacturer shall not be liable for and owner and READER shall release, and hold manufacturer, harmless from any and all claims, demands, AND damages, regardless of their nature or type losses and expenses , whether known or unknown, present or future, any and all liability, of and from any and all manner of actions, cause[s] of actions, all suits in law, in equity, or under statute, State or Federal, of whatever kind or nature, third party actions, including suits for contribution and/or indemnity on account of or in any way arising out of acts or omissions of the Owner or READER and relating in any way to this MANUAL or THE PRODUCTS referenced herein, including, but not limited to the Owner's or READER'S use thereof or any other cause identified herein or that may be reasonably inferred HEREFROM.



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1.7 Terminology

The following terms and definitions may have been used in this manual:

Authorized personnel	Persons who are authorized by the owner and who have the necessary training to carry out operation or service actions.
Braking resistor	Model 006 includes an internal braking resistor for resistor braking.
Bridge	The bridge (main girder) moves along the runway.
CE marking	The product's CE-marking indicates that the product complies with the appropriate CE regulations.
Check	A visual and functional assessment (not a test) of the product without dismantling.
Compact brake	Motor with internal brake.
Controller	The pendant or other type of controller is used by the operator to give commands to the crane.
Current rating	The nominal current of the frequency converter
EMC Filter	The frequency converter has an internal EMC filter in the power supply
Flux braking	The flux braking is a braking method in which the braking is dissipated as thermal energy in a motor. Model 003 is using flux braking as a braking method.
Hoist	Drive mechanism for lifting and lowering the load.
Main girder	The main girder (bridge) is connected to the bridge end carriages.
Main isolation switch	The main isolation switch is the power switch which the operator should normally use to turn off the power.
Power supply	Power is supplied to the components via the power supply.
Qualified personnel	One with necessary qualification based on theoretical and practical knowledge of hoists or/and cranes. The person must be in a position to assess the safety of the installation in conjunction with the application. Persons with the authority to undertake certain maintenance work on products of manufacturers include manufacturers' service engineers and trained fitters with corresponding certification.
Resistor braking	The resistor braking is a braking method in which the braking is dissipated as thermal energy in a resistor. Model 006 is using resistor braking as a braking method.
Slowdown limit	Slowdown limit reduces the speed of the crane or trolley at the end of the runway.
Stop limit	Stop limit stops the crane or trolley before the end of the runway.
Trolley (hoisting unit)	The trolley (hoisting unit) moves along the main girder.
QR Code™	A two dimensional bar code that can include, for example, a product's serial number in an optically readable form. Note: The term "QR Code" is a registered trademark of Denso Wave Incorporated in Japan and other countries.



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1.8 Directives and standards

1.8.1 CE/CSA/UL/CCC

This product complies with one or more of the following requirements and directives described in this section. For more detailed information about which requirements the product meets, see the main sticker attached to the device.

- | | |
|-------------|--|
| CE | The CE marking certifies that a product has met EU health, safety, and environmental requirements, which ensure consumer safety. |
| CSA | The CSA marking means that a product has been tested and meets applicable standards for safety and/or performance, including the applicable standards written or administered by the American National Standards Institute (ANSI), Underwriters Laboratories (UL), Canadian Standards Association (CSA), National Sanitation Foundation (NSF), and others. |
| UL | The UL marking means that Underwriters Laboratories (UL) has tested representative samples of the product and determined that they meet UL's requirements. These requirements are based primarily on UL's published and nationally recognized Standards for Safety. |
| CCC | The China Compulsory Certificate mark, commonly known as the CCC Mark, is a compulsory safety mark for a variety of products sold on the Chinese market. The CCC mark is required for both domestically manufactured products and products imported into China. |
| RoHS | The RoHS marking means that a product complies with the directive for the restriction of the use of certain hazardous substances in electrical and electronic equipment. |
| WEEE | The WEEE indicates that the product should be disposed of according to the WEEE directive regulations. |

The frequency converters carry the CE label as a proof of compliance with the Low Voltage Directive (LVD) and the Electro Magnetic Compatibility (EMC).



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2 SAFETY FIRST!

Safety requirements must be understood and followed.

2.1 Fire Safety

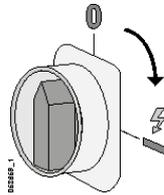
In the event of a fire, only attempt to fight it if you can do so without putting yourself in danger. Turn the power off if it is possible to do so. Evacuate the area. Notify other people about the potential danger, and call for help.



WARNING

Never use a powder type fire extinguisher on high voltage.

2.2 Main Isolation Switch



The product can only be driven when power is turned on. The owner must identify and document the location and function of the **main isolation switch** and must communicate this information to all operators.



CAUTION

Owner/Operator shall be aware of main isolation switch functionality. Even though one switch is turned off, there may still be voltage present in some parts of the product. This may result in exposure to electric shocks.



The operator shall not operate the product unless he or she knows the location of the main isolation switch.

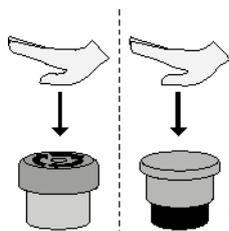


CAUTION

Avoid turning off the main isolation switch during load movement. Sudden loss of power may cause the load to swing and cause serious damage to the product, personnel or load.

When the **main isolation switch** is turned on after being placed in the off position, the set-up procedure must be followed before the product can be used.

2.3 Emergency Stop



In the event of a equipment malfunction or other emergency situation, all motions can be stopped immediately by pressing the red emergency stop button located on the controller. In normal operation, the emergency stop button should not be used instead of making proper use of the direction controls. Routinely using the emergency stop button increases wear on the product and can cause the load to swing.



NOTICE

Only use the emergency stop button to stop movement in the event of a product malfunction or other emergency situation. Using the emergency stop button can cause the load to swing unexpectedly.



WARNING

Do not push the emergency stop button or turn off the equipment if a Brake Slip fault occurs. Pushing the emergency stop button or turning the equipment off de-energizes the product and prevents braking with the motors. The load could fall if the emergency stop button is pressed.

Drive the hook into a safe area, lower the load, and only then de-energize the equipment for investigation.



The operator shall not operate the equipment unless he or she knows the location of the emergency stop button.

2.4 Intended use of the frequency converter

Travelling movements

These frequency converters are designed for industrial crane usage for controlling the speed of trolley and bridge motors.

2.5 Limitations of use



Note: The frequency converter shall be used only in crane applications.



Note: Only the product's manufacturer shall perform any voltage withstand tests.



Any alterations and/or modifications to the product not authorized by the manufacturer are strictly prohibited. Opening the product's cover voids its warranty.



WARNING

The parameters and settings of the frequency converter shall not be changed. Changing the parameters or settings could lead to dangerous situations, serious injury or death.



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3 IDENTIFICATION

3.1 Manufacturer

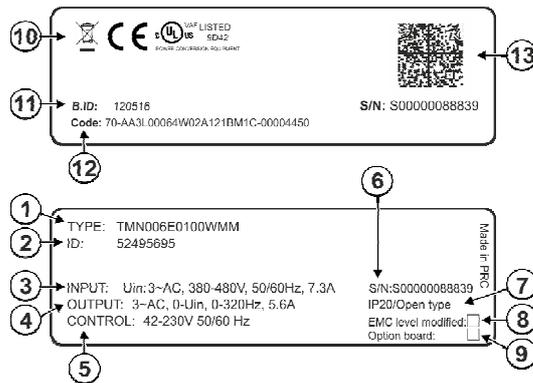
Manufacturer: **R&M Materials Handling Inc.**
 Address: **4501 Gateway Boulevard
 45502 SPRINGFIELD, OH
 USA**



Note: For further information about the product, operational training or servicing, please contact the manufacturer or manufacturer's representative.

3.1.1 Main sticker

The main sticker shows, for example, the model and serial number of the frequency converter, as well as the rated voltage.



1	Product model number	Indicates the exact model of the product.
2	Identification number	A unique string that identifies the unit.
3	Input	Indicates the acceptable mains voltage range, current and frequency that the product can be connected to.
4	Output	Indicates the voltage range, current and frequency range the product is able to provide at a specified output capacity.
5	Control	Indicates the acceptable voltage range and frequency of control signals that the product can be connected to.
6	Serial number	The serial number of the unit in an alphanumerical format.
7	IP classification	Indicates the ingress protection classification of the product.
8	EMC level modified	Indicates whether the EMC level has been changed from the default level. By default, the EMC level is set as N.
9	Option board	Indicates whether the product is fitted with an optional board providing additional features. Option boards can be used only with a frequency converter featuring a display. Not in use in this frequency converter.
10	Approvals and standards	Indicates the directives and approvals the product complies to. See the section "Directives and standards" for more information.
11	Batch identification number	Indicates the batch from which the unit originates. The first four digits indicate the year and week of manufacture, respectively. The last digit (1 through 5) indicate the weekday, 1 being



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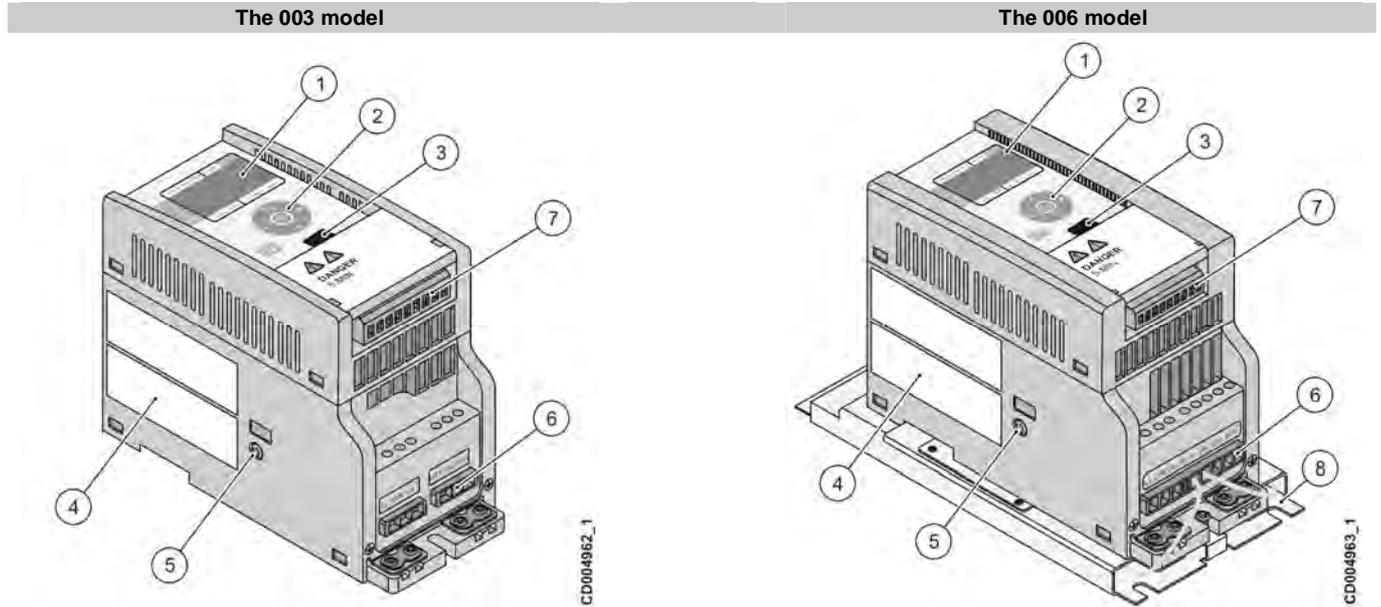
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		Monday, 2 Tuesday, number 5 indicating Friday.
12	Code	Identification and feature information provided by the manufacturer.
13	QR Code™	A two dimensional bar code in an optically readable form. Note: The term "QR Code" is a registered trademark of Denso Wave Incorporated in Japan and other countries.

4 CONSTRUCTION

4.1 Main components



Pos.	Part	Description
1	Display	LCD Display
2	Navigation and confirmation buttons	Buttons with four arrow navigation buttons and buttons for back/reset and confirmation, used in navigating in the menu structure and in adjusting parameter values.
3	Terminal for MCA cable	MCA cable is used with Connection tool for TM.
4	Main sticker	Identification data
5	EMC filter screw	EMC level of the frequency converter can be modified by removing the EMC filter screw
6	Power supply terminals	3-phase power supply and motor supply terminals
7	Digital input terminals	6 digital input terminals (API2 control board)
8	Braking resistor	Internal braking resistor (in model 006)



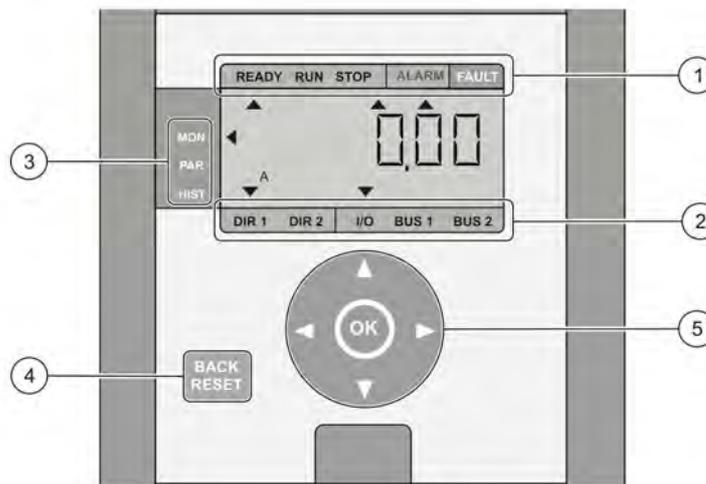
5 USER INTERFACE

 WARNING	Changing parameter settings during running may cause a hazardous situation. Parameter settings must not be changed during running.
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5.1 Control Panel

The control panel contains:

- LCD display with backlight.
- Display options (1-3) indicating drive status, control selection, and current menu.
- Buttons (4-5) with four arrow navigation buttons and buttons for back/reset and confirmation, which are used in navigating in the menu structure and in adjusting parameter values.



- 1 – Drive status
- 2 – Drive control indication
- 3 – Main menu
- 4 – Back/Reset button
- 5 – Navigation and confirmation (OK) buttons

5.2 Display options

5.2.1 Drive status



The drive status is located above the LCD display. The status of the drive is indicated with different states:

- The **Ready** state indicates that the drive is ready to start.
- The **Run** state indicates that the drive is running.
- The **Stop** state indicates that the drive has been stopped.
- The **Alarm** state indicates that an alarm has been occurred and it is active.
- The **Fault** state indicates that a fault has been occurred and drive has been stopped due to the fault.

The state is active when an arrow is pointing towards the corresponding text. For example, when the drive is running, an arrow is shown under the text RUN.



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5.2.2 Control selection



The control selections are located below the LCD display. The control selections:

- The control **DIR1** indicates that the motor is rotating forward.
- The control **DIR2** indicates that the motor is rotating backward.
- The control **I/O** indicates that the I/O terminal block is the selected control place.
- The control **BUS1** indicates that the fieldbus is the selected control place (BUS1).
- The control **BUS2** indicates that the fieldbus is the selected control place (BUS2).

The control is selected when an arrow is pointing towards the corresponding text. For example, when the motor is rotating forwarding, an arrow is shown above the text DIR1.

5.2.3 Main menu



The content of the main menu is described in the following section.



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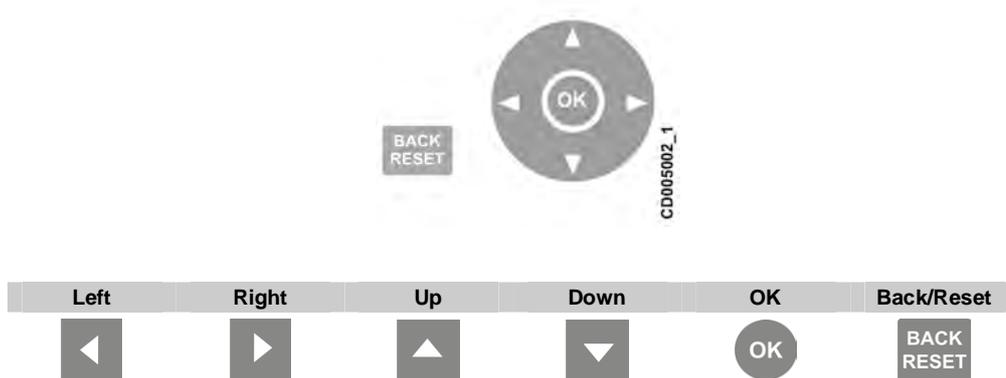
5.3 Navigating in the menu

The user interface consists of the following menus:

- The **Monitoring** menu allows you to view the monitoring values.
- The **Parameter** menu allows you to view and edit the parameter settings.
- The **Fault history** menu allows you to view the latest fault indications.

5.3.1 Using buttons

The control panel contains buttons for navigating in the menu.



Use the navigation buttons to view, select, and edit the wanted menu items.

- Activate the menu by pressing an arrow button.
- Move between the menus and menu items by using the arrow buttons.
- Select the parameter to be edited or save a new value by pressing OK.
- Increase or decrease the activated value by using the up and down arrow buttons.
- Navigate between menu options by using the right and left arrow buttons.
- Reset and return the display to the previous mode by pressing the Back/Reset button.

5.3.2 Monitoring menu

The monitoring menu consists of:

- The actual values of the measured signals
- Statuses of some control settings

The monitoring values are visible, but they cannot be edited.

Accessing the monitoring menu

<p>1</p>	<p>Press back/reset button until the display momentarily empties and the main selection arrow blinks.</p>		
<p>2</p>	<p>Press the up or down arrow button until the display indicator is pointing towards the MON menu.</p>		
<p>3</p>	<p>Press OK.</p>		

4	Navigate between monitoring groups values by using the up and down buttons.		
5	Press OK to see monitoring value.		
6	Press Back/Reset to return to the main display.		

5.3.3 Parameter menu

In the parameter menu, you can set the values for the parameters. Parameters are shown according to password level.

Code	Parameter name	Range	Default	Unit	Description	Password level
P1.1	Password	1-65535	0	-	Startup = 47 Engineering = 129	0

Accessing the parameter menu

1	Press back/reset button until the display momentarily empties and the main selection arrow blinks.		
2	Press the down arrow button until the display indicator is pointing towards the PAR menu.		
3	Press OK.		
4	Navigate between parameter groups by using the up and down buttons.		



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	Navigate between parameters by using the right and left arrow buttons.		
5	Select the parameter by pressing OK.		
6	Edit the selected parameter by using the up and down arrow buttons.		
7	Save a new value by pressing OK.		
8	Press Back/Reset to return to the main display.		

5.3.4 Fault history menu

In the fault history menu, you can view nine latest faults. The fault history shows the operating date, hour, and minutes for the fault.

When a fault is active, a fault code alternates with the main menu. It is possible to navigate in the menu, when the faults are active. The display is returned to the fault menu, if the navigation buttons has not been pressed.

When you are browsing between the faults, the active faults are blinking in the display. Press OK to reset the active fault. If the fault cannot be reset, the blinking continues.

To clear fault history, press the Back/Reset button 5 seconds in the fault history menu. Note that the drive must be stopped.

Accessing the fault history menu

1	Press back/reset button until the display momentarily empties and the main selection arrow blinks.		
2	Press the down arrow button until the display indicator is pointing towards the HIST menu.		



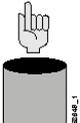
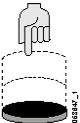
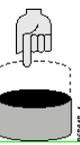
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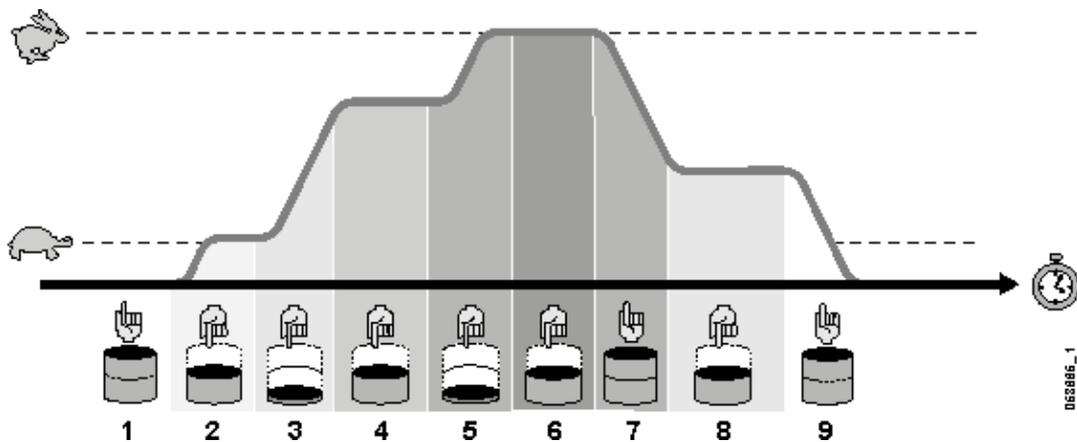
3	Press OK.		
4	Navigate between faults by using up and down buttons.		
5	Select the fault by pressing OK.		
6	Navigate fault information by using the right and left arrow buttons.		
7	Press Back/Reset to return to the main display.		

6 OPERATING INSTRUCTIONS

6.1 Control methods

EP (Electronic Potentiometer) stepless pushbutton control

	<p>Released (stop): The device doesn't move or, if it is already moving, it will decelerate to a complete stop.</p>
	<p>Fully pressed (accelerate): The device accelerates continuously until the pushbutton is released or the maximum speed is reached.</p>
	<p>Half-pressed (slow/hold): If half-pressed the device will accelerate until it reaches the preset slow speed. If half-pressed when the device is moving above the preset slow speed, the current speed will be held without accelerating or decelerating.</p>

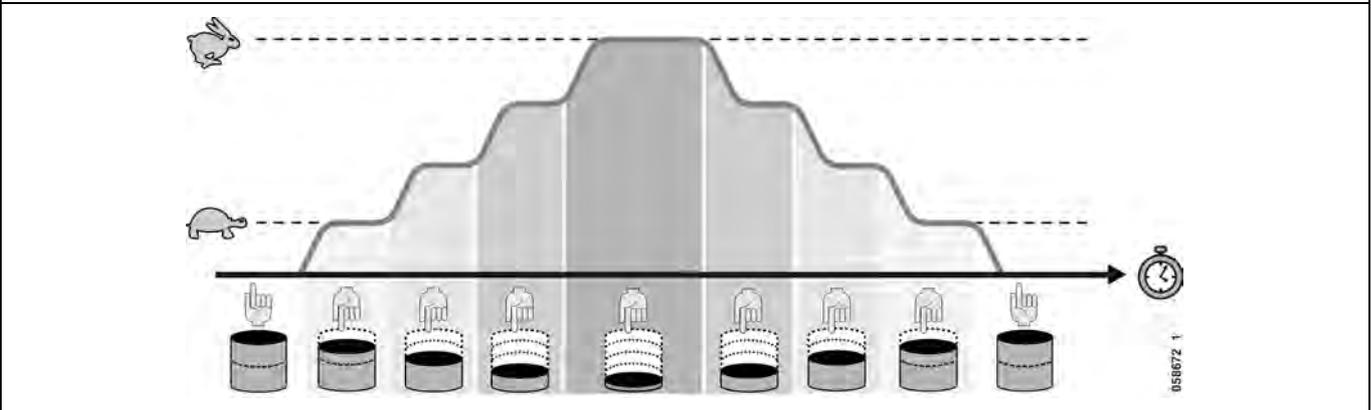


- 1 Pushbutton released: the motor does not turn
- 2 Pushbutton half-pressed: the motor accelerates until it reaches the preset slow speed
- 3 Pushbutton fully pressed: the motor accelerates towards maximum speed
- 4 Pushbutton half-pressed: the current speed is held
- 5 Pushbutton fully pressed: the motor accelerates until it reaches maximum speed
- 6 Pushbutton half-pressed: the current (maximum) speed is held
- 7 Pushbutton released: the motor decelerates
- 8 Pushbutton half-pressed: the current speed is held
- 9 Pushbutton released: the motor decelerates to a complete stop.

 <p>CAUTION</p>	<p>When a pushbutton is pressed or released, the movement will accelerate or decelerate smoothly. The operator SHALL account for the starting and stopping distances before making crane movements.</p>
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Multistep pushbutton control



The motor moves at a speed corresponding to the force applied to the direction control. The motor moves at its slowest speed when the control is partially pushed and at its maximum speed when the control is fully pushed. Between the fastest and slowest positions, there are other preset speeds. The motor stops moving when the pushbutton is released. Acceleration and deceleration is smoother than with contactor control.

NOTICE

When a pushbutton is pressed or released, the movement will accelerate or decelerate smoothly. The operator SHALL account for the starting and stopping distances before making crane movements.

6.1.1 Slowdown-limit

The slowdown limit reduces the speed of the crane or trolley at both ends of the runway or speed of the hook at up or down limit. The slowdown limit signal is connected to DI4 terminal (except for MS4 and MS5 control methods). The limit switch contact is normally closed and control voltage is connected to the input. When limit switch contact is opened, the slowdown function is activated.

The slowdown function limits the output frequency. If the driving frequency is higher than the set limit value, the frequency converter decelerates to the slowdown frequency. Movement is possible between the slowdown frequency and minimum frequency. The movement speed is reduced in the running direction or both directions, depending on the setting of parameter P6.2 (DIA4 Function).

6.1.2 Stop-limit

The stop limit stops the crane or trolley before the end of the runway or hook at the up or down limit. The stop limit signal is connected to DI5 terminal (except for MS4 and MS5 control methods). The limit switch contact is normally closed. When the limit switch contact is opened, the motion stops with ramp. Movement is possible only in the opposite direction when the stop limit function is active.



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7 TAKING PRODUCT OUT OF OPERATION

7.1 Disposal of waste materials

Waste material from installation, maintenance or dismantling shall be disposed of according to local regulations.

	If the product is taken out of use, the metal and electrical parts should be recycled.	
	In addition to local regulations, liquids like oil, grease and other chemicals shall never be spilled onto the ground or soil. Used oil and grease shall be stored in containers indicated for the purpose.	



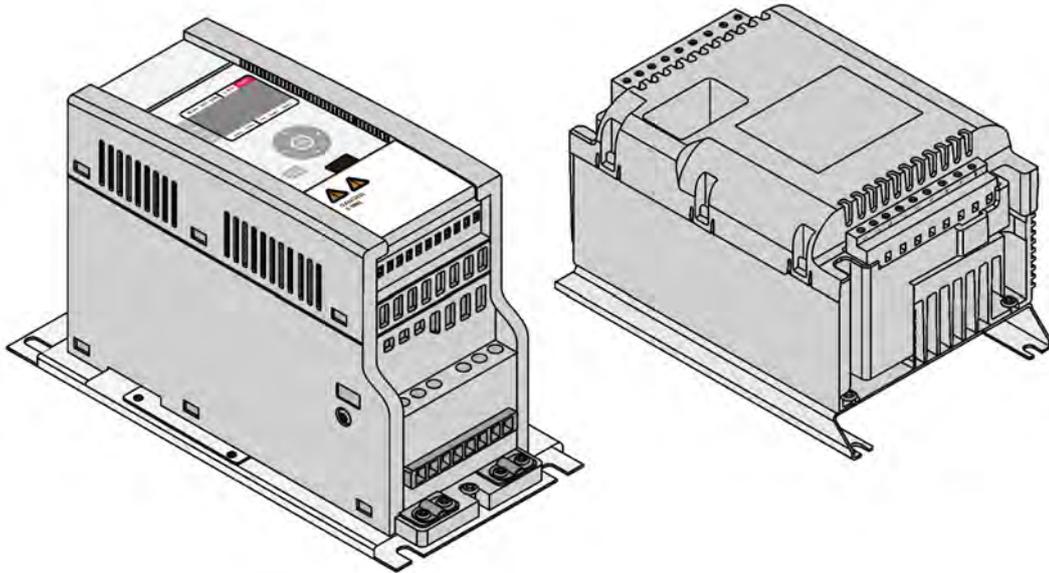
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8 TECHNICAL DATA

Mains connection	Supply voltage U_{in}	380 - 480V, -10%...+10% 3-phase
	Supply voltage frequency	45...66 Hz
	Connection to mains	Once per minute or less (normal case)
Motor connection	Output voltage	0 — U_{in}
	Nominal output current	003: I_N 5.6A (max 8.4A), 006: I_N 5.6A (max 8.4A), 012: I_N 12A (max 18A)
	Continuous output current	Rated current I_N at ambient temperature max +50°C, overload 1.5 x I_N max (1min/10min)
	Starting current	2 x I_N 2 sec every 20 sec
	Output frequency	0...250 Hz (limited options)
Digital inputs	Control voltage	42 – 240 V_{ac} , current consumption 14 - 20 mA
Control features	Control method	Frequency Control U/f Open Loop Sensorless Vector Control
	Switching frequency	3,6 kHz
	Field weakening point	Adjustable with parameter
	Acceleration time	0...20s (0,1s steps)
	Deceleration time	0...20s (0,1s steps)
Ambient conditions	Ambient operating temperature	-10°C (no frost)...+50° C (outside the cubicle + 40° C)
	Storage temperature	-40°C...+70°C
	Relative humidity	0...95% RH, non-condensing, non-corrosive, no dripping water
	Air quality: - Chemical vapors - Mechanical particles	IEC 721-3-3, unit in operation, class 3C2 IEC 721-3-3, unit in operation, class 3S2
	Altitude	100% load capacity (no derating) up to 1000m. 1% derating for each 100m above 1000m; max. 2000m
	Vibration: EN50178/EN60068-2-6	5...150 Hz Displacement amplitude 1 (peak) mm at 5...15.8 Hz Max acceleration amplitude 1 G at 15.8...150 Hz
	Shock EN50178, IEC 68-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP20
	Weight	003 model: 0.9 kg, 006 model: 1.2 kg, 012 model: 1.7 kg
Safety		61800-5-1 (2007), EN60204-1 (2009), CE, UL, cUL, FI, GOST R, IEC (see the unit's main sticker for more detailed approvals), RoHS
Protections	Over voltage protection	875 V_{DC} trip level
	Under voltage protection	333 V_{DC} trip level
	Earth-fault protection	Earth fault is tested before every start. In case of earth fault in motor or motor cable, only the frequency converter is protected.
	Unit over temperature	Yes
	Motor stall	Yes
	Overcurrent protection	Trip limit 4,0* I_N instantaneously
	Motor overtemperature supervision	Yes

English

Original Instruction



INSTALLATION INSTRUCTION

CMX 022 Upgrade Kit

031097en / Revision D

2015-04-29



R&M
MATERIALS HANDLING



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1 INTRODUCTION

1.1 About this manual

This manual offers guidance to the installation and start-up tasks of CMX 022 frequency converter replacement.

As a maintenance technician, taking the time to read this manual will help you easily adopt the replacement procedures. This manual is not intended as a substitute for proper training.



Please read through these instructions and make yourself familiar with all the steps before proceeding.



More information can be found in the original Service Manuals of the specific device.

1.2 About the upgrade kit usage

This upgrade kit is designed only for CMX 022 frequency converter.

1.3 Waste treatment and recycling of removed material

The removed parts and packaging material shall be recycled according to local regulations. We recommend recycling the frequency converter's aluminum heat sink separately.



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2 SAFETY

2.1 Before starting to work at the site

Before starting any work on the crane:

- Familiarize yourself with the equipment and its user instructions.
- Find out the location of the main switch and the emergency stop buttons.
- Evaluate the risks of the site and try to minimize them.
- Inform the site responsible that you will be working on the crane.
- Restrict access to the working area, if possible.
- Prevent unintentional use of the crane.
- Ensure that you have all the appropriate personal protection equipment. Use them as required.

2.2 Main switch and emergency stop buttons

Lock and tag the main switch when you need to switch it off during your work.

Electrical shock hazard

Touching live electrical circuit can cause serious injury.

Even though main switch is turned off, there may still be voltage inside electrical devices such as inverters. Wait at least 5 minutes before opening covers.

2.3 After working at the site

Ensure that you leave the site in a safe condition:

- Ensure that the work area is clean.
- Remove any locks/tags from switches.
- Ensure that the crane functions normally.
- Inform the site responsible that you have finished the work.



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3 DESCRIPTION OF THE UPGRADE KIT

3.1 Parts included in the kit

Part	Name	Qty.	Image
Part 1	Frequency converter	1 pcs	
Part 2	Mounting rack	1 pcs	
Part 3	Installation accessory	1 pcs	

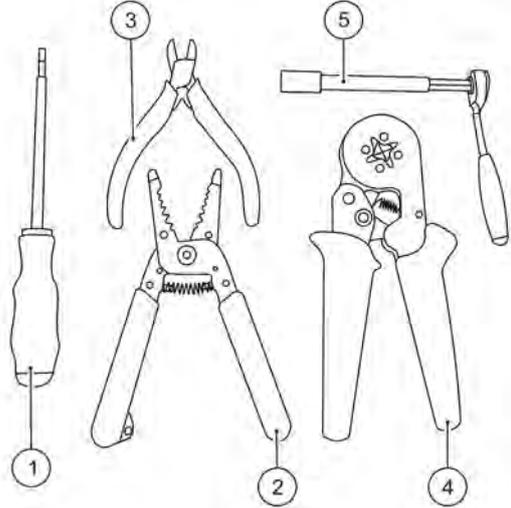
Installation accessory

Part	Name	Qty.	Image
Part 1	Cable tie	3 pcs	
Part 2	Wire marker set	1 pcs	
Part 3	Cleaning pad	1 pcs	
Part 4	Wire end ferrule 2,5mm ²	10 pcs	
Part 5	M5 x 10 Flanged screw	10 pcs	



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3.2 Required tools

Item No	Name	Image
1	Screwdriver, slot -head, 3,5 x 0,6mm	
2	Wire strippers	
3	Wire cutters	
4	Crimping tool for wire end ferrules	
5	Socket wrench, 8mm	



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3.3 Terminal connections

Table 1. Power terminals

Description of Terminal	CMX 022 Terminal X2	ControlMaster @NXT 006 Power terminals
Power supply, phase 1	L1	L1
Power supply, phase 2	L2	L2/N
Power supply, phase 3	L3	L3
Motor supply, phase 1	U	U/T1
Motor supply, phase 2	V	V/T2
Motor supply, phase 3	W	W/T3
Braking resistor, positive	R+	R+
Braking resistor, negative	R-	R-
Protective earth	PE	PE

Table 2. Control terminals

CMX 022		ControlMaster @NXT 006	
Description of Terminal	Terminal X1	Description	Control board terminals
Drive command, direction 1	1	Drive command, direction 1	1
Drive command, direction 2	2	Drive command, direction 2	2
Speed 2 / Acceleration command	3	Speed 2 / Acceleration command	3
Slowdown/Stop limit, direction 1	4	Common slowdown, Slowdown/Stop limit, direction 1	4
Slowdown/Stop limit, direction 2	5	Common stop, Slowdown/Stop limit, direction 2	5
Common DI1-5	6	Motor temperature protection / External stop	6
Normally open relay contact	7	Common DI1-6	7
Normally open relay contact	8	Normally open relay contact	8
Empty	9	Normally open relay contact	9
Motor thermistor, T1	10		
Motor Thermistor, T2	11		

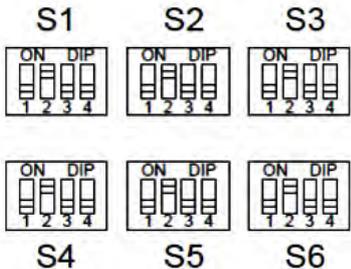
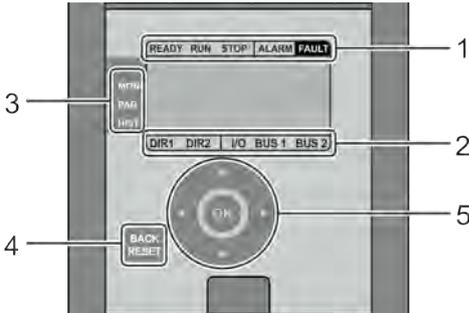
Terminal X1 and control board terminal pins may have different functions!



R&M Materials Handling, Inc. reserves the right to alter or amend the above information without notice.

3.4 User interface

CMX 022 has 6 groups of DIP switches (S1-S6), whereas ControlMaster @NXT 006 has operating digital panel and large menu structure. The correct parameter settings for ControlMaster @NXT 006 can be found in chapter: "Commissioning".

CMX 022		ControlMaster @NXT 006	
Switch	Description	No:	Description
			
S1	Maximum driving frequency	1.	Drive status
S2	Minimum driving frequency	2.	Control selection
S3	Acceleration and deceleration ramp times	3.	Main menu
S4	Control mode and motor type	4.	Back/reset button
S5	Motor current limit	5.	Navigation and confirmation (OK) buttons.
S6	Limit operation settings		

3.5 EMC filter

CMX 022 has an external EMC filter package (KC310 / KC330), whereas ControlMaster NXT has an internal EMC filter in the power supply. By default, the EMC level of the frequency converter is set to N by the manufacturer.

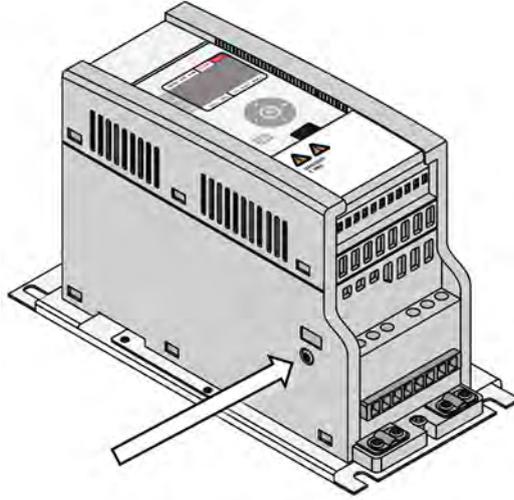
If the mains network is non-grounded (IT-network), the ControlMaster @NXT 006 frequency converter's EMC level must be changed to 0 by removing the filter capacitor disconnection screw.



Verify the type of electrical supply network from original electrical drawings.



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4 INSTALLATION

4.1 Preparations

Before you start, be sure to take into account the following matters:

- If the crane is drivable, check the trolley/bridge driving directions before switching the main power off.
- Check that the main power switch is off (lock and tag procedure).
- Always follow all local safety regulations and instructions.

⚠ WARNING

High voltage inside the device.

Wait for at least five minutes after the voltage supply has been switched off before taking any service actions.

4.2 Old frequency converter removal

1	If the trolley is operable (not broken), record the trolley driving directions.	
2	Push the main power off from the pendant or radio controller.	⚠ WARNING
High voltage inside the Frequency converter. Wait for at least five minutes after the voltage supply has been switched off before taking any service actions.		
3	ControlMaster ®NXT 006 has an internal EMC filter. The old EMC filter can be removed. Cut the ground wire and the power supply wires (L1, L2, L3) right next to the connector and mark them with the yellow wire marks (Part 17). The old EMC filter can remain on the CMX 022 body.	



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4	<p>Disconnect and mark the motor supply wires (U, V and W) with cable markers. If the CMX 022 has an external braking resistor, disconnect the braking resistor wires and remove the braking resistor. Disconnect the control wires and mark them according to the next table.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pin in CMX 022</th> <th style="text-align: center;">Connect to pin number in ControlMaster @NXT 006</th> <th style="text-align: center;">Function</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td>Drive command, direction 1</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td>Drive command, direction 2</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td>Speed 2 / Acceleration command</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> <td>Slowdown/stop limit, direction 1</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">5</td> <td>Slowdown/stop limit, direction 2</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td>Common for Digital Inputs</td> </tr> <tr> <td style="text-align: center;">7*</td> <td style="text-align: center;">8</td> <td>Normally open relay contact</td> </tr> <tr> <td style="text-align: center;">8*</td> <td style="text-align: center;">9</td> <td>Normally open relay contact</td> </tr> <tr> <td style="text-align: center;">10**</td> <td style="text-align: center;">Connect to OL10 signal</td> <td>Supply voltage for motor bi-metal thermal protection</td> </tr> <tr> <td style="text-align: center;">11**</td> <td style="text-align: center;">6</td> <td>Motor thermal protection</td> </tr> </tbody> </table> <p>*) If there are no wires connected in pins 7 and 8 in CMX 022 , the relay is not in use and thus must not be marked.</p> <p>***)If the pins 10 and 11 are connected together, the motor thermal protection is not in use and thus pin number 6 must be connected to OL10 signal. If there are two motors, there are two thermal protection circuits which must be connected in series.</p> <p>If there is a thermistor installed in the motor, a thermistor relay ,e.g. MSL, must be installed to thermal protection circuit of the motor. Pin number 6 must be connected to OL10 via MSL.</p>	Pin in CMX 022	Connect to pin number in ControlMaster @NXT 006	Function	1	1	Drive command, direction 1	2	2	Drive command, direction 2	3	3	Speed 2 / Acceleration command	4	4	Slowdown/stop limit, direction 1	5	5	Slowdown/stop limit, direction 2	6	7	Common for Digital Inputs	7*	8	Normally open relay contact	8*	9	Normally open relay contact	10**	Connect to OL10 signal	Supply voltage for motor bi-metal thermal protection	11**	6	Motor thermal protection
Pin in CMX 022	Connect to pin number in ControlMaster @NXT 006	Function																																
1	1	Drive command, direction 1																																
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8*	9	Normally open relay contact																																
10**	Connect to OL10 signal	Supply voltage for motor bi-metal thermal protection																																
11**	6	Motor thermal protection																																
5	<p>Loosen and remove the screws (4 pcs) holding the CMX 022 . Remove the CMX 022 and the EMC-filter from the enclosure. Note: The old screws are self-tapping so they must not be re-used. Use the delivered screws (part 8) instead.</p>																																	
6	<p>Strip all the wires up to 10 mm. If the wires have thin strands, use wire end ferrules (Part 21) as shown in the picture.</p>																																	

4.3 Control voltage front resistors

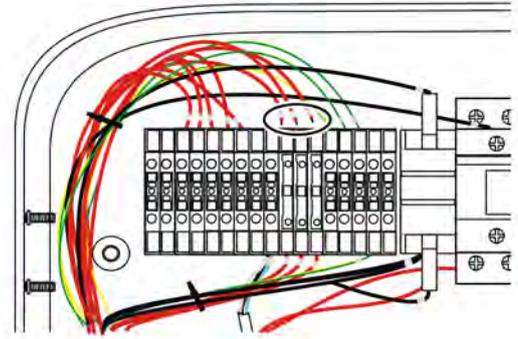
The control voltage range in the CMX 022 was 48V - 115V. If the control voltage was 230V, the front resistors were used to decrease the control voltage to 115V or 48V. In the ControlMaster @NXT 006 the control voltage range is 42V - 230V. Therefore you must remove or by-pass the possible front resistors when upgrading the CMX 022 to ControlMaster @NXT 006 .



If the front resistors are not removed or by-passed, the control inputs on the ControlMaster @NXT 006 frequency converter are not activated, even though voltage can be measured with a multimeter.

4.4 By-passing the control voltage front resistor

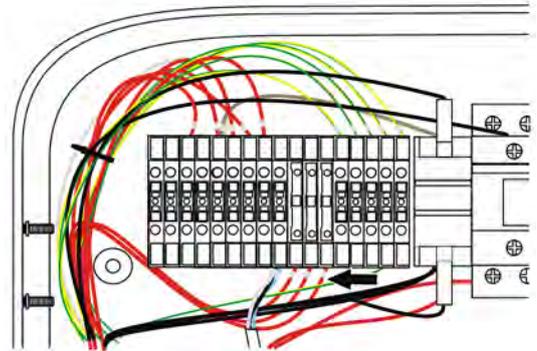
- 1** Remove the control signal wires from the top side of the front resistor.



- 2** Connect the control signal wires to the bottom side of the front resistor. See the picture below.



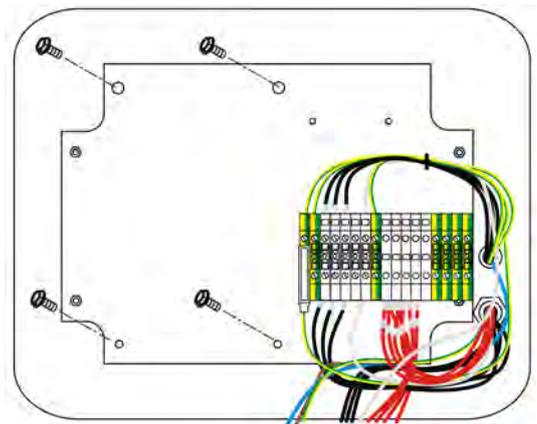
Do not mix the order of the wires.

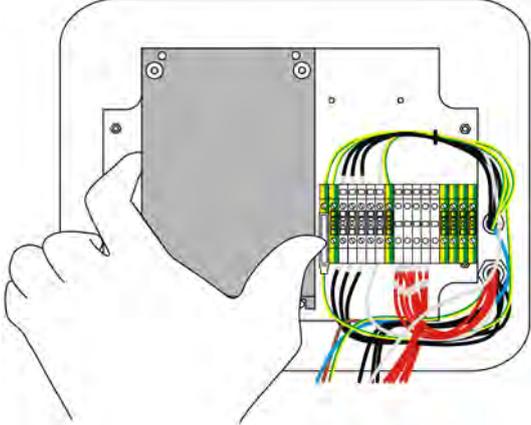
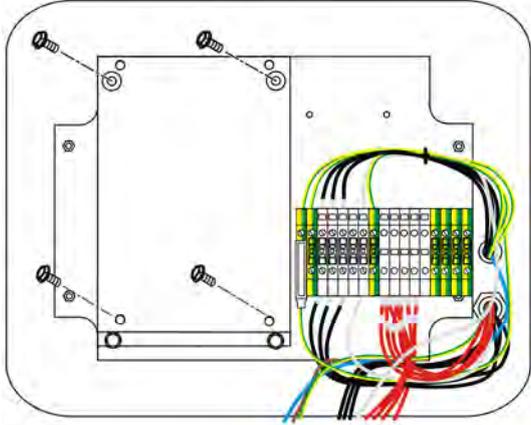
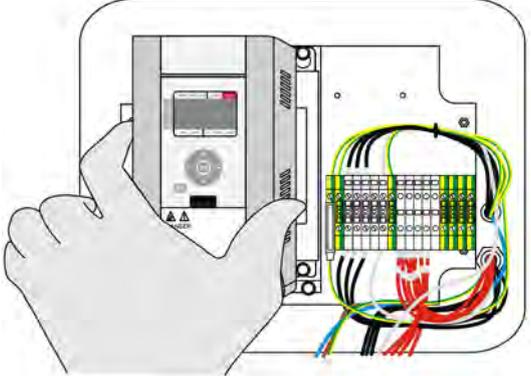


4.5 New frequency controller installation

- 1** If the CMX 022 has an external braking resistor: install the braking resistor to suitable place close to ControlMaster @NXT 006 in the crane. Install the braking resistor wire from the braking resistor to the cubicle.

- 2** Put 4 pcs , size M5 x 10 Flanged installation screws into back plate. Leave screws loose. The installation rack has slotted screw holes.



<p>3</p>	<p>Put the installation rack (part 2) into place . Tighten the screws.</p>	
<p>4</p>	<p>Put 4 pcs, size M5 x 10 Flanged installation screws into assembly rack. Leave screws loose. The inverter has slotted screw holes.</p>	
<p>5</p>	<p>Put the ControlMaster ®NXT 006 into place. Tighten the screws.</p>	
<p>6</p>	<p>Connect the power supply and motor wires in ControlMaster NXT according to electrical drawings.</p>	
<p>7</p>	<p>Connect extra grounding wire from new inverter PE(protective earth) terminal to ground. Wire length should not exceed 10 cm. The wire size should be minimum of 2.5 mm². This extra grounding wire is not delivered with the package.</p>	
<p>8</p>	<p>If the CMX 022 has an external braking resistor: Remove the internal braking resistor wires and connect the braking resistor cable to ControlMaster ®NXT 006 according to the electrical drawings.</p>	



Digital input 5 in ControlMaster NXT will be deactivated. No connection is needed.

Variation 2 - EP2+slow down. MS2 control method with slowdown limit switch. With ControlMaster NXT both direction signals from limit switch must be connected in series as shown in below figures.

Figure 3. Old inverter + EP2 + slow down

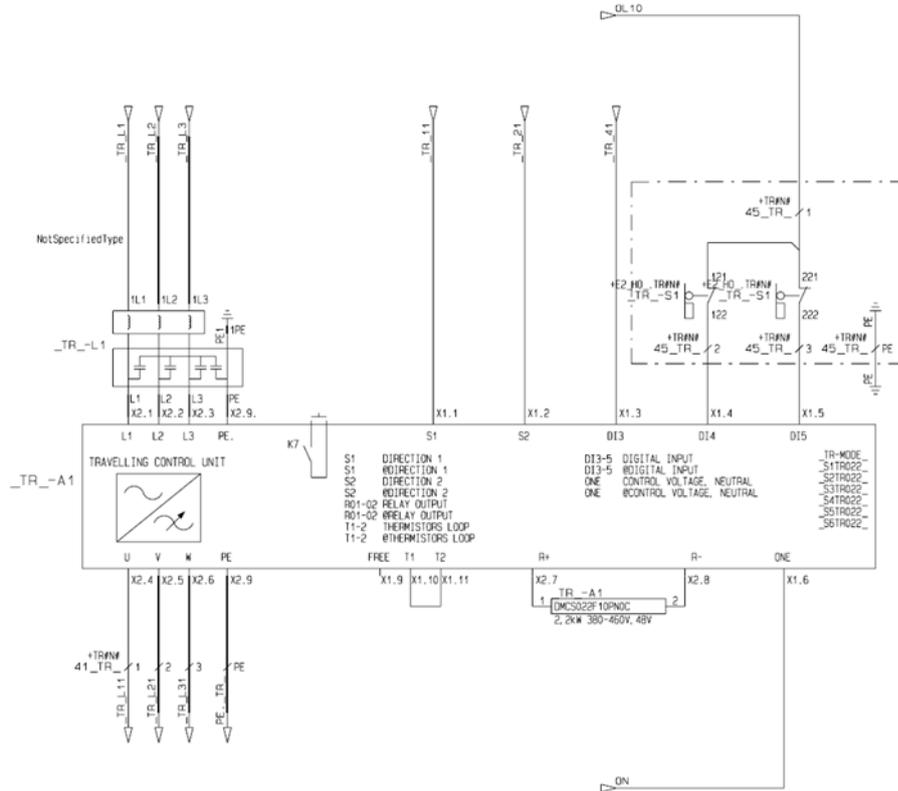
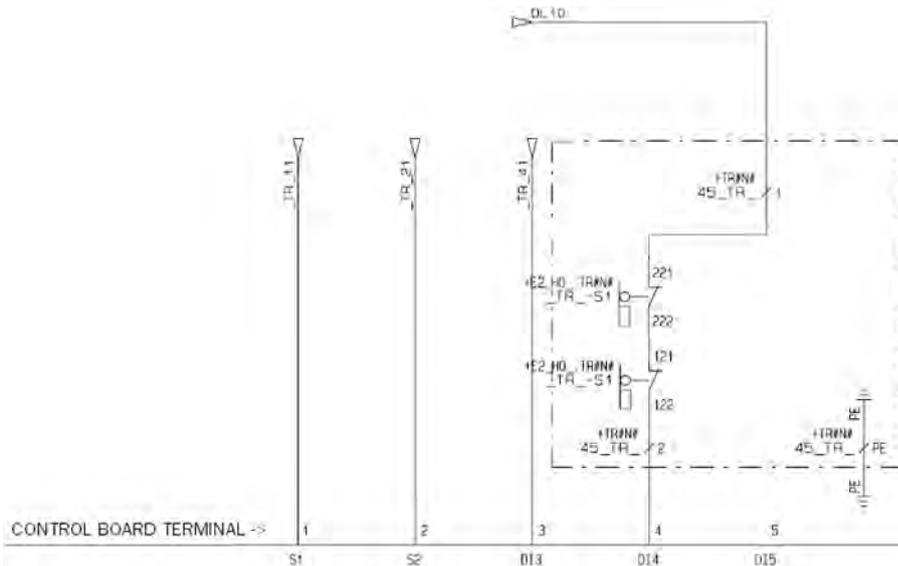


Figure 4. New inverter + EP2 + slow down





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Digital input 5 in ControlMaster NXT will be deactivated. No connection is needed.

Variation 3 - EP2 / MS2 + stop.

Figure 5. Old inverter + EP2 / MS2 + stop

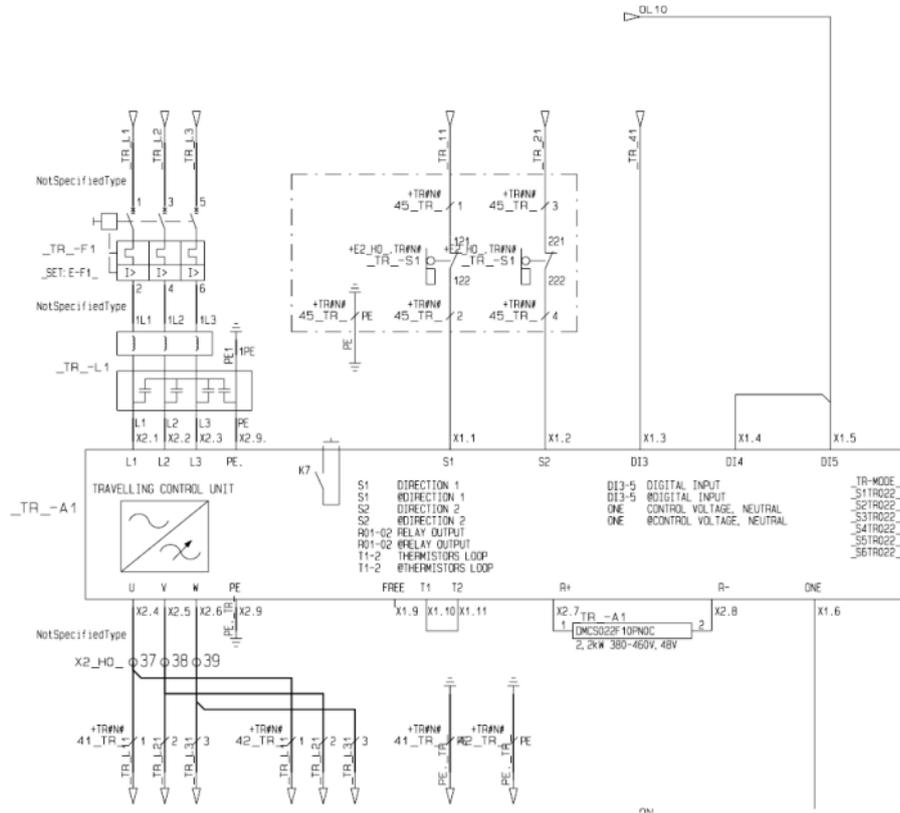
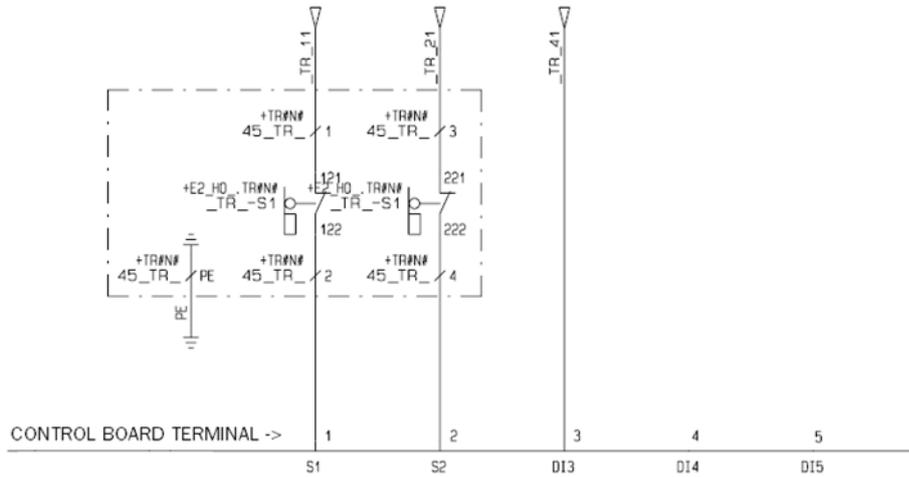


Figure 6. New inverter + EP2 / MS2 + stop



Digital inputs 4 and 5 in ControlMaster NXT will be deactivated. No connection is needed.

Variation 4 - MS2 + 2-step limit switch.

Figure 7. Old inverter + MS2 + 2-step limit switch

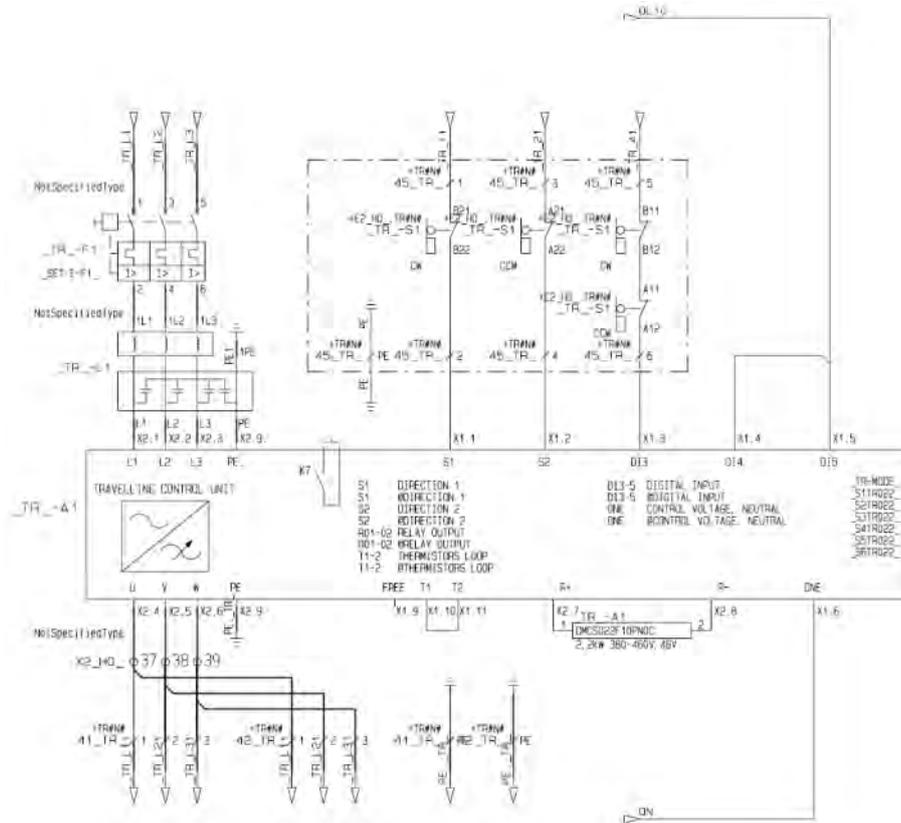
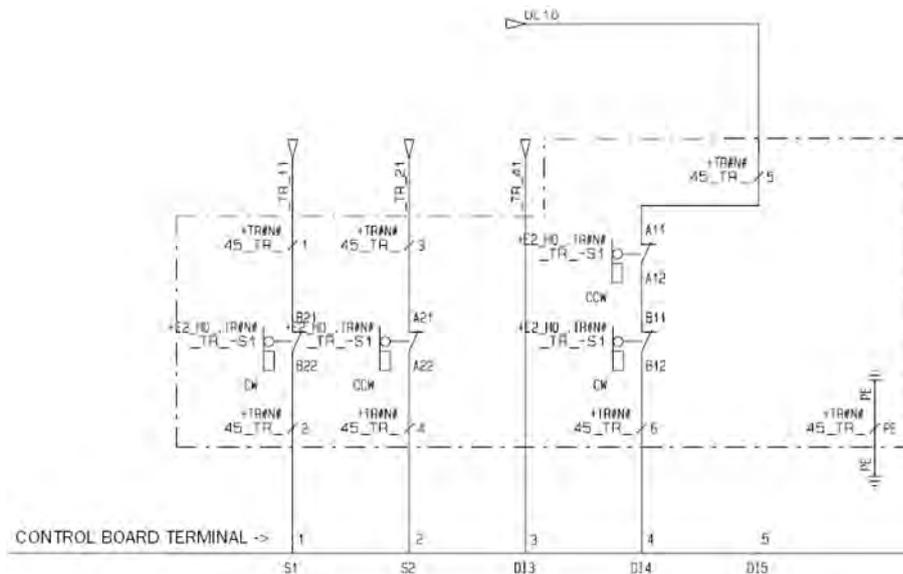


Figure 8. New inverter + MS2 + 2-step limit switch



Variation 5 - EP2 + 2-step limit switch. With ControlMaster NXT the both slowdown direction signals from limit switch must be connected in series.

Figure 9. Old inverter + EP2 + 2-step limit switch

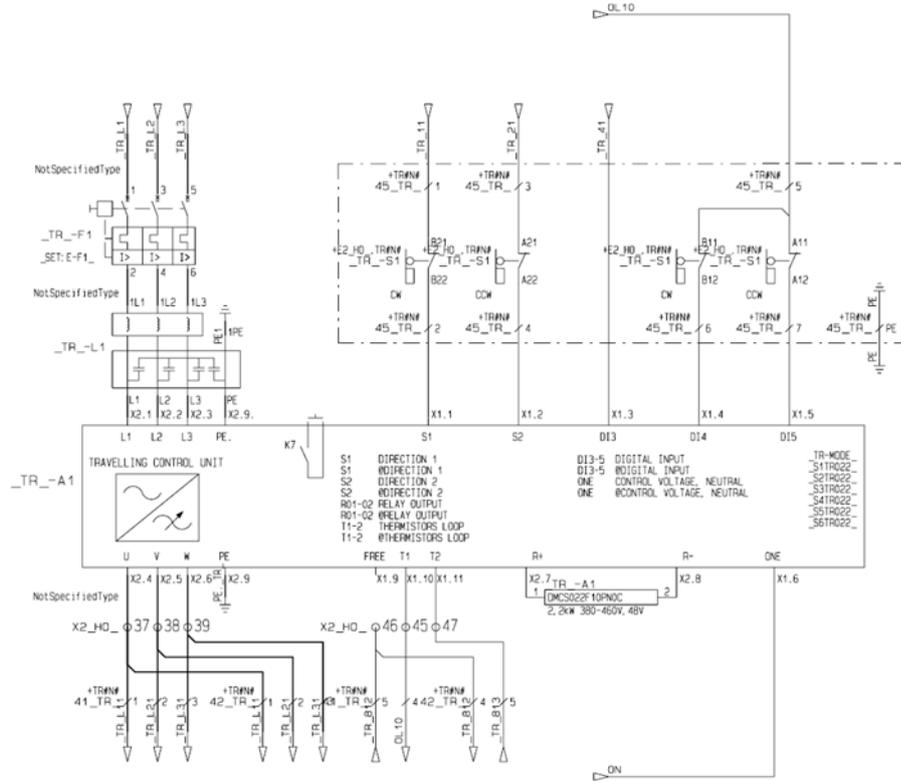
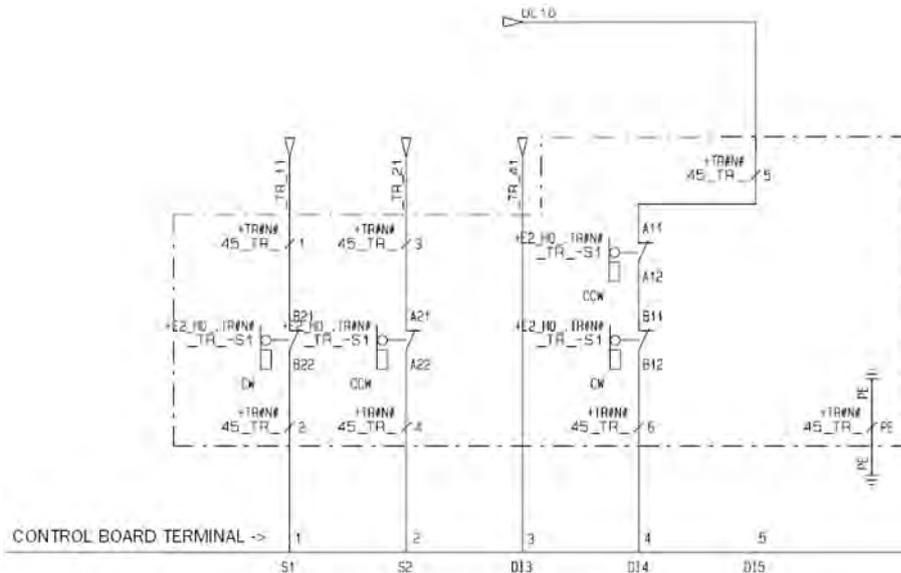


Figure 10. New inverter + MS2 + 2-step limit switch





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5 COMMISSIONING

5.1 Old inverter parameter settings

Write down the old parameter settings from the CMX 022 frequency converter in the table below.

Table 1: CMX 022 parameter settings																								
Dip switch position	Switch 1				Switch 2				Switch 3				Switch 4				Switch 5				Switch 6			
	-1	-2	-3	-4	-1	-2	-3	-4	-1	-2	-3	-4	-1	-2	-3	-4	-1	-2	-3	-4	-1	-2	-3	-4
ON																								
OFF																								

5.2 Motor type

Record the motor type. You need to verify if your motor is equipped with compact brake. This information is later used on the commissioning steps. The commissioning steps are different with compact brake motors.

Motor type

Compact brake motor types
MF06MA200
MF06MA100
MF06LA200
MF06LA100

5.3 Traveling motor rating plate values

Record the traveling brake rating plate values for further use on commissioning.

Name	Motor rating plate value
Motor Nom Volt [V]	
Motor Nom Freq [Hz]	
Motor Nom Speed [rpm]	
Motor Nom Curr [A]	
Nom Magnetizing Curr [A]	
Motor Cos Phi	

5.4 Setting up the new inverter parameters

Compare the DIP switch settings of the CMX 022 with the following tables and find correct settings for the ControlMaster @NXT 006 parameter settings.



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1

At the ControlMaster @NXT 006 frequency converter; set parameter **P1.1** to value 129. This sets the engineering password level which is needed for parameter settings.



2

Set the nominal driving frequency. Driving frequency depends on the chosen nominal frequency of the motor. Use table 1 to determine which table must be used to set the maximum and minimum driving frequencies. Note that switch S4-3 and S4-4 are not shown, because these were used for the IR-compensation purpose in the CMX 022 inverter.

Table 3. Selecting Maximum and Minimum frequency table

CMX 022		Table	Nominal Frequency (Hz)
Switch S4			
-1	-2		
0	0	4	100/120
1	0	5	80
0	1	6	50/60

Table 4. Maximum and minimum frequency 100/120 Hz

CMX 022				Minimum frequency (Hz) To P1.2	Maximum Frequency (Hz) To P1.3
Switch S1					
-1	-2	-3	-4		
0	0	0	0	29	100
0	0	0	1	14	50
0	0	1	0	23	62
0	0	1	1	10	54
0	1	0	0	32	80
0	1	0	1	12	58
0	1	1	0	16	66
0	1	1	1	18	70
1	0	0	0	50	115
1	0	0	1	20	75
1	0	1	0	26	85
1	0	1	1	35	90
1	1	0	0	38	95
1	1	0	1	41	105
1	1	1	0	44	110
1	1	1	1	47	120



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Table 5. Maximum and minimum frequency 80 Hz

CMX 022				Minimum frequency (Hz) To P1.2	Maximum Frequency (Hz) To P1.3
Switch S1					
-1	-2	-3	-4		
0	0	0	0	22	77
0	0	0	1	14	42
0	0	1	0	18	50
0	0	1	1	10	40
0	1	0	0	30	62
0	1	0	1	12	44
0	1	1	0	16	46
0	1	1	1	20	48
1	0	0	0	40	80
1	0	0	1	24	53
1	0	1	0	26	56
1	0	1	1	28	59
1	1	0	0	32	65
1	1	0	1	34	68
1	1	1	0	36	71
1	1	1	1	38	74

Table 6. Maximum and minimum frequency 50/60 Hz

CMX 022				Minimum frequency (Hz) To P1.2	Maximum Frequency (Hz) To P1.3
Switch S1					
-1	-2	-3	-4		
0	0	0	0	15	50
0	0	0	1	7	25
0	0	1	0	12	31
0	0	1	1	5	27
0	1	0	0	16	40
0	1	0	1	6	29



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CMX 022				Minimum frequency (Hz) To P1.2	Maximum Frequency (Hz) To P1.3
Switch S1					
-1	-2	-3	-4		
0	1	1	0	8	33
0	1	1	1	9	35
1	0	0	0	25	58
1	0	0	1	10	38
1	0	1	0	13	43
1	0	1	1	18	45
1	1	0	0	19	48
1	1	0	1	21	53
1	1	1	0	22	55
1	1	1	1	24	60

3

Set acceleration and deceleration ramp time values. Acceleration and deceleration ramp time values for CMX 022 can be found in table 7. The corresponding value for ControlMaster ®NXT 006 must be set to parameters **P1.7** and **P1.8**. The original value for the Acceleration and deceleration ramp time can be found from the original electrical drawings. Default value for trolley acceleration time is 3,5s and bridge acceleration time 4,5s.



Reducing of the acceleration or deceleration ramp time from the value of the original delivery is not allowed.

Table 7. Acceleration and deceleration ramp times

CMX 022				Acceleration and deceleration Ramp Time (s)
Switch S3				
-1	-2	-3	-4	
0	0	0	0	2,5
0	0	0	1	3,5
0	0	1	0	3
0	0	1	1	5
0	1	0	0	2
0	1	0	1	8
0	1	1	0	1
0	1	1	1	7,5
1	0	0	0	1,5
1	0	0	1	4
1	0	1	0	7
1	0	1	1	6,5
1	1	0	0	4,5
1	1	0	1	6
1	1	1	0	5,5
1	1	1	1	0,5

4

At the ControlMaster ®NXT 006 frequency converter; Set **P1.9**=drive selection, to value 1=travel or 2=travel compact brake motor.



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5 If you set **P1.9**=drive selection to value 1=travel on the step 4, autotune the inverter. After autotuning, go to step 8. Steps 6 and 7 are done only with compact brake motors.
AUTOTUNING
 5.1 Ensure that parameters **P3.1** (Motor Nominal Voltage), **P3.2** (Motor Nominal Frequency), **P3.4** (Motor Nominal Current), **P3.5** (Motor Nominal Flux Current), **P3.6** (Motor Cos Phi) are equal to the motor rating plate values. If motor no-load current is not known, set **P3.5** (Motor Nominal Flux Current) equal to zero. Auto-tuning then uses motor cos phi for calculations instead of no-load current.
 5.2 Set parameter **P3.7** (Autotuning) = 1. Auto-tuning will start right after the parameter change. RUN indicator on the display turns on (and STOP indicator turns off). Autotuning will take about 5 seconds.
 5.3 After auto-tuning, parameter **P3.7** (Autotuning) = 3, successfully done.

6 (only with compact brake motors) Set motor control parameters.
 • **P3.2**=Motor nominal frequency in percent of motor nominal voltage.
 • **P4.1**=zero frequency voltage in percent of motor nominal voltage.
 • **P4.2**=U/f mid voltage in percent of motor nominal voltage.
 • **P4.3**=U/f mid frequency in Hz.
 • **P4.4**=Rs voltage drop in percent of motor nominal voltage.

Table 8. Motor control parameters

Compact brake motors	CMX 022				ControlMaster®NXT 006				
	Switch S4				Parameter				
	-1	-2	-3	-4	P3.2	P4.1	P4.2	P4.3	P4.4
MF06MA200	0	0	0	0	100/120 Hz	10%	14%	10%	0%
MF06MA100	1	0	1	0	80 Hz	9%	16%	8%	0%
MF06LA200	0	0	1	0	100/120 Hz	8%	12%	10%	0%
MF06LA100	1	0	0	1	80 Hz	6%	12%	8%	0%



7 (only with compact brake motors) Set motor nominal current. You can set the parameter according to this table or look the real value from the motor rating plate.

Table 9. Motor nominal current

CMX 022		Motor nominal current limit	ControlMaster ®NXT 006
Switch S5			Parameter
-1	-2		P3.4
0	0	0...1,8A	1,8A
0	1	1,9...2,7A	2,7A
1	0	2,8...3,5A	3,5A
1	1	>3,5A	5,6A

8 At the ControlMaster ®NXT 006 frequency converter; Set **P3.8**=Start DC-Current. If you have multiple motors, motor current values must be multiplied by the number of motors.

9 At the ControlMaster ®NXT 006 frequency converter; Set **P3.9**=current limit to 8.4A. This is the maximum allowed temporary over current for one minute of time.

10 Set the control mode. The control mode settings in CMX 022 and the corresponding parameter value for ControlMaster ®NXT 006 are given in table 6.

Table 10. Control mode

CMX 022		Control Method	ControlMaster ®NXT 006
Switch S6			Parameter
-1	-2		P6.1
0	0	MS2	2
1	0	EP2	1

11 Set travel limit operation settings. See chapter [New frequency controller installation \(page 12\)](#), step 9, how the control wiring was in the old inverter and how the new inverter wiring was done. In the new inverter you need to set correct parameters in order to set travel limits to work. After setting the parameters, test the limit functions.

Old CMX 022 inverter control board connections		Original limit settings	ControlMaster ®NXT 006 parameter		
			P6.2	P6.3	P6.4
X1:4 / DIA4	X1:5 / DIA 5	S11 , S21	3	0	1
X1:4 / DIA4	X1:5 / DIA 5	OL10	0		
X1:3 / DIA3		S11, S21	3		



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12	At the ControlMaster ®NXT 006 frequency converter; set parameter P1.1 to value 0. This sets the default password level which doesn't allow any changes to the parameters .
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6 TROUBLESHOOTING

6.1 Purpose of troubleshooting

The purpose of troubleshooting is primarily to determine whether problems are caused by the frequency converter or external devices. It is also possible that a faulty external device has caused damage to the frequency converter. In that case it is very important to repair or change any faulty devices to prevent recurring problems.

6.2 Problems and solutions

Sr. no.	Product	Suggested solution
1	The frequency converter is on READY status but motor does not run or just jerks but control voltage can be measured from the terminals.	Make sure that the front resistors on the control voltage circuit have been removed or by-passed according to the instructions in Control voltage front resistors (page 11) .
2	The frequency converter does not start (not in READY status) when it is started.	<ul style="list-style-type: none"> • Measure the main voltage between terminals L1, L2 and L3. See electrical drawings for the correct value. • Make sure that there are no devices causing disturbance connected to the same voltage supply as the crane, such as big motors or welding devices. • Make sure all motor cables have proper connection. • Make sure that no limit switch or operation is not active. • Measure the control voltage in direction command terminal 1 (DI1) and terminal 2 (DI2) against the common (terminal 7). Voltage should increase when button is pushed on the controller. <p> When the EMC screw is connected, the frequency converter has RC filters connected to the power supply side to reduce disturbance to the network. The capacitors of these filters may cause the RCD (Residual Current Device) to trip. Therefore, using RCD with frequency converter controlled cranes is not recommended.</p>
3	The motor runs poorly: trolley/bridge does not move as it supposed to move.	<ul style="list-style-type: none"> • Check that the load is not over nominal. • Check that all cables are correctly connected and not loose. • Check that all motor parameters are correctly set. • Check that the U/f-curve parameters (P4.2, P4.3 and P4.4) are correctly set. • Check that the motor's brake opens completely.

6.3 Fault codes and alarms

When the frequency converter detects an unacceptable situation it stops the current movement and indicates a warning or fault code. First digits of the fault code indicates the order of the code, e.g. F1 means the latest fault. Next two digits are indicating the fault code. At active fault situation FAULT arrow and fault code are blinking. If there are several active faults, they all are blinking in history browsing.



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Some of the faults are reset automatically by the software, while others may require the frequency converter to be powered down. The causes of the fault(s) must be resolved and both drive commands have to be on the OFF position for 0.5s before the motor can be started again. In a case of over current fault the supply voltage must be switched off and back on before it is possible to resume operation.

The warning and fault code numbers and corresponding warnings and faults, possible causes and suggested solutions are listed in the following table.

Table 11. FAULT CODES

Code	Fault	Possible cause	Suggested solution	Resetting
1	Overcurrent	<ul style="list-style-type: none"> • Motor failed • Short circuit in motor wiring 	<ul style="list-style-type: none"> • Check/replace motor • Check/repair motor wiring. 	A
2	Overvoltage	<ul style="list-style-type: none"> • Too high supply voltage • Braking resistor failed • Break in braking resistor wiring 	<ul style="list-style-type: none"> • Measure supply voltage and check hoist supply voltage from hoist type plate • Measure braking resistor resistance • Check braking resistor and wiring visually 	C
3	Earth Fault	<ul style="list-style-type: none"> • Short circuit in wiring • Motor failed 	<ul style="list-style-type: none"> • Check/repair wiring • Check/replace motor 	A
8	System Fault	<ul style="list-style-type: none"> • Internal fault 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B
13	Under temperature	<ul style="list-style-type: none"> • Internal temperature too low 	<ul style="list-style-type: none"> • Minimum operating temperature is -30°C 	C
14	Overtemperature	<ul style="list-style-type: none"> • Internal heat sink temperature too high 	<ul style="list-style-type: none"> • Wait for unit cooling down 	C
22	API EEPROM Checksum	<ul style="list-style-type: none"> • Internal parameter save error 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B
23	POW EEPROM Checksum	<ul style="list-style-type: none"> • Internal parameter save error 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B
24	Counter fault	<ul style="list-style-type: none"> • Internal counter error 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B
25	API Microprocessor Watchdog	<ul style="list-style-type: none"> • Internal watchdog error 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B
26	POW Microprocessor Watchdog	<ul style="list-style-type: none"> • Internal watchdog error 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B



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Code	Fault	Possible cause	Suggested solution	Resetting
34	Internal Bus Communication	<ul style="list-style-type: none"> Internal bus error 	<ul style="list-style-type: none"> Switch off supply voltage If problem recurs, replace inverter 	B
35	Application Fault	<ul style="list-style-type: none"> Internal application error 	<ul style="list-style-type: none"> Switch off supply voltage If problem recurs, replace inverter 	B
41	IGBT Overtemperature	<ul style="list-style-type: none"> Internal IGBT temperature too high 	<ul style="list-style-type: none"> Wait for unit cooling down 	C
52	Parameter Fault	<ul style="list-style-type: none"> Wrong parameter setting. P1,9 Drive Selection = 0 	<ul style="list-style-type: none"> Check parameter P1.9 Drive Selection 	C
53	CAN Communication Fault	<ul style="list-style-type: none"> CAN Communication is not working 	<ul style="list-style-type: none"> Switch off supply voltage from all devices that are connected to CAN bus Check CAN-bus wiring and termination resistor settings Check CAN-communication parameters 	C
55	Board Fault	<ul style="list-style-type: none"> API3 is not installed or not working properly 	<ul style="list-style-type: none"> Switch off supply voltage Check API3 supply voltage Check API3 wiring connections If problem recurs, replace inverter 	B
56	Generator Current Limit/Deceleration Ramp Supervision	<ul style="list-style-type: none"> Inverter cannot stop with the set ramp stretching 	<ul style="list-style-type: none"> Increase P1.8 Deceleration Time or P11.1 Ramp Stretching value 	C
57	Motor Overtemperature	<ul style="list-style-type: none"> Motor temperature too high Digital input DIA4 deactivated when used for motor overtemperature protection 	<ul style="list-style-type: none"> Wait for motor cooling down Avoid running long periods at low speed Check motor temperature protection wiring 	C
58	Overvoltage Regulator Timeout	<ul style="list-style-type: none"> Overvoltage regulator has been active for 5 sec 		C
59	Overvoltage at Start	<ul style="list-style-type: none"> Too high supply voltage 	<ul style="list-style-type: none"> Measure supply voltage and check hoist supply voltage from hoist type plate 	C
60	Power unit fault	<ul style="list-style-type: none"> Power unit has stopped running E-stop during running 	<ul style="list-style-type: none"> Switch off supply voltage Check power unit wiring If problem recurs, replace inverter 	B



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Code	Fault	Possible cause	Suggested solution	Resetting
61	Overspeed	<ul style="list-style-type: none"> • Overspeed situation detected • Interference in speed signal connected to ENC1A 	<ul style="list-style-type: none"> • Check supply voltage • Check load measurement operation and calibration • Check sensor cable grounding and inverter PE-connections • Check/replace speed sensor connected to ENC1A 	A
62	Speed difference	<ul style="list-style-type: none"> • Speed difference situation detected • Load measured too low in ESR use • Mechanical failure e.g. in gear • Interference or missing signal in ENC1A • Sensor channels ENC2A-B connected wrong way • Interference or missing signal in ENC2A-B 	<ul style="list-style-type: none"> • Check supply voltage • Check load measurement operation and calibration • Check hoist operation without load • Check sensor cable grounding and inverter PE-connections • Check/replace speed sensor connected to ENC1A • Swap connections between ENC2A and ENC2B • Check/replace speed sensor connected to ENC2A-B 	A
63	Stall	<ul style="list-style-type: none"> • Motor does not run. Mechanical failure e.g. in gear • Missing signal in ENC1A 	<ul style="list-style-type: none"> • Check/replace motor • Check/repair motor wiring • Check hoist operation without load • Check/replace speed sensor connected to ENC1A 	A
64	Relay	<ul style="list-style-type: none"> • Error detected in ROB1 relay, test circuit or the main contactor 	<ul style="list-style-type: none"> • Check main contactor circuit wiring • If problem recurs replace inverter 	A
71	Brake control	<ul style="list-style-type: none"> • Error detected in brake control circuit 	<ul style="list-style-type: none"> • Check/repair brake control circuit wiring • Check brake coil resistance • Replace brake if not ok • If problem recurs replace inverter 	A
73	Both Direction Commands Active	<ul style="list-style-type: none"> • S1 and S2 controls active at the same time • Fault in control circuit/controller 	<ul style="list-style-type: none"> • Check/repair control circuit wiring • Check/replace pendant controller 	C
77	CRC	<ul style="list-style-type: none"> • Internal safety parameter fault 	<ul style="list-style-type: none"> • Switch off supply voltage • If problem recurs, replace inverter 	B



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Code	Fault	Possible cause	Suggested solution	Resetting
82	Overload	<ul style="list-style-type: none"> Overload situation detected Worn chain or chain drive (chain hoist) Load sensor out of calibration Load sensor failed Mechanical failure in gear (chain hoist) 	<ul style="list-style-type: none"> Make sure that the load on hook is not more than rated load Check/replace chain and chain drive Recalibrate load sensor by performing load calibration function If problem recurs after re-calibration, replace load sensor and perform offset correction and calibration Check hoist gear operation by observing noise, vibration and so on 	C
84	Clutch supervision	<ul style="list-style-type: none"> Clutch slipping detected (chain hoist) Worn chain or chain drive (chain hoist) Missing pulses in signal connected to ENC2A-B Parameter P8,7 ENC2 Stall Pulse Limit value too high 	<ul style="list-style-type: none"> Check/adjust clutch adjustment Check/replace chain and chain drive Check/replace speed sensor connected to ENC2A-B Lower the parameter P8,7 ENC2 Stall Pulse Limit value 	A
85	Load Sensor Fault	<ul style="list-style-type: none"> Load sensor signal out of range 	<ul style="list-style-type: none"> Check/repair load sensor wiring Check/replace load sensor 	C

Resetting column explanation

- A = E-stop activation / deactivation
- B = Hoist supply voltage switch OFF / ON
- C = Automatic when fault situation is over

Table 12. ALARMS

Code	Alarm	Possible cause	Suggested solution
6	External Stop	ES-signal not active.	Lift E-stop button.
51	Stop Limit	Stop limit activated. Break in limit switch wiring. Limit switch failed.	<ul style="list-style-type: none"> Run to the other direction Check/repair limit switch wiring Check/replace limit switch
54	Limit fault	Wrong limit switch active. Frequency too low to detect direction.	Check limit switch operation and wiring.



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Code	Alarm	Possible cause	Suggested solution
83	Slack wire	Slack wire function active.	
86	Load not calibrated	Load calibration has not been done.	Perform load calibration function.
87	Programmable limit active	Programmable limit is disabling driving in either direction	<ul style="list-style-type: none"> • Run other direction • Set the programmable limit to other position • Limit can be also bypassed temporarily by activating the movement control more than 5 seconds
88	CCU fault	Controlled common use fault.	Another device that is connected in CAN bus has an active fault.
93	CCU activation	Controlled common use activation.	Another device that is connected in CAN bus has caused the stopping.