motionlabs™
We Manufacture Solutions For Your Challenges

MODIFIED SAFETY CHAIN HOIST

ELECTRIC CHAIN HOISTS

USER MANUAL

Modified Chain Hoist for
VFD
1701-0002-03
CM Model: LL-3.5

This chain hoist control system is intended for professional use only.
Read this entire document before installing operating or using
this chain hoist control system.

■ORIGINAL INSTRUCTIONS

Copyright [year] © Motion Laboratories Inc.
All right reserved
Part Number: 1701-XXXX-05-UM
Release: 06-2018

Original Instructions
Modified Safety Chain Hoist
Rev ORG
Released 06-2018

The reproduction, transmission or use of this document, or its contents is not permitted unless authorized in writing.
Offenders will be liable for damages.
All rights including rights created by patent grant or registration of a utility model or design are reserved.
Other functions not described in this document may be available. However, this fact shall not constitute an obligation to supply such functions with a new product or when servicing.

We have checked that the contents of this document correspond to the device described.
There may be discrepancies nevertheless, and no guarantee can be given that they are completely identical.
The information contained in this document is reviewed regularly and any necessary changes will be included in the next edition.

We welcome suggestions for improvement.

Motion Laboratories Inc. intends this document, whether printed or electronic, to be provided in its entirety.

- **USER DOCUMENTATION**

WARNING
Before installing and commissioning the Modified Safety Chain Hoist, you must read all safety instructions and warnings carefully including all the warning labels attached to the equipment. Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels.

REGIONAL CONTACTS

Motion Laboratories Inc.
520 Furnace Dock Road,
Cortlandt Manor,
NY 10567
USA

Tel: 1.800.227.6784
Tel: +1 (914) 788-8877
Fax: +1 (914) 788-8866
www.motionlabs.com
Info@motionlabs.com

- **CENTRAL TECHNICAL SUPPORT**

Motion Laboratories Inc.
520 Furnace Dock Road,
Cortlandt Manor,
NY 10567
USA

Tel: 1.800.227.6784
Tel: +1 (914) 788-8877
Fax: +1 (914) 788-8866
www.motionlabs.com
Info@motionlabs.com

- **USE FOR INTENDED PURPOSE ONLY**

The equipment may be used only for the application stated in the manual and only in conjunction with devices and components recommended and authorized by Motion Laboratories Inc.

- **IDENTIFICTION**

This user manual pertains to the following Modified Chain Hoist models:
1701-0002-03

Table of Contents

- **SYMBOLS**

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
Used without a safety alert symbol indicates a potentially hazardous situation which, if not avoided may result in property damage.

- **DON'Ts**

Do NOT allow lifting operations unless carried out by a competent person.
Do NOT operate the hoists without a clear view of the load or reliable communication with an observer.
Do NOT operate the hoists unless the hazard zone has been cleared
Do NOT operate the system until a full risk assessment for your particular application has been completed.

- **GENERAL SAFETY INFORMATION**

The manual must be kept by a person in charge in a suitable place and ready for consultation, in optimal conditions. Should it be lost or damaged, the manual can easily be retrieved on the manufacturers website: www.motionlabs.com.
The manufacturer retains all material and intellectual rights on the manual, and restricts its duplication, even partial, for any commercial use.

CAUTION

All marking data should not be removed by grinding, abrasion or peeling, whether accidental or not. Any unit that does not carry the proper identification references should be removed from service until those references can be replaced.

WARNING

This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Non-compliance with or failure to follow the instructions contained in this manual can result loss of life, severe personal injury or serious damage to property.

- **ELECTRICAL SAFETY INFORMATION**

The Modified Safety Hoists operates at high voltages.

DANGER

Risk of electric shock. Disconnect the power supply across all poles before opening the equipment for access. Repairs on equipment must only be carried out by trained NA service technicians familiar with the technical specifications contained in this unit.

To ensure proper operation and dependability, any defective electrical component must be replaced using parts contained in the relevant spare parts list.

- **OPERATIONAL SAFETY INFORMATION**

The modified safety chain hoist is provided with a full operator manual supplied by the manufacturer of the chain hoist. This document should be read in its entirety.

- **PRODUCT DEFINITION**

The modified safety chain hoist described in this manual is based on modifications performed to inverter duty rated electric chain hoist as supplied by the manufacturer. All lifting capacities and electrical characteristics are as supplied by the manufacturer.

Modifications in the "…-03" series are identified as MLI VFD MOD-01 and includes the following:

- An absolute encoder driven by a timing belt coupled to a pulley on the limit output pinion and attached via a bracket assembly.
- An incremental encoder mounted into a recessed end bell of the motor.
- A Han Mod connector assembly installed on the hook side of hoist body

- **PRODUCT PERFORMANCE**

The modified chain hoist 1701-0002-03 identified in this manual is part of a variable speed hoisting system. The hoist is controlled by an external variable frequency drive (VFD) box. they interface with the hoist via a HAN multipin power and control cable assembly. This hoist connector provides the following connection points:

- The connections needed to power the motor.
- The connections needed to energize the brakes
- The connections needed to monitor the incremental encoder.
- The connections needed to monitor the absolute encoder.
- The connection needed to monitor the hoist travel limits.

The hoist motor power is supplied by the VFD box as determined by control platform criteria. This criteria effects hoist performance regarding speed, acceleration and deceleration curves.

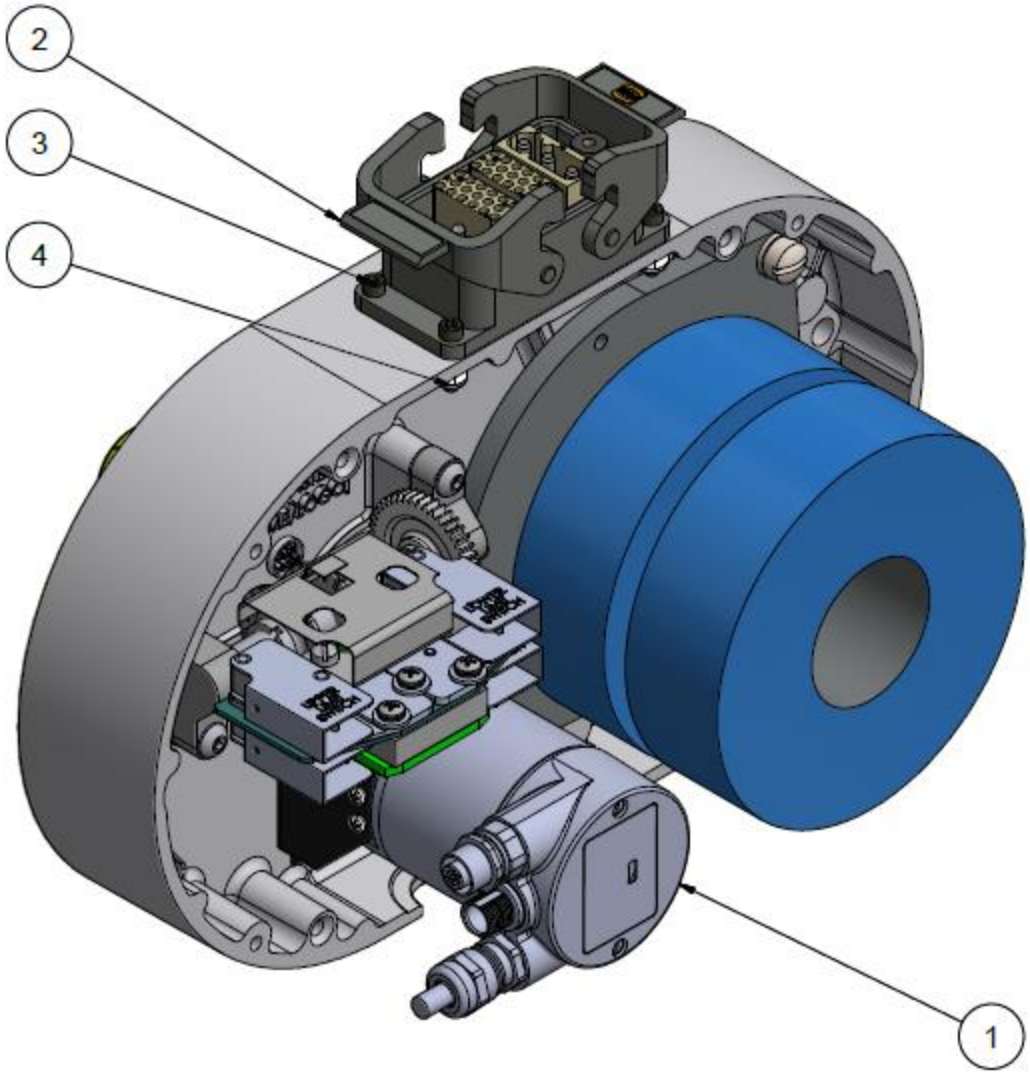
The DC brakes are energized through a circuit controlled by a set of outputs from the drive box. The brakes are only released after the drive box has been given a run command and established zero speed torque hold. Brake DC power is provided by a bridge rectifier mounted on the hoist Internal plate assembly. Additionally, there is a relay provided to eliminate back-fed voltage during brake de-energization.

The incremental encoder is designed to send a speed reference to the drive to complete a closed loop architecture. This information is used to maintain accurate speed references and smooth speed transitions.

The absolute encoder is designed to send positional information back to the drive box. This encoder communicates with the drive via an open CAN bus network. This information is used to maintain position accuracy and allow the hoist to be moved to pre-determined locations with an accuracy of .001"

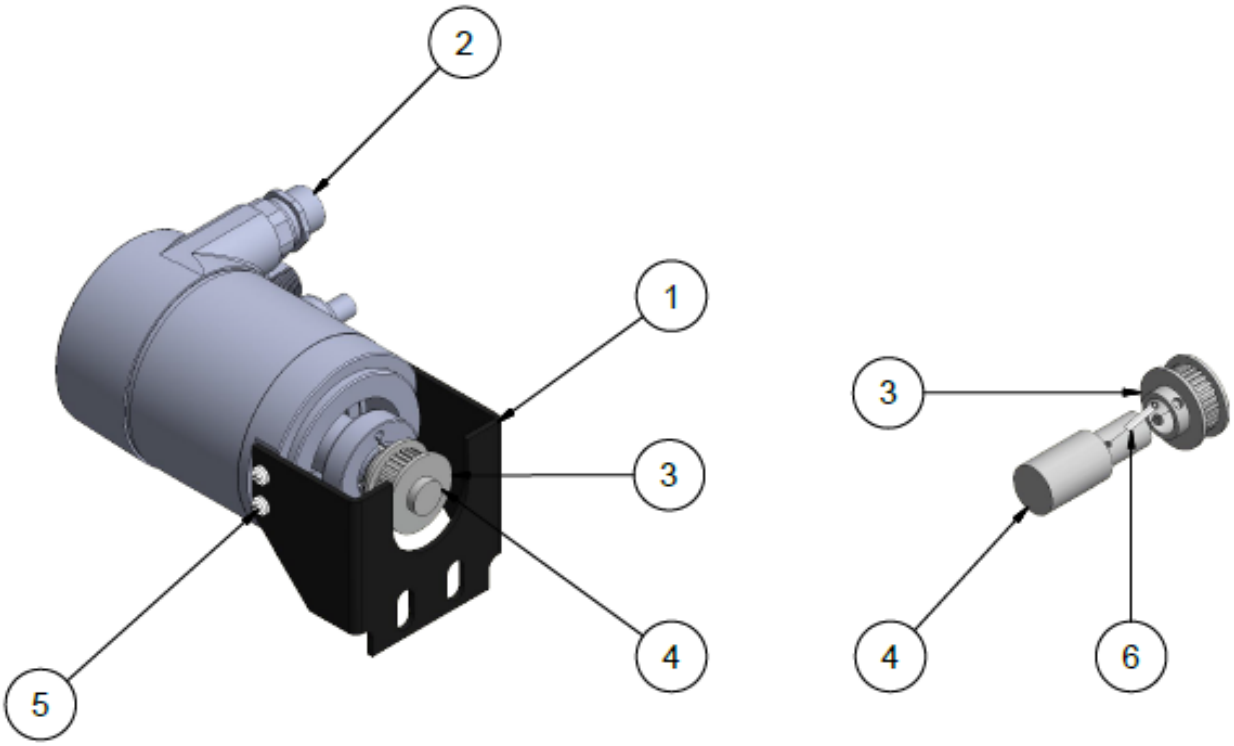
There are two sets of limits provided. Travel up and down as well as a set of emergency overtravel limits. The travel limits are connected directly to the drive for monitoring to provide a quick ramp stop when activated. Currently, the emergency limits are reserved for future use.

- **1701-0002-03, Brake End, Internal Assembly**



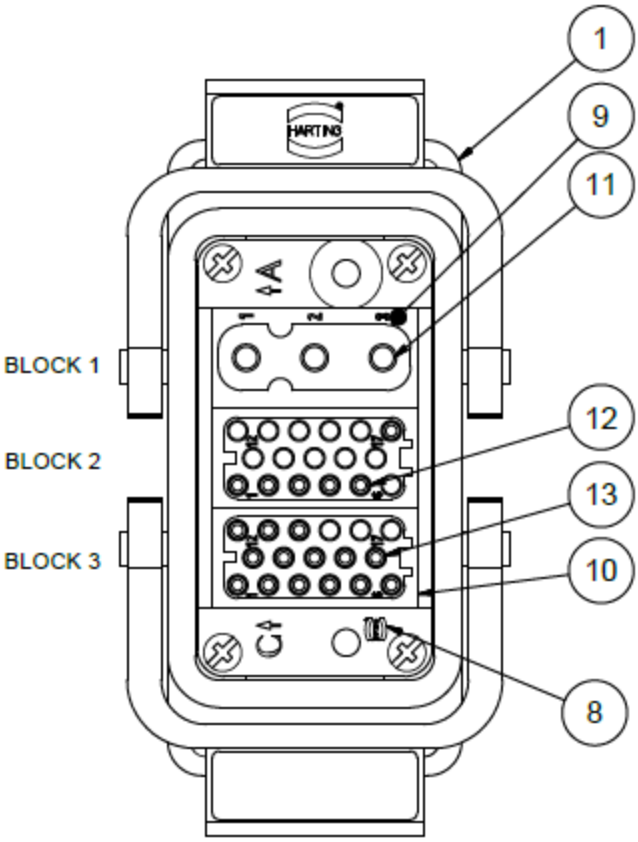
	MLI Part Number	MAN Part Number	Description
1	A-16-008-0001	N/A	Encoder Assembly, CAN bus, Timing belt drive, Frame mount, CM V2 VFD Application
2	C-01-411-0007	N/A	Wired Connector Assembly, Han, Modular, VFD Hoist, HAN10B-50
3	1900-03-02-02-005	N/A	SHCS, 8-32 X 3/4", Hex, Stainless Steel
4	1900-03-01-04-002	N/A	HN, 8-32, Steel Zinc, Nylox

- **A-16-008-0001 - Encoder Assembly, CAN bus, Timing belt drive, Frame mount, CM V2 VFD Application**

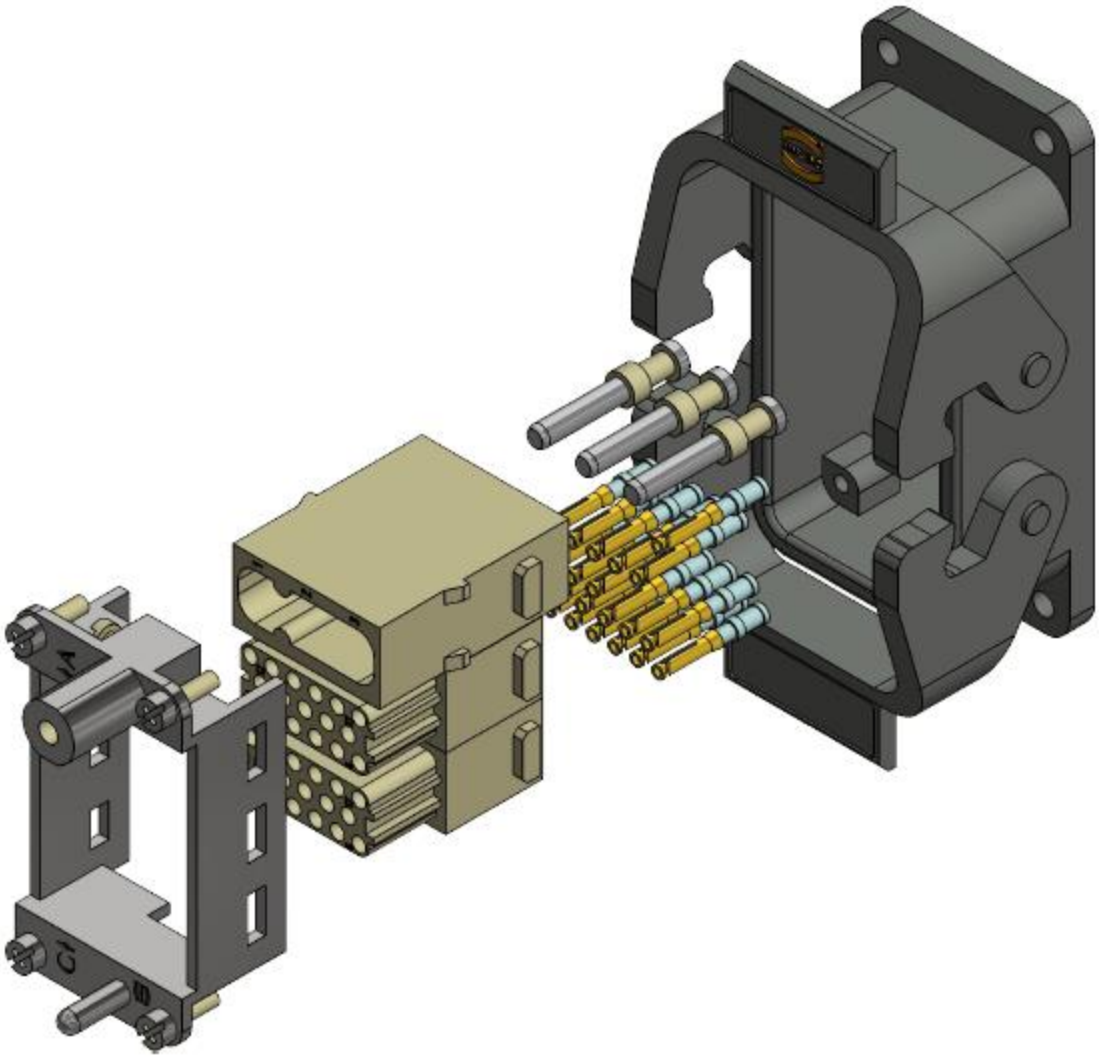


	MLI Part Number	MAN Part Number	Description
1	2602-05-00-55-001	N/A	Mounting Bracket for XCC-3515CS84CBN
2	2022-01-02-02-001	XCC-3515CS84CBN	Encoder, Absolute, 58mm / Hollow Blind Shaft, CAN bus
3	1900-00-15-08-001	N/A	Gear, Pulley, 30 Tooth for MXL 1/4“ Belt
4	2602-20-00-01-002	N/A	Shaft, Adapter, XCC35 Encoder to Timing Pulley
5	2022-01-02-02-001-01	N/A	Vendor Supplied Screw
6	1900-45-14-02-001	N/A	Pin, 5/64” X .625”, Roll pin, Stainless Steel
7	2022-50-01-01-002	56MXL025	MXL Series Timing Belt, 1/4" Width, 5.6" Outer Circle (Not Shown)

- **C-01-411-0007 – Wired Connector Assembly, Han, Modular, VFD Hoist, HAN10B-50**

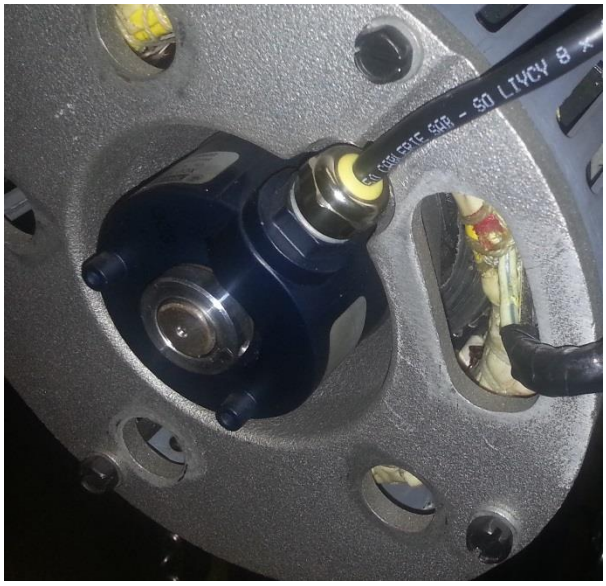


	MLI Part Number	Man Part Number	Description
1	1002-09-30-010-03-01	N/A	Han Standard Housing, Bulkhead Mount, 2 levers, Size 10B
8	1002-09-14-010-03-03	N/A	Han Modular Hinged Frame, 3 Modules, Size 10B
9	1002-09-14-003-30-01	N/A	Han C Module, 3 Contacts, Male Insert, Crimp Contacts
10	1002-09-14-017-31-01	N/A	Han DDD Module, 17 Contacts, Female Insert, Crimp Contacts
11	1002-09-32-000-61-05	N/A	Male Crimp, Silver Plated, 2.5mm, 14AWG
12	1002-09-15-000-62-22	N/A	Han, Crimp Contact, Female, 18AWG, Gold Plated
13	1002-09-15-000-62-24	N/A	Han, Female Contact, 26-22AWG, Gold Plated



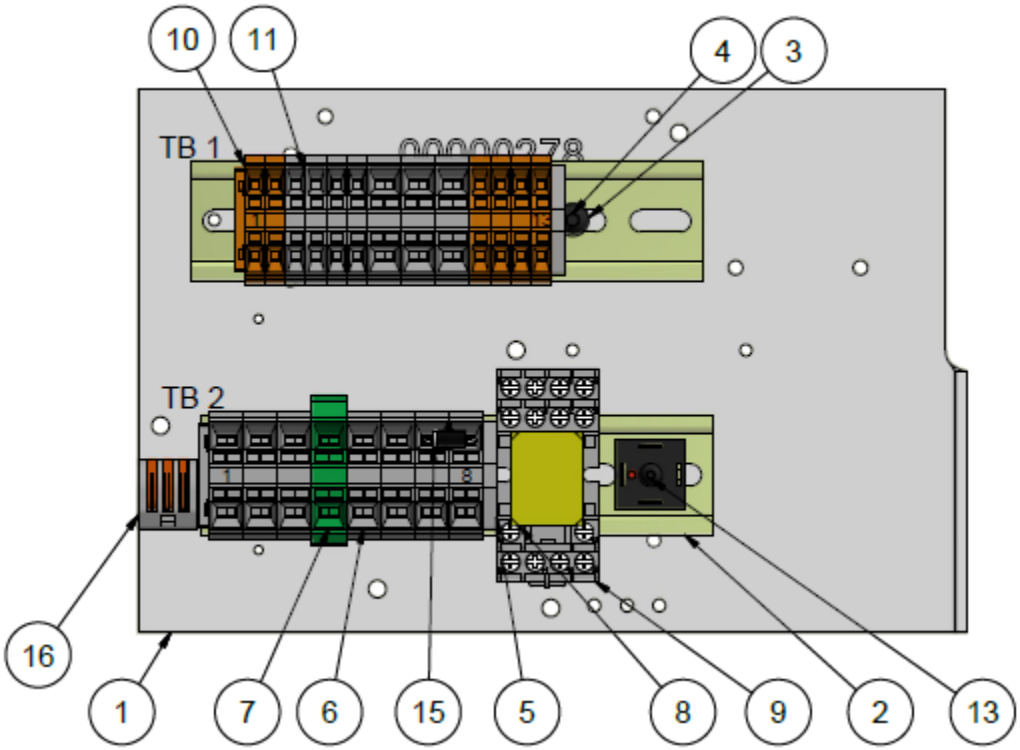
Pin / Socket Location	Pin / Socket Part Number	Pin / Socket Function	Pin / Socket Wire Color
Block 1 Pin 1	1002-09-32-000-61-05	Line 1 (L1)	Black
Block 1 Pin 2	1002-09-32-000-61-05	Line 2 (L2)	Red
Block 1 Pin 3	1002-09-32-000-61-05	Line 3 (L3)	Blue
Block 2 Pin 1	1002-09-15-000-62-22	Brake	Black
Block 2 Pin 2	1002-09-15-000-62-22	Brake	Red
Block 2 Pin 3	1002-09-15-000-62-22	Control, Common	Violet
Block 2 Pin 4	1002-09-15-000-62-22	Control, Up Limit	Brown
Block 2 Pin 5	1002-09-15-000-62-22	Control, Down Limit	Yellow
Block 2 Pin 17	1002-09-15-000-62-22	Shield	N/A
Block 3 Pin 1	1002-09-15-000-62-24	Incremental Encoder B	Green
Block 3 Pin 2	1002-09-15-000-62-24	Incremental Encoder B/	Yellow
Block 3 Pin 3	1002-09-15-000-62-24	Incremental Encoder A	Grey
Block 3 Pin 4	1002-09-15-000-62-24	Incremental Encoder A/	Pink
Block 3 Pin 5	1002-09-15-000-62-24	Incremental Encoder VDC+	Brown
Block 3 Pin 6	1002-09-15-000-62-24	Incremental Encoder 0 VDC	White
Block 3 Pin 7	1002-09-15-000-62-24	Incremental Encoder Shield	N/A
Block 3 Pin 8	1002-09-15-000-62-24	Absolute Encoder CAN_V+	Green
Block 3 Pin 9	1002-09-15-000-62-24	Absolute Encoder CAN_GND	Yellow
Block 3 Pin 10	1002-09-15-000-62-24	Absolute Encoder CAN_H	Grey
Block 3 Pin 11	1002-09-15-000-62-24	Absolute Encoder CAN_L	Pink
Block 3 Pin 12	1002-09-15-000-62-24	Absolute Encoder VDC+	Brown
Block 3 Pin 13	1002-09-15-000-62-24	Absolute Encoder 0 VDC	White
Block 3 Pin 14	1002-09-15-000-62-24	Absolute Encoder Shield	N/A
Frame Ground	N/A	Connector Ground	Green

- **A-16-006-0001 – Incremental Encoder Assembly, 58mm Frame, Recessed Bell Mount, Baldor Motor, CM V2 VFD Application**



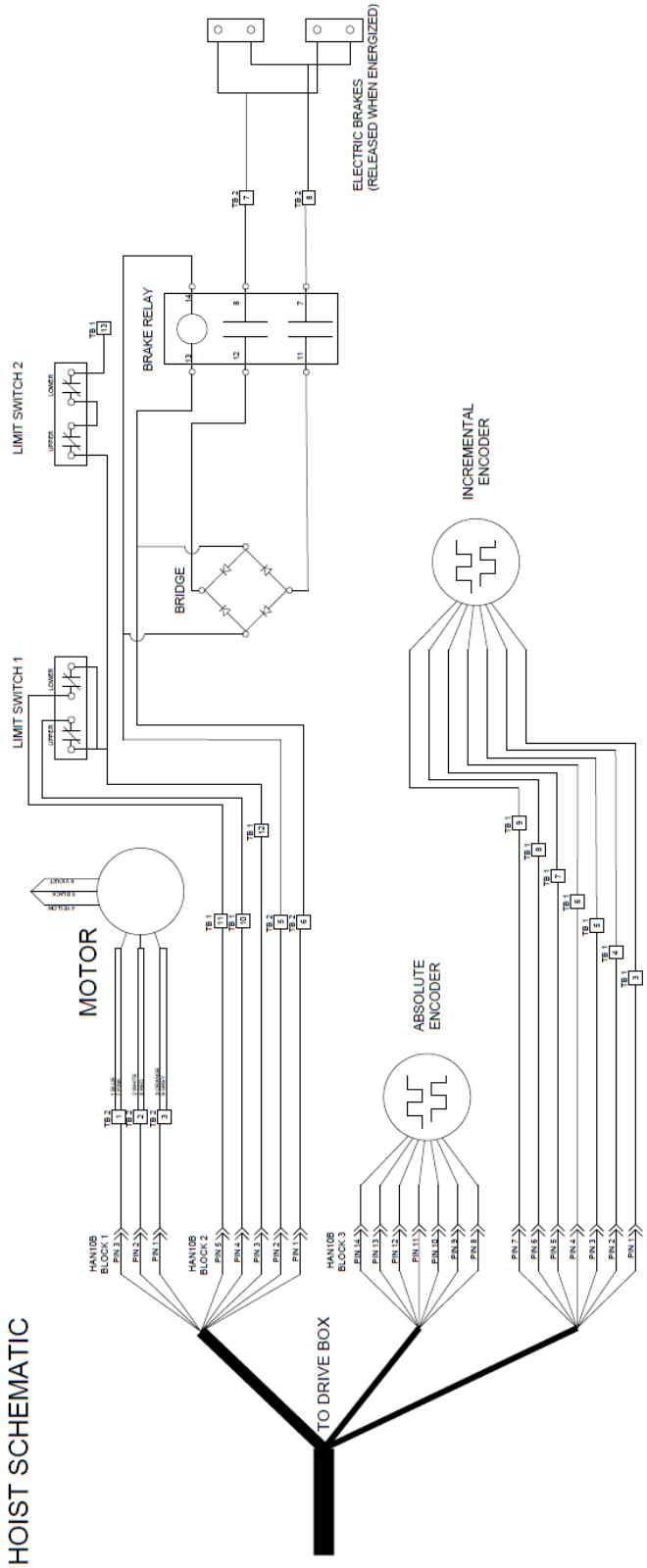
	MLI Part Number	MAN Part Number	Description
1	2022-02-01-01-002	RS422XCC1514T	Encoder, Incremental, 58mm/Hollow Shaft, RS422XCC1514T, Spring Clip Removed
2	2602-24-00-13-002	N/A	Spacer, Encoder Mount, XCC1514T, Flat, Aluminum
3	2602-24-00-13-001	N/A	Spacer, Encoder Mount, XCC1514T, Anti-Rotation, Aluminum
4	1900-28-02-04-002	N/A	PHMS, M3 X 5mm, Phillips, Steel, Zinc

- **A-16-050-0001 – Hoist Internal Plate Assembly, V2, NEW GEN, VFD, W/CMCO Steel Plate**



	MLI Part Number	MAN Part Number	Description
1	1710-00000278	00000278	CMCO Contactor Bracket for Model J - RR
2	2602-11-00-01-002	N/A	Din Rail, 6Wide
3	1900-04-04-04-003	N/A	SW, #10, Steel Zinc, Internal Tooth
4	1900-04-02-05-012	N/A	BHCS, 10-32 X 1/4", Hex, Steel Black
5	1000-90-04-01-001	N/A	Modular Terminal Block, Din Rail Mt, 264 Series, end plate, Grey
6	1000-90-04-01-005	N/A	Modular Terminal Block, Din Rail Mt, 264 Series, 4 conductor, Grey
7	1000-90-04-01-006	N/A	Modular Terminal Block, Din Rail Mt, 264 Series, 4 conductor, ground, Green-Yellow
8	2202-02-02-04-002	N/A	Relay, RY, Plug In, Form 4PDT, Covered, 5A, Coil-220/240V
9	2202-02-05-00-002	N/A	Socket, Screw Terminal, RY, Form 4PDT, 10 A
10	1000-90-04-01-004	N/A	Modular Terminal Block, Din Rail Mt, 264 Series, 2 conductor, Orange
11	1000-90-04-01-003	N/A	Modular Terminal Block, Din Rail Mt, 264 Series, 2 conductor, Grey
12	1710-70246	70246	CM Brake Rectifier
13	1900-02-02-05-007	N/A	BHCS, 6-32 X 5/8", Hex, Steel Black
14	1900-02-01-04-002	N/A	HN, 6-32, Steel Zinc, Nylox
15	2004-01-01-00-003	BY255P	Diode, Silicon, 1300V, 3A
16	1800-08-00-17-001	N/A	Connecting Terminal, Plastic, 3-Conductor, 28-12AWG

- **1701-0002-03 – Hoist Schematic**



- **PART NUMBERS**

PART NUMBER CONFIGURATION						
CATEGORY		**XXXX**		**XX**		**MODIFICATION TYPES**
1701 =	-	Base Hoist	-	MLI Modification		01= MLI FIXED SPEED MOD-01
Safety Chain Hoist		Model				02= MLI FIXED SPEED MOD-02
						03= MLI VFD MOD 01
						04= MLI VFD MOD 02
						05= MLI FIXED SPEED MOD -03

- **CAPACITY**

The capacity of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the hoist manufacturer's user manual.

- **ELECTRICAL SPECIFICATIONS**

The electrical specifications of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the hoist manufacturer's user manual.

- **PHYSICAL SPECIFICATIONS**

The physical specifications of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the hoist manufacturer's user manual.

- **DATA SPECIFICATIONS**

Data Communication Protocol, Absolute Encoder to Drive…….. CAN open
Data Communications Protocol, Incremental Encoder to Drive…….. TTL

- **ENVIRONMENTAL SPECIFICATIONS**

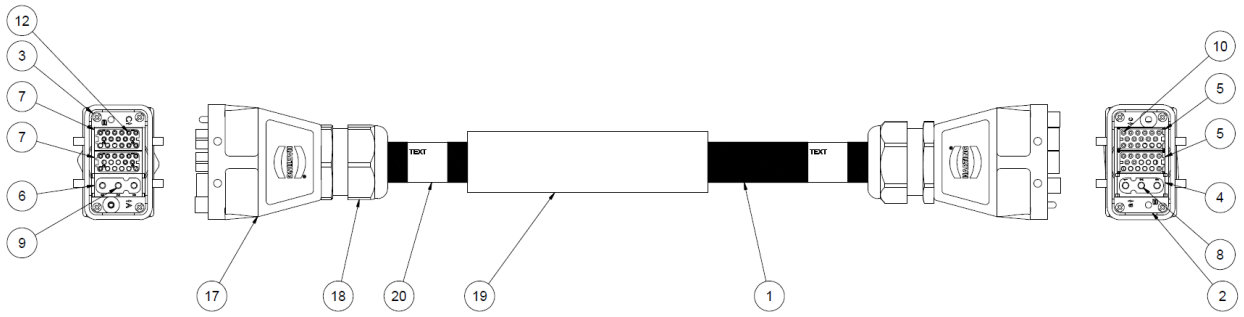
The environmental specifications of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the hoist manufacturer's user manual.

- **CABLE SPECIFICATIONS**

HOIST POWER CONTROL CABLE

1421-05-69-XX-001

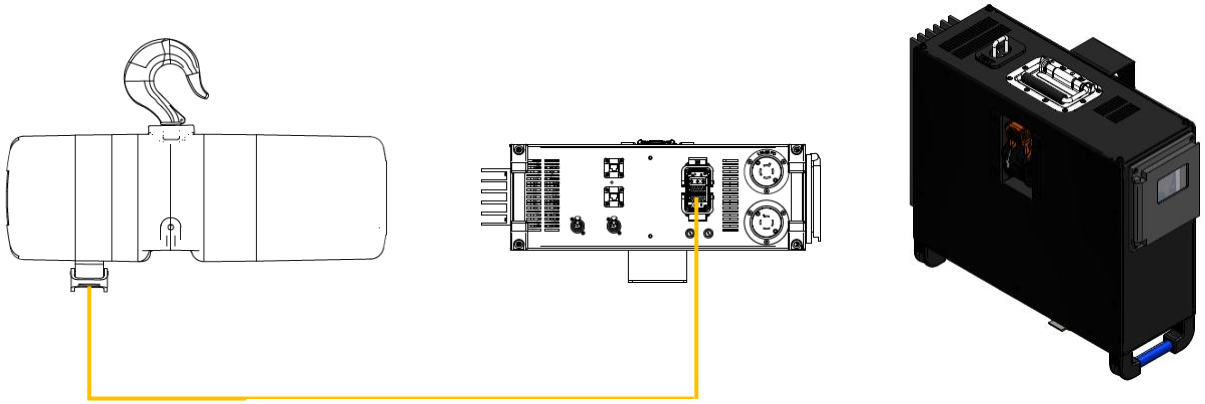
The Hoist Power and Control Cable uses a custom motion labs multi conductor cable with Harting Han 10b connectors. The Cable has a maximum length of 25ft. Cable is a MLI product, part number 1500-50-00-00-003



Item	QTY	MLI Part Number	Description
1		1500-50-00-00-003	Han Standard Housing, Bulkhead Mount, 2 levers, Size 10B
2	1	1002-09-14-010-0313	Han Modular Hinged Frame, 3 Modules, Size 10B, Marking a...c
3	1	1002-09-14-010-0303	Han Modular Hinged Frame, 3 Modules, Size 10B
4	1	1002-09-14-003-3101	Han C Module, 3 Contacts, Female Insert, Crimp Contacts
5	2	1002-09-14-017-3001	Han DDD Module, 17 Contacts, Male Insert, Crimp Contacts
6	1	1002-09-14-003-3001	Han C Module, 3 Contacts, Male Insert, Crimp Contacts
7	2	1002-09-14-017-3101	Han DDD Module, 17 Contacts, Female Insert, Crimp Contacts
8	3	1002-09-32-000-6204	Han, Power Contact, Female Socket, 4mm, 16AWG, Silver Plated
9	3	1002-09-32-000-6104	Male Crimp, Silver Plated, 4mm, 16AWG
10	14	1002-09-15-000-6124	HAN, DM Crimp Contact, Gold Plated, 26-22AWG
11	9	1002-09-15-000-6121	HAN, DM Crimp Contact, Gold Plated, 16AWG
12	14	1002-09-15-000-6224	Han, Female Contact, 26-22AWG, Gold Plated
13	9	1002-09-15-000-6221	Han, Female Contact, 16AWG, Gold Plated
14	1 FT	1500-03-03-00-001	MTW, Stranded, Bare Copper, 16/26, UL 1015-1230, Black
15	4	D-02-001-0005	Heatshrink Cover, black, .125"OD, .5" Length
16	2	1800-04-00-03-001	Crimp, Barrel, Blue, 14-16AWG
17	2	1002-19-30-010-0428	Han Standard Housing, Cable Mount, Top Entry, 4 Pegs for 2 lever Locking, Size 10B, M40 Cable Gland
18	2	1401-03-01-18-001	Liquid Tight Straight Strain Relief Fitting, Dome Nut, Nylon, Black, M40, Cable Range .75"-1.10"
19	1	D-02-001-0700	Heat Shrink Cover, Clear, 1.5"OD, 6" Length
20	2	3500-04-05-03-002	Std Label, Printable, Vinyl, White, Self Laminating, 1" X 1" - 4" Cable Marker, 100pc Roll, PTL-23-427

- **SYSTEM CONNECTIONS**

Prior to powering up the system, all cabling should be properly installed and connected in the following manner:



1421-05-69-XX-001

- **POWER UP**

The power up sequence for the system will be detailed in the respective Drive box and Front-End manuals.

- **HOIST SETUP & CONFIGURATION**

The setup & configuration of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the manufacturers user manual.

- **OPERATION**

The OPERATION of the 1701-0002-03 in this manual is specified by the base hoist model and detailed in the manufacturers user manual and in the respective Drive Box & Front-End manuals.

- **FAULTS**

The hoist itself does not indicate any faults. the 2022-01-02-02-001 encoder has a led indicator on it as shown below:

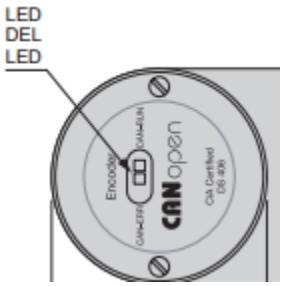


Table for the LED status of the Encoder LED:

N°	LED DEL LED	Type of flashing Type de clignotement Tipo deparpadeo	Status / Possible cause Etat / Cause possible Estado / Causa posible
1	CAN ERR (red / rouge / rojo)	Off Eteinte Inactivo	No error. Pas d'erreur. Sin error.
2		1 flash 1 flash 1 parpadeo	The internal error counter has reached or exceeded the maximum level. Le niveau du compteur d'erreur interne a atteint ou dépassé le niveau maximum. El contador de errores internos ha alcanzado o ha superado el nivel máximo.
3		2 flashes 2 flash 2 parpadeos	Detection of a guard event or a heartbeat event. Détection d'un évènement de type "guard" ou "heartbeat". Detección de un evento de "guard" o de "heartbeat".
4		3 flashes 3 flash 3 parpadeos	Synchronization error: message not received within the defined period. Erreur de synchronisation : message non reçu dans la période définie. Error de sincronización: mensaje no recibido durante el período definido.
5		Flashing Clignotement Parpadeo	Error in the bus address or speed. Erreur dans l'adresse ou dans la vitesse du bus. Error en la dirección o la velocidad del bus.
6		On Allumée Conectado	Bus off. Bus off. Bus desactivado.
7	CAN RUN (green / verte / verde)	1 flash 1 flash 1 parpadeo	Module in "Stopped" mode. Module en mode "Stopped". Módulo en modalidad "Stopped".
8		Flashing Clignotement parpadeo	Module in "Pre-operational" mode. Module en mode "Pre-operational". Módulo en modalidad "Pre-operational".
9		On Allumée Conectado	Module in operational mode. Module en mode opérationnel. Módulo en modalidad operativa.
When both LEDs are off, the encoder is not supplied with power. Lorsque les deux DEL sont éteintes, le codeur n'est pas alimenté. Cuando los indicadores LED están apagados, el codificador no suministra alimentación.			

- **INSPECTIONS**

All maintenance and inspections are to be done in accordance with the hoist manufacturer's manuals.

- **SPARE PARTS**

Only original spare parts may be used. Motion Laboratories Inc. cannot be held responsible for failures and breakdowns caused by the use of non-OEM or incorrect spare parts.

In case of necessity for parts and assemblies identified in the modifications, please contact:

Motion Laboratories Inc.
520 Furnace Dock Road, Cortlandt Manor, NY 10567, USA
TEL: 800.277.6784 I TEL: +1 (914) 788-8877 I FAX: +1 (914) 788-8866
www.motionlabs.com

In case of necessity for parts and assemblies in the hoist, please contact:

An Authorized CM Repair Station
TEL: 800.888.0985
www.cmworks.com