Creative Conners, Inc

½-TON SMART CHAIN HOIST-CM ™

REFERENCE MANUAL V1.0

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GETTING STARTED

*Congratulations on your purchase of the **Smart Chain Hoist** from Creative Conners, Inc.! Connect the **Smart Chain Hoist** to a **Stagehand Pro**, **Showstopper 3 Base** and a PC running **Spikemark** to Make It Move!* You can extend functionality by pairing it with the Spikemark Pendant, allowing you to operate your **Smart Chain Hoists** wherever they are located.

This manual will direct you through:

1. Unpacking
2. Installing & Testing
3. Operation Procedures

If you need help along the way, contact us!

- Online: www.creativeconners.com
- Email: support@creativeconners.com
- Phone: 401-289-2942 x2

A WORD ABOUT SAFETY

Hoisting a load overhead can be dangerous, and the Smart Chain Hoist is no exception. Though this looks like any other chain motor, it is much quieter and faster than your everyday fixed speed chain motor. Exercise extreme caution when operating this machine. Although there are 2 brakes inside, there is no tell-tail brake clap to alert folks that the rig is moving. All standard rigging practices should be used when installing and operating your Smart Chain Hoist.

WHAT'S INCLUDED

1. **Smart Chain Hoist - CM**
2. CM Product Manual

FEATURES

- Motor Up or Motor Down installation
- Quiet operation
    - 65dB when installed motor up
- Variable Speed up to 20"/sec
- BGV D8+ Rating
- Dual brakes
- Dual encoders

OVERVIEW

The **Smart Chain Hoist** is a Columbus McKinnon (CM) Varistar which is customized to work exclusively with the Stagehand Pro and Spikemark control. Now you are able to leverage the ease of installation, familiarity of rigging a chain hoist, and the trusted name of Columbus McKinnon's products in your productions. The CM Varistar combines a powerful 3.5HP motor with a 10:1 safety factor, dual brakes, initial & ultimate limits and dual encoders to make precision, high speed moves safe and reliable while also meeting the BGV D8+ hoisting standard.

INSTALLATION

REQUIRED TOOLS

The **Smart Chain Hoist** is sent to you with the intent that you can simply hang it, plug it in, and *Make It Move!* If for any reason the enclosure needs to be opened, the following tools may be required:

- Flat head #1 x 5.5 screwdriver
- Philips head #2 screwdriver
- 5/64” Hex key
- 3/32” Hex key
- 5/32” Hex key
- 3/16” Hex key

INSTALLATION OPTIONS

The Smart Chain Hoist can be installed motor up or motor down depending on your needs. Hanging the machine motor up is most often best to reduce chain noise and the need for any cable management.

In either orientation, it is important to confirm that the hook latch is fully closed and that the hanging point is sufficient for the load prior to declaring victory. Be sure to employ safe rigging practices each and every time a chain hoist is installed - the process should be completed by a competent and qualified rigger.

Once the machine is safely and securely rigged, it's now time to think about connecting the scenery (or any load) to the other hook. Be sure that the latch is fully closed and that the connecting point is sufficiently stout to handle the load.

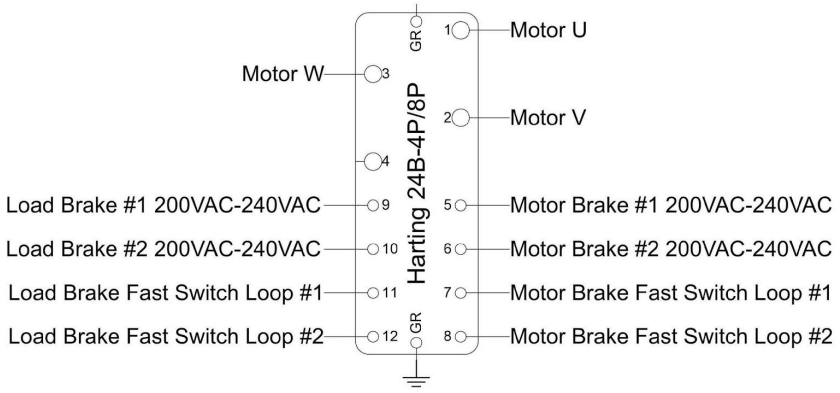
The Smart Chain Hoist is not rated for performer flying. Do not use the hoist to lift a performer, either directly to the chain, on a prop, or on a piece of scenery.

MAKING THE CONNECTIONS

The **Smart Chain Hoist** is nothing more than counterweight unless connected to a **Stagehand Pro** controller. The **Smart Chain Hoist** will not function with any other **Stagehand** controller, nor any other manufacturers' controllers.

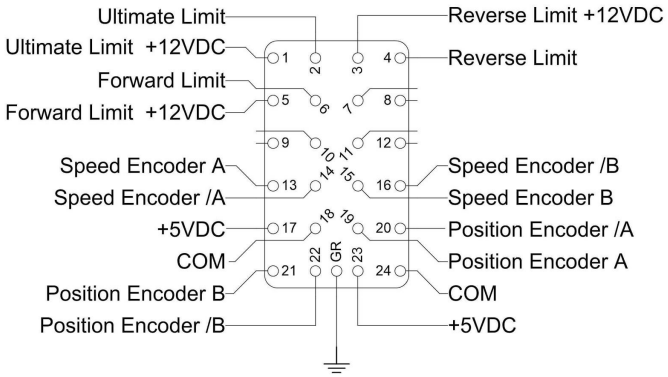
MOTOR/BRAKE

The motor and brake connections are made through a Harting or similar 24B locking connector. The **Smart Chain Hoist** includes a latching hood to ensure the connection is maintained even under the stresses of production use. Below is the pinout of the connector and cable.



SIGNAL

All encoder and limit signals are transmitted through the Signal cable with Harting or similar 6B locking connectors. The **Smart Chain Hoist** includes a latching hood to ensure the signal connection is maintained even under production conditions. Below, is the pinout of the signal connector.



UNDER THE HOOD

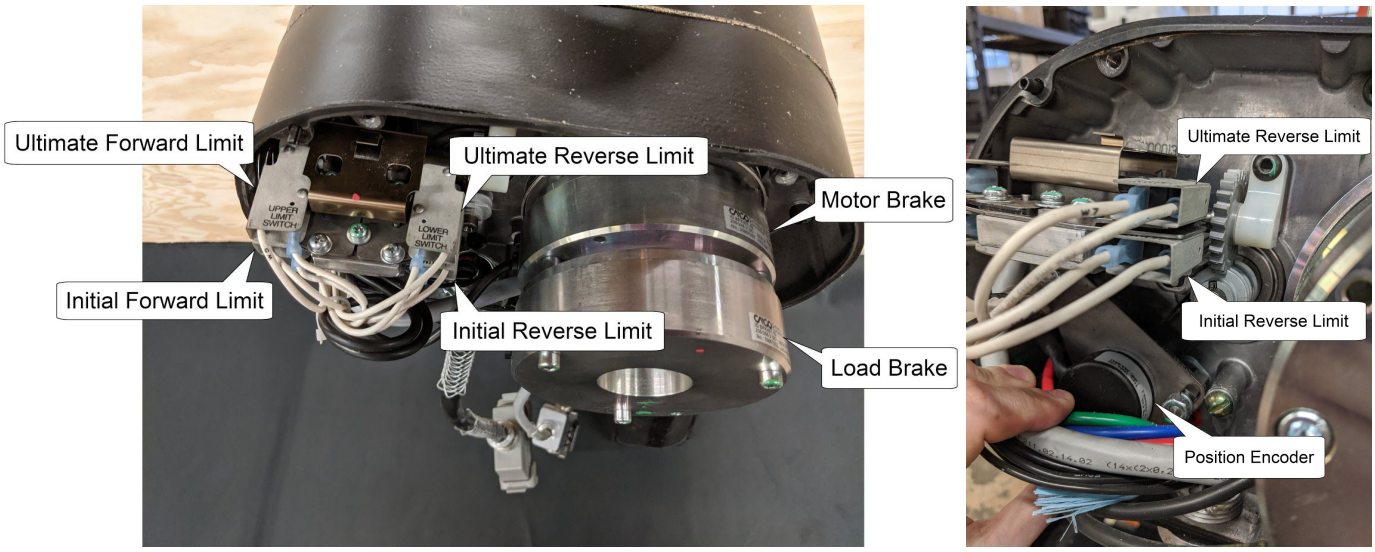
Typically, you will not need to open your **Smart Chain Hoist**. However, you may need to adjust the limits due to installation conditions, or you may need to access the terminal blocks for advanced troubleshooting.

OPENING THE MACHINE

On each side of the hoist, there is a hood to protect the mechanics and electrical connections inside. The limits are covered by the hood that has a label with the load rating of the machine and (4) SHCS.

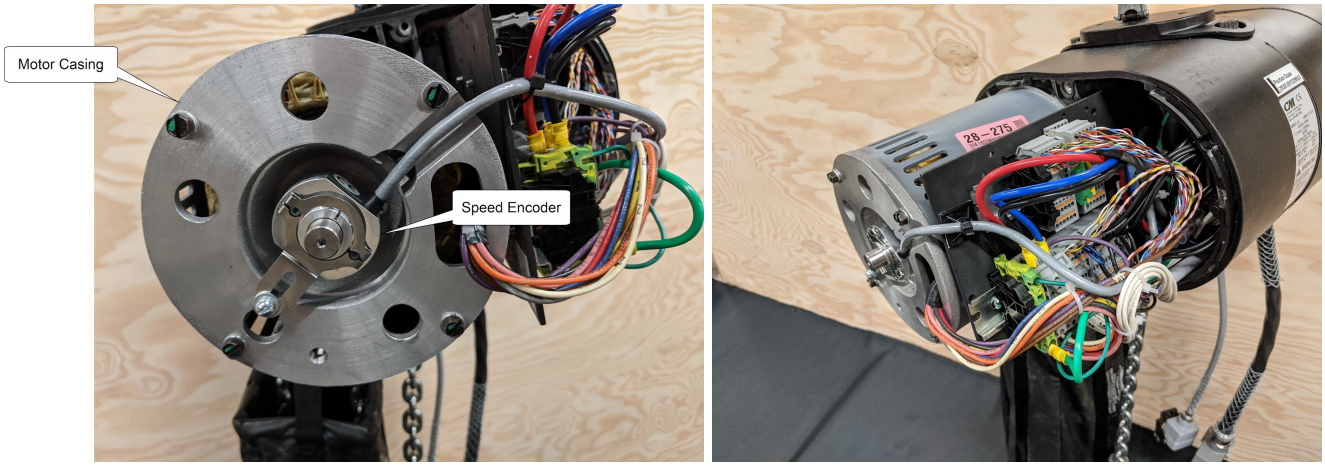
These screws need to be loosened to take the limit enclosure hood off and access the inside of the **Smart Chain Hoist.** To open the **Smart Chain Hoist**, you will need a 3/16” Allen key. Be aware, each hood has a gasket which must be reseated properly.

Inside the limit enclosure hood, you'll find the **Smart Chain Hoist's** rotatable limit switch and position encoder, as well as its motor and load brakes.



The motor enclosure hood protects the motor, speed encoder, and most of its wiring. This hood is held in place with (2) SHCS and has a label with the CM/Lodestar logo.

Like the limit enclosure, you will need to loosen the two screws with a 3/16" Allen Key. Once taken off, you will see the motor and signal wiring, as well as the motor and speed encoder.



There shouldn't be a need to open this side of the hoist, however it's always nice to know what you're looking at.

SETTING THE LIMITS

Setting limits is important for operating any automated effect. Setting limits prevents the machine from moving past a safe location, protecting the machine and the load attached. The limits for the **Smart Chain Hoist** are inside the enclosure and are pre-set from the factory to allow the maximum chain travel while keeping the machine from damaging itself.

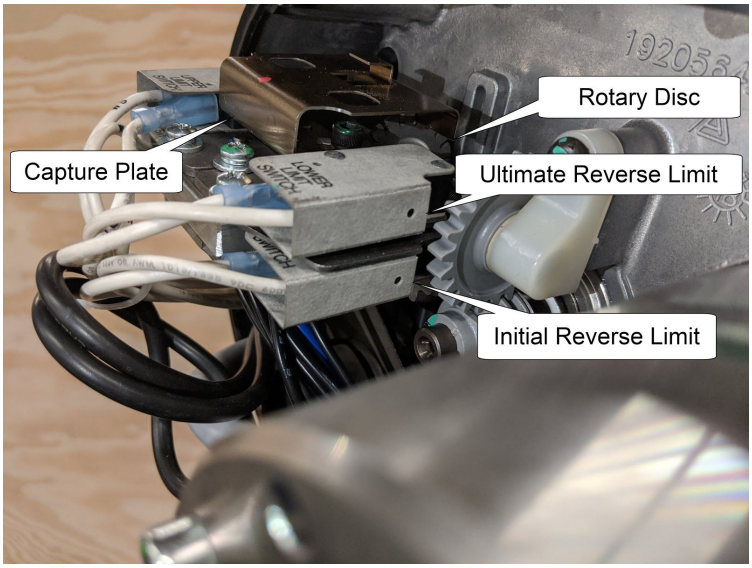
There may come a time when your installation requires resetting the limits for a particular installation. Keep in mind that you will also need to restore those limits at the end of the run.

The Smart Chain Hoist includes four limits:

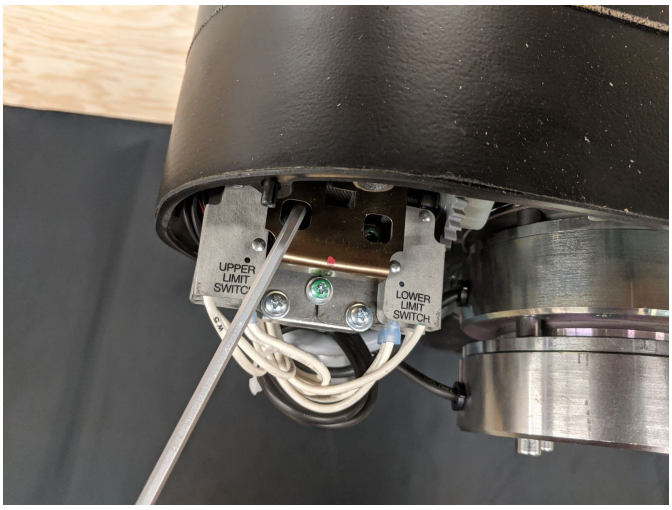
- FWD Ultimate
- FWD
- REV
- REV Ultimate

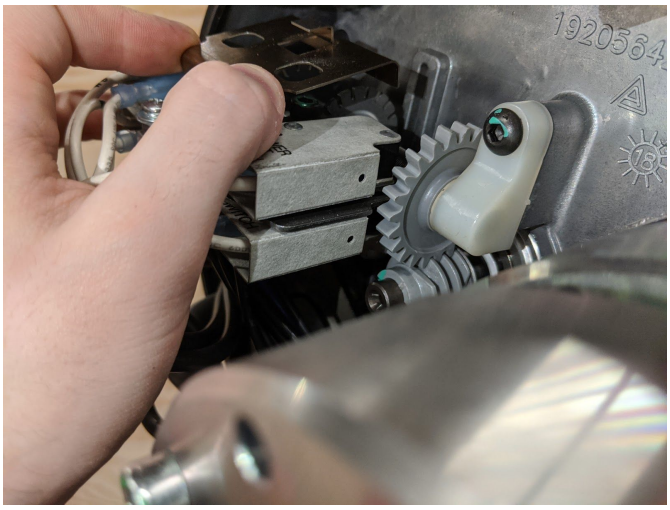
The initial and ultimate limits are factory set the correct distance apart to not inadvertently trip an Ultimate Limit.

These limits are actuated by rotary discs on a threaded rod driven by a worm gear. The discs are indexed for a capture plate to keep them from free spinning once the limit is set. As the motor runs, the discs are pulled along the threaded rod until they make contact with the limit switch.

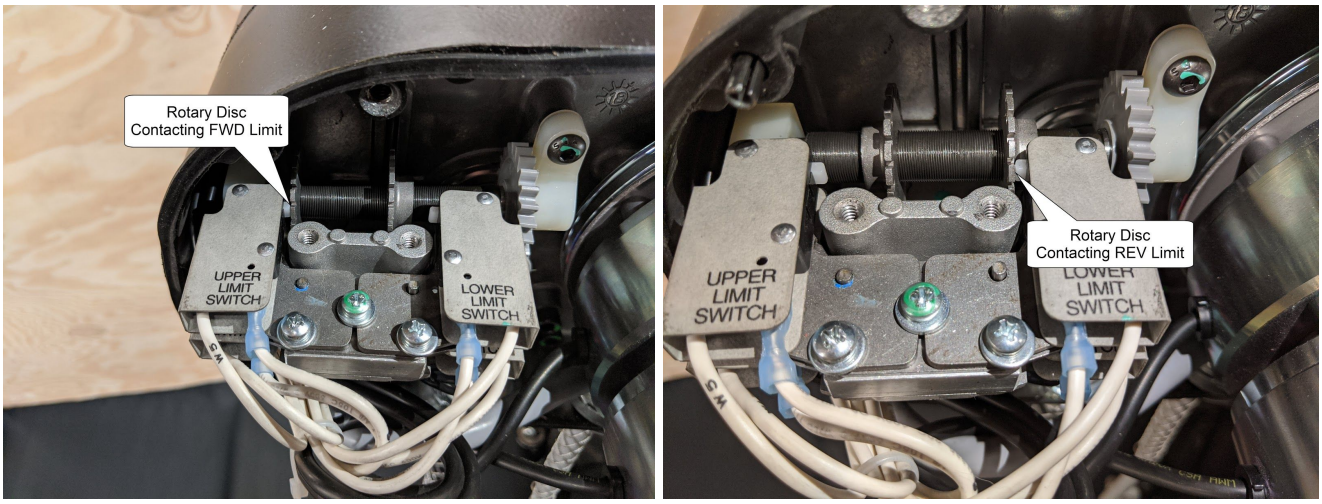


To adjust the position of your rotary discs, you will need to loosen the two 5/32” SHCS that keep your capture plate engaged with your discs.



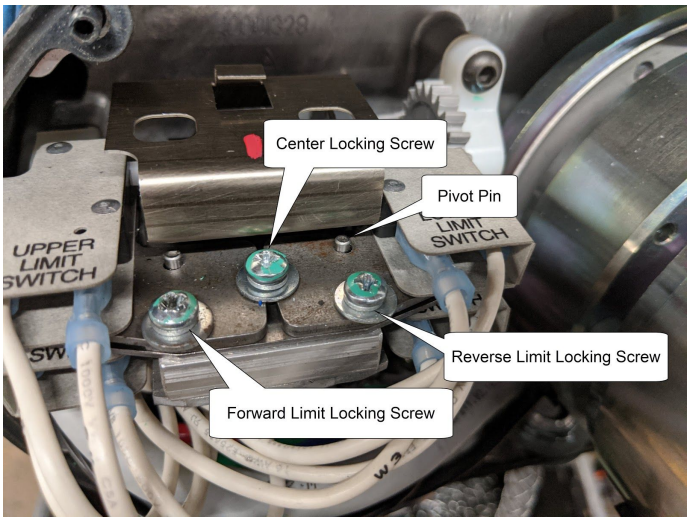


Once the screws have been loosened and the capture plate has been disengaged from the rotary discs, you can freely spin the discs to your desired position to adjust where they will engage the limit switches.

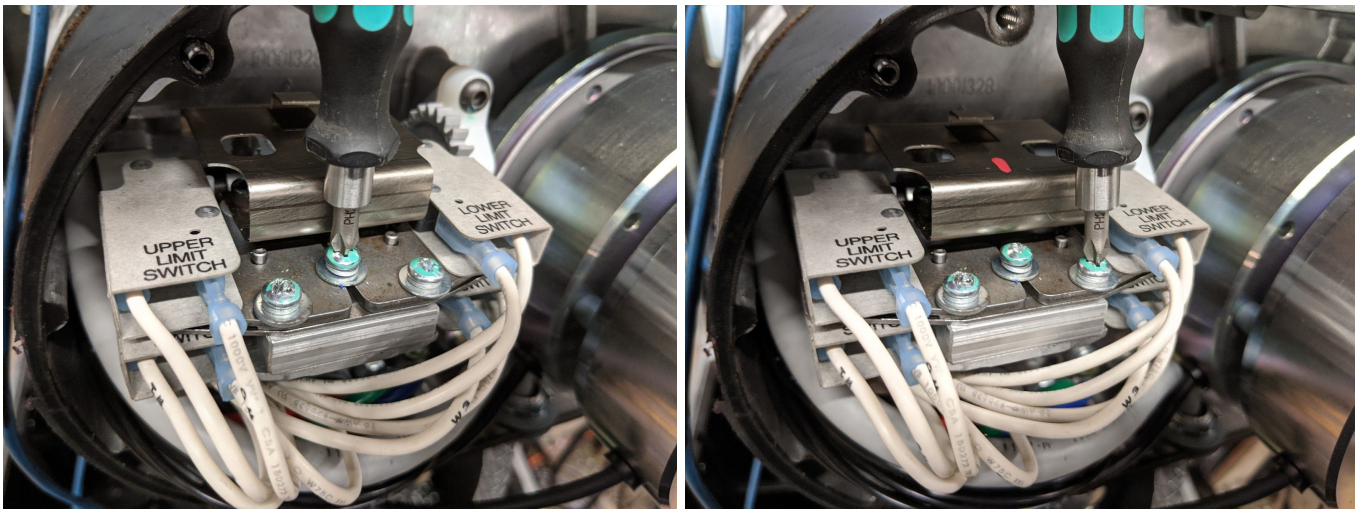


Once set, place the capture plate back into position, indexing with the rotary discs, and tighten the 5/32” screws. Once you test that the limits are engaging where you want them, you can replace your limit hood onto the hoist enclosure.

It is also possible to move the initial limits closer or farther away from the ultimate limits, although we don’t recommend doing so. The two initial limit plates are locked in place by (3) PHCS. The middle screw locks both plates down, while each plate has an individual screw locking it down as well.



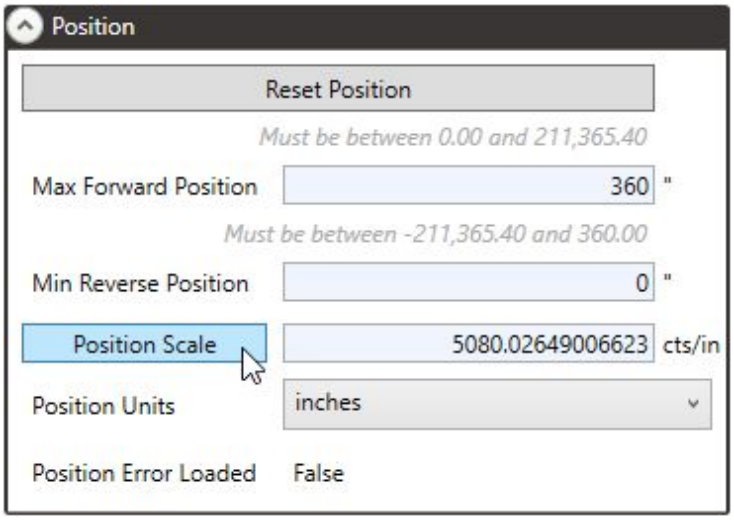
When both screws on one plate are loosened, you can pivot the limit on an indexing pin, moving the initial limit closer or farther away from the ultimate limit.

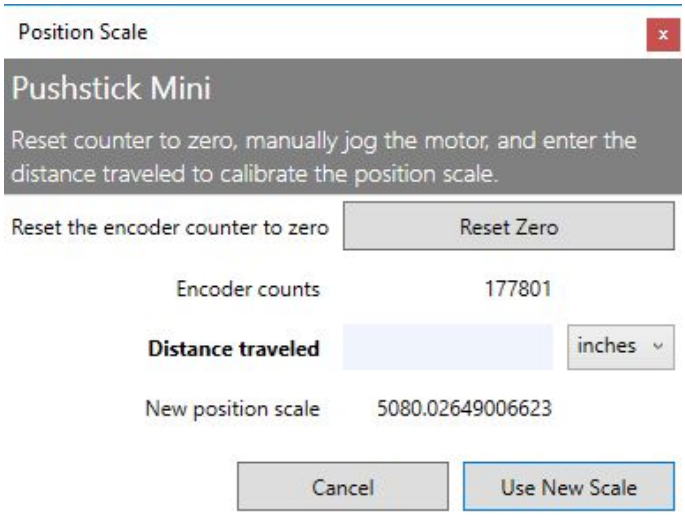


POSITION SCALE

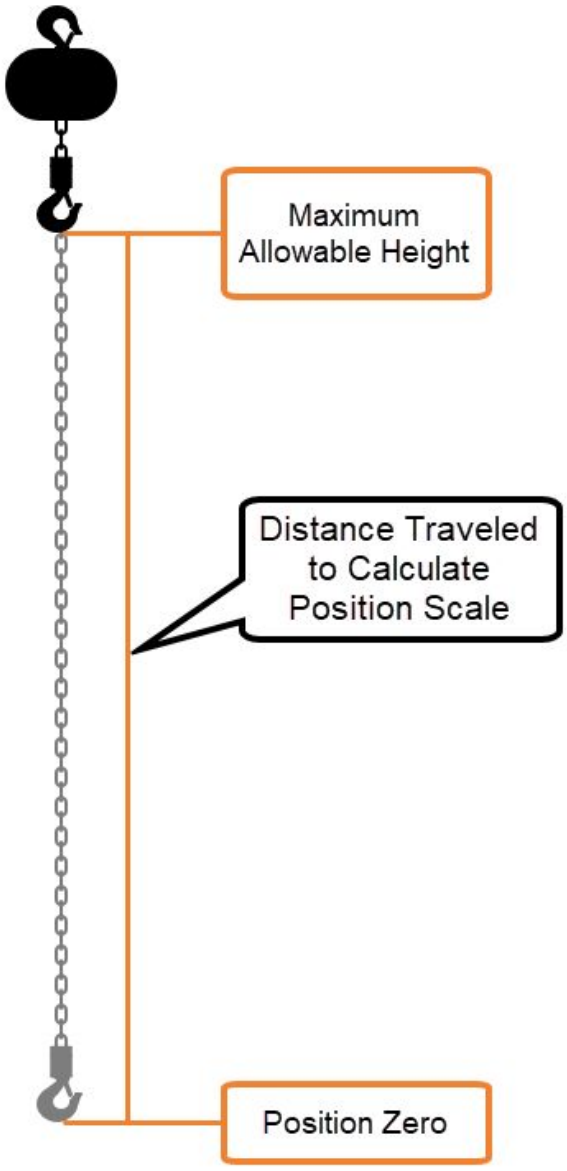
Each **Smart Chain Hoist** has its own position scale. This is a departure from most of our stock machines and is due to small variances in each hoist. The Spikemark Machine Library has a stock position scale, but to achieve the most accurate positioning you will need to set the position scale for each **Smart Chain Hoist**. To ease this process, each machine has the Position Scale noted on a label, directly above the electrical specs.

This number will need to be set in the Position Scale field in Spikemark. If you are having trouble with the scaling on your **Smart Chain Hoist**, you can calculate and adjust either by using our Position Scale Wizard or by calculating the math yourself.





To adjust your scaling, bring the **Smart Chain Hoist's** hoisting hook down to where you want your "zero" point to be. Bring up the Position Scale Wizard, reset your zero, and run the hoisting hook to your maximum allowable height. Measure the distance from zero to this height and input that number into the position wizard and it will calculate the position scale for you. If you do not want to use the Wizard, you can calculate your position scaling with the formula shown below.



Position Scale = Encoder Counts / Distance Traveled

Position Scale = (cts) / (cts, in, mm, deg, etc.)

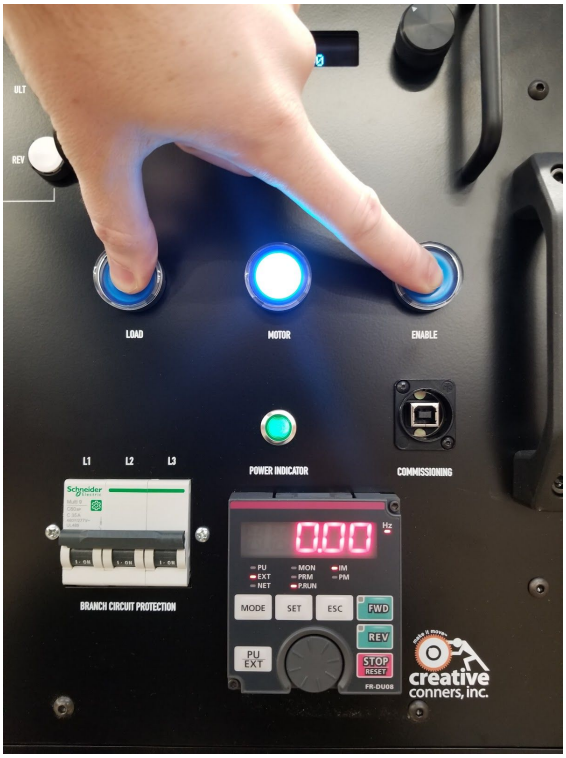
BRAKE TESTING

The **Stagehand Pro** can control two brakes for use in hoisting applications. The **Stagehand Pro** will internally check the electronic systems to ensure the brake circuits are working properly before releasing either the motor brake or the load brake to prevent dropping a suspended piece of scenery. However, the **Stagehand** cannot confirm that the brakes are mechanically operating correctly.

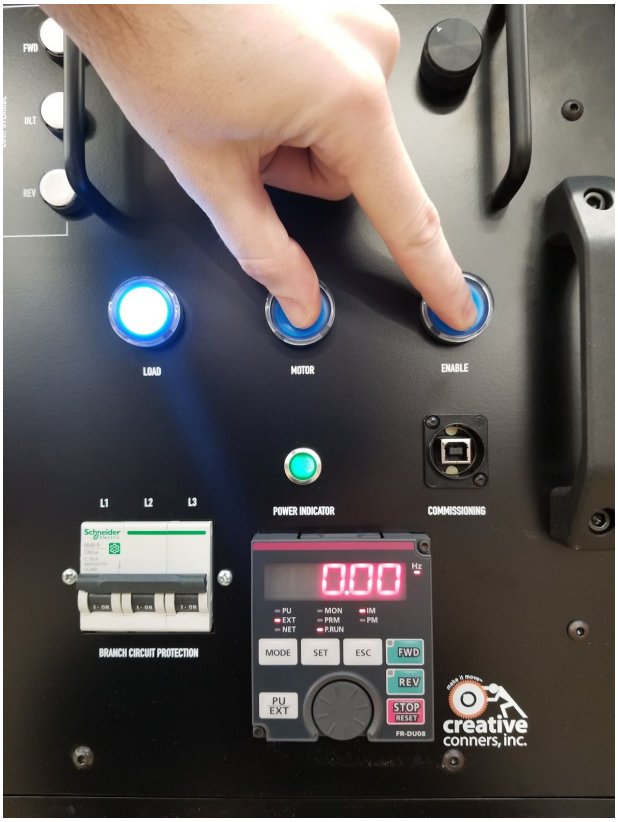
Since the **Stagehand** cannot confirm that both brakes are functioning mechanically and that neither has jammed in a released state (very rare, but possible), the brakes should be tested at every install and nightly pre-show check. The **Stagehand** has convenient buttons on the faceplate to assist you with testing the brakes. To test that your brakes are operating correctly on your **Smart Chain Hoist**, read through the following steps in their entirety and then perform each action as follows:

- Clear the stage below the suspended scenery
- Press the Brake Test button

- While holding the Brake Test Button, press the Load Brake button. This will manually release the Load Brake. The Motor Brake should still be engaged and will hold the load. If the suspended scenery slips down, release the Load Brake button immediately. Since the Motor Brake did not hold the load as expected, that brake has failed. DO NOT OPERATE THE MACHINE UNTIL THE MOTOR BRAKE IS REPAIRED OR REPLACED. FAILURE TO REMOVE THE MACHINE FROM SERVICE COULD RESULT IN DAMAGE, INJURY, OR DEATH.



- Provided the Motor Brake passed the functional test, release the Load Brake button.
- While holding the Brake Test Button, press the Motor Brake button. This will manually release the Motor Brake. The Load Brake should still be engaged and will hold the load. If the suspended scenery slips down, release the Motor Brake button immediately. Since the Load Brake did not hold the load as expected, that brake has failed. DO NOT OPERATE THE MACHINE UNTIL THE LOAD BRAKE IS REPAIRED OR REPLACED. FAILURE TO REMOVE THE MACHINE FROM SERVICE COULD RESULT IN DAMAGE, INJURY, OR DEATH.



- Release the Motor Brake button

  Pro Tip: If you press all three buttons at once, all brakes will engage

For use with the **Smart Chain Hoist**, we suggest that this procedure be executed every night to ensure that all equipment is operating in a safe, reliable manner.

VFD SETTINGS

The parameter settings on the Mitsubishi Variable Frequency Drive (VFD) are tailored to make the unit work effectively with each machine. The **Smart Chain Hoist** uses a different set of VFD parameters than all of the other Creative Conners, Inc. stock products. Below is a list of the parameters that are changed from the factory defaults, and what they do. Viewing and changing the parameters is a straightforward process. On the VFD keypad press the MODE button until a 'P' is displayed. Use the wheel to scroll to the desired parameter number and press the SET button. The display will change and display a number value. Use the wheel to adjust the value and press SET. To make no change, simply press the SET button. When all settings are confirmed/adjusted, press the mode button 3 times until the display shows 0.00. A more detailed explanation of this process can be found at http://cci.fyi/vfd.

We have designed a few variants of the **Stagehand Pro** and they each need slightly different parameters to run your **Smart Chain Hoist** efficiently and effectively. To know what **Stagehand Pro** and VFD you have, look at the VFD keypad on the face plate and notice where that keypad is located on the **Stagehand** itself. If the keypad is square and is located on the bottom right of the faceplate, it is a **Stagehand Pro 3** with an A800. If the keypad is square on the bottom left of the faceplate it is a **Stagehand Pro 2** with an A800. If it is rectangular and is located on the bottom left of the faceplate, it is a **Stagehand Pro 2** with an A700.

YOU MUST SET PARAMETER 77 = 2 PRIOR TO BEGINNING THE MANUAL RESTORE PROCESS					
Pr. No.	**Name**	**Description**	**Stagehand Pro 3**	**Stagehand Pro 2 A800**	**Stagehand Pro 2 A700**
1	Maximum frequency	Set the upper limit of the output frequency.	110	110	110
2	Minimum frequency	Set the lower limit of the output frequency.	0	0	0
3	Base frequency	Set the frequency at the rated motor torque. (50Hz/60Hz)	106	106	106
7	Acceleration time	Standard time to accelerate a movement.	0	0	0
8	Deceleration time	Standard time to decelerate a movement.	0	0	0
9	Electronic thermal O/L relay	Current rating from the motor nameplate.	13	13	13
10	DC injection brake operation	Set the frequency at which the	0.5	0.5	0.5

	frequency	brakes will release.			
13	Starting frequency	Motor won't start until the speed signal is at least this value.	0.5	0.5	0.5
18	High speed maximum frequency	Allows for VFD output at 120Hz or higher.	110	110	110
30	Regenerative function selection	External brake resistor, L1/L2/L3 power source.	1	1	1
70	Special regenerative brake duty	Duty cycle of the braking resistor.	10	10	10
71	Applied motor	Other manufacturers' standard motor.	3	3	3
72	PWM frequency selection	Carrier Frequency. Reduces output noise.	15	15	15
73	Analog input selection	+/-10vdc with reversing enabled.	1	14	14
77	Parameter write selection	Allow parameter writes regardless of operation status.	2	2	2
79	Operation mode selection	External control at power ON, changeable to PU mode with PU/EXT button	0	0	0
80	Motor capacity	Kilowatt rating of motor.(1hp=0.75kw, 5hp=3.7kw, 10hp=7kw)	2.63	2.63	2.63
81	Number of motor poles	governs the base rpm of the motor	4	4	4
83	Rated motor voltage	Set the voltage rating from the motor nameplate.	230	230	230
84	Rated motor frequency	Set the frequency rating from the motor nameplate.	106	106	106
96	Auto tuning setting/status	Offline auto-tuning status. 0 = not set; 1 = auto-tuning initiated, 2 = auto-tuning in progress, 3 = auto-tuning completed. See Stagehand Pro manual for instructions	0	0	0
117	PU communication station number	Specifies the inverter station number.	1	1	1
118	PU communication speed	4800bps	48	48	48

119	PU communication stop bit length / data length	Data length: 8 bits, stop bit: 1 bit	0	0	0
120	PU communication parity check	No parity check.	0	0	0
125	Terminal 2 frequency setting gain frequency	Terminal 2 input gain (maximum) frequency.	106	106	106
180	RL terminal function selection	general input (used to sense load brake relay status)	9999	9999	9999
181	RM terminal function selection	general input (used to sense motor brake relay status)	9999	9999	9999
182	RH terminal function selection	SQ signal, sequence run for PLC mode. Must be shorted to run, open to program	50	50	50
183	RT terminal function selection	general input (used to sense load brake test button)	9999	9999	9999
184	AU terminal function selection	general input (used to sense motor brake test button)	9999	9999	9999
190	RUN terminal function selection	Alarm signal, normally on shuts off if there's a fault	199	199	199
191	SU terminal function selection	general output (used by PLC to indicate a brake relay failure)	9999	9999	9999
192	IPF terminal function selection	general output (used by PLC for motor brake)	9999	9999	9999
193	OL terminal function selection	general output (used by PLC for load brake)	9999	9999	9999
194	FU terminal function selection	General output	9999	9999	9999
252	Override bias	Percentage of analog signal to use for speed signal ***adjust this to overspeed motor	100	100	100
285	Overspeed detection frequency (speed deviation excess detection frequency)	Hz difference between commanded speed and actual that will trip an overspeed fault	20	20	20
331	RS-485 communication station number	RS-485 Communication	1	1	1
332	RS-485 communication speed	RS-485 Communication	48	48	48
333	RS-485 communication stop bit length / data length	RS-485 Communication	0	0	0

334	RS-485 communication parity check selection	RS-485 Communication	0	0	0
338	Communication operation command source	RS-485 Communication	0	0	0
339	Communication speed command source	RS-485 Communication	0	0	0
340	Communication startup mode selection	RS-485 Communication	0	0	0
359	Encoder rotation direction	CCW encoder rotation is forward	0	0	0
368	Feedback gain	Response of the feedback will become slow when the acceleration/deceleration time is long. In such case, increase the setting value	1	1	1
369	Number of encoder pulses	PPR for Vector Control	1024	1024	1024
374	Overspeed detection level	Inverter shuts down if motor speed is greater than indicated value. (Hz)	9999	9999	121
376	Encoder signal loss detection enable/disable selection	Inverter shuts down if the encoder stops working or the encoder signal is lost.	1	1	1
414	PLC function operation selection	enable PLC to run brake switching logic, must be turned off to manually auto-tune motor. A800='2' A700='1'	2	2	1
549	Protocol selection	MODBUS RTU protocol	1	1	1
550	NET mode operation command source selection	The RS-485 terminals are the command source when in the NET operation mode	1	1	1
551	PU mode operation command source selection	The RS-485 terminals are the command source when in the PU operation mode.	9999	9999	9999
800	Control method selection	0=Vector control, speed control, 10=Sensorless Vector control, 20=Volts/Frequency control	0	0	0
802	Pre-excitation selection	servo lock	1	1	1

818	Easy gain tuning response level setting	1-15 range that governs aggression of easy gain-tuning	2	2	2
819	Easy gain tuning selection	OFF	0	0	0
820	Speed control P gain 1	pgain level, higher for tighter speed control but more oscillation	20	20	20
850	Brake operation selection	zero speed control	1	1	1
853	Speed deviation time	seconds that an overspeed can occur before faulting	1	1	1
903	Terminal 2 frequency setting gain frequency	C4 - Enter the value on the Stagehand cabinet or refer to the manual for details on other methods	TBD	TBD	TBD

TROUBLESHOOTING

Common Problems

MOTOR IS JERKY

Your **Smart Chain Hoist** motor may need to be auto-tuned. Auto-tune from Spikemark and run the motor again.

Double check all motor and brake terminations in the Harting connectors on installed cable and in machine whip. A loose or poorly terminated brake lead can cause jerky motion and VFD faults.

There may be an issue with the parameters on the VFD, double check that they are correct and adjust them according to the table above. Be aware that improperly set parameters can damage your scenery and/or machine.

LUBRICATION

As with all chain hoists, lubrication is essential to the longevity of the chain. A chain improperly lubricated is not only loud, but can also be dangerous. The increase in friction will cause the dry chain to grind and wear itself out.

The frequency in which you lubricate your hoist chain varies depending on the amount and severity of use. Industrial use of chain hoists usually calls for weekly intervals of lubrication, however it is your discretion if you need to lubricate your hoist chain more or less frequently.

The type of oil used for lubrication is also important to your chain hoist. There are many different oils that can be used, however they should all use an ‘EP’ additive. ‘EP’ or ‘Extreme Pressure’ additives allow your lubrication to stay between your chain links under a full load. CM recommends the use of 10R mineral oil by *Lubriplate*. The Smart Chain Hoists that we send out pre-oiled with Toolmates 7043 oil by *Aervoe*. **(Note: Never use motor oil as a chain lubricant.)**

STAGEHAND DISPLAYS DRIVE FAULT

Your E-stop may be engaged. Check to make sure that your E-stop is plugged in and disengaged.

There may be an issue with the parameters on the VFD, double check that they are correct and adjust them accordingly. Be aware that improperly set parameters can damage your scenery and/or machine.

VFD IS FAULTING

E.EECT - confirm signal cable is connected to the Smart Chain Hoist

E.OSD - most likely a faulty connection in the Motor/Brake cable. Check terminations.

LIMIT SWITCH

If your drive is showing FWD, REV, or ULT Limit, you are on a limit. Jog in the opposite direction to clear the error. If you have a need to travel further, adjust the limits accordingly. Be aware that improperly setting limits can damage your scenery and/or machine.

TECHNICAL SUPPORT

If you get stuck, we're here to help. The best way to get in touch with a tech expert is via email - even during normal business hours - because most days we are spread around the shop and may not be near the phone. There's someone in the office from 8:30a-5pm EST Monday - Friday and will return an email or phone call quickly. After hours (honestly when most tech support issues arise) we have a crack team monitoring email and voicemail who will respond quickly to help get you moving.

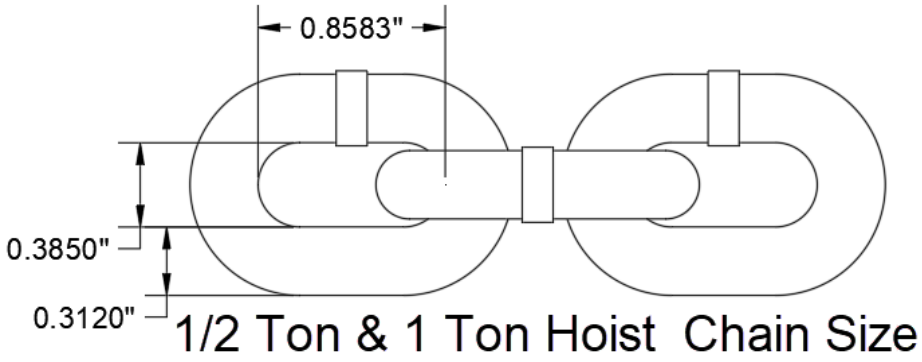
- Online: www.creativeconners.com
- Email: support@creativeconners.com
- Phone: 401-289-2942 x2

SPECIFICATIONS

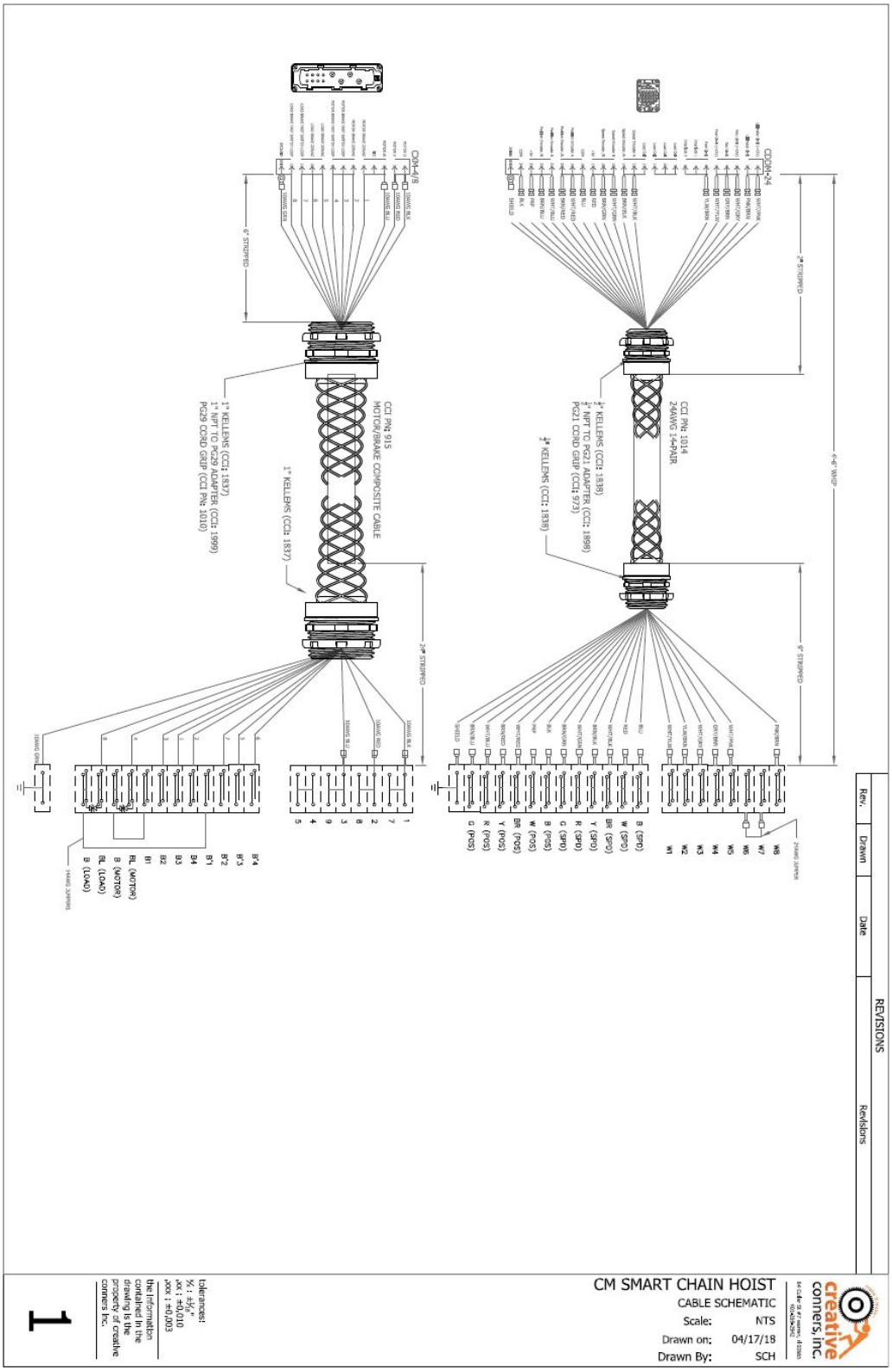
Description	Value
Max Load	500KG/1,100lbs*
Max Speed	100FPM - 20in/sec*
Min Speed	.5in/sec
Motor HP	3.5
Motor Voltage	230VAC 3P 106 Hz
F.L.A.	12A
Brake Voltage	200-240VAC 50/60 Hz
Machine Weight (no chain)	125lbs
Chain Size	.312” x .8583” x .385”
Overall Dimensions	7” H x 24” W x 12” D (44” H x 24” W x 14” D w/ Chain Bag)

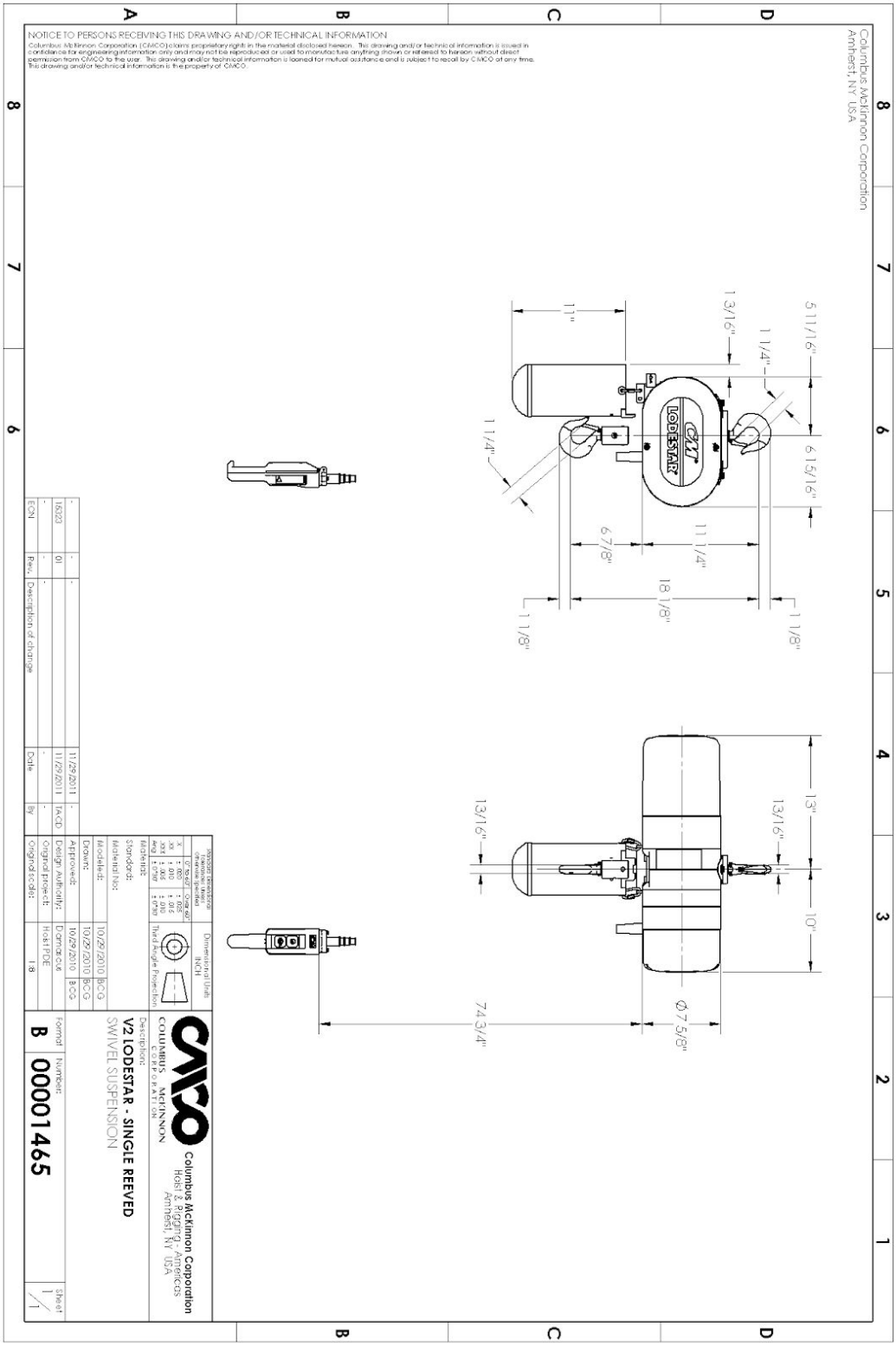
*Load chain can be double reeved to double the **Smart Chain Hoist’s** load capacity. This will reduce the maximum speed to 50FPM and maximum height to 40’.

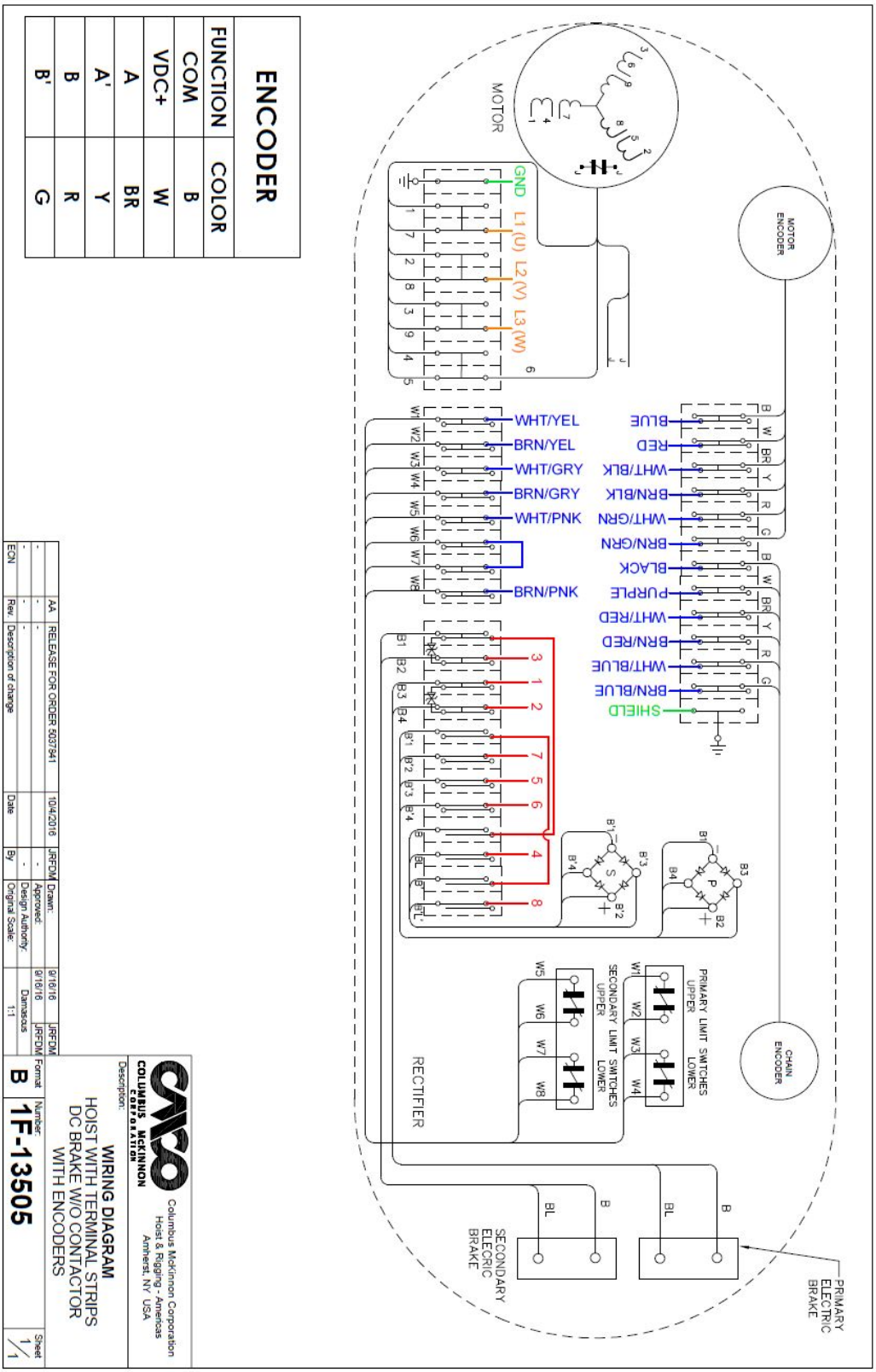
LOAD CHAIN



DRAWINGS


CM-4-18
CDDH-4-24
CCI PN: 915
MOTOR/BRAKE COMPOSITE CABLE
1" KELLEMS (CCI: 1837)
1" NPT TO PG29 ADAPTER (CCI: 1999)
PG29 CORD GRIP (CCI PN: 1010)
CCI PN: 1014
24AWG 14-PAIR
¾" KELLEMS (CCI: 1838)
¾" NPT TO PG21 ADAPTER (CCI: 1998)
PG21 CORD GRIP (CCI: 973)
REVISIONS
Rev.
Drawn
Date
Revisions
CM SMART CHAIN HOIST
CABLE SCHEMATIC
Scale: NTS
Drawn on: 04/17/18
Drawn By: SCH
creative connectors, inc.
tolerances:
⅛ : ±¹/₆₄"
xx : ±0.010
xxx : ±0.003
the information contained in the drawing is the property of creative connectors inc.
1


NOTICE TO PERSONS RECEIVING THIS DRAWING AND/OR TECHNICAL INFORMATION
Columbus McKinnon Corporation
Amherst, NY USA
5 11/16"
1 1/4"
1 3/16"
1"
6 15/16"
11 1/4"
6 7/8"
18 1/8"
1 1/8"
13"
13/16"
10"
74 3/4"
Ø 7 5/8"
Columbus McKinnon Corporation
Hoist & Rigging - Americas
Amherst, NY USA
V2 LODESTAR - SINGLE REEVED
SWIVEL SUSPENSION
B
00001465



ENCODER

FUNCTION	COLOR
COM	B
VDC+	W
A	BR
A'	Y
B	R
B'	G

Rev	Description of change	Date	By
-	-	-	-
-	-	-	-
AA	RELEASE FOR ORDER 5037941	10/4/2016	JRFDM
ECN			

Drawn: JRFDM 9/16/16
Approved: - -
Design Authority: JRFDM 9/16/16
Original Scale: 1:1
Format: B
Number: 1F-13505
Sheet: 1/1

Columbus McKinnon Corporation
Hoist & Rigging - Americas
Amherst, NY USA

Description:

WIRING DIAGRAM
HOIST WITH TERMINAL STRIPS
DC BRAKE W/O CONTACTOR
WITH ENCODERS