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SOFT LIMIT CONTROL SYSTEM

PORTABLE AUTOMATION CHAIN HOIST CONTROL SYSTEMS

USER MANUAL

Portable Controller
A-17-007-0001
Power Distro
1125-7-0012-0014
TSOS Interface
A-17-005-0103
TSOS
A-17-005-0014
A-17-005-0015

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

Part Number: A-17-007-0001-UM
Release: 03-2025

Original Instructions
Portable Automation Chain Hoist Control Systems
Rev A
Released 03-2025

- **USER DOCUMENTATION**

WARNING

Before installing and operating Soft Limit System, all safety instructions and warnings must be read carefully including all the warning labels attached to the equipment. Make sure that the warning labels are kept in legible condition and replace missing or damaged labels.

REGIONAL CONTACTS

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- **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.

TABLE OF CONTENTS

WARNINGS

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 hoists without a clear view of the load or reliable communication with an observer.
Do NOT operate 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.
Do NOT operate the system manually until all safety conditions have been assessed and only in emergency situations or initial setup.
Do NOT operate the system until the emergency stop system has been connected and tested.
Do NOT operate the system unless all operators and observers have been informed of the location of all emergency stop (E-stop) switches.

SAFETY INSTRUCTION

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 manufacturer's 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

Do not remove any machine labeling by grinding, peeling, or any other means. 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 potentially dangerous rotating mechanical parts. Non-compliance with or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury, or serious damage to property.

Electrical Safety Information

The Soft Limit Control System operates at high voltages. There are no user serviceable parts inside the enclosure.

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 who are 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 Soft Limit Control System runs to preset soft limit positions. The system's encoders must be correctly positioned and configured to ensure safe and reliable soft limit operation. It is imperative that the user read and understand the instructions contained in the manual before attempting to operate.

DANGER

The manual control function will bypass all safety features. Care must be taken to assess the area and chain hoists carefully before operating in this mode.

OVERVIEW

Product Definition

The Soft Limit Control System identified in this manual is portable control system built into Motion Laboratories rolling racks. The system can be configured in building blocks of eight channels. The system can be 8 – 32 channels with standard components. The system has a maximum capacity of 80 channels. Custom components are built to a project scope.

The Soft Limit Control System is a standalone control system that operates chain hoists, connected to the system. Each channel has position control with the option to monitor weight and to stop movement if either an upper or lower weigh limit is exceeded. Position control is achieved with the use of an encoder for position feedback.

These systems can come in different rack sizes with different combinations of components to make a complete system.

These systems are intended to operate fixed speed electric chain hoists modified to provide feedback required. Available feedback components include encoders, encoder kits, and load cells. Reference part numbers are:

- A-16-003-0001 – A-16-003-0099 Encoders
- A-16-003-0100 – A-16-003-0199 Encoder Kits
- A-17-003-XXXX Load Cells

The Soft Limit Control System has the following features:

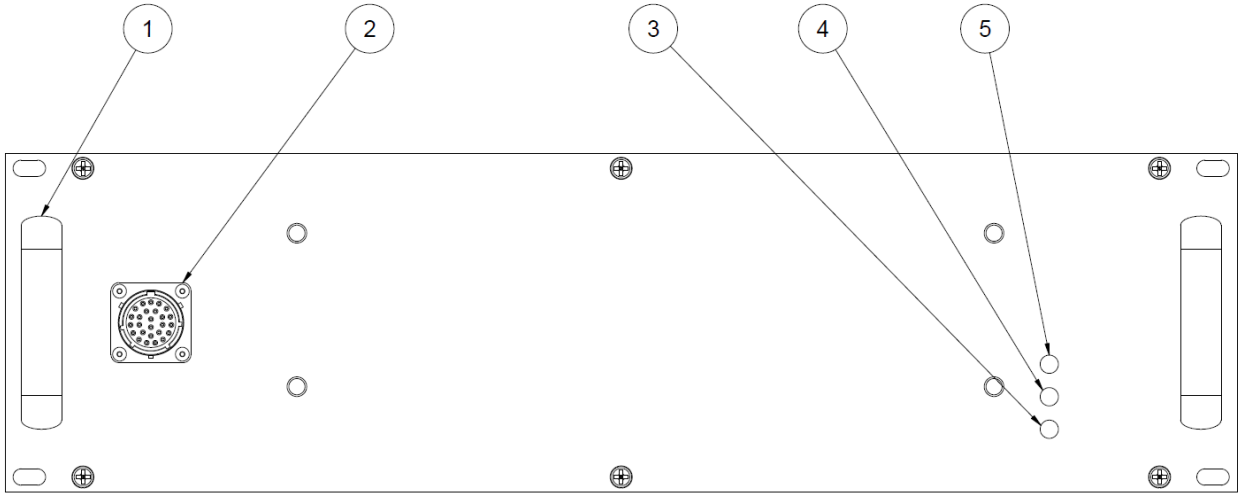
- E-stop system with global E-stop switches and reset switches.
- Human Machine Interface (HMI) Touch screen operator/display
- Manual Override input connector

Product Performance

The Soft Limit Control System, identified in this manual, monitors, and reacts to the following criteria:

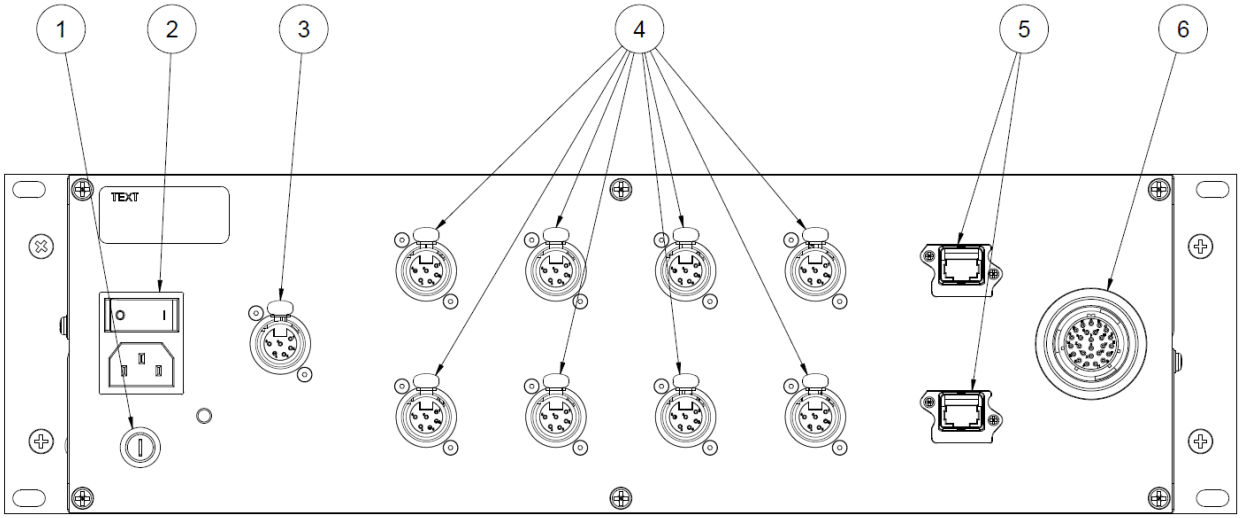
- Load Manager: an optional feature that when used with the proper components, allows the system to monitor the imposed weight on each hoist. It allows the user to set upper and lower limits that, if surpassed, will stop motion.
- Position Manager: A feature that allows the system to monitor verification of movement, direction of movement and position. The position manager allows for the system to stop chain hoists at predetermined positions.

Soft Limit Main, Front



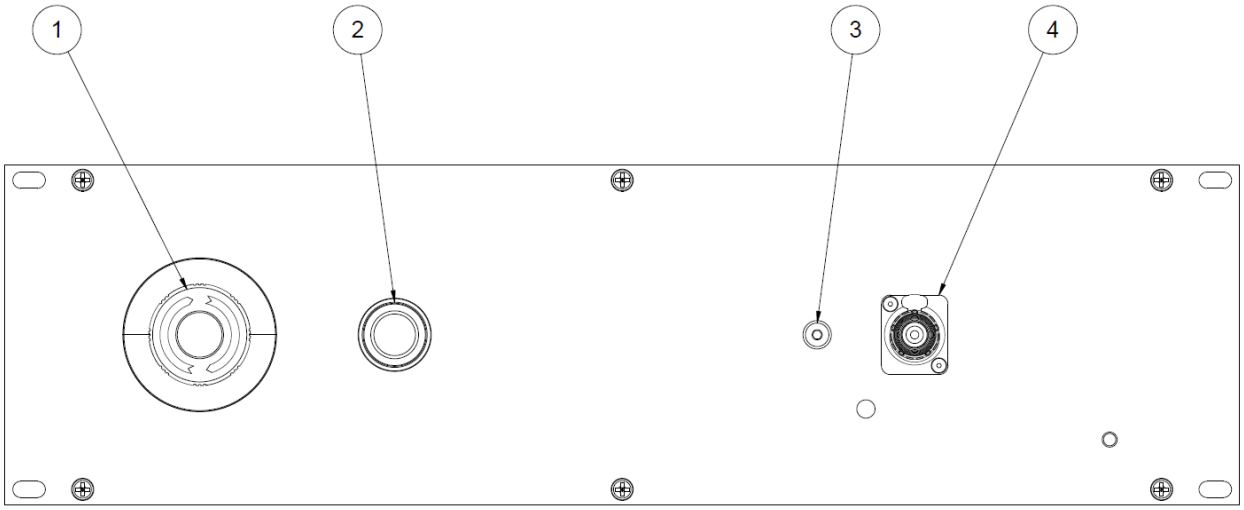
1. **Grab Handles.** Front panel, black, metal grab handles.
2. **Multi-hoist Handheld Remote Input**. Connection for Multi-hoist Handheld Remote.
3. **5 VDC LED Indicator**. The 5 VDC LED Indicator indicates if there is 24 VDC present.
4. **12 VDC LED Indicator**. The 12 VDC LED Indicator indicates if there is 24 VDC present.
5. **24 VDC LED Indicator**. The 24 VDC LED Indicator indicates if there is 24 VDC present.

Soft Limit Main, Rear



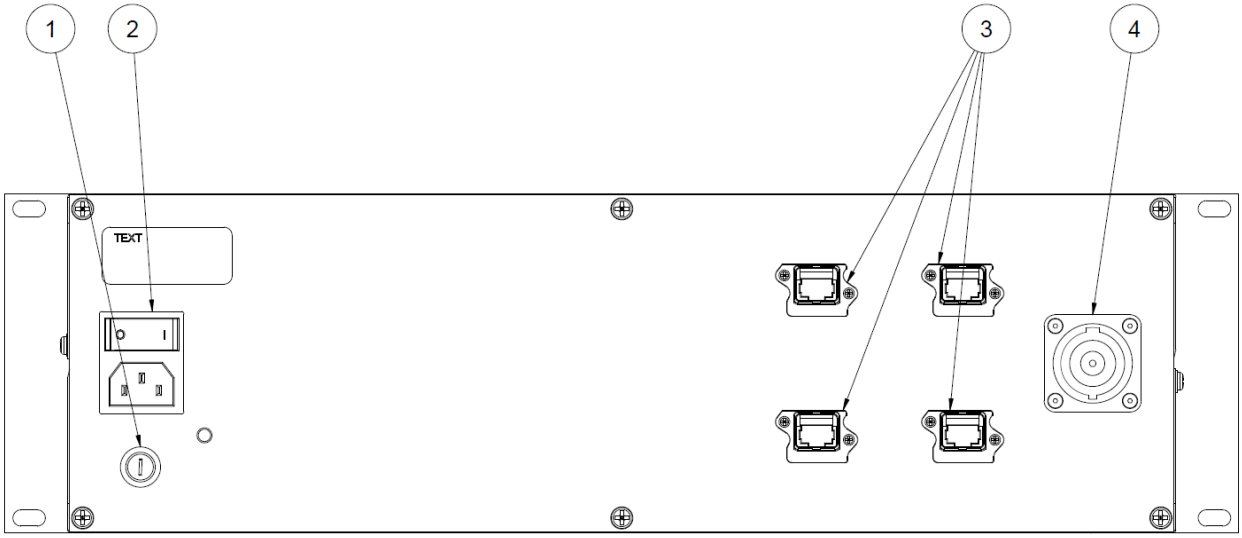
1. **Input Fuse.** Standard systems come with NEMA 3R Enclosures.
2. **Input Rocker Switch**. Main switch to turn on power to the controller.
3. **Load Cell Hub Input**. Input connection for Cell Mate Hub Data Cable.
4. **Encoder Inputs**. Input for eight Encoder Data Cables.
5. **Network Ports**. Connections for the communication network.
6. **Motor Controller Remote Connection**. Output for controlling a motor controller's Multi-hoist Handheld Remote.

Touch Screen Operating System (TSOS) Interface, Front



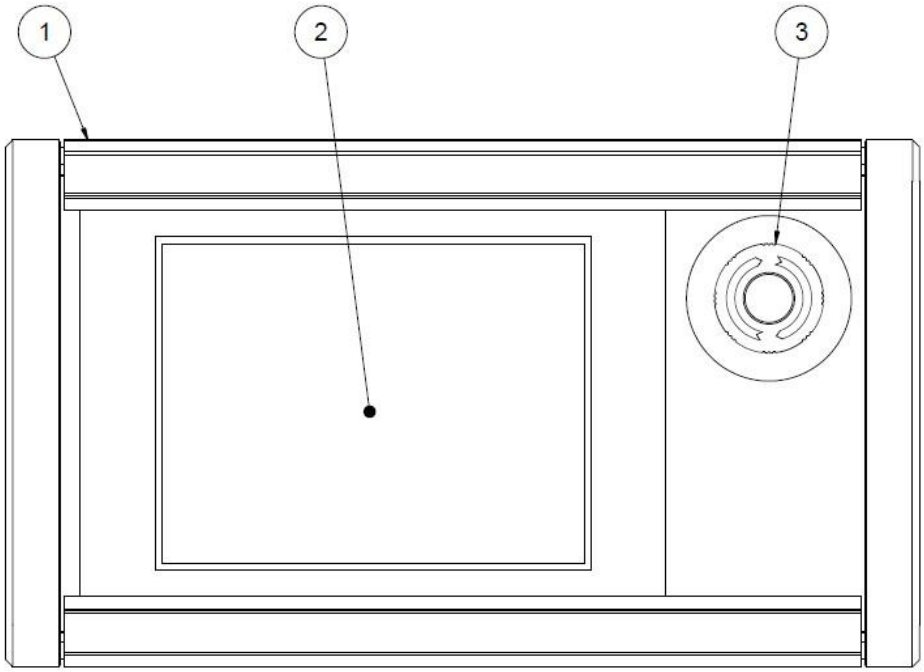
1. **Emergency Stop Mushroom Button.** Button for activating the emergency stop circuit.
2. **Reset Button.** Button to reset the emergency stop circuit.
3. **Shorting Plug.** Connector for TSOS connection to satisfy the emergency stop circuit if TSOS is not being used..
4. **TSOS Connection.** Connector to plug in the TSOS.

Touch Screen Operating System (TSOS) Interface, Rear



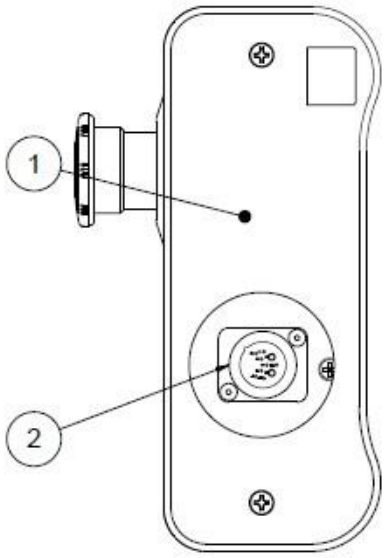
1. **Input Fuse.** Fuse protection for input power.
2. **Power Switch.** Rocker switch allying power to the Interface.
3. **Network Ports.** Connections for the communications network.
4. **Emergency Stop Link Input.** Connects to a Max Pac that has an emergency stop circuit integrated into it to control contactor driven outputs.

Touch Screen Operating System (TSOS) Handheld, Front



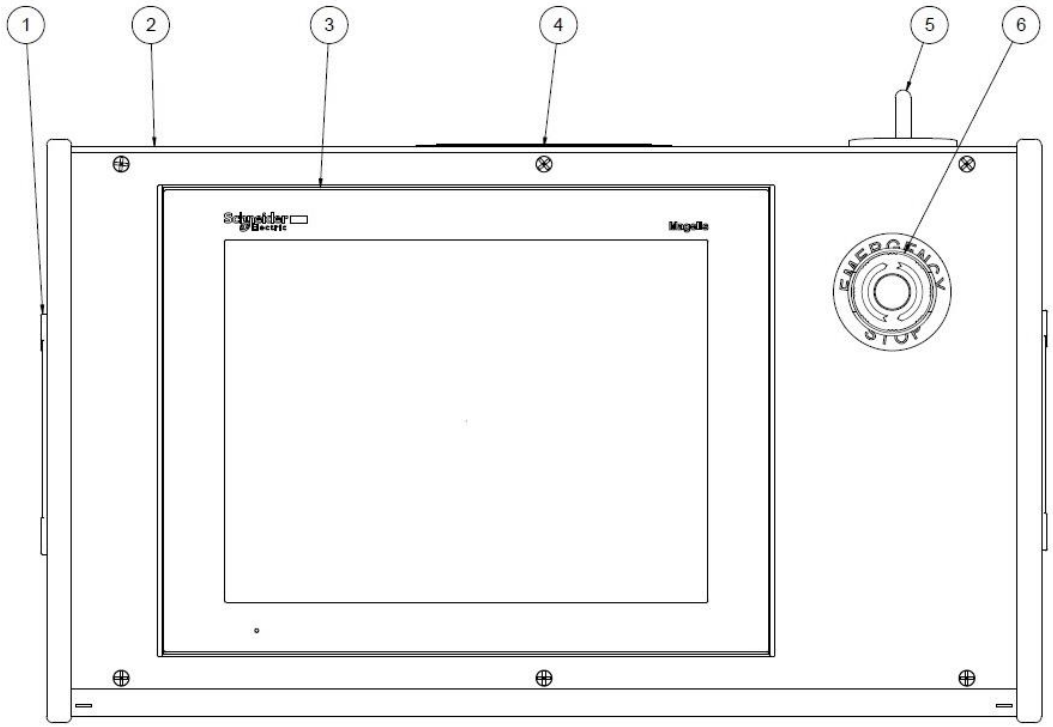
1. **Enclosure.** Plastic outer enclosure.
2. **Human Machine Interface (HMI).** Touch screen interface.
3. **Emergency Stop Mushroom Button.** Button for activating the emergency stop circuit.

Touch Screen Operating System (TSOS) Handheld, Side



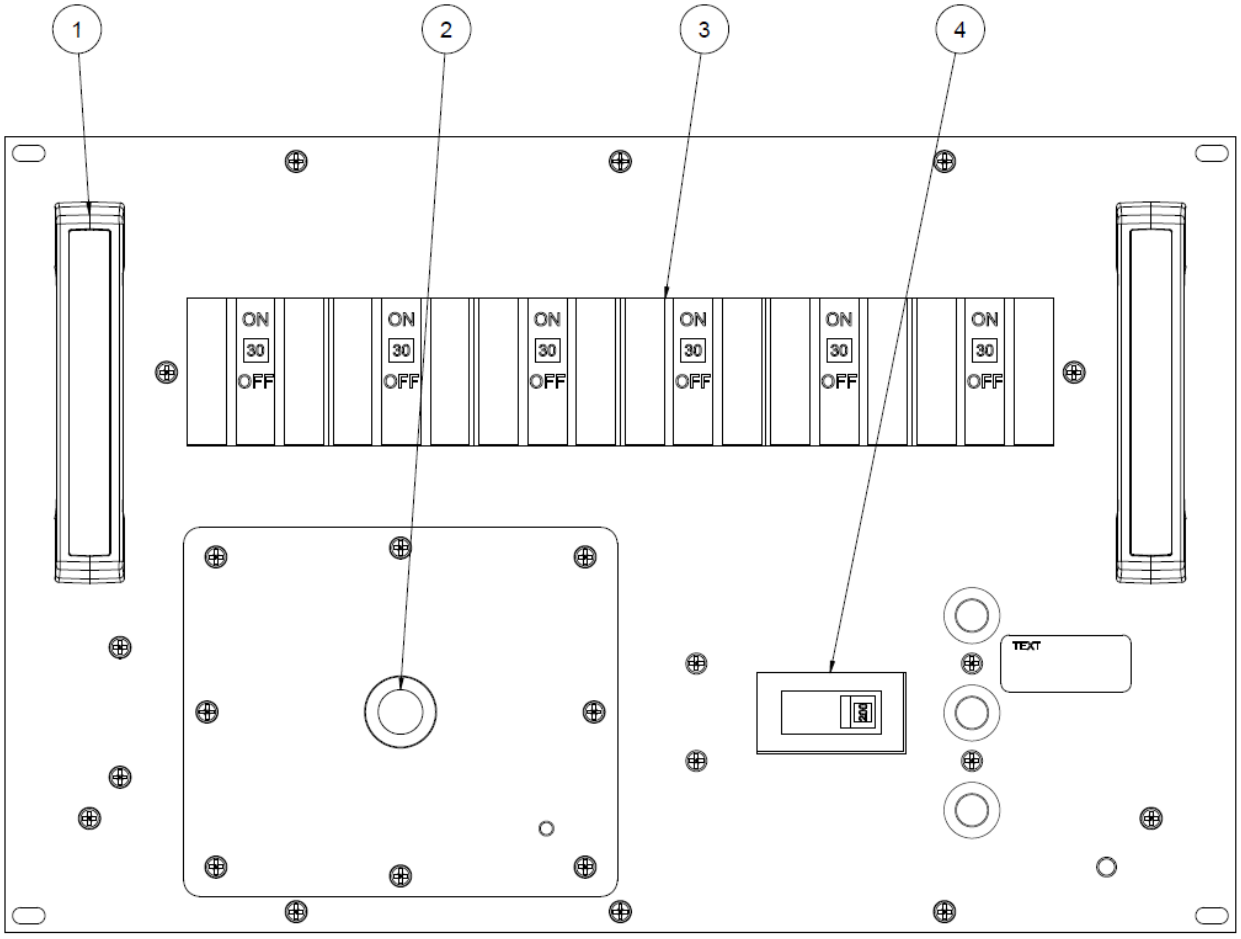
1. **End cap.** Plastic end protecting connector.
2. **10 pin XLR Connector.** Connection for the Touch Screen Operating System (TSOS) to the TSOS Interface. Connection for power, communications, and the emergency stop circuit.

Touch Screen Operating System (TSOS) Console



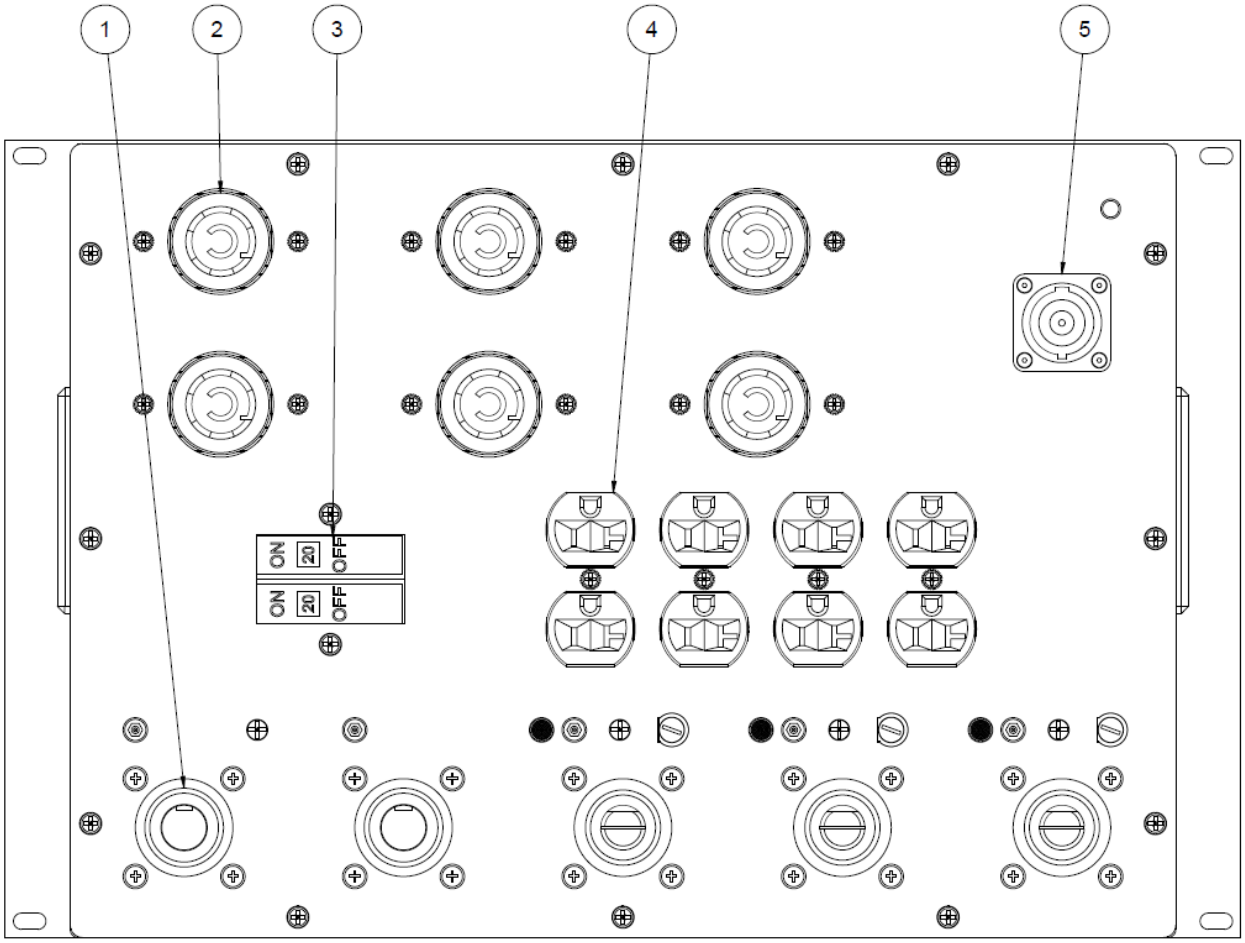
1. **Side Grab Handles.** Ergonomic handle for carrying the TSOS.
2. **10 pin XLR Connector.** This is for the connection of the TSOS to the TSOS Interface. Connection for power, communications, and the emergency stop circuit.
3. **HMI.** Touch screen interface.
4. **Carry Handle.** Safe, single carry handle for carrying the TSOS.
5. **Fall Protection Anchor.** A place to connect wire rope for fall protection.
6. **Emergency Stop Mushroom Button.** Button for activating the emergency stop circuit.

Power Distro, Front



1. **Side Grab Handles.** Ergonomic handles for carrying.
2. **Contactor Energized Indicator.** Illuminates when the contactors that supply power to the six rac pac motor controllers through the twist lock outputs are energized.
3. **Brach Rated Circuit Breakers.** Provide protect for each rac pac motor control power output.
4. **Main Breaker.** Breaker to protect the whole power system downstream from this device.

Power Distro, Rear



1. **Single Pole Main Power Input (TYP).** Input device for mains power.
2. **Rac Pac Motor Controller Power Output (TYP).** Six output to power up to six controllers.
3. **Auxiliary Power Branch Circuit Breakers.** Circuit breakers that control the auxiliary power outputs.
4. **Auxiliary Power Outputs.** These duplex outputs are controlled by the auxiliary power branch circuit breakers. This power is not affected by the emergency stop function.
5. **Emergency Stop Link Input.** Connects to the TSOS interface to connect the emergency stop mushroom buttons and resets to control the emergency stop circuit.

TECHNICAL SPECIFICATIONS

Part Numbers

PART NUMBER CONFIGURATION

GROUP		CATEGORY		SUBDIVISION		ID NUMBER
A = Top Level Assembly	-	17 = Rigging Electronics	-	005 = Touch Screen Operating System 007 = Soft Limit	-	xxxx = Iteration

GROUP		CATEGORY		FRONT DESIGNATION		REAR DESIGNATION
1125 = Max Pac, CC4, 15" F/R	-	7 = Rack Units (RU)	-	0012 = B-03-201-0004 Front Panel	-	0014 = B-03-259-0002 Rear Panel

PART NUMBER TABLE

Part Number	Type	Description
A-17-007-0001	CONTROLLER	PLC Control System, Rack mount, 8CH, Soft Limit, Loadcell, Encoder, 3SP
1125-7-0012-0014	POWER DISTRO	Max Pac, RP7 15", CAM5 RGN, 200A, 6X30A3P, 2X 20A1P, 6X L15-30R, 4X Duplex, E-stop, Pilot Light
A-17-005-0103	TSOS INTERFACE	PLC Control System, HMI Interface, RP3, IEC Input, E-Stop, Reset,XLR 10Pin, NL8
A-17-005-0014	TSOS CONSOLE	PLC Control System, Touch Screen Operating System (TSOS), HMI 12", Console, XLR-10-01, E-Stop, Truss Mount
A-17-005-0015	TSOS HANDHELD	PLC Control System, Touch-Screen Operating System (TSOS), HMI 7.5", Hand Held, XLR-10-01, E-Stop

System Capacity

The Portable Soft Limit Control System in this manual can operate 1 to 80 chain hoists. The system capacity is based on the system configuration. Each Soft Limit Main Controller can operate up to eight chain hoists. Up to ten Soft Limit Main Controllers may be connected through network cables to accomplish this control.

The TSOS's capacity is based on the scope of the project and how many hoists can be operated safely on a specific HMI size. The TSOS Handheld, A-17-005-0015, has a 7.5" HMI and can operate up to eight hoists on eight channels. This device is designed to be used with one Soft Limit Main Controller. The TSOS Console, A-17-005-0014, has a 12" HMI and can operate up to 24 hoists on 24 channels.

Projects or systems larger than 24 channels will incorporate programming to accommodate systems larger than 24 channels and up to 80 channels.

Electrical Specifications

- Power Distro

Input Power..... 120/208 VAC 3PH
Frequency..... 60Hz
Wiring Configuration..... 4P5W
Maximum Ampacity..... 200A

- Soft Limit, Main Controller

Input Power..... 100-240 VAC
Frequency..... 50/60Hz
Current Rating..... 6A max

- Touch Screen Operating System (TSOS), Interface

Input Power..... 100-240 VAC
Frequency..... 50/60Hz
Current Rating..... 3A max

- Touch Screen Operating System (TSOS), Handheld

Input Power..... 24VDC
Current Rating..... 3A max

- Touch Screen Operating System (TSOS), Console

Input Power..... 24VDC
Current Rating..... 4A max

Physical Specifications

- Power Distro

Chassis..... 18-gauge steel, black powder coat finish
Front and Rear Panel..... .090" Aluminum, black powder coat finish
Chassis Height..... 7RU, 12.25"
Chassis Width..... 19"
Enclosure Depth..... 15"
Weight..... 30 lb

- Soft Limit Main Controller

Chassis..... 18-gauge steel, black powder coat finish
Front and Rear Panel..... .125" Aluminum, black powder coat finish
Chassis Height..... 3RU, 5.25"
Chassis Width..... 19"
Enclosure Depth..... 15"
Weight..... 15 lb

- Touch Screen Operating System (TSOS), Interface

Chassis..... 18-gauge steel, black powder coat finish
Front and Rear Panel..... .090" Aluminum, black powder coat finish
Chassis Height..... 3RU, 5.25"
Chassis Width..... 19"
Enclosure Depth..... 7"
Weight..... 5 lb

- Touch Screen Operating System (TSOS), Handheld

Chassis..... .090" Steel, black powder coat finish
High visibility yellow PVC end caps
Black PVC cover profiles
Front Panel..... .090" Aluminum, black powder coat finish
Chassis Width..... 14.35"
Chassis Height..... 4.1"
Chassis Depth..... 7.52"
Weight..... 5 lb

- Touch Screen Operating System, Console

Chassis..... .090" Steel, black powder coat finish
High visibility yellow PVC end caps
Black PVC cover profiles
Front Panel..... .090" Aluminum, black powder coat finish
Chassis Width..... 20.15"
Chassis Height..... 7.5"
Chassis Depth..... 11.25"
Weight..... 10 lb

Data Specifications

Data Communication Medium, TSOS to Soft Limit Main..... RS485 Full Duplex
Data Communication Protocol, TSOS to Soft Limit Main..... Modbus RTU

Data Communication Medium, Soft Limit Main to Soft Limit Main..... Ethernet
Data Communication Protocol, Soft Limit Main to Soft Limit Main ..... Modbus TCP

Environmental Specifications

- Power Distro, Soft Limit Main Controller & Touch Screen Operating System (TSOS), Interface

Indoor Use Only
IP Rating..... IP40
NEMA..... NEMA1
Operating Temperature Range..... 0°C to 70°C

- Touch Screen Operating System (TSOS), Handheld

Indoor Use Only
IP Rating..... IP40
NEMA..... NEMA1
Operating Temperature Range..... 0°C to 70°C

- Touch Screen Operating System (TSOS), Console

Indoor Use Only
IP Rating..... IP40
NEMA..... NEMA1
Operating Temperature Range..... 0°C to 70°C

Cable Specifications

- TSOS Data Cable

The TSOS Data Cable uses 10 pin XLR (8 + 2) connectors with 26/7 Cat6 and 4 16AWG shielded hybrid cable. The cable is a Motion Laboratories Inc. product, with a part number series of 1400-06-86-XX-015. The cable has a black outer jacket.

TSOS Data Cable 8 + 2 XLR	
Pin	**Function**
1	Tx+
2	Tx-
3	Rx+
4	Emergency Stop In
5	Emergency Stop Out
6	Rx-
7	Reset In
8	Reset Out
9	24 VDC
10	0 VDC

- Data Cable

The Data cable is primarily used for connecting sensing equipment like load cells and encoders to reading equipment like controllers and hubs. The Data cable uses 6 pin XLR connectors with an 18 AWG, 6 conductor cable. The cable is a Motion Laboratories Inc. product, with a part number series of 1400-06-37-XX-001. The cables have a black outer jacket.

Data Cable
6 Pin XLR

Pin	Function
1	+ VDC
2	0 VDC
3	A+ / Tx +
4	A- / Tx -
5	B+ / Rx +
6	B- / Rx -

- 26 Pin Remote Cable

The 26 Pin Remote Cable uses Souriau 26 pin ¼ turn connectors with a 26 conductor, 22AWG cable. The cable is a MLI product, part number series 1400-05-39-XX-001 with a yellow outer jacket and part number series 1400-05-38-XX-001 with a black outer jacket.

Remote Cable 26 Pin 1/4 Turn Bayonet	
Pin	**Function**
A	1 UP
B	1 DOWN
C	2 UP
D	2 DOWN
E	3 UP
F	3 DOWN
G	4 UP
H	4 DOWN
J	5 UP
K	5 DOWN
L	6 UP
M	6 DOWN
N	7 UP
O	7 DOWN
P	8 UP
Q	8 DOWN
T	KILL
U	GO
V	12VDC+
W	0VDC
b	Jumper to c
c	Jumper to b

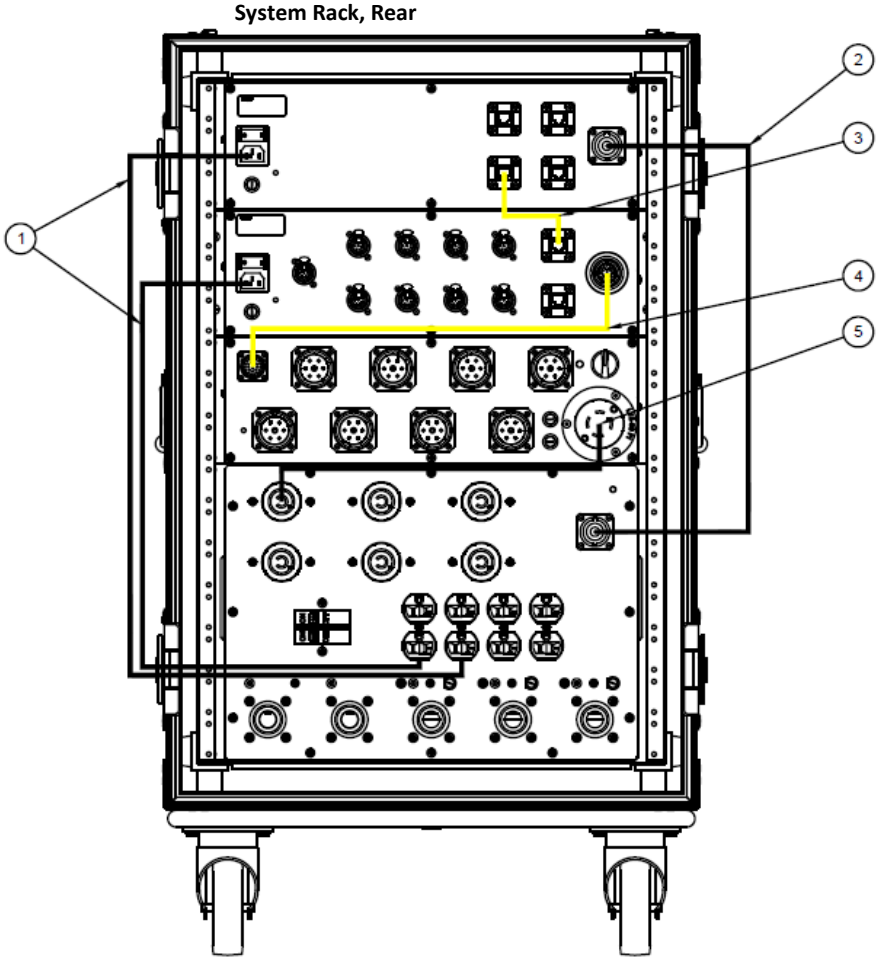
INSTALLATION

System Connections

Note: System connections will detail all cable connections related to Portable Automation Chain Hoist Systems. The rack below represents an eight-channel automation system. All components are modular and can be added or removed to design larger systems in eight channel blocks.

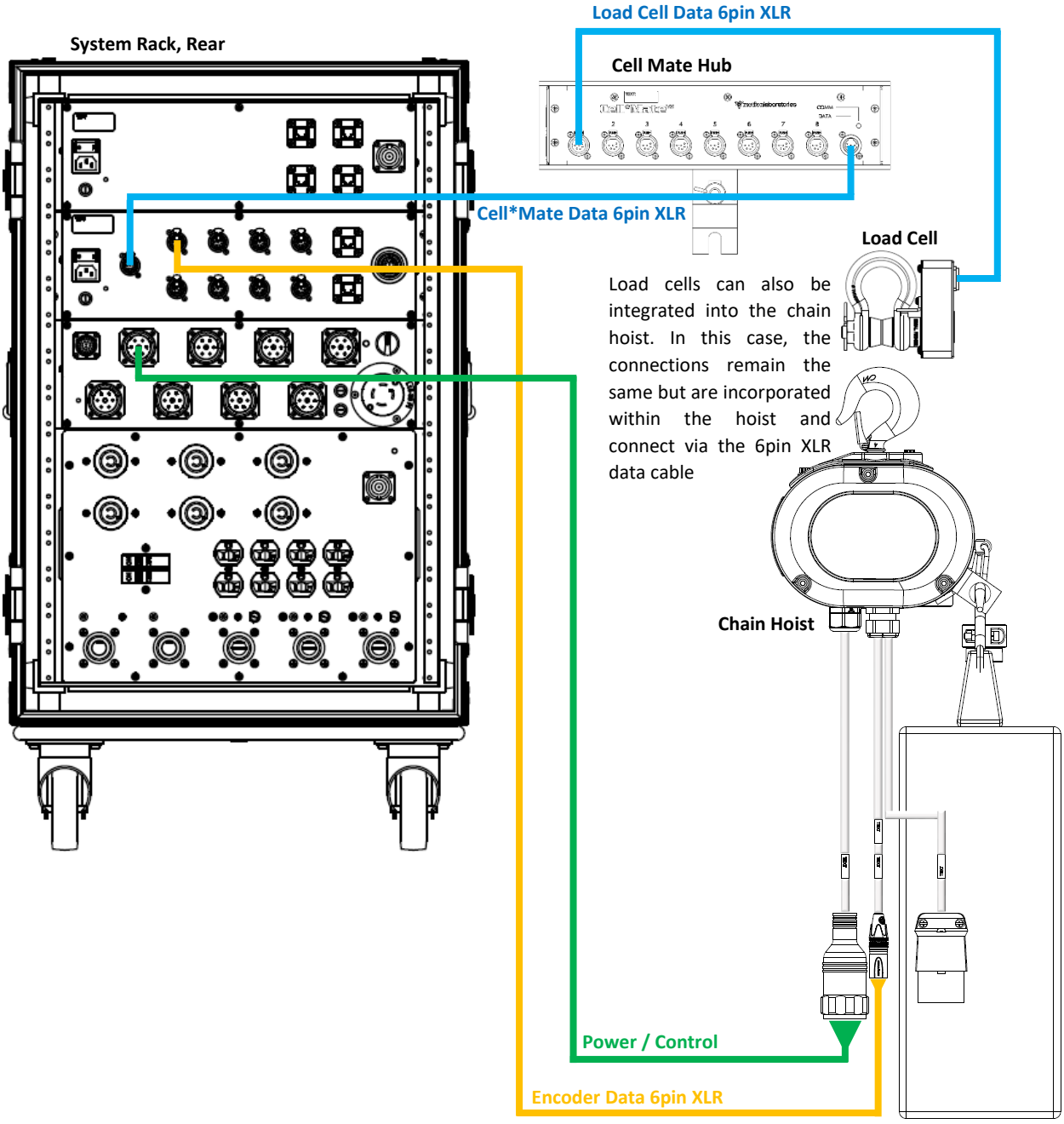
- System Rack Connections

System Rack, Rear

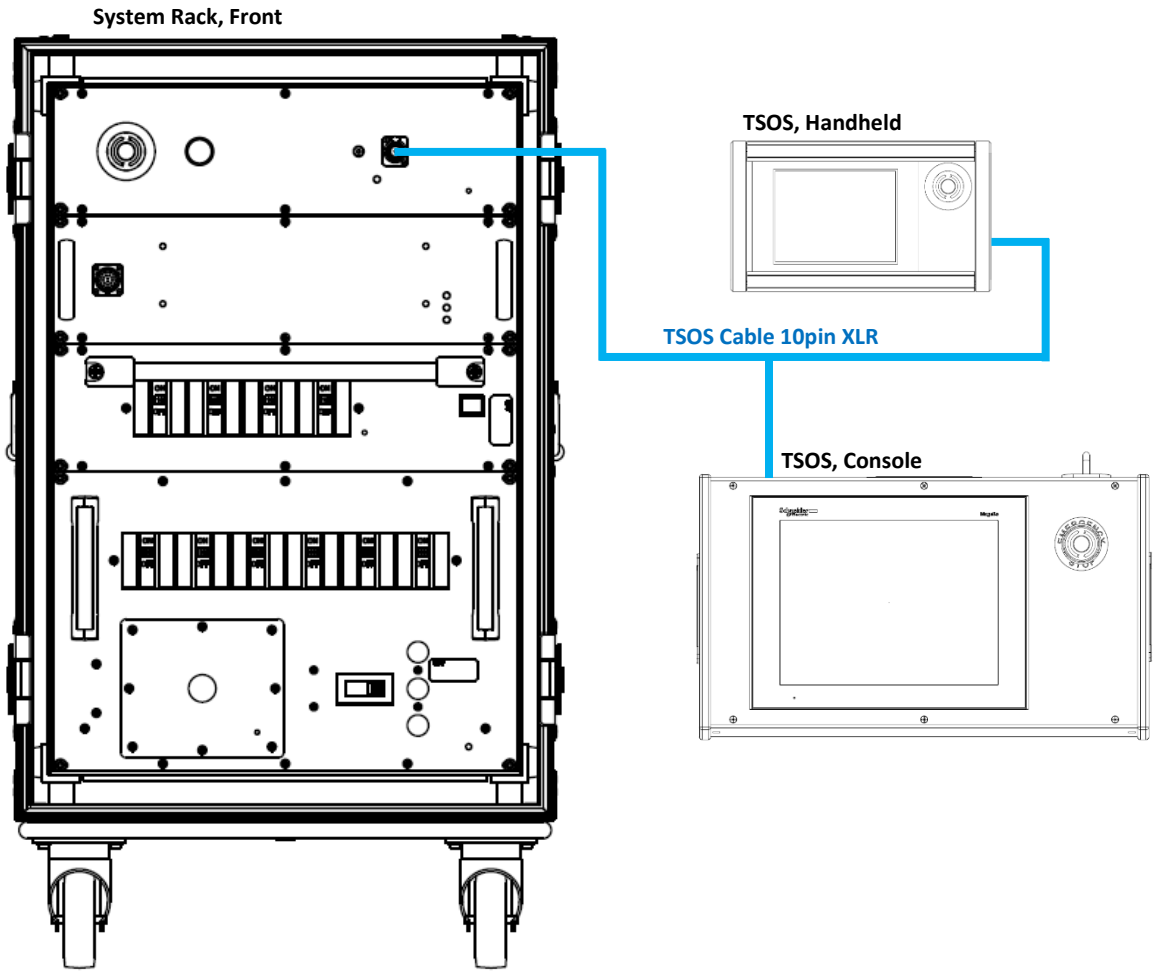


1. **Cable Assembly, IEC 320, Edison Plug, Power cord, 6Ft.**
2. **Cable, SpeakOn NL8FC, SEOOW, 16/7, 5ft, Pinout NL8-02/Color Code ES001.**
3. **Cable, Data, CAT6, 3ft, Harting PushPull Ethernet RJ45, Yellow.**
4. **Cable, Multi Pin, Custom, 22/26, Yellow, 3FT, 26Pin.**
5. **Cable, Twistlock, SOW, 8/4, 4ft, L15-30.**

- Chain Hoist Connections

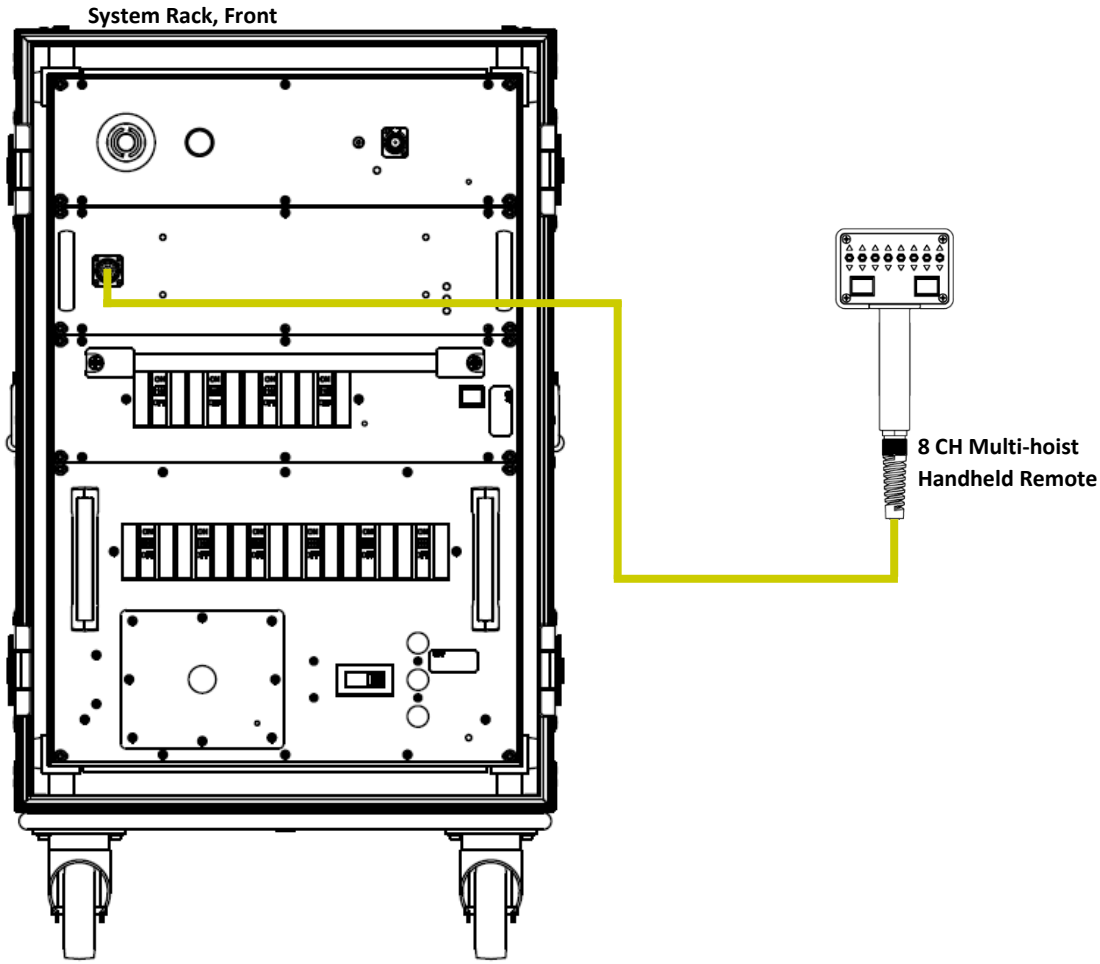


- Touch Screen Operating System (TSOS) Connections

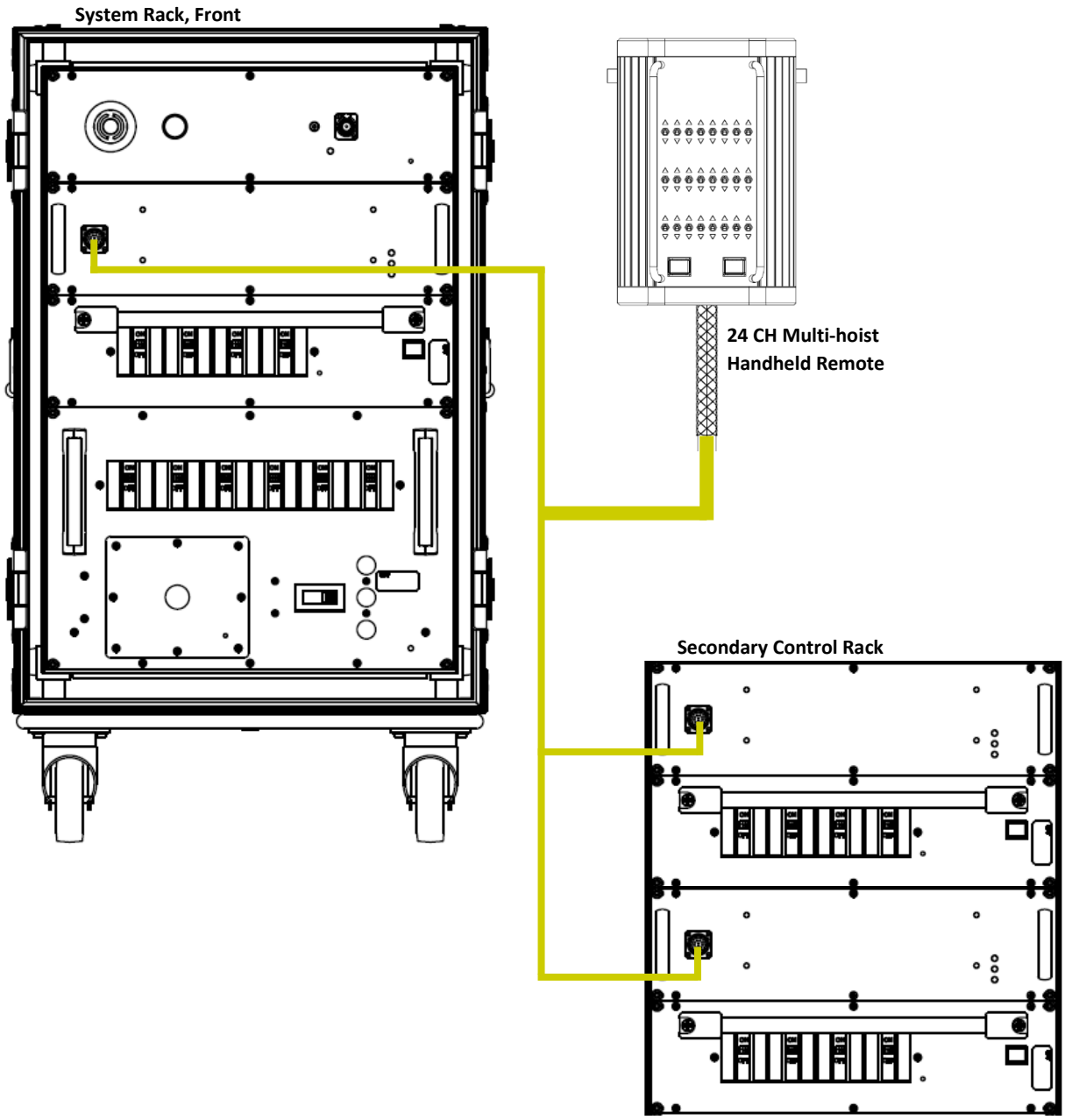


For the system to operate, the emergency stop circuit must be completed or satisfied. Part of the E-stop circuit is satisfied through the TSOS connection point on the TSOS Interface. If the TSOS is not being used, you must insert the shorting plug to complete the circuit, allowing the system to function.

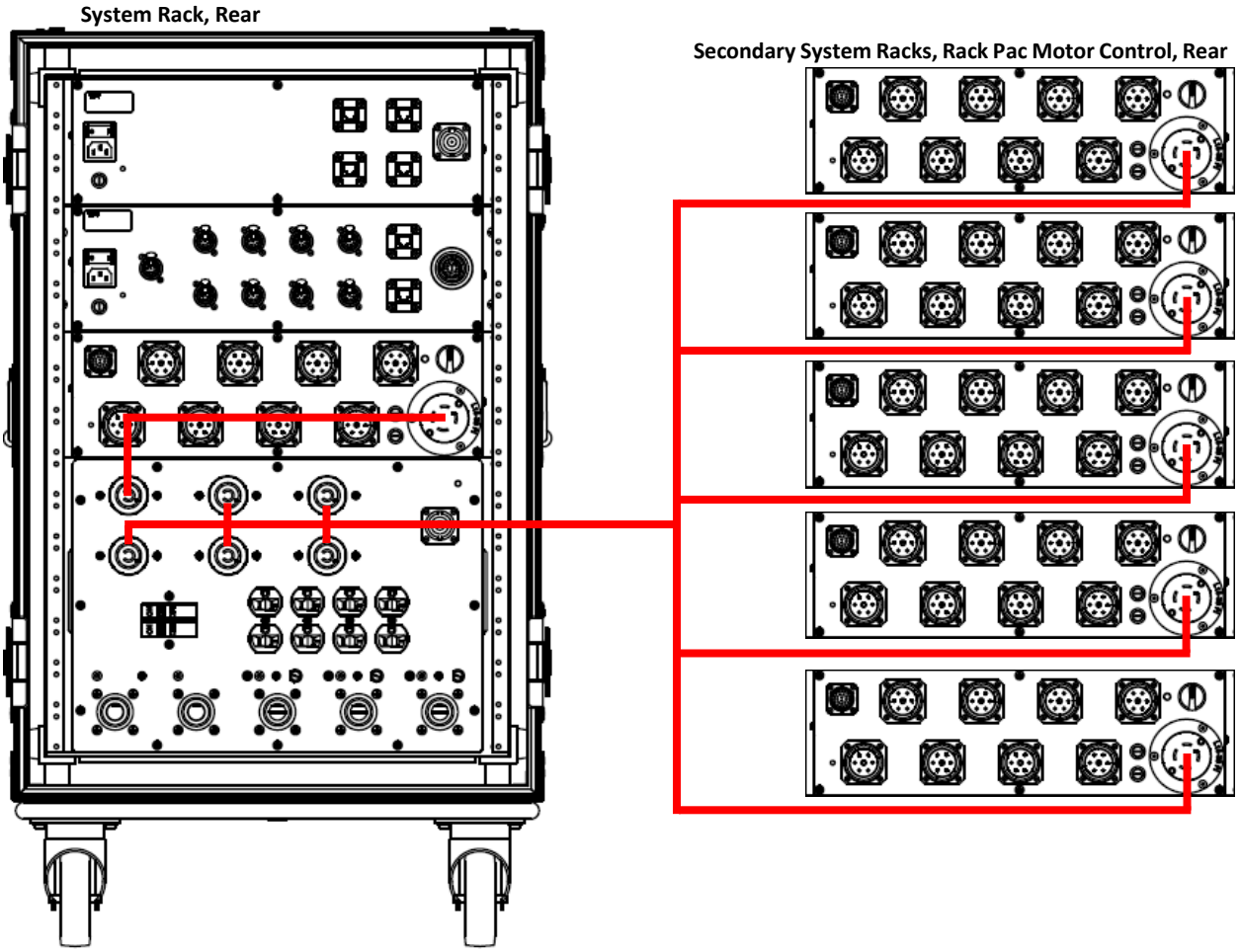
- Multi-hoist Handheld Remote Connections, Small Systems



- Multi-hoist Handheld Remote Connections, Larger Systems



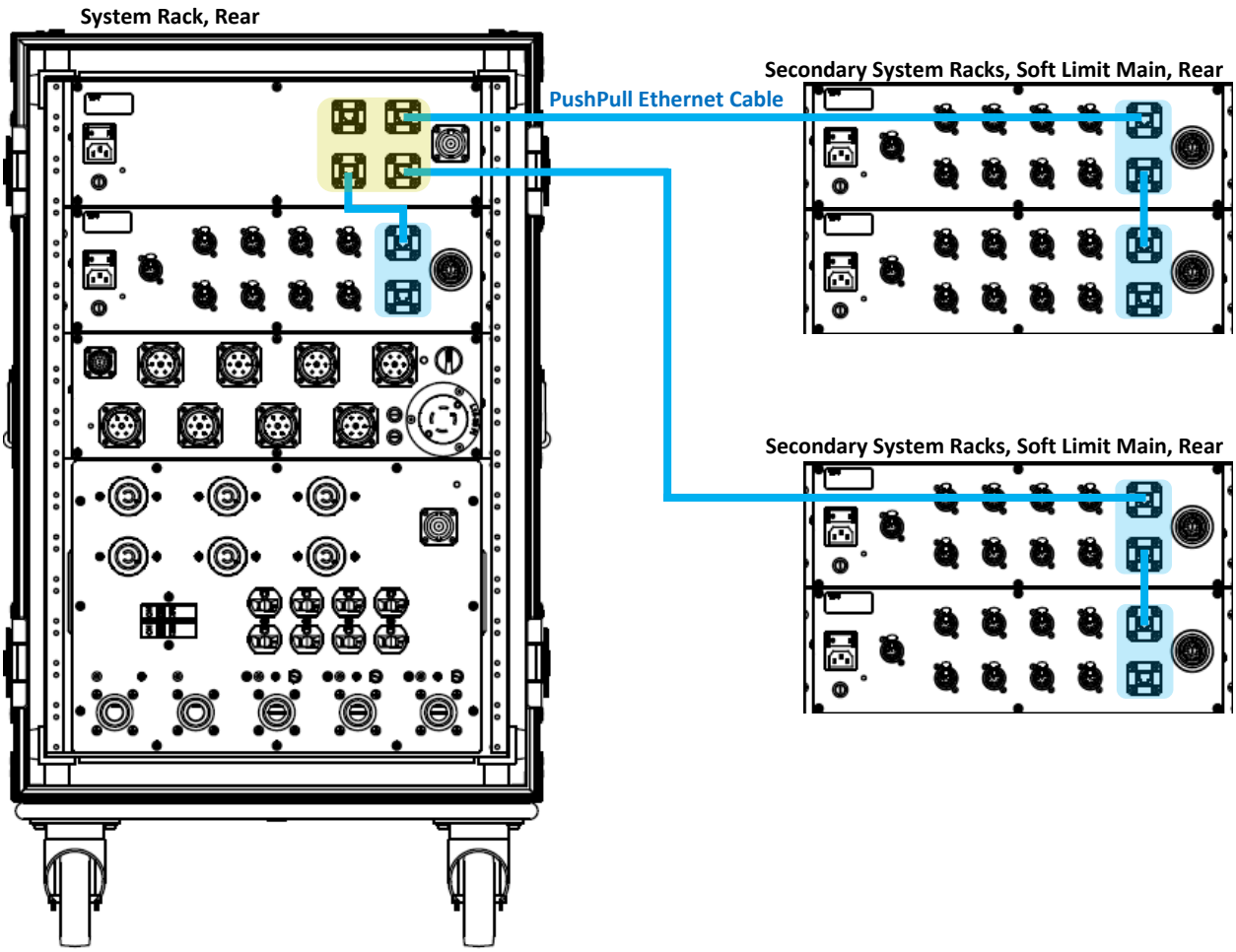
- Rac Pac Motor Controllers, Power



DANGER

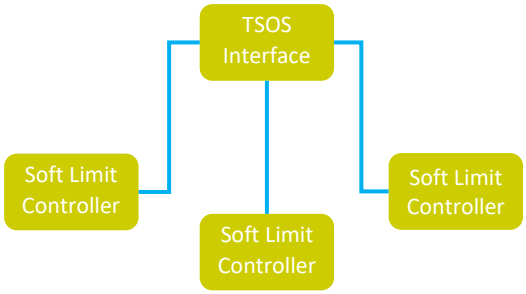
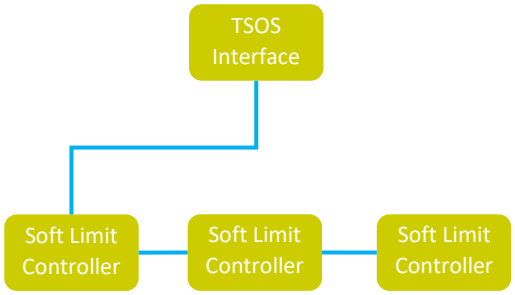
Motor Controllers in this Portable Soft Limit System must be connected to the Soft Limit Max Pac. The Soft Limit Max Pac's Motor Controller outputs are contactor driven and controlled by a safety relay. Without this connection the system power cannot be safely removed by the emergency stop circuit.

- Multi-Rack Setups, Network



PushPull Ethernet Connections on the TSOS Interface

PushPull Ethernet Connections on the Soft Limit Main Controllers

Star Topology	Daisy Chain Topology
	
A Star Topology in industrial chain hoist control systems involves each hoist or control device connecting individually to a central communication hub or controller. This design simplifies fault isolation, enhances reliability, and allows straightforward system expansions or modifications without disrupting the overall network. Benefits: • Centralized Control • Fault Isolation • Easy Expansion	A Daisy Chain Topology in industrial chain hoist control systems connects hoists or control devices sequentially in a single, linear communication line. This setup minimizes cabling complexity and installation costs, but a failure in any device or connection can interrupt communication with all subsequent devices downstream in the chain. Benefits: • Minimal Cabling • Sequential Dependance • Cost-Effective Installation

Any combination of star and daisy chain topology may be used to connect the network cables from each Soft Limit Main Controller to the TSOS Interface.

CAUTION

Every time data passes through a network switch a small amount of propagation occurs. It is best practice to make your network connections with the least amount of network switches as possible to mitigate the total propagation time impacting real-time application and control systems. Every controller and interface in this system will have a network switch.

Power Up

WARNING

Before powering up the Soft Limit System there must be a Commission and Start Up that occurs. These actions ensure that the whole system has been installed to the required standards and that there are qualified personnel available to operate the system.

WARNING

Do not operate the system without the encoder cables connected! This will result in your position values becoming corrupt.

DANGER

Risk of electric shock! Do not attempt to power up this system with any of the components open or damaged.

Follow these steps to power up the system.

1. Validate all cables are connected.
2. Validate your service and branch circuits, powering your system is energized.
3. Power up System Rack(s). Every rack will have a combination of main power and branch breakers, TSOS Interface power switch, Soft Limit Main Controller power switch.
4. Check for proper phasing utilizing the phase reverse system on Rack Pac Motor Controller(s).
5. Validate your TSOS is powered up. Your TSOS will power up when the Hybrid Data Cable has been connected to it and TSOS Interface.
6. Satisfy the emergency stop circuit. Every time the system is powered up or the emergency stop circuit is opened the emergency stop function is active not allowing power to pass along to the chain hoists. To satisfy the function you must make sure the emergency stop circuit is closed. To do this make sure all emergency stop mushroom buttons are deactivated and the TSOS or Shorting Plug (if no TSOS) is properly plugged into the TSOS Interface. At this point your Reset Lamp should be lit indicating your emergency stop system is ready to be reset. Press the Reset Button to satisfy the emergency stop system.

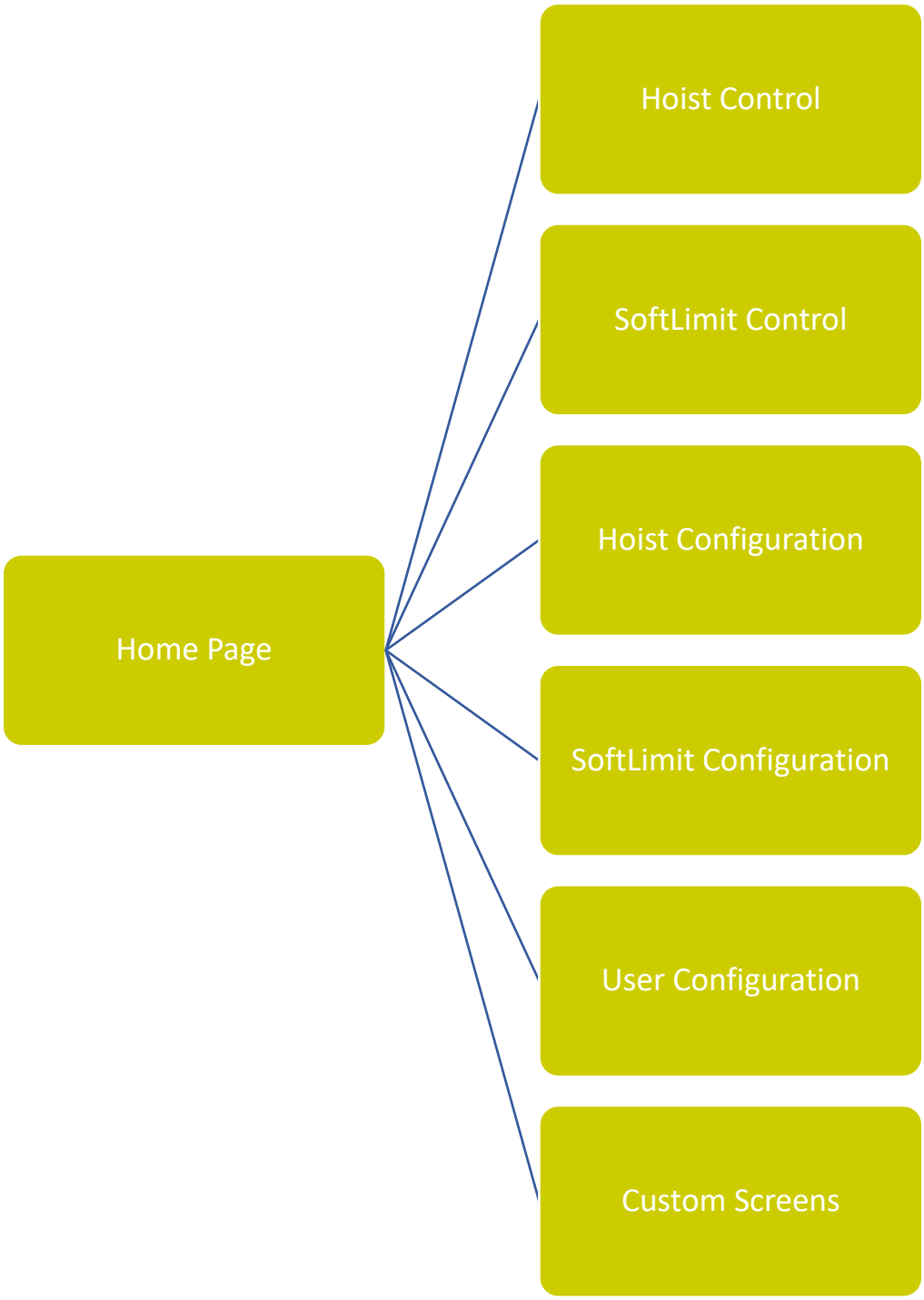
Once the PLC and other electronic devices in the unit have cycled on, the TSOS will be ready to operate.

QUICK START

Here is a quick list of items that should be done to operate the Portable Soft Limit System.

1. Make Sure All system connections are made, and all cables are in proper working order.
2. Power up the system following the Power up routine.
3. Make sure the emergency stop circuit has been satisfied.
4. Go to the Soft Limit Control page.
5. Choose groups or hoists to move.
6. Press the Go to Soft Limit button for the desired Soft Limit.

OPERATION
Navigation Guide



- Home Page

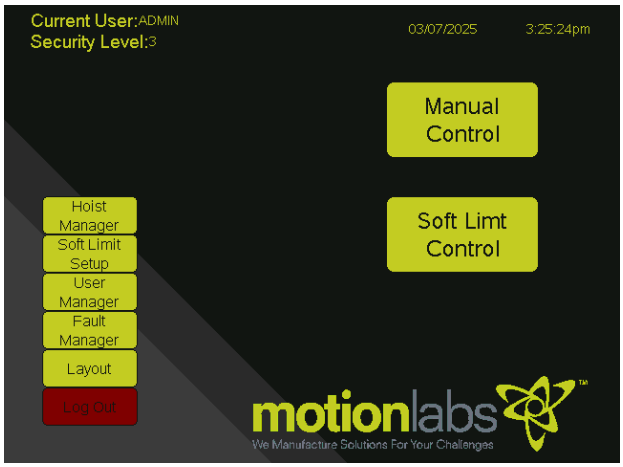


Figure 1. Home Screen (gray)

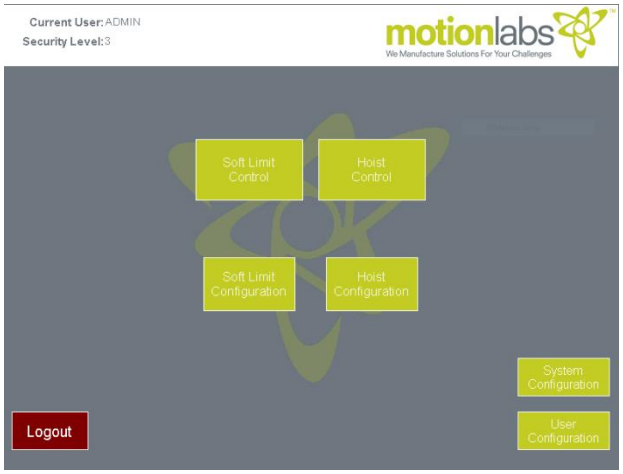


Figure 2. Home Screen (black)

The Home Page is the main page. It is the first page that will be displayed when the device is powered on. All other pages are accessible from here. This is where users can log in. Different user levels will have different pages available. The admin security level will have access to configuration pages and control pages while the user security level would just have access to preprogrammed control.

Screens may vary based on system size and features.

There are currently two color schemes used for TSOS: gray and black. Both schemes are illustrated above for clarity but are not consistently shown throughout the manual. The choice of color scheme does not impact functionality; all control elements remain available regardless of the scheme used.

Table 1. Home Screen Elements

Function	Image	Description
Hoist Control		Displays Hoist Control Page.
Soft Limit Control		Displays Soft Limit Control Page.
Hoist Configuration		Displays Hoist Configuration Page.
Soft Limit Configuration		Displays Soft Limit Configuration Page.
System Configuration		Displays System Configuration Page.
User Configuration		Displays User Configuration Page.
Logout		Logs current user out of system.

- Soft Limit Control

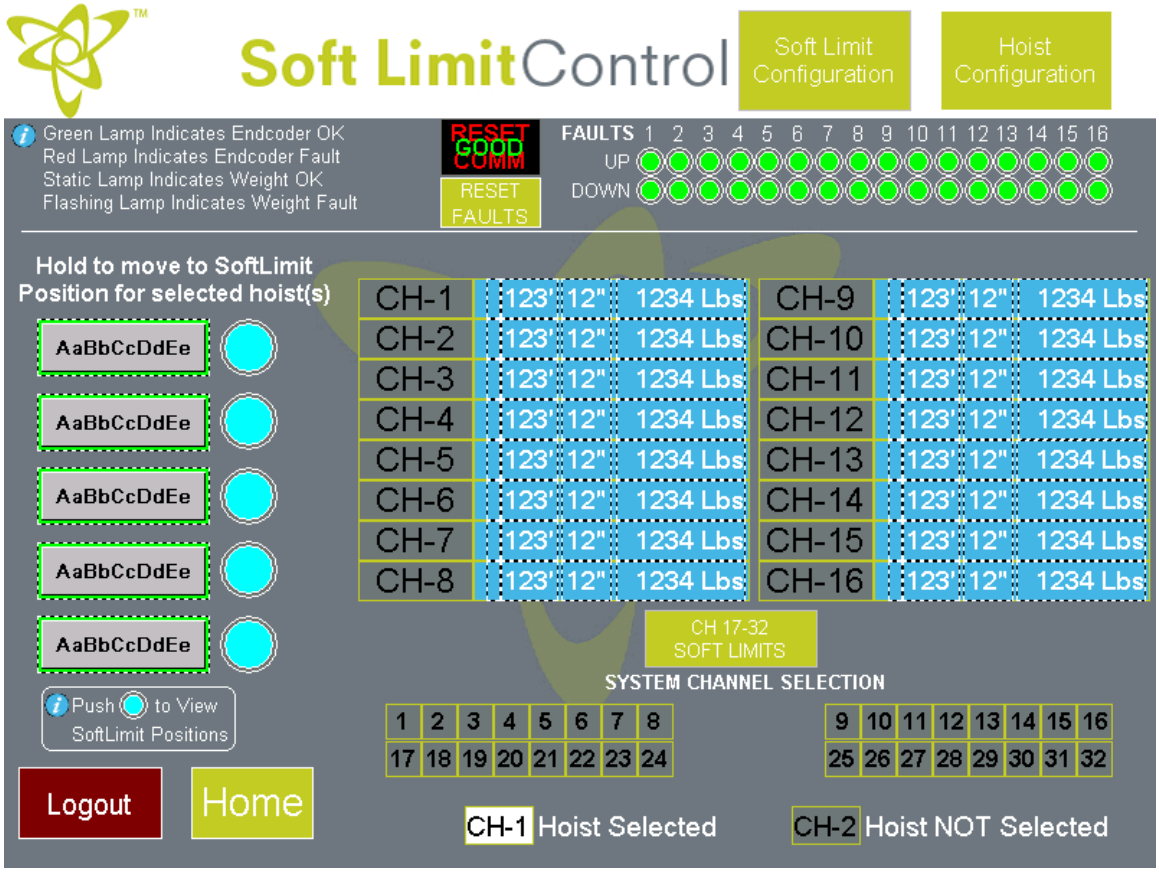
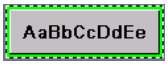


Figure 3. Soft Limit Control Screen

Table 2. Soft Limit Control Screen Elements

Function	Image	Description
Soft Limit Configuration		Displays Soft Limit Configuration Page.
Hoist Configuration		Displays Hoist Configuration Page.
PLC Comms		Resets communication watchdogs.
Fault Indicators		Fault indicators for Channels Green – OK Red (solid) – Encoder Fault Red (flashing) – Weight Fault
Reset Faults		Allows a fault to be reset after fault condition is cleared.
Run to Soft Limit		Run command for selected Soft Limit.
Soft Limit Popup		Displays the popup showing position setpoint data for all hoists for the Soft Limit.
Hoist Select		Allows user to select a hoist for movement. Number. White – Hoist Selected Gray – Hoist Not Selected
Current Position		Displays the current position.
Home Button		Displays Home Page
Logout Button		Logs current user out of system

- Hoist (Manual) Control

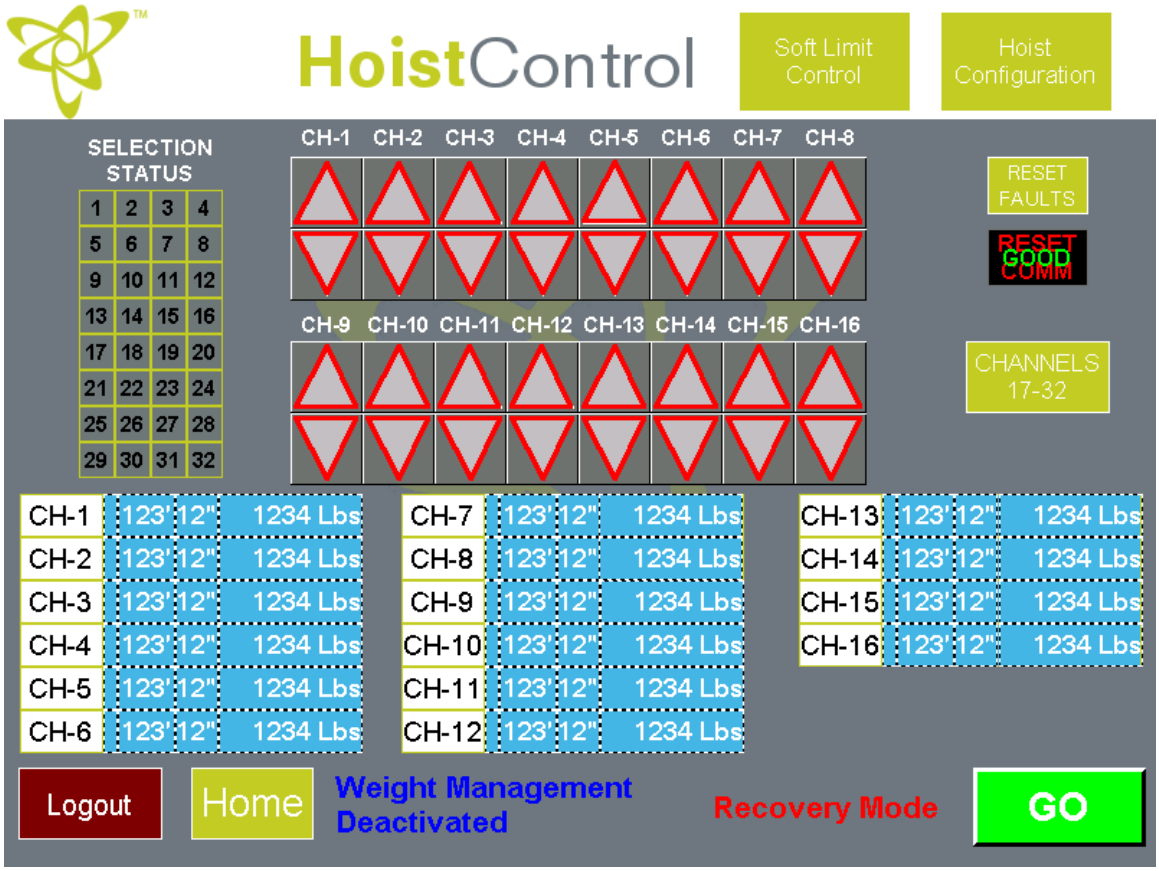


Figure 4. Hoist (Manual) Control Screen

Table 3. Hoist (Manual) Control Screen Elements

Function	Image	Description
PLC Comms		Resets communication watchdogs.
Channel direction Selection		Press the up or down arrows to choose your selection for movement. Green Arrow – Indicates Up direction has been selected. Yellow Arrow – Indicates Down direction has been selected. Gray Arrow – No direction selected
Actual Position		Displays Actual Position of Hoist in feet and inches.
GO Button		Momentary run command.
Home Button		Displays Home Page.
Logout Button		Logs current user out of system.

- Hoist Configuration

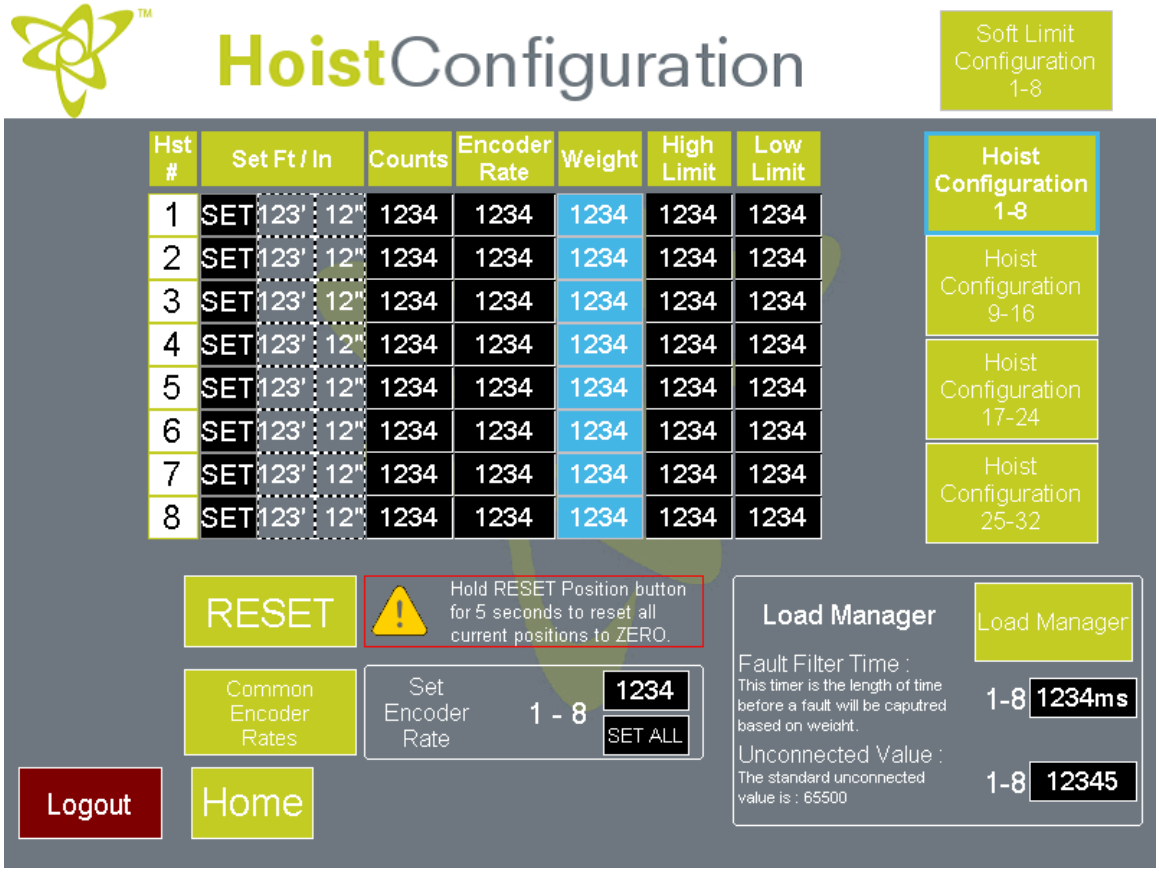


Figure 5. Hoist Configuration Screen

Table 4. Hoist Configuration Screen Elements

Function	Image	Description
Set Ft / In		This section is used to set new position values to the actual position.
Encoder Counts		Displays encoder counts and can be pressed to edit.
Actual Weight		Displays the load in lb.
Weight Limits		Displays the upper and lower weight limits in lb and can be pressed to edit.
Home		Displays Home Page.
Logout		Logs current user out of system.

- Soft Limit Configuration

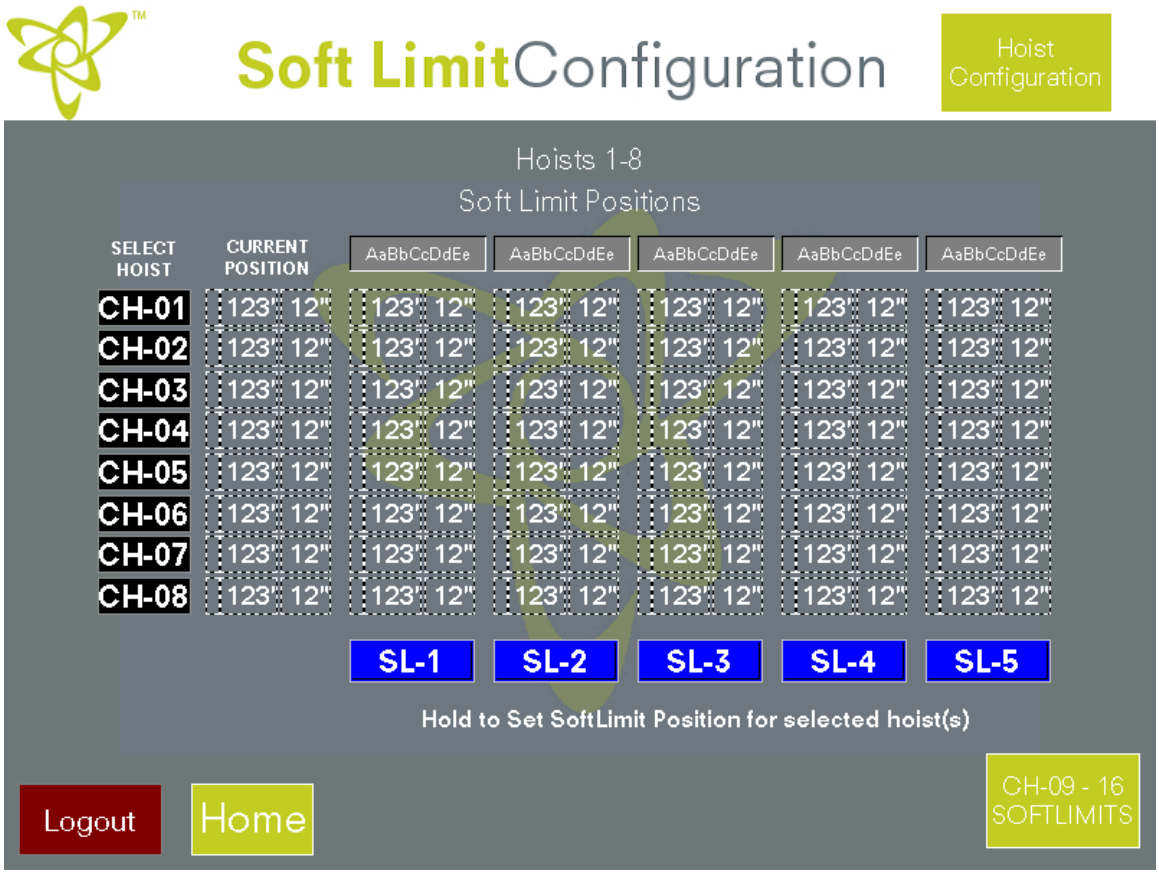


Figure 6. Soft Limit Configuration Screen

Table 5. Soft Limit Configuration Screen Elements

Function	Image	Description
Select Hoist		Black Background – Not selected. White Background – Selected Toggle to Select / Deselect
Current Position		Displays current hoist position.
Soft Limit Name		Custom name for each Soft.
Soft Limit Learn		Learns current positions of selected hoists.
Home		Displays Home Page.
Logout		Logs current user out of system.

- User Configuration

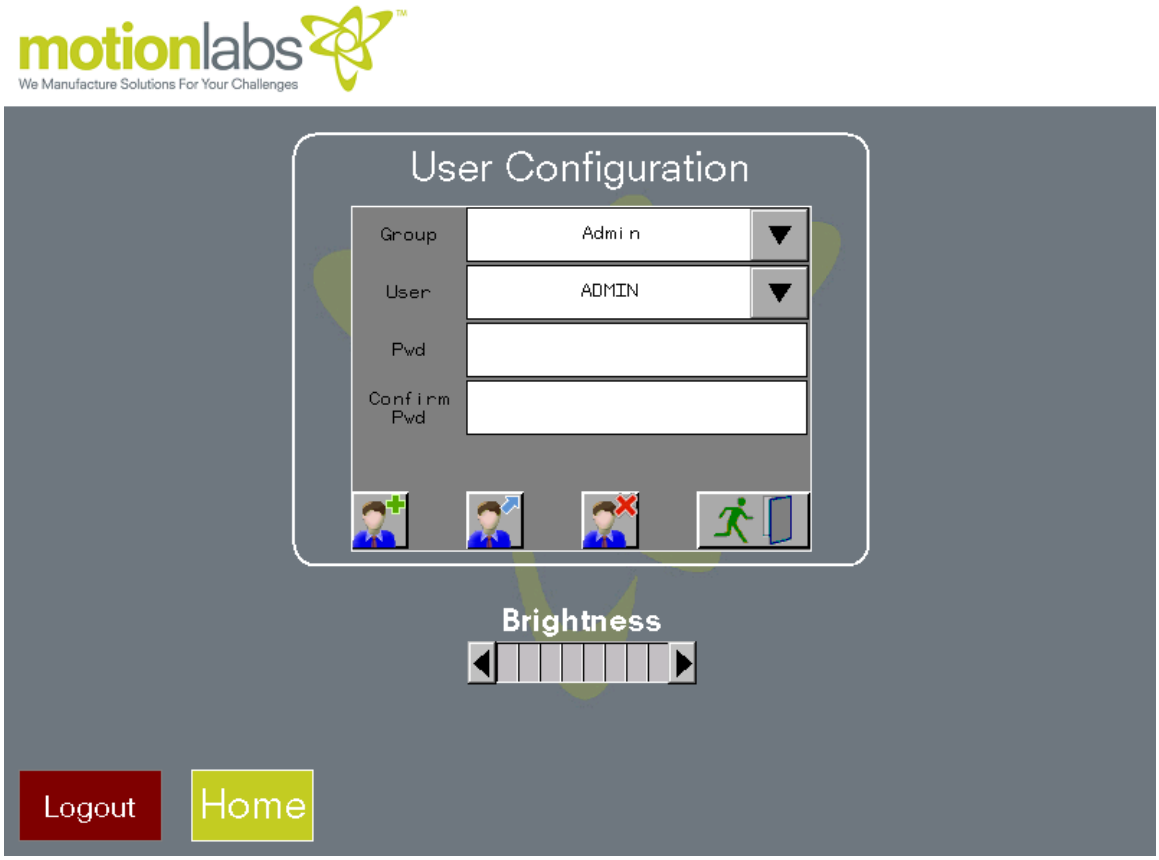
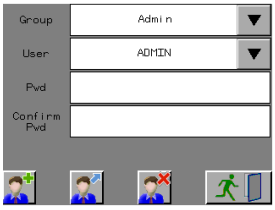


Figure 7. User Configuration Screen

Table 6. User Configuration Screen Elements

Function	Image	Description
User Configuration Menu		Used to add/edit/delete users.
Home		Displays Home Page.
Login		Displays Sign in Screen.
Logout		Logs current user out of system.

Login / User Management

On the Soft Limit Control System, a user must be logged in to be able to access setup, configuration, & control screens. There are different security levels that allow access to different screens and functions.

- Security Levels

Table 7. Security Levels

Name	Security Level	Authorizations
Administrator	3	Operate, Configuration, User Administration
Operator	1	Operate

- Authorizations

Table 8. Authorizations

Name	Description
Operate	Authorizes user to be able to run hoists.
Configuration	Authorizes user to be able to change parameters and set up information.
User Administration	Authorizes user to maintain the User data base.

- User Table

The system comes with two preloaded users and passwords. One with user level security and one with administrator level security.

Table 9. User Table

Username	Password	Security Level
USER	USER	Operator (1)
ADMIN	ADMIN	Administrator (3)

It is advisable to change the default passwords on initial startup. Add any new user information here but keep password records in a secured location.

- How to Log In & Log Out

Log in is available from the Home screen. Log in status and user information are displayed in the upper-left corner, indicating whether a user is logged in. If a user is not logged in, the Log In button can be pressed.

Logged out:

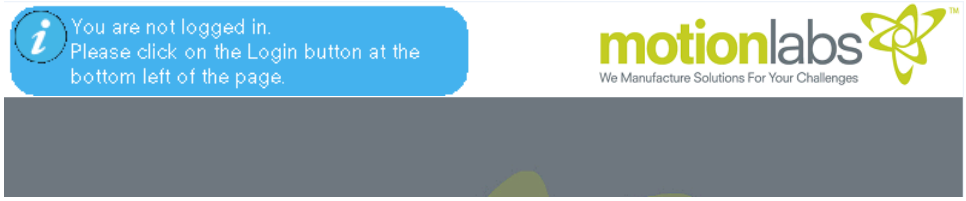


Figure 8. Logged Out

Logged in:

Figure 9. Logged In

If you are not logged in press the green Login button on the bottom left of the Home screen to pull up the Log In popup screen (refer to Figure 10. Log in Popup Screen).

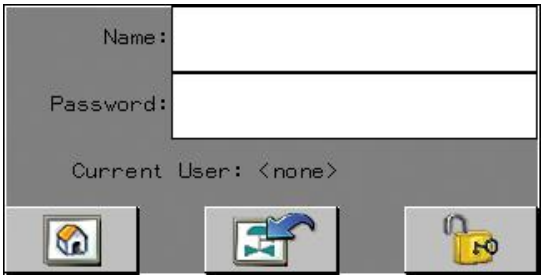
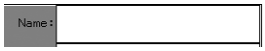


Figure 10. Log in Popup Screen

Table 10. Log in Popup Screen Elements

Function	Image	Description
Username		Field to enter username.
Password		Field to enter password.
Home		Press the Home button to go to the Home screen.
Unlock		Press the unlock icon to unlock the user.
Previous		Press the Previous button to go to the previous screen.

Once you are successfully logged in, the HOME page will display your security level and login name.

- Editing User Data

To edit an existing user's data, navigate to the User Configuration screen utilizing the User Configuration Menu.

Change a User's Password

1. Select the security group of the intended user to delete.
2. Select the user's name from the user dropdown list.
3. Enter the new password in the PWD field.
4. Enter the new password in the Confirm PWD field.
5. Press the Edit User button to edit the user data.

Table 11. User Configuration Menu Elements

Function	Image	Description
Security Group		Selection of Security Level.
User		Selection of User.
PWD		Password field used when adding or editing a User.
Confirm PWD		Confirm Password field used when adding or editing a user.
Edit User		Edits the user's password.
EXIT		Returns to the previous page.

- Add and Delete Users

To add or delete users navigate to the User Configuration screen.

Add a User

1. Select the security group from that dropdown list you want the user to be part of.
2. Enter the users name in the User field.
3. Enter the user's password into both the PWD and Confirm PWD fields.
4. Press the Add User button to add the user.

Table 12. Add User Elements

Function	Image	Description
Add User		Adds new user to the security group.

Delete User

1. Select the security group of the intended user to delete.
2. Select the user's name from the user dropdown list.
3. Press the Delete User button to delete the user.

Table 13. Delete User Elements

Function	Image	Description
Delete User		Deletes the selected user.

System Setup

- Encoder Rates

The encoder rate is defined as the distance traveled by the chain hoist per encoder pulse. Factors such as hoist speed and gear ratio can affect the encoder rate, causing it to vary between different hoist models. The encoder rate must be configured during system setup and is stored in memory after configuration.

Set a Single Encoder Rate

Navigate to the Hoist Configuration screen.

To adjust a single encoder rate, enter the desired value into the encoder rate input field associated with the channel being configured.

Table 14. Single Encoder Rate

Function	Image	Description
Encoder Rate input Fields		Each encoder rate field can be adjusted by selecting the field and entering a new value from the keypad.

Set All Encoder Rates

Navigate to the Hoist Configuration screen.

In addition to adjusting encoder rates individually, the **Set All** feature allows simultaneous configuration of a group of eight encoders. This feature is especially useful for larger systems or installations using identical chain hoist models. Encoder rates set using **Set All** are applied immediately and stored in memory.

Figure 11. Set All Encoder Rates

WARNING

Verify encoder rates any time the system has been disconnected and reconnected. Not doing so can lead to having to re-home the chain hoist's position.

- Resetting & Adjusting Positions

The Soft Limit system allows precise positioning by stopping chain hoists at predetermined, programmed points, known as "Soft Limits." An encoder installed in each hoist provides position feedback to the control system, enabling it to issue controlled stop commands when a Soft Limit is reached. To ensure safe and accurate operation, each chain hoist must have its position calibrated. Multiple calibration methods are available.

WARNING

Verify position data any time the system has been disconnected and then reconnected. Not doing so can lead to having to re-home the chain hoist's position.

Reset All Positions to Zero

Navigate to the Hoist Configuration screen.

To reset all position values to 0' 0" (Zero) press and hold the Reset button down for 5 seconds. When the operation is complete you will observe all the live encoder count values change to zero I the counts field.

Figure 12. Reset All

WARNING

There is no undo for this operation!

Set a single Position to Zero

Navigate to the Hoist Configuration screen.

To reset a single position value press the counts field associated with the channel you want to zero. Enter "0" on the keypad and press enter. When the operation is complete you will observe that live encoder counts value change to "0" in the counts field.

Figure 13. Reset Single

Set a Single Position to a Value

Navigate to the Hoist Configuration screen.

Set a single position value for a chain hoist by utilizing the “Set Ft / In” section on the Hoist Configuration screen.

Figure 14. Set Position Value

1. Enter the desired position in the feet and inches fields.

2. Press and hold the Set button until the counts field changes to the new value.

WARNING

When setting a single position value using the “Set Ft / In” or Counts field, the change takes effect immediately. The displayed value in the Counts field represents the current live position value. Be sure of your intent before editing this data as it could lead to equipment failure or personal injury.

- Load Manager

  The Warden Load Manager section found on the Hoist Configuration Screen primarily deals with Load monitoring. It obtains its name from a MLI Product called the Warden and incorporates its functionality utilizing working load data to create safe load limits to shut down a system from moving when an over or underweight condition occurs.

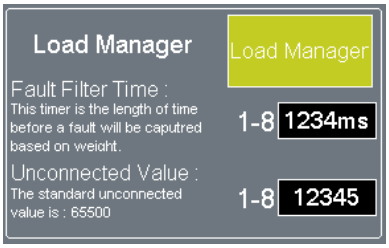


Figure 15. Load Manager

Table 15. Load Manager Elements

Function	Image	Description
Fault Filter		This is the time after a run or go command that the system will take before assessing weight faults. The Fault Filter field can be adjusted by selecting the field and entering a new value from the keypad.
Unconnected Value		This is the value that the Cellmate system returns when no loadcell is connected. The current value for this is 65500. The Unconnected Value field can be adjusted by selecting the field and entering a new value from the keypad.

Fault Filter

The fault filter is a programmable delay timer designed to prevent unnecessary faults caused by shock loads when chain hoists begin running. When hoists start moving, momentary spikes in load readings (shock loads) can occur, potentially triggering false overweight fault conditions. The fault filter briefly delays the load assessment, allowing the system to ignore these transient forces until the load stabilizes.

For example, two 16 fpm chain hoists running from a stationary position to lift a 1000 lb load can momentarily generate an additional 150–200 lb of force, briefly exceeding an upper weight limit set at 1100 lb. Without the fault filter, this transient load spike of about 1200 lb would immediately trigger an overweight fault. A fault filter setting of approximately 400 ms for 16 fpm hoists provides sufficient time for the load to stabilize without adding significant operational risk.

A practical guideline for fault filter timing is to anticipate roughly 100 lb of extra force per 500 lb of load when running hoists upward from rest at 16 fpm. This effect is even more pronounced when reversing direction from downward to upward travel.

The mathematical expression used to calculate the total force is shown below:

$$F = W + \frac{W}{g} \times \frac{v}{\Delta t}$$

W = Weight (static load)
g = Acceleration due to gravity
v = Final velocity (in ft/s)
Δt = Time interval over which acceleration occurs

WARNING

Setting a fault filter timer that is too long will not allow the system to start assessing the over / underweight condition in a time frame that is safe enough to catch the condition when it occurs. Do not exceed a 1 second fault timer as it could lead to equipment failure or personal injury

Unconnected Value

When there is no load cell connected to a port on the Cell Mate Hub, the hub will return a digital value to tell the system there is no load cell connected. On all Motion Laboratories Inc. load cells this value is 65500.

This screen allows a user with administrator level security (3) to configure the load manager and enable or disable individual channels for upper and lower weight shutdowns.

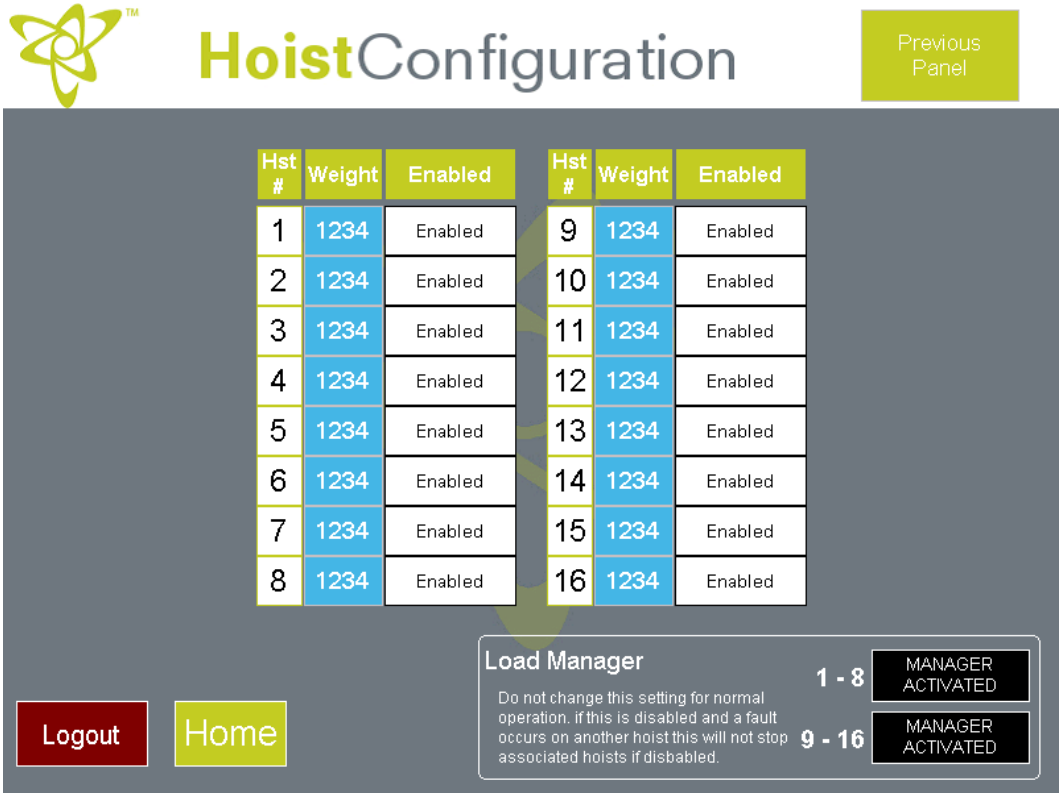
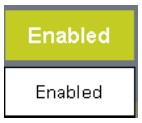


Figure 16. Load Manager Configuration Screen

Table 16. Load Manager Configuration Screen Elements

Function	Image	Description
Weight		Displays the load in lb.
Channel Enable		Allows the user to enable a hoist channel for over and underweight shutdown.
Load Manager Activated		Allows the user to enable the manager for a PLC group for over and underweight shutdown.

Activating and Deactivating the Manager

The Manager has a higher-level system control than the single hoist channel enables. They are set up in banks of eight just as the PLC control is set up in banks of eight. Each manager can be controlled independently of the others. Activating the manager will include all channels in that group in shutdown protocols during a fault condition. Deactivating it will take all hoists.

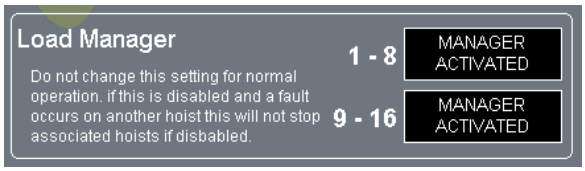


Figure 17. Load Manager Enable Buttons

Enabling Single Hoist Channels

The Enabled setting for each individual hoist channel controls whether the system monitors that hoist for over- or under-load conditions. When a hoist channel is set to "Enabled," the system actively monitors and will trigger a shutdown if the hoist exceeds programmed weight limits. Setting the channel to "Disabled" turns off weight-limit monitoring for that specific hoist, allowing operation without triggering over- or under-load faults. Use this setting cautiously, as disabling load monitoring removes critical safety checks for that hoist channel.

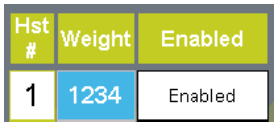


Figure 18. Single Hoist Channel Enables

- Load Manager – Setting Load Limits

Upper and Lower Weight Limits define the maximum and minimum allowable load for each hoist. To set these limits, locate the desired hoist channel on the Hoist Configuration screen. Enter the appropriate values into the High Limit and Low Limit fields, referencing the current load displayed in the adjacent blue Weight field if needed. Once set, the system monitors each hoist's actual load, triggering a fault condition if these configured limits are exceeded.

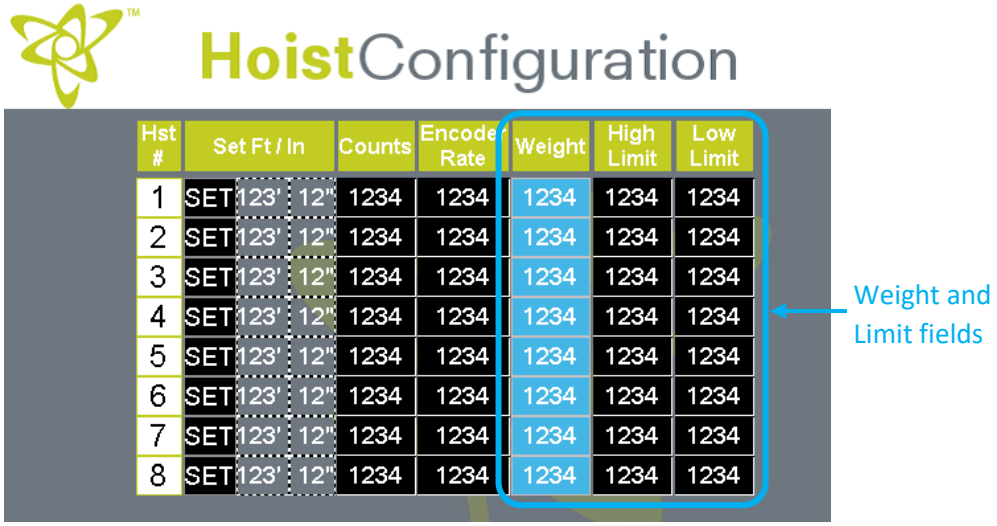


Figure 19. Setting Load Limits

- Setting Soft Limit Cues

Soft Limits are predefined position setpoints that enable hoists to automatically stop at precise, repeatable locations. Each hoist can have up to five unique Soft Limits, which can be custom-named for clarity and ease of use.

Setting Soft Limits

1. Use manual mode to jog the desired hoist(s) into target position.
2. Press the corresponding SELECT HOIST button(s) to choose the hoist(s) for configuration.
3. Press and hold one of the blue SL buttons (SL-1 through SL-5) until the current position is captured and appears in the selected Soft Limit position field.
4. Optionally, assign a custom name to the Soft Limit for easy identification.

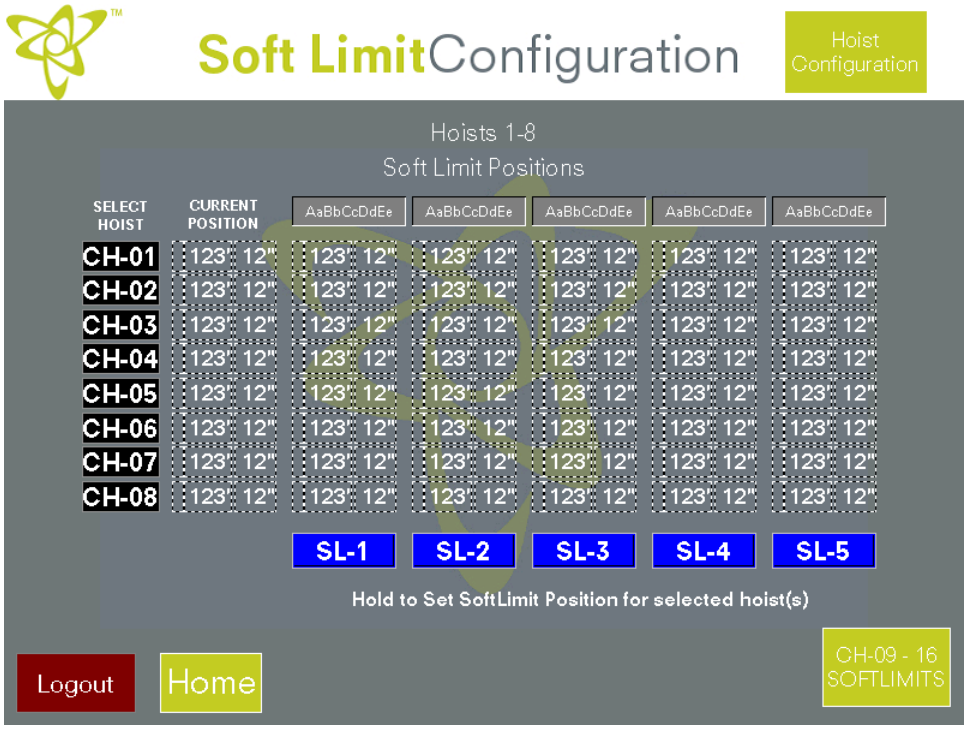


Figure 20. Soft Limit Configuration Screen

Naming Soft Limits

Above each soft limit positions column is a header row. Each soft limit has a customizable field to name the limit. Press on the field and type in the desired name with the popup keypad.

Must have administrator or higher security level to edit soft limits.

Operation

- General Principles

Networking

When using multiple PLC's, PLC communication time may vary. It is always best practice to minimize the amount of network switch connections possible. For connection methods refer to: INSTALLATION>System Connections>Multi-Rack Setups, Network.

The Soft Limit main controller (part number A-17-007-0001) manages feedback and control for up to eight channels per controller. Each controller has a unique, pre-assigned IP address shown in the table below. The fixed IP address defines the controller's channel set within the overall system, determining which specific hoist channels it manages. For example, the controller assigned to channels 1 through 8 has an IP address of 192.168.1.2. The IP addressing structure ensures consistent organization, simplifies system identification, and prevents IP conflicts.

Table 17. System IPs

Part Number / Description	Channel Set	IP Address
A-17-007-0001 **Soft Limit Main Controller**	1-8	192.168.1.2
	9-16	192.168.1.5
	17-24	192.168.1.8
	25-32	192.168.1.11
	33-40	192.168.1.14
	41-48	192.168.1.17
	49-56	192.168.1.20
	57-64	192.168.1.23
	65-72	192.168.1.26
	73-80	192.168.1.29
A-17-005-0014 **TSOS Console** **Or** **A-17-005-0015** **TSOS Handheld**	All Channels	192.168.1.51

IP conflicts can occur when connecting Soft Limit Main controllers with the same channel designation or IP address.

Emergency Stop

All portable Soft Limit systems incorporate a dedicated emergency stop circuit designed for immediate and safe shutdown in emergency situations. When any emergency stop mushroom button within the system is activated, it instantly interrupts power to every controller output, stopping all connected chain hoists simultaneously. Multiple emergency stop buttons may be strategically positioned throughout the system for quick accessibility and operator safety. After activation, the emergency stop circuit remains engaged until manually reset, ensuring chain hoists remain powered down until the issue causing the emergency stop has been fully resolved and safe conditions are restored. This design guarantees rapid response and enhances overall operational safety.

DANGER

Do not supply power to motor controllers in a portable soft limit from another source. Power must be supplied by the 1125-7-00012-0014 Power Distro (PD) or a like PD that has an emergency stop shutdown. If not utilized the emergency stop mushroom buttons will not function. this could lead to equipment failure or personal injury.

- Hoist (Manual) Control

The Manual Control screen provides operators with direct, real-time control over hoist movements. Operators select the desired hoist(s) by choosing the intended travel direction, either Up or Down, for each hoist individually. Once a direction is selected, pressing and holding the GO button initiates movement of the hoist(s) in that chosen direction. The hoists will continue running until the operator releases the GO button or until a predetermined end-of-travel limit switch is reached, automatically stopping the hoist to prevent damage or unsafe operation. This mode facilitates precise, controlled positioning essential during setup, and maintenance tasks.

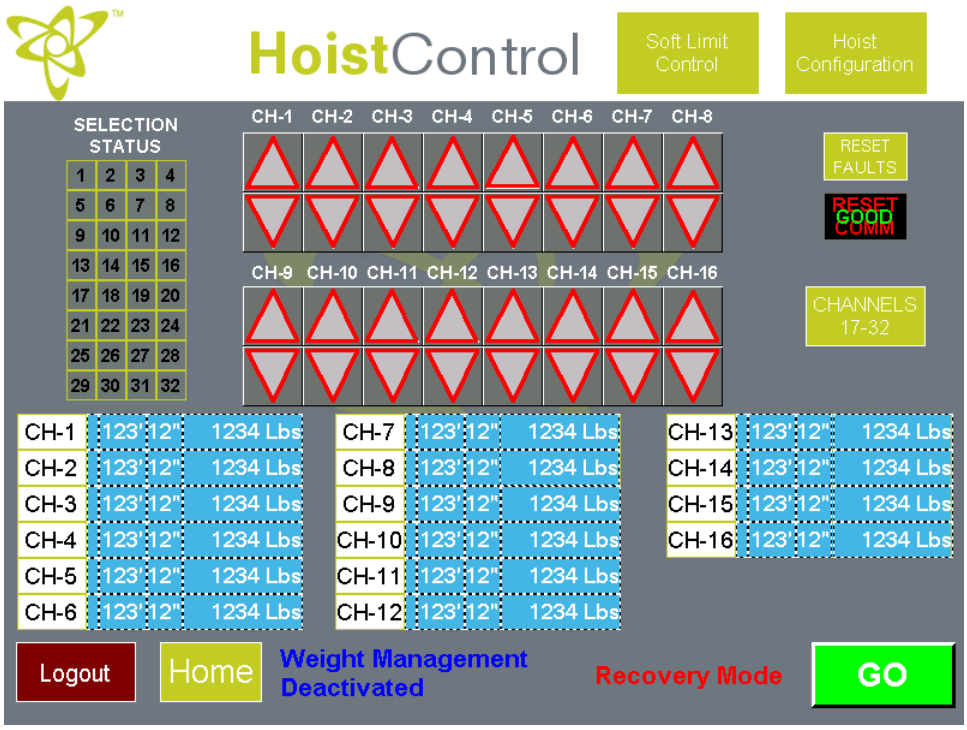
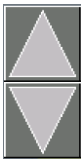
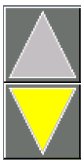


Figure 21. Hoist (Manual) Control Screen

Selecting Hoists

To manually control any of the hoists, select either UP or DOWN for the desired hoist. Once selected an indicator will light up enabling UP or DOWN for the specified hoist.

Table 18. Hoist Selection Elements

Function	Image	Description
No Selection		No movement will occur when the GO button is pressed.
Up Selected		Chain hoist will travel up when the GO button is pressed.
Down Selected		Chain hoist will travel down when the GO button is pressed.

GO Button

The GO button will initiate movement for any chain hoist channel that has an up or down selection active on the hoist direction arrows. This button is a momentary command. When you release the button the chain hoists will stop movement.

Figure 22. GO Button

System Channel Selection

Each control screen displays control and feedback for up to 16 hoist channels. For systems with more than 16 channels, multiple control screens are used (e.g., channels 1–16 on one screen and channels 17–32 on another). To maintain awareness of hoist selections on channels not currently displayed, a Selection Status indicator is provided. This indicator clearly shows whether each channel is set to move Up (green), move Down (yellow), or is not selected for movement (gray). The color coding matches the hoist selection toggle, providing consistent visual feedback across screens and ensuring the operator is always informed of hoist selection states, even when viewing alternate channel screens.

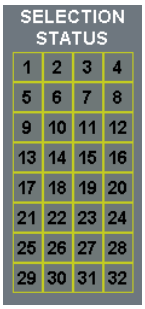


Figure 23. Selection Status

Table 19. Selection Status Elements

Function	Image	Description
No Selection	1	No movement will occur when the GO button is pressed.
Up Selected	1	Chain hoist will travel up when the GO button is pressed.
Down Selected	1	Chain hoist will travel down when the GO button is pressed.

Weight Management Deactivated

The Weight Management Deactivated is an indicator. When you have the Load Manager turned off this will be visible to inform you that you are not using weight management in your system. This means your system will not shut down from an overweight or underweight condition.

Figure 24. Weight Management Deactivated Indicator

DANGER

If the weight management deactivated is visible, upper and lower weight shutdowns will not occur. This could lead to equipment failure or personal injury.

Recovery Mode

The system triggers a fault condition when an over- or under-weight event occurs while both the Load Manager and individual channel monitoring are enabled. When a weight-related fault is detected, Recovery Mode is activated. In this mode, only the affected hoists can be moved, allowing the operator to correct the under- or over-weight condition safely.

Figure 25. Recovery Mode Indicator

- Soft Limit Control

The Soft Limit Control screen is used to move a hoist or a group of hoists to a pre-configured position. Positions are captured as setpoints using the Soft Limit Configuration Screen.

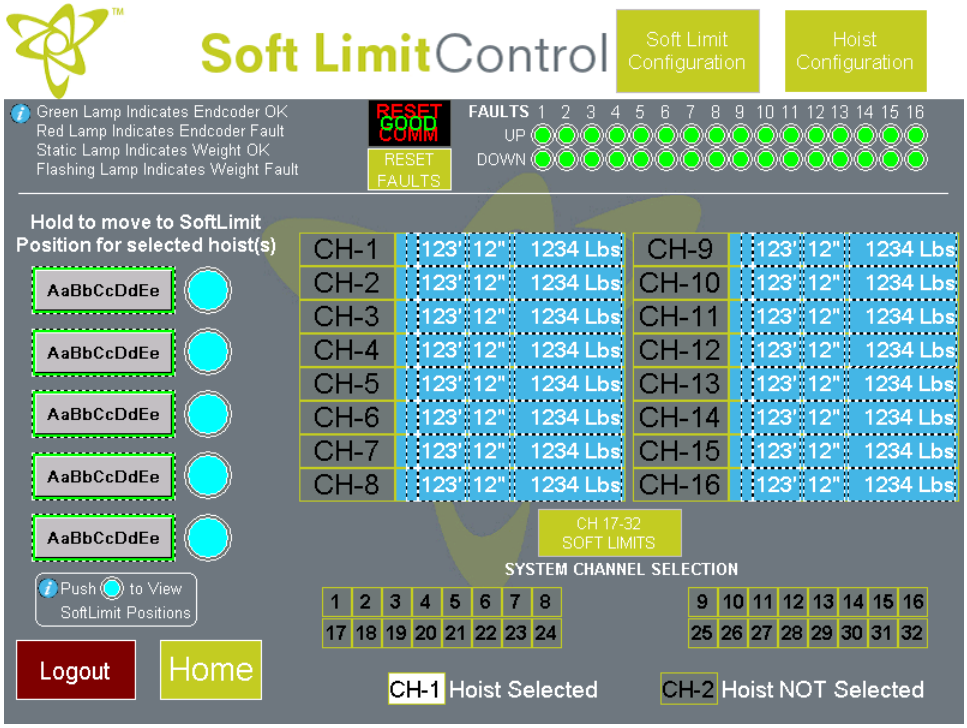


Figure 26. Soft Limit Control Screen

Running to Soft Limits

To execute a Soft Limit move, select the hoist(s) desired to move. Then, press and hold the desired Soft Limit run button.

Figure 27. Soft Limit Run Button

The run button is a momentary button. Pressing it will start movement toward the predetermined position value stored in the respective soft limit and releasing it will stop all movement. Press and hold the button until the system has stopped all chain hoists at their predetermined soft limit positions. You are now at your Soft Limit.

The TSOS is a single touch resistive touch screen and will prevent accidental operation of other hoists while running.

Faults

If a hoist(s) is out of the Preset High / Low Weight, all movement will stop. A Fault indicator will flash on the channel linked to the hoist(s). Once the weight is adjusted, press Reset Faults, to continue operation.

Figure 28. Fault Indicators

Table 20. Fault Indicator Status

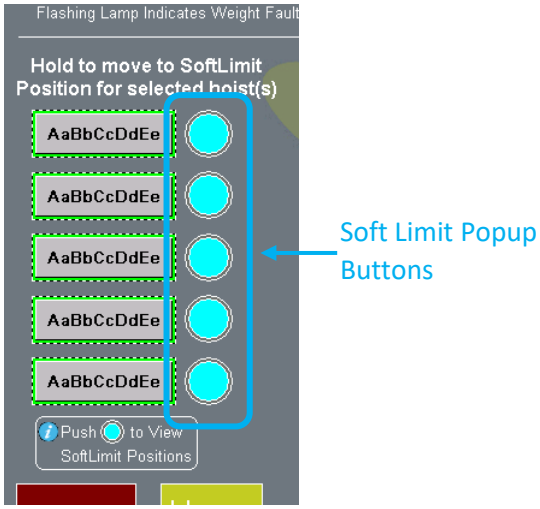
Function	Description
Green – Solid	No Fault (Encoder and Weight is OK)
Red – Solid	Encoder Fault
Flashing	Weight Fault

If a fault occurs time must be taken to assess what caused the fault. A resolution must be made and then clear the fault by pressing the Reset Faults button.

Figure 29. Reset Faults Button

Viewing Soft Limits

Each soft limit may be viewed from the Soft Limit Control screen. Use the round light blue buttons to view the Soft Limit Popup



MAINTENANCE

Maintenance and inspections should be carried out by competent personnel familiar with the system and safety requirements.

Periodic Maintenance

Periodic maintenance is technician-level, scheduled monthly or quarterly.

- Electrical & Mechanical Inspections
  1. Check for loose or missing hardware in the rack-mounted unit and secure as needed.
  2. Inspect system cables and electrical connectors for wear, damage, or strain.
  3. Verify that all wiring terminations are secure inside the control rack.
  4. Check for signs of overheating (e.g., discoloration, melted insulation, burn marks) on power components.
  5. Ensure that grounding and bonding connections are intact and corrosion-free.
- Cooling System & Ventilation
  1. Clean panel filters to maintain proper airflow and prevent dust buildup inside the unit.
  2. Inspect cooling fans and ventilation grilles for obstructions or signs of failure.
  3. Check internal heat sinks for dust accumulation and clean if necessary.
- Controls & User Interface
  1. Verify that all switches, buttons, and connection points operate smoothly and as intended.
  2. Test the TSOS touch screen response for accuracy and responsiveness.
  3. Check TSOS connectivity (wired or wireless) to ensure stable communication with the control system.
- Safety System Checks
  1. Verify emergency stop (E-stop) system operation by performing a controlled test.
  2. Inspect limit switches and interlocks for correct operation.
  3. Ensure safety relays (if applicable) reset properly and function as expected.
- Functional Testing & Diagnostics
  1. Run a low-load movement test to confirm smooth and predictable operation.
  2. Check for unusual noise, excessive vibration, or delays in response.
  3. Review system logs and error history for any recorded faults or warnings.

Annual Maintenance

Annual maintenance is a comprehensive inspection focusing on preventative measures.

- Electrical & Hardware Integrity
  1. Tighten all terminal screws and verify secure connections inside the control rack.
  2. Perform an insulation resistance test (megohmmeter) on power circuits (if applicable).
  3. Conduct a continuity check of control wiring, signal cables, and communication lines.
  4. Inspect all contactors, relays, and fuses for wear or potential failure.
- Cooling System & Environmental Protection
  1. Disassemble and deep clean cooling fans to remove dust buildup.
  2. Inspect ventilation paths and air intake areas for obstructions or contamination.
  3. Apply anti-corrosion treatment to connectors in harsh environments (if applicable).
- Control System & Firmware Updates
  1. Recalibrate control settings to match operational requirements.
  2. If applicable, update firmware/software on the Soft Limit Main Controller and TSOS.
  3. Test all communication interfaces (Ethernet, serial, wireless) for stable data exchange.
- Safety & Compliance Verification
  1. Perform a full E-stop function test to ensure immediate system shutdown.
  2. Validate limit switch positions and re-adjust if necessary.
  3. Load test safety features to confirm proper engagement under operational conditions.
  4. Review system compliance with safety standards and update documentation as needed.
- Mechanical & Functional System Check
  1. Inspect all mounting points for signs of mechanical stress or wear.
  2. Perform a load cycle test to detect inconsistencies in operation.
  3. Verify all status indicators and warning systems are operational and visible.
- Documentation & Reporting
  1. Maintain a record of all inspections, adjustments, and repairs.
  2. Note any parts replaced or scheduled for future replacement.
  3. Update operator and technician training records if system changes were made.

Periodic Maintenance				
	Maintenance Task	Date	Initials	Notes/Findings
1	Check for loose or missing hardware in the rack-mounted unit and secure as needed.			
2	Inspect system cables and electrical connectors for wear, damage, or strain.			
3	Verify that all wiring terminations are secure inside the control rack.			
4	Check for signs of overheating (e.g., discoloration, melted insulation, burn marks) on power components.			
5	Ensure that grounding and bonding connections are intact and corrosion-free.			
6	Clean panel filters to maintain proper airflow and prevent dust buildup inside the unit.			
7	Inspect cooling fans and ventilation grilles for obstructions or signs of failure.			
8	Check internal heat sinks for dust accumulation and clean if necessary.			
9	Verify that all switches, buttons, and connection points operate smoothly and as intended.			
10	Test the TSOS touch screen response for accuracy and responsiveness.			
11	Check TSOS connectivity (wired or wireless) to ensure stable communication with the control system.			
12	Verify emergency stop (E-stop) system operation by performing a controlled test.			
13	Inspect limit switches and interlocks for correct operation.			
14	Ensure safety relays (if applicable) reset properly and function as expected.			
15	Run a low-load movement test to confirm smooth and predictable operation.			
16	Check for unusual noise, excessive vibration, or delays in response.			
17	Review system logs and error history for any recorded faults or warnings.			

Annual Maintenance				
	Maintenance Task	Date	Initials	Notes/Findings
1	Tighten all terminal screws and verify secure connections inside the control rack.			
2	Perform an insulation resistance test (megohmmeter) on power circuits (if applicable).			
3	Conduct a continuity check of control wiring, signal cables, and communication lines.			
4	Inspect all contactors, relays, and fuses for wear or potential failure.			
5	Disassemble and deep clean cooling fans to remove dust buildup.			
6	Inspect ventilation paths and air intake areas for obstructions or contamination.			
7	Apply anti-corrosion treatment to connectors in harsh environments (if applicable).			
8	Recalibrate control settings to match operational requirements.			
9	If applicable, update firmware/software on the Soft Limit Main Controller and TSOS.			
10	Test all communication interfaces (Ethernet, serial, wireless) for stable data exchange.			
11	Perform a full E-stop function test to ensure immediate system shutdown.			
12	Validate limit switch positions and re-adjust if necessary.			
13	Load test safety features to confirm proper engagement under operational conditions.			
14	Review system compliance with safety standards and update documentation as needed.			
15	Inspect all mounting points for signs of mechanical stress or wear.			
16	Perform a load cycle test to detect inconsistencies in operation.			
17	Verify all status indicators and warning systems are operational and visible.			
18	Maintain a record of all inspections, adjustments, and repairs.			
19	Note any parts replaced or scheduled for future replacement.			
20	Update operator and technician training records if system changes were made.			

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, please contact:

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Daisy Chain Topology A communication network arrangement where each device is connected sequentially, one after another, in a continuous linear chain without a central hub.

Encoder Rate The distance traveled by the chain hoist per encoder pulse.

HMI Human Machine Interface is a user interface or dashboard that connects a person to a machine, system, or device. While the term can technically be applied to any screen that allows a user to interact with a device, HMI is most commonly used in the context of automation processes.

Load The weight or force applied to a load cell.

Load Cell A force transducer that measures force or weight by converting the measured quantity into another measurable quantity (Signal).

Load Management A control system takes feedback from a loadcell, in the load path of each hoist, in order to provide notification and/or stoppage of movement in situations where any given hoist or group of hoists are under or over a programmed weight limit.

Load Manager Monitors and manages weight distribution of a rigging system.

Load Path Is simply the direction in which each consecutive load will pass through connected members. The sequence starts at the anchor or attachment point down thru the lifting device and ending at the imposed load being lifted.

Position Management A control system that takes feedback from an encoder, installed in each hoist, to provide position control. This allows a specific set piece, truss or array to be moved to a predetermined position repeatedly and reliably.

Position Manager Monitors and manages elevation and/or location of points within a rigging system.

Safe Load Limit The maximum load that can be applied without producing a permanent shift in the performance characteristics beyond those specified.

Safety Factor The ratio of the ultimate strength of a member or piece of material to the actual working stress or the maximum permissible stress when in use.

Soft*Limit System A system that gives position feedback via an encoder to a PLC and allows for movement of chain hoists to a desired position (position manager).

Stage Machinery Are mechanical devices used to create effects or move equipment or scenery. Can be divided into two general categories: permanent machinery, which is equipment that is part of the venues structure and temporary machinery, which is equipment that is taken into the venue to be used with a specific production or event. These can include hoists, winches and other flying systems, lifts, or horizontal drives such as trolleys.

Star Topology A communication network arrangement where each device is individually connected directly to a central communication hub or control unit.

TSOS Touch Screen Operating System is a human machine interface that is operated by a touch screen. The touch screen is both an input and an output device layered on the top of a visual display or an information processing system. The user can give input or control the information processing through simple multi-touch gestures by touching the screen with a special stylus or one or more fingers.

Working Load Limit (WLL) The maximum working load designed by the manufacturer. This load represents a force that is much less than that required to make the equipment fail or yield. The WLL is calculated by dividing the minimum breaking load (MBL) by a safety factor.