

INSTALLATION AND MAINTENANCE MANUAL LM STEPLESS CHAIN HOIST

LOADMATE® LM05 STEPLESS CHAIN HOIST

English
STD-R-KHA-F-CQD-ENG



THIS PAGE INTENTIONALLY LEFT BLANK



CAUTION: Read the instructions supplied with the product before installation and commissioning.



CAUTION: Keep the instructions in a safe place for future reference.

Table of contents

1	INTRODUCTION	5
1.1	Contact Information.....	5
1.2	Warranty.....	5
1.3	Disclaimer	5
1.4	Safety	6
1.5	Placards and Instructions.....	8
2	INSTALLATION.....	9
2.1	General	9
2.2	Lubrication.....	9
2.3	Mounting	10
2.4	Load Hook Throat Opening.....	10
2.5	Electrical Connection	11
2.6	Connection	13
3	INITIAL START-UP	14
3.1	General	14
3.2	Correcting the Direction of Hook Travel.....	14
3.3	Operational Checks – No Load.....	15
3.4	Operational Checks – With Load	15
4	HOIST OPERATION.....	16
5	LOW HEADROOM TROLLEY	17
5.1	Description – Technical Characteristics (low headroom trolley).....	17
5.1.1	Technical Characteristics	17
5.1.2	Environmental Data.....	18
5.1.3	Optional equipment	18
6	SWIVEL TROLLEY	19
6.1	Description – Technical Characteristics (swiveling trolley to 3.2 tons)	19
6.1.1	Technical Characteristics	19
6.2	Installation of Swivel Trolley.....	20
6.3	Electric Swivel Trolley	21
6.3.1	Swiveling trolley (3.2 tons)	22
6.3.2	Swiveling trolley (3.2 to 5.0 tons) (NOT LOCALLY AVAILABLE)	22
6.3.3	Procedure to adjust swivel trolley guide rollers	23
7	MAINTENANCE	24
7.1	Basic Hoist Construction	24
7.2	Motor / Body.....	25
7.3	Hoist Motor Brake and Load-Limiting Device	25
7.3.1	Slip Clutch Operation	25
7.3.2	Slip Clutch Adjustment after Installation.....	27
7.4	Load Chain.....	28
7.4.1	General.....	28
7.4.2	Maintenance Inspection	28
7.4.3	Load Chain Specifications (see Figure 11)	30
7.4.4	Removing the Load Chain.....	30
7.4.5	Installing the Load Chain.....	31
7.5	Fall Stop Assembly	33
7.5.1	General.....	33
7.5.2	Removing fall stop (Figure 13).....	33

7.5.3	Fall Stop Installation (Figure 13)	33
7.6	Chain Container	34
7.6.1	Removing Chain Container (Figure 14)	34
7.6.2	Installing Chain Container (Figure 14)	34
7.7	Vinyl Chain Bag (optional)	35
7.7.1	Installing Vinyl Chain Bag (Figure 15)	35
7.8	Limit Switches	36
7.8.1	Upper and Lower Gear Limit Switch	36
7.9	Hooks	37
7.9.1	General	37
7.9.2	Inspection	38
7.9.3	Hook Dimensions and Specifications	38
7.9.4	Top Hook	39
7.10	Control Changes and Fuses	40
7.10.1	Control Circuit Fuses	40
7.11	Printed Circuit Board (Stepless)	41
7.12	Three Phase – Wiring Diagram – Stepless Hoist - 460 volts – Power Circuit	43
7.13	Three Phase – Wiring Diagram – Stepless Hoist - 460 volts – Control Circuit	44
7.14	Wiring Diagram – 3 Button – Push Button	45
7.15	Wiring Diagram – 5 Button – Push Button	46
7.16	Wiring Diagram – 7 Button – Push Button	47
8	PREVENTATIVE MAINTENANCE	48
8.1	Maintenance and Inspection Table	48
8.2	Lubrication	49
8.3	Recommended technical support for various spare parts	50
8.4	Screw Tightening Torque (lb-ft) Specifications	50
8.5	Troubleshooting	51
9	PARTS ILLUSTRATION	52
9.1	Hoist Body – Three Phase Power Supply	52
9.2	Mechanism / Brake (Stepless)	54
9.3	Lifting Assembly	56
9.4	Controls (Stepless)	58
9.5	Adjust Limit Switch (Stepless)	59
9.6	Low Headroom Trolley	60
9.6.1	Low Headroom Trolley (Drive Components)	60
9.6.2	Low Headroom Trolley (Suspension Components)	62
9.7	Electric trolley (Swiveling trolley 0 to 3.2 Tons (3200 Kg))	64
9.8	Push Button Assembly – Horizontal Pairs of Buttons	66
9.9	Pushbutton Assembly – Horizontal Pairs of Buttons	67
9.10	Push Button Assembly – Vertical Pairs of Buttons (Option)	68
9.11	Push Button Assembly – Vertical Buttons (Option)	70

1 INTRODUCTION

1.1 Contact Information

Please do not hesitate to use the following contact information in the event that you may need assistance:

R&M MATERIALS HANDLING, INC.

4501 Gateway Boulevard

Springfield, OH 45502

General Telephone: 937 - 328-5100

Toll Free Telephone (US): 800 - 955-9967

General Fax: 937 - 325-5319

Parts Department Fax (US): 800 - 955-5162

Parts Dept. Fax (other): 937 - 328-5162

Website: www.rmhoist.com

1.2 Warranty

All sales are subject to the **R&M Materials Handling, Inc.** Standard Terms and Conditions of Sale (Revision 101707), a copy of which is available at www.rmhoist.com or upon request from **R&M Materials Handling, Inc.** customer service/sales representatives and the terms of which are incorporated as if fully rewritten herein.

1.3 Disclaimer

This Manual has been prepared by **R&M MATERIALS HANDLING, INC.** to provide information and suggestions for hoist installation, maintenance, and inspection personnel. This manual should be used in conjunction with the **LoadMate® Electric Chain Hoist Operator's Manual** to teach safe operating practices to all personnel associated with hoist operations and maintenance.

It is **NOT** intended that the recommendations in this manual take precedence over existing plant safety rules and regulations or OSHA regulations. However, a thorough study of the following information should provide a better understanding of proper installation, maintenance, and inspection procedures that are to be followed in order to afford a greater margin of safety for people and machinery in the area of hoist operations.

It must be recognized that this is a manual of recommendations for the Hoist Installation, Maintenance, and Inspection personnel and its use is permissive not mandatory. It is the responsibility of the hoist owner to make personnel aware of all federal, state, and local codes and regulations. The owner is responsible for providing instruction and insuring that certain installation, maintenance, and inspection personnel are properly trained.

1.4 Safety

Read and understand this manual before using the hoist.

Important issues to remember during installation, operation, maintenance, and inspection are provided at the hoist control stations, at various locations on the hoist, in this manual, and in the [LoadMate® Electric Chain Hoist Operator's Manual](#). These issues are indicated by **DANGER**, **WARNING**, or **CAUTION** instructions or placards that alert personnel to potential hazards, proper operation, load limitations, and more.



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: Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Taking precedence over any specific rule, however, is the most important rule of all:

“USE COMMON SENSE”

It is a responsibility of the hoist owner / user to establish programs to:

1. Train and designate hoist operators, and
2. Train and designate hoist inspectors / maintenance personnel.

The words **SHALL** and **SHOULD** are used throughout this manual in accordance with definitions in the ASME B30 standards as follows:

SHALL indicates a rule is mandatory and must be followed.

SHOULD indicates a rule is a recommendation, the advisability of which depends on the facts in each situation.

Hoist operation, hoist inspection, and hoist maintenance personnel training programs should be based on requirements in accordance with the latest edition of:

- **ASME B30.16 Safety Standard for Overhead Hoists (Underhung)**

Such training should also provide information for compliance with any Federal, State, or Local Code requirements, and existing plant safety rules and regulations.

If an overhead hoist is installed as part of an overhead crane or monorail system, training programs should also include requirements in accordance with the latest editions, as applicable, of:

- **ASME B30.2 Safety Standard for Overhead and Gantry Cranes, Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist**
- **ASME B30.11 Safety Standard for Monorails and Underhung Cranes**
- **ASME B30.17 Safety Standard for Overhead and Gantry Cranes, Top Running Bridge, Single Girder, Underhung Hoist.**

NOTICE:

It is a responsibility of the owner / user to install, inspect, test, maintain, and operate a hoist in accordance with the ASME B30.16 Safety Standard, OSHA Regulations, and ANSI / NFPA 70, National Electric Code. If the hoist is installed as part of a total lifting system, it is also the responsibility of the owner / user to comply with the applicable ASME B30 volume that addresses other types of equipment used in the system.



Further, it is the responsibility of the owner / user to require that all personnel who will install, inspect, test, maintain, and operate a hoist read the contents of this manual, [LoadMate® Electric Chain Hoist Operator's Manual](#), ASME B30.16 Safety Standards for Overhead Hoists (Underhung), OSHA Regulations, and ANSI / NFPA 70, National Electric Code. If the hoist is installed as part of a total lifting system, all personnel must also read the applicable ASME B30 volume that addresses other types of equipment used in the system.



DANGER: Failure to read and comply with any one of the limitations noted in this manual can result in product failure, serious bodily injury or death, and / or property damage.

[R&M Materials Handling, Inc.](#) has no direct involvement or control over the hoist's operation and application. Conforming to good safety practices is the responsibility of the owner, the user, and its operating personnel.

Only those Authorized and Qualified Personnel who have shown that they have read and have understood this manual and the [LoadMate® Electric Chain Hoist Operator's Manual](#) should be permitted to operate the hoist.

The owner / user **SHALL** insure that all Operators read and understand the [LoadMate® Electric Chain Hoist Operator's Manual](#) prior to operating the hoist.

1.5 Placards and Instructions

READ and OBEY all Danger, Warning, Caution, and Operating Instructions on the hoist and in this manual and [LoadMate® Electric Chain Hoist Operator's Manual](#). Make sure that all placards are in place and legible.

Failure to comply with safety precautions in this manual and on the hoist is a safety violation that may result in serious injury, death, or property damage.

2 INSTALLATION



DANGER: Before installing, removing, inspection, or performing any maintenance on a hoist, the main switch shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1. Follow other maintenance procedures outlined in this manual and ASME B30.16.

2.1 General



NOTE: Install the breather on the upper part of the hoist.

Prior to installation, the unit shall be checked thoroughly for damage during shipment or handling at the job site.

Each complete electric chain hoist is load tested at the factory at 125% of the nameplate-rated capacity.

All hoists are designed for the type of mounting specified by the purchaser. The adequacy of the supporting members (monorail beams, cranes, hangers, supports, framing, etc.) is the responsibility of user / owner and shall be determined or verified by qualified personnel.

Read the instructions contained in this manual and the [LoadMate® Electric Chain Hoist Operator's Manual](#) as well as any other related manuals. Observe the warning tags attached to the unit before the installation is started.

2.2 Lubrication

The hoist gear case comes completely pre-lubricated with grease.

Note: Open trolley wheel gearing has not been greased at the factory. See the trolley manual for proper gear lubricant to use before installing hoist.

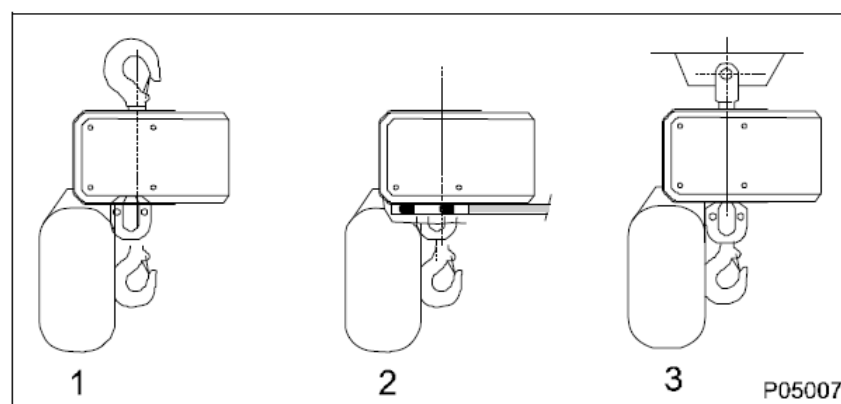
The load chain requires lubrication prior to first use. Chain lubricant is included with shipment of each new chain hoist.

2.3 Mounting

Below are three types of mounting:

1. Hook Mounted
2. Base Mounted
3. Coupling Mounted
4. Trolley Mounted – NOT SHOWN – is accomplished via a Hook or Trolley Coupling to the Trolley Assembly.

Figure 1. Mounting Types



For all trolley-mounted hoists, refer to appropriate trolley manual for trolley installation instructions.

After a trolley-mounted hoist has been assembled to a beam, check for balance. Each trolley-mounted hoist is balanced at the factory for “as shipped” condition. Any auxiliary devices (radio control, lights, hose reels, etc.) furnished and mounted by “others” may require additional counterweight. Hoists must hang straight without a load or there will be a noticeable “kick” when a load is applied to hook. An unbalanced hoist / trolley may result in damage to equipment.














2.4 Load Hook Throat Opening



CAUTION: ANSI B30.16-1998 recommends that the throat opening of a load hook be measured and recorded prior to putting a hoist into service and that a gage be made to provide a quick visual inspection for a bent hook as required during routine inspections. Record this information before initial start-up. See Section 7.9 for more detailed hook information.

2.5 Electrical Connection

The user / owner must provide the main power supply hardware (cable, conductor bar, fuses, disconnect switch, etc.).

-  **CAUTION:** Make sure that the power supply voltage is the same as that shown on hoist serial plate / nameplate.
-  **CAUTION:** Make sure that fuses and other current overload devices are in place to protect the power supply.
-  **CAUTION:** Make sure that power cable or conductors have sufficient capacity to maintain the hoist supply voltage by ± 5 percent of nominal voltage under all operating conditions. Poor voltage regulation may cause motor overheating or sluggishness, and chattering / inoperative motor brake(s) and controls.
-  **CAUTION:** Do not use power supply cables with solid conductors.
-  **CAUTION:** Check the device cover is properly installed.
-  **CAUTION:** High voltages are present in this device. Switch the power off and after the display turns off, wait 5 minutes before opening the cover.
-  **CAUTION:** Insulation resistance test with a megger multimeter requires special precautions.
-  **CAUTION:** Do not make any measurements inside the device when it is connected to the main supply.
-  **CAUTION:** Do not touch the components on the circuit boards. Electrostatic discharge may cause damage or destroy the IC-circuits.
-  **CAUTION:** Check all ventilation holes are clear and unobstructed.
-  **CAUTION:** Check that hot air coming from the brake resistors does not cause any danger.
-  **CAUTION:** It is forbidden to use radiophones or portable phones near this device with the doors open.
-  **CAUTION:** Drive is not intended to be used in a low-voltage public network, which supplies domestic premises. Radio frequency interference is expected if used in such a network.



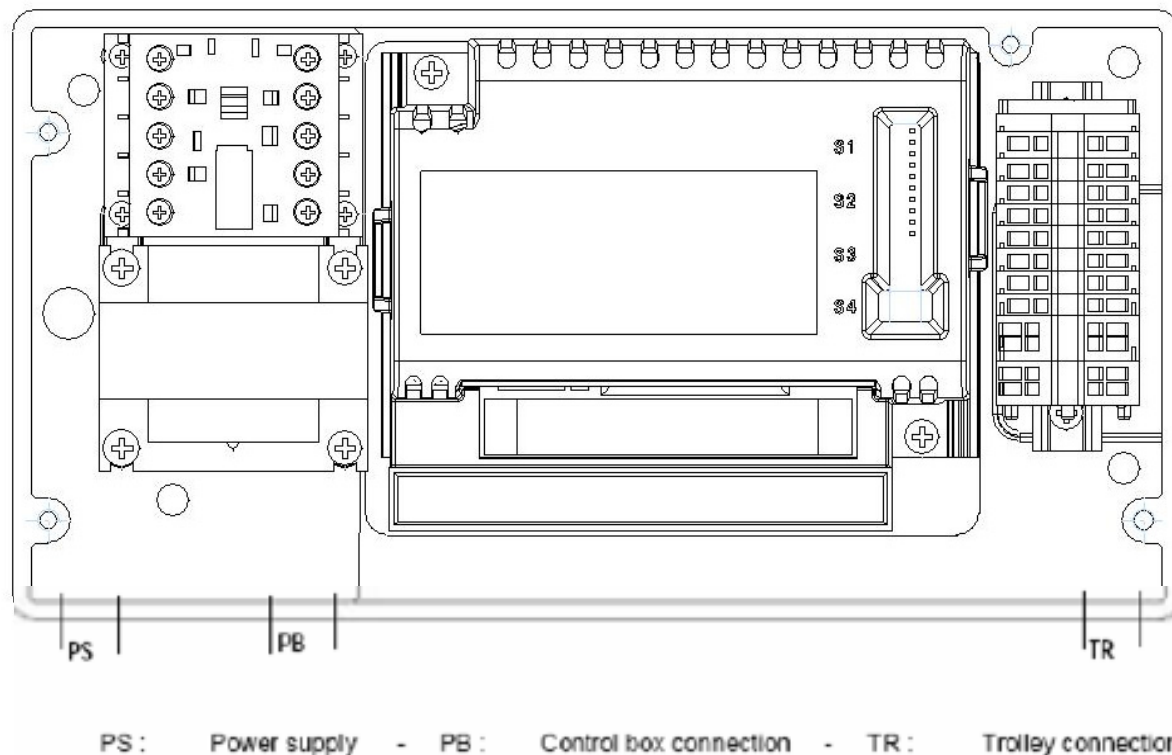
WARNING: Failure to properly ground the hoist presents the danger of electric shock.



WARNING: An improper or insufficient ground connection creates an electrical shock hazard when touching any part of the hoist or trolley.

2.6 Connection

Figure 2. Control Box Power Connection



NOTE: The electrical configuration can be different according to the specifications of the hoist. See electrical drawing.



NOTE: Do not change the travel directions labels in the control box or in the hoist internal wiring.

3 INITIAL START-UP



NOTE: Before connecting power to hoist, check all “motion” buttons on pendant control assembly to make sure that they operate freely without binding or sticking. Check pendant cable and strain relief connection to ensure that they are not damaged.

3.1 General

Initial start-up procedures are as follows:

- Read all attached **WARNING** tags and placards affixed to hoist.
- Oil load chain generously over entire length of chain.
- Make sure that load chain is not twisted. If so, untwist load chain before using.
- Make sure fall stop is placed at least 6” [150 mm] from last chain link on free end.
- Install chain container.
- If furnished, make sure that trolley wheels have proper spacing in relation to beam flange. See appropriate trolley manual for details.
- Check direction of hook travel to make certain that it corresponds to respective control button that is depressed. That is, does hook travel “**UP**” when **UP BUTTON** is depressed? If OK, go to section 3.3. If not, proceed to section 3.2 for correcting direction of travel.

3.2 Correcting the Direction of Hook Travel



DO NOT change control leads in pushbutton enclosure or at motor relays. **DO NOT** change nameplates on pushbutton assembly. The upper/lower safety limit switch is wired in series with “**UP**” control circuit as furnished from factory. Changing pushbutton control leads or nameplates will prevent the upper safety travel limit switch from functioning properly.

Reversing any two power leads of a three-phase AC motor will reverse the direction of rotation.

- Reverse any two leads of a three-phase power at the main power source or at connections to motor. **Do not change internal wiring of hoist.**
- After changing two of the main power leads, recheck direction of rotation. Press “**UP**” button only. If hook travel goes in “**UP**” direction, proceed to section 3.3. If not, redo section 3.2.

3.3 Operational Checks – No Load

- Check hoist motor brake function. Run empty load block up or down to check that load block does not drift more than 1.0 inch [25mm]. If so, adjust brake as described in Section 7.3 of this manual.
- Run empty load block down to check that fall stop (located on free end of load chain) makes proper contact with upper / lower travel safety limit switch and that limit switch functions properly.
- Run empty load block up to check that load block makes proper contact with upper / lower travel safety limit switch and that limit switch functions properly.
- Run empty load block up and down several times while checking for proper tracking of load chain.

3.4 Operational Checks – With Load

- After completion of no-load operational tests, the user /owner should perform a full load test even though each complete hoist is load tested at factory.
- Lift a near capacity load about one (1) foot [30cm] above floor level. Check that the brake holds load. Also, check stopping capability of brake when lifting to a stop and lowering to a stop.
- Move trolley the full length of monorail or crane beam. Check for any binding of trolley wheels on flange and/or interference at splice joints, hanger connections / bolts, etc.
- Check contact with stops. Contact with stops **SHALL** only be made with trolley bumpers. Stops that are designed to make contact with wheels **SHALL NOT** be used.

4 HOIST OPERATION



WARNING:



BEFORE PROCEEDING WITH THE NORMAL OPERATION OF THIS HOIST, THE OPERATOR/(S) SHALL BE TRAINED IN ACCORDANCE WITH THE [LoadMate® Electric Chain Hoist Operator's Manual](#) AS SUPPLIED WITH THIS HOIST.



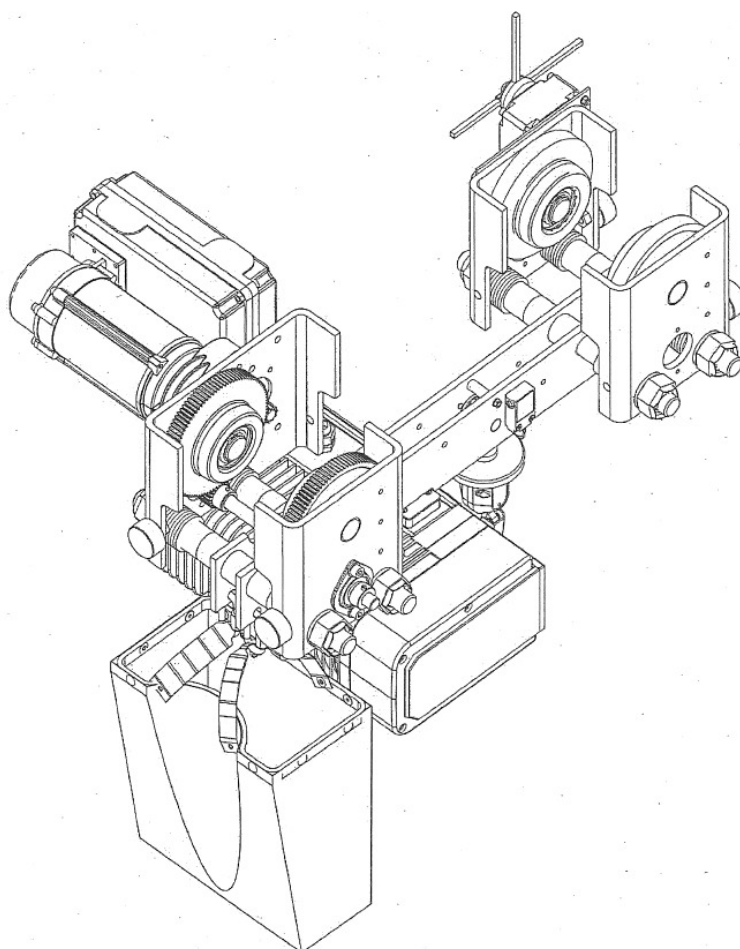
FAILURE TO READ AND COMPLY WITH ANY ONE OF THE LIMITATIONS NOTED IN THIS MANUAL AND THE [LoadMate® Electric Chain Hoist Operator's Manual](#) FURNISHED WITH THIS HOIST CAN RESULT IN PRODUCT FAILURE, SERIOUS BODILY INJURY OR DEATH, AND / OR PROPERTY DAMAGE.



REFER TO SECTION 1.0 OF THIS MANUAL FOR CONTACT INFORMATION IF ADDITIONAL ASSISTANCE IS NEEDED.

5 LOW HEADROOM TROLLEY

Figure 3. Low headroom trolley



5.1 Description – Technical Characteristics (low headroom trolley)



NOTE: The trolley you have just purchased must be used only with the nominal load indicated on the rating plate.



NOTE: The trolley's service life will depend upon the level of duty, the average operating time, the number of starts and the maintenance applied to it.

5.1.1 Technical Characteristics

The low headroom trolley can be used for loads from 60 kg up to 5000 kg with all our electrical chain hoists. It can be driven with an inverter drive unit or a dual or single speed unit.

5.1.2 Environmental Data

Ambient temperature:	-10 °C to +40 °C
Protection degree:	IP55 as standard
Sound level:	70 decibels at 1 m

5.1.3 Optional equipment

- **Limit Switch:** This cuts off the directional movement when the trolley reaches the end of its run.
- **Electric Actuation Device:** This actuates the supply line; the slide block must not exceed the rolling profile (A).
- **Brush:** This allows for earthing, due to the brush rubbing on the profile element.
- **Raceway Stops:** Not supplied: These must be fitted on the profile element, at the end of the trolley run.

6 SWIVEL TROLLEY

6.1 Description – Technical Characteristics (swiveling trolley to 3.2 tons)



NOTE: The trolley you have just purchased must be used only with the nominal load indicated on the rating plate.



NOTE: The trolley's service life will depend on the level of duty, the average operating time, the number of starts and the maintenance applied to it.

6.1.1 Technical Characteristics

	Type 1	Type 2
	30 Hz ≤1000 kg	100 Hz >1000 kg
Fem Class	H4	H4
IP	IP55	IP55
Insulation class	F	F
Duty factor	40%	40%
Operating temperature	-10 °C, +40 °C	-10 °C, +40 °C
Power supply frequency	60 Hz	60 Hz
Standard speed	20/5 m/min 80/20 fpm	20/5 m/min 80/20 fpm
Default acceleration time (Deceleration time)	2.5 s	2.5 s
Thermal protection for motor	Option	Option
Thermal protection for frequency converter	Std.	Std.
Noise level	70 db	70 db

6.2 Installation of Swivel Trolley

The service life of the trolley depends upon the way it is installed. The instructions in this manual must be followed carefully for the installation, use and maintenance of the hoist. Any use contrary to these instructions can be dangerous. Do not use hoist until this manual has been fully read and understood. Always keep this manual near the hoist, available to the operator and the person in charge of maintenance.

Make sure that the safety rules are followed (harness, clearance of work areas, posting of instructions to be followed in the area, etc.).

The Trolley can be mounted on any type of standard profile (see: setting of the flange width).



NOTE: Check the width of the runaway rail and adapt the spacing of the flanges of the trolley as indicated by the tables.

Make sure:

- That the profile is secured.
- That the profile is suitable to the loads to be supported.
- That the dimensions are compatible with the trolley that is to be installed.
- That the electrical characteristics of the mains network conform to those of the motor.

Carry out:

1 – Disassembly of the trolley:

- Remove the side plate on the counterweight side.
- Position the trolley on the beam.
- Refit the side plate.
(see: Tightening torques)

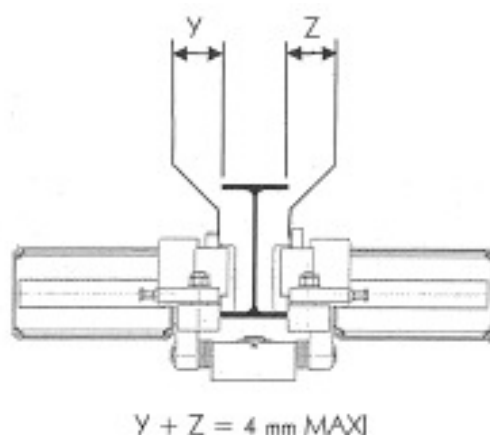
2 – Without disassembly of the trolley:

- Install the trolley on the profile, by the end.
- Fit the travel limit stops (not provided) at the end of the runway.
- Check that the nuts are correctly tightened.
(see: Tightening torques)

After these checks, perform the following test with care:

1. Drive in one direction with the slow speed for a few seconds.
2. Accelerate up to the high speed and keep the high speed for 5-10 seconds.
3. Follow the same procedure in the other direction.
4. If the trolley drives in the wrong direction, swap the cables (blue and white) of the motor or the wires on D1 and D2.
5. Check the function of the slow down and end limit switches.

Figure 4. Drive wheel and idler wheel/side plates



Adjust drive wheel and idler wheel/side plates as shown above.

6.3 Electric Swivel Trolley

Figure 5. Electric swivel trolley

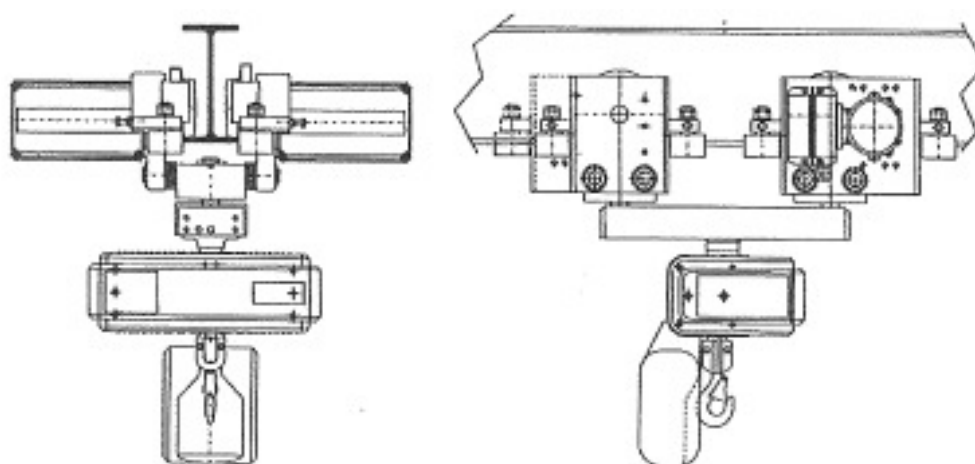
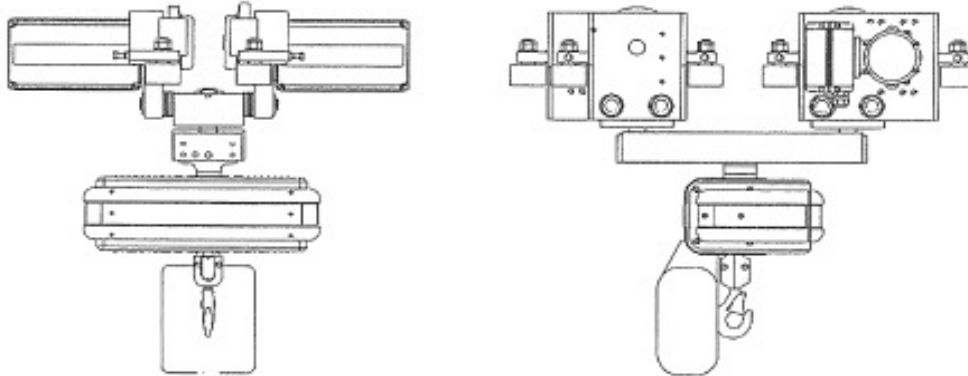


Table 1. Electric swivel trolley

HOIST TYPE	SWIVELING TROLLEY TYPE	CAPACITY	NUMBER OF WHEELS	WHEEL DIAMETER	MOTOR TYPE
C05	SWIV32	0 – 1 ton	4	100	2 x TMU 1 (35 Hz)
C10	SWIV32	0 – 2 tons	4	100	2 x TMU 2 (100 Hz)
C16-20-25	SWIV32	0 – 3.2 tons	4	100	2 x TMU 2 (100 Hz)

6.3.1 Swiveling trolley (3.2 tons)

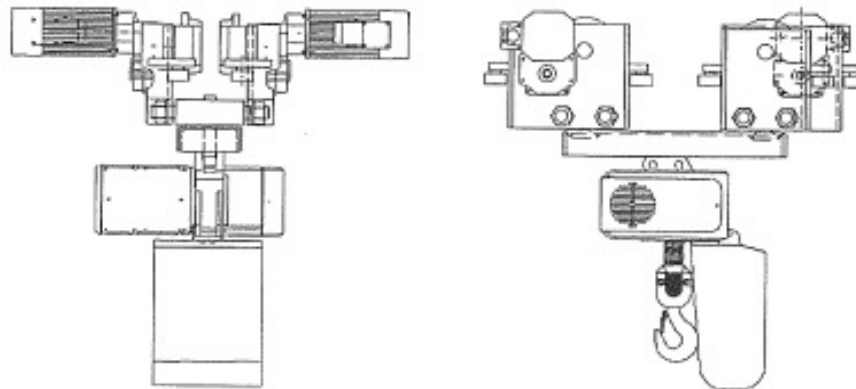
Figure 6. Swiveling trolley (3.2 tons)



- **CAPACITY MAX 3.2 TONS (3200 KG)**
- **RAY OF CURVE MINI 2.6 FEET**

6.3.2 Swiveling trolley (3.2 to 5.0 tons) (NOT LOCALLY AVAILABLE)

Figure 7. Swiveling trolley (3.2 to 5.0 tons)

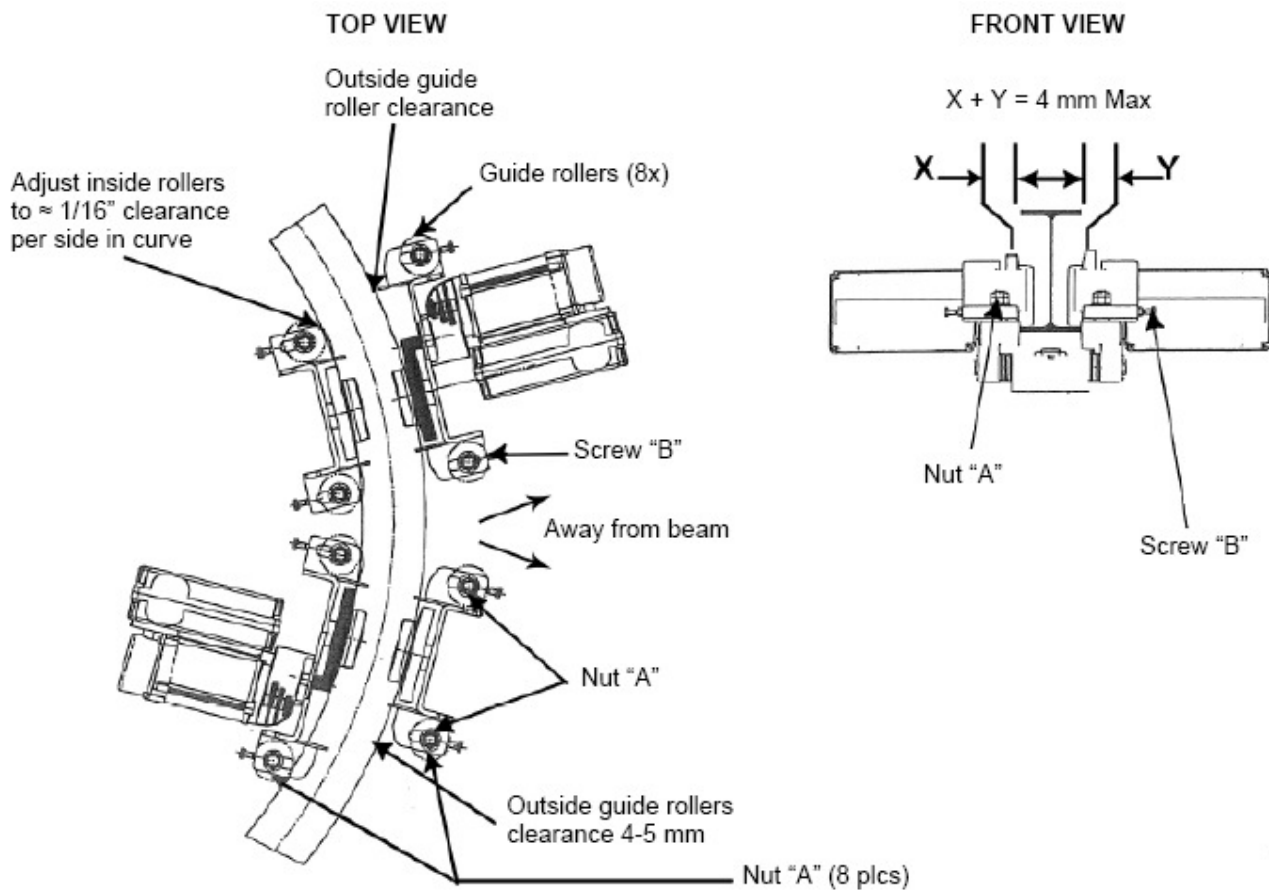


- **CAPACITY MAX 3.2 TO 5 TONS (3200 TO 5000 KG)**
- **RAY OF CURVE MINI 3.9 FEET**

6.3.3 Procedure to adjust swivel trolley guide rollers

1. Loosen nut "A" (8 plcs).
2. Adjust guide rollers the maximum distance away from beam.
3. Place swivel trolley on beam.
4. Move trolley to curve section of beam.
5. Adjust guide rollers allowing approximately 3/16" (4-5 mm) clearance per side using screw "B."
6. Tighten nut "A" (8 plcs).

Figure 8. Swivel trolley guide rollers

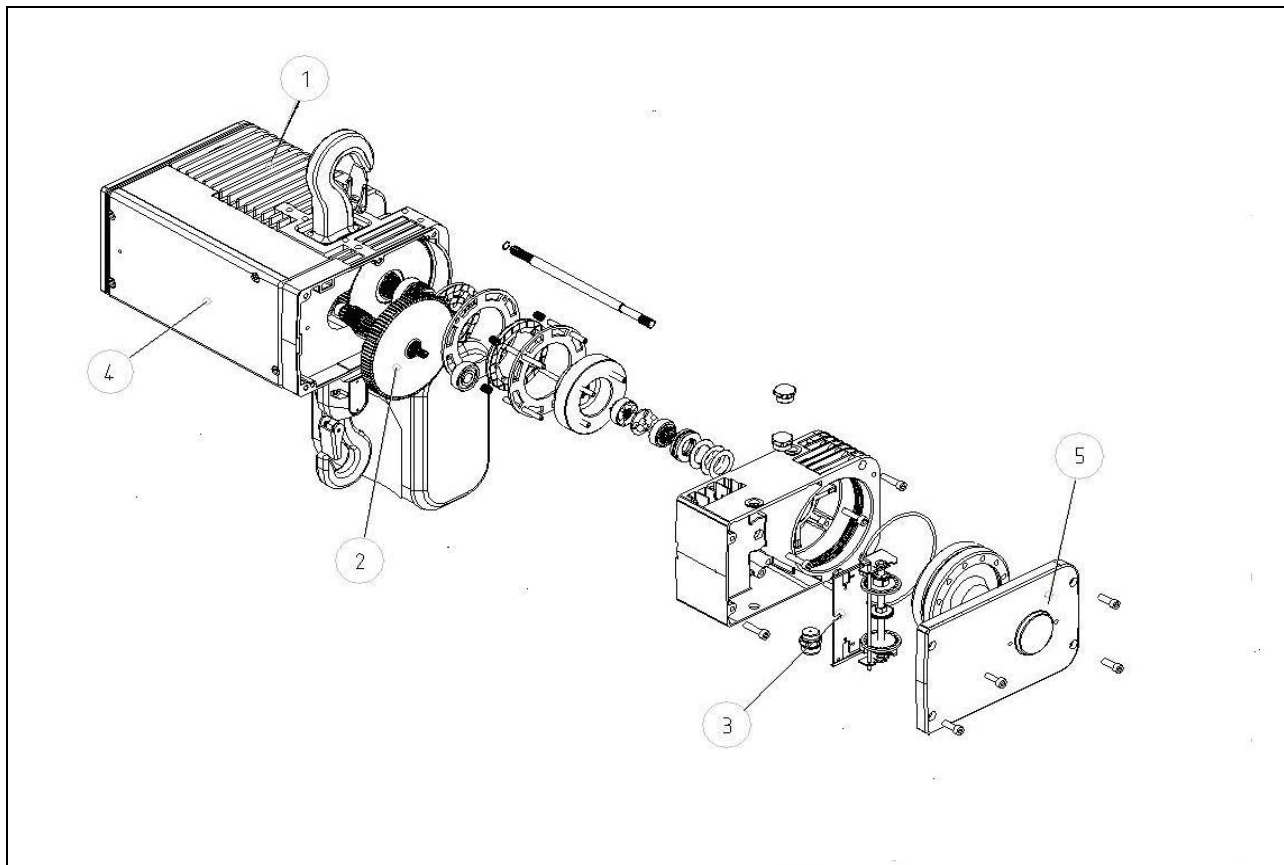


NOTE: Adjustments should be made with swivel trolley in radius of monorail.

7 MAINTENANCE

7.1 Basic Hoist Construction

Figure 9. Basic Hoist Components



1 Main casing

2 Gears

3 Brake/slipping clutch/housing assembly

4 Electrical box

5 Brake Flange



NOTE: The hoist which you have just purchased should only be used with a maximum load equal to the nominal load.



NOTE: The length of its useful service life depends on the demands placed on it, the average operating time, the number of start-ups and its maintenance.

7.2 Motor / Body

The hoist motors are designed to provide dependable hoisting service. The standard motors are enclosed for IP55 rated protection against normal hazards of dust and moisture. The motor bearings are sealed and do not require further greasing.

The hoist body is constructed of aluminum and requires no maintenance. Remove from service and replace the hoist body if damaged.

7.3 Hoist Motor Brake and Load-Limiting Device

The load-limiting device is a slip clutch and it is integrated into the design of the hoist motor brake. Even if the clutch slips, once power is removed, the brake will engage to stop and hold the load.

7.3.1 Slip Clutch Operation

Static situation with a load suspended

The torque load is transmitted to brake through the pinion (12). The brake linings are compressing the anchor discs (3 and 6) due to the force of the springs (4).

Hoisting movement

The load is creating a counter torque on the gear shaft (12) compared to the motor torque on the shaft (13). Due to that torque, the cam system (9, 10, and 11) is opening by compressing the springs (4). When the cam system opens, it releases the brake discs (1 and 5) which can rotate freely from the anchor discs (3 and 6) which are connected to the frame by the pins (2). The flywheel (8) is transmitting the motor torque to the brake disc (1) thru the clutch lining (17). The gearbox is then driven by that brake disc (1) thru the pinion (12). If an overload occurs while hoisting, the clutch lining (17) slides and the load is not lifted.

Lowering movement

The load torque and the motor torque on the brake are in the same direction. Still, when the motor is powered, the cam system is slightly opened due to the inertia in the flywheel (8) until there is a balance between the load torque and the motor torque. The load is then lowered at the motor speed been kept under the control of the friction of the brake linings (16) and the anchor disc (3 and 6). The heat generated is dissipated in the oil bath.

Figure 10. Hoist Brake / Slip Clutch

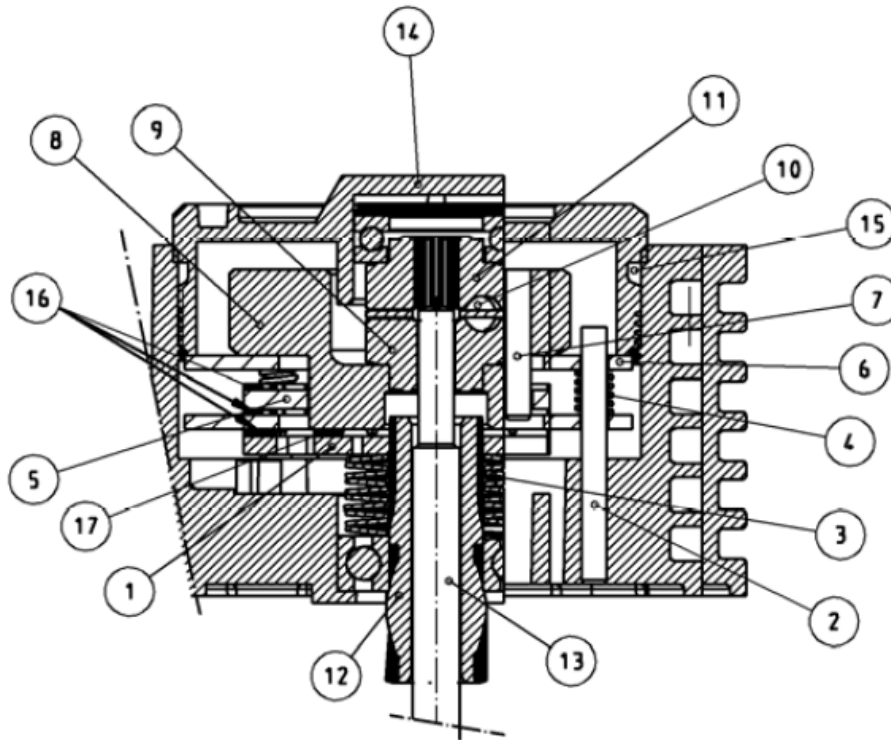


Table 2. Hoist Brake / Slip Clutch Parts List

ITEM	DESCRIPTION
1	BRAKE DISC
2	PINS
3	ANCHOR DISC
4	SPRING
5	BRAKE DISK
6	ANCHOR DISC
7	FLYWHEEL PIN
8	FLYWHEEL
9	CAM SYSTEM
10	CAM SYSTEM
11	CAM SYSTEM
12	GEAR SHAFT
13	MOTOR SHAFT
14	COVER
15	O-RING
16	BRAKE LINING
17	CLUTCH LINING



SEE Figure 10



CAUTION: Make sure the motor is not running before placing tool on the nut to adjust it. Do not touch any moving components.



CAUTION: The slip-clutch generates heat when slipping. ITEMS 3, 8 & 17 absorb this heat. When these items become too hot, clutch adjustment may be difficult due to unstable behavior of friction surfaces. If this happens, allow brake & clutch assembly to cool before trying to re-adjust slip-clutch.



CAUTION: Decreasing torque too much when adjusting slip-clutch will allow a suspended load to free-fall when trying to lift. If this occurs, release the motion button and the brake will engage to stop and hold the load.

7.3.2 Slip Clutch Adjustment after Installation

The brake and the clutch torque are connected to each other. This is due to the fact that the brake lining (16) diameter is twice the clutch lining diameter (17) and that they are activated thru the same spring (4). Then, only a clutch setting is required and no brake setting is afterwards needed.

The clutch is set by tightening or loosening the over (14) to increase or decrease the hoisting capacity. The clutch setting tool should be connected to the chain. The clutch should then be adjusted at a level 125% of the nominal load of the hoist.



NOTE: The slip clutch / Torque Limiter is a safety device to prevent overloading of the hoist. This device is not intended for use as means to measure the weight of load being lifted.



NOTE: To adjust the slipping clutch, it is recommended to use the chain force measuring device. Nevertheless, it is possible to use loads.

7.4 Load Chain

7.4.1 General



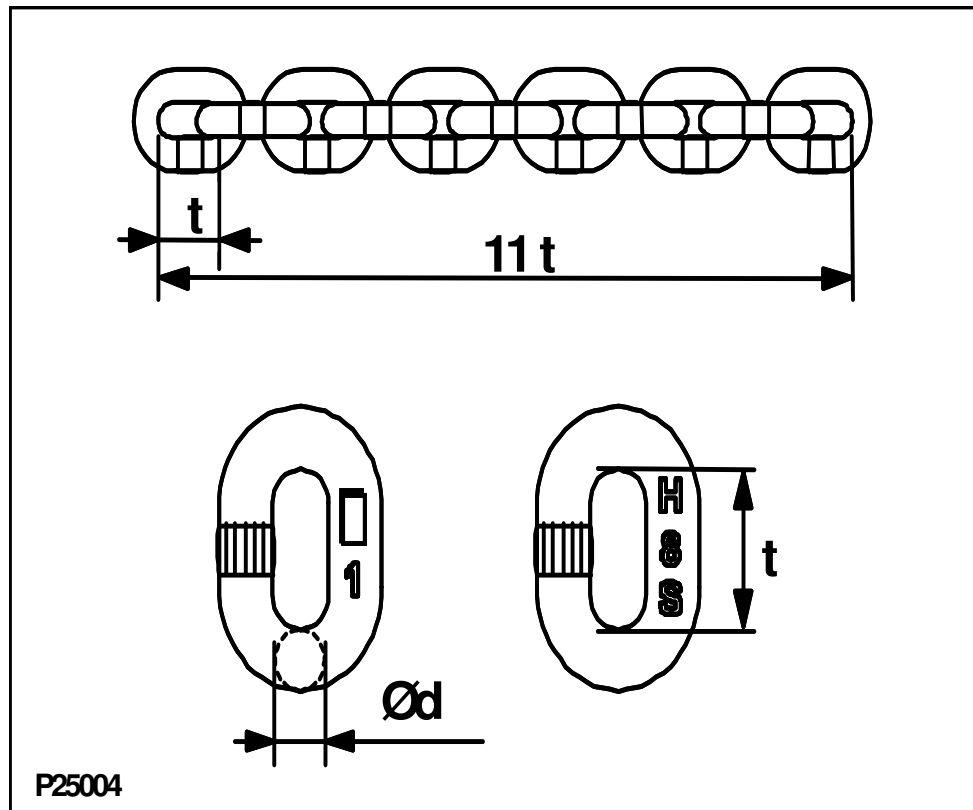
CAUTION: A hoist **SHALL NEVER** be used if the load chain shows any evidence of mechanical damage or excessive wear. Never use the load chain as a sling. Use only original equipment chain as supplied by a factory authorized source. Improper load chain storage or installation can render the load chain unusable prior to the first lift.

7.4.2 Maintenance Inspection

A qualified person **SHALL** be designated to routinely conduct an in-depth inspection of the load chain (See Section 8 – Preventative Maintenance for schedule recommendations). This designated person **SHALL** inspect load chain using good judgment in evaluating the remaining service life. Any deterioration of load chain resulting in appreciable loss of original strength **SHALL** be noted and evaluated.

An in-depth inspection **SHALL** include a written record that is dated and signed by the inspector.

Figure 11. Chain Dimensions



Measure the following chain dimensions at several points on chain: (Figure 11)

- Dimensions of one link ($d \times t$) where, d = diameter and t = pitch
- Length over 11 links ($11t$)

Replace load chain if any one of these dimensions exceeds maximum allowed wear.

Maximum allowed wear:

Minimum link diameter allowed	(d):	0.1693" [4.30 mm] MINIMUM
Maximum pitch allowed	(t):	0.5157" [13.10 mm] MAXIMUM
Maximum length allowed	($11t$):	5.5216" [140.25 mm] MAXIMUM

NOTICE:



If load chain needs replaced, then inspect chain guide and chain (load) wheel on hoist and idler sprocket in 2-fall load block for excessive wear. A chain sprocket showing evidence of scored pockets or sharp edges generated from wear SHALL be replaced. A worn chain sprocket or idler sprocket can greatly reduce the life of load chain.

7.4.3 Load Chain Specifications (see Figure 11)

Chain Specification:	Load chain
Chain type:	Standard
Diameter (d) x pitch (t):	0.189" (4.8 mm) /0.492" (12.5 mm)
Class:	DAT
Grade:	H8S or HIS G80 RAS
Maximum working stress:	19,652 lbs/in ² (135.5 N/mm ²)
Hardened surface:	580 or 700 HV (Vickers Hardness)
Thickness:	0.0039" (0.1 mm) to 0.0079" (0.2 mm)
Standard:	DIN 5684 - 8
Marking (10 x t):	1 or 16 H 8 S or A 8
Maximum working load per one fall:	1100 lbs. (500 kg)
Breaking load:	6519.50 lbs. (29 kN)
Maximum breaking stress:	116,030 lbs/in ² (800 N/mm ²)
Total breaking elongation:	>10% min.
Weight for 100 links:	1.5 lbs. (0.680 kg)

7.4.4 Removing the Load Chain

1-FALL CHAIN

1. Remove load from hook block assembly.
2. Remove load block assembly from load chain. Some disassembly of 1-fall load block is required.
3. Attach the chain insert tool to the end of bottom block end of the chain.
4. Run hoist in "UP" direction until all of chain is in container. Stop the hoist with the insertion tool remaining in the hoist ready for the new chain.
5. Remove chain container with all of old chain in chain container.
6. Remove fall stop from old chain and save for use with new chain.

2-FALL CHAIN

1. Remove load from hook block assembly.
2. Run hoist in "UP" direction until hook block assembly is about 1.0 foot [30cm] from hoist body.
3. Unfasten load chain from chain anchor mounted on hoist body.
4. Remove load block assembly from load chain by allowing chain to run through it. Attach the chain insertion tool to the bottom block end of the chain.
5. Run hoist in "UP" direction until all of the chain is in the container. Stop the hoist with the insertion tool remaining in the hoist ready for the new chain.
6. Remove chain container with old chain.
7. Remove fall stop from old chain and save for use with new chain.

7.4.5 Installing the Load Chain

Figure 12. Chain Installation

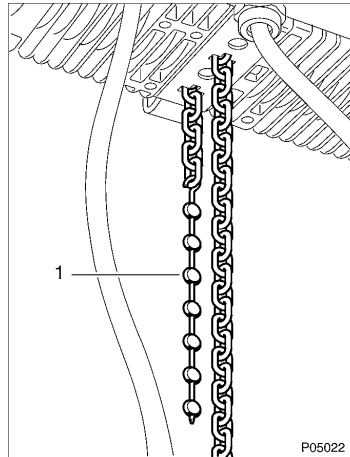
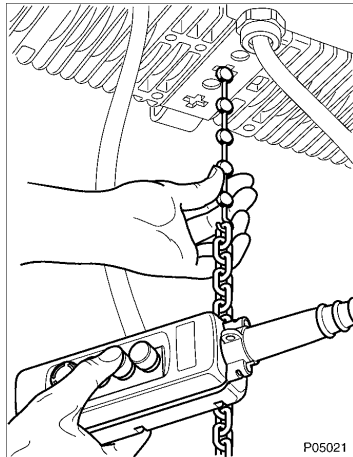
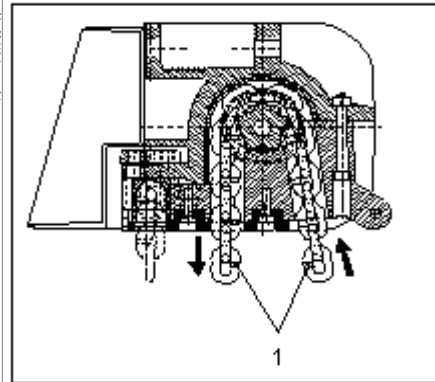


Figure 12-A. Chain Orientation



1-FALL CHAIN INSTALLATION

1. Attach last link of chain onto hook of CHAIN INSERTION TOOL (item 1, Figure 12).
2. If the insertion tool is not in the hoist (removal procedure), insert other end of CHAIN INSERTION TOOL into chain opening closest to chain container side.



CAUTION: Make sure the chain weld on chain link faces inward toward chain wheel pocket on hoist load sprocket. See Figure 12-A.

3. Run hoist “**DOWN**” in slow speed to feed chain through chain sprocket and out other side.
4. Attach fall stop at least 6.0 inches [150 mm] from end of chain (chain container side). Attach load block assembly on other end of load chain. Refer to Figure 13 for details.
5. Make sure that load chain is not twisted or deformed.
6. Attach chain container.

2-FALL CHAIN INSTALLATION

1. If the chain insertion tool is not in the hoist (removal procedure), attach last link of chain onto hook of CHAIN INSERTION TOOL (item 1, *Figure 12*).
2. Insert other end of CHAIN INSERTION TOOL into chain opening closest to chain container.



CAUTION: For a 2-Fall load block assembly, make sure the chain weld on chain link faces inward toward chain wheel pocket on hoist and away from idler sprocket of hook block assembly. See figure 12-A. Follow steps outlined below:

3. Run hoist in slow speed to feed chain through chain sprocket. Continue running until about 2.0 feet [60cm] of chain is available out the other side.
4. Slide chain onto idler sprocket of load block making sure not to twist chain while inserting it. Link weld must face away from idler sprocket on load block assembly.
5. Attach chain anchor and chain to hoist body. Tighten chain anchor bolts per recommended torque settings in Section 8.4.
6. Attach fall stop 6.0 inches [150 mm] from end of chain (chain container side). See *Figure 13* for details.
7. Make sure that chain is not twisted or kinked.
8. Attach chain container

After chain installation:

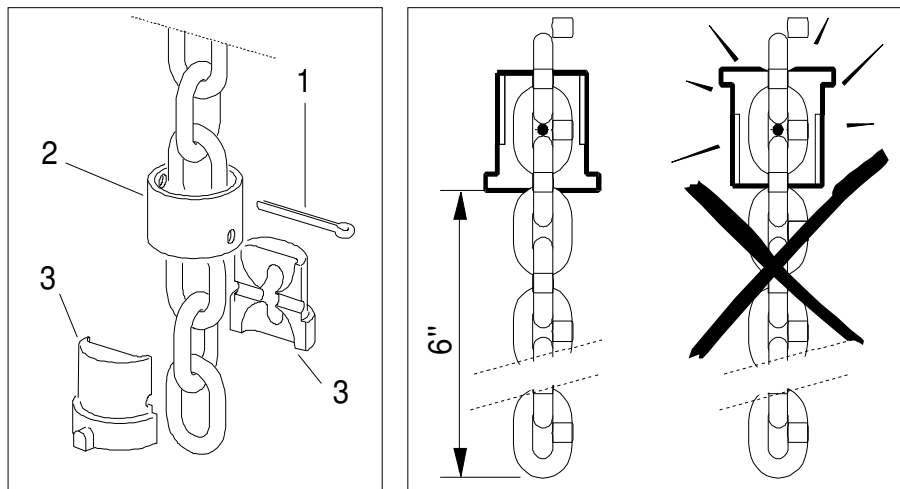
1. Without a load, run chain up and down a few times to make sure load chain is not twisted. If so, remove chain twist.
2. Lubricate load chain.

7.5 Fall Stop Assembly

7.5.1 General

The slack fall stop is a safety stop, not a functional stop. The fall stop must be located at least six (6.0) inches [150mm] from end of last chain link.

Figure 13. Installation of Slack Fall Stop



7.5.2 Removing fall stop (Figure 13)

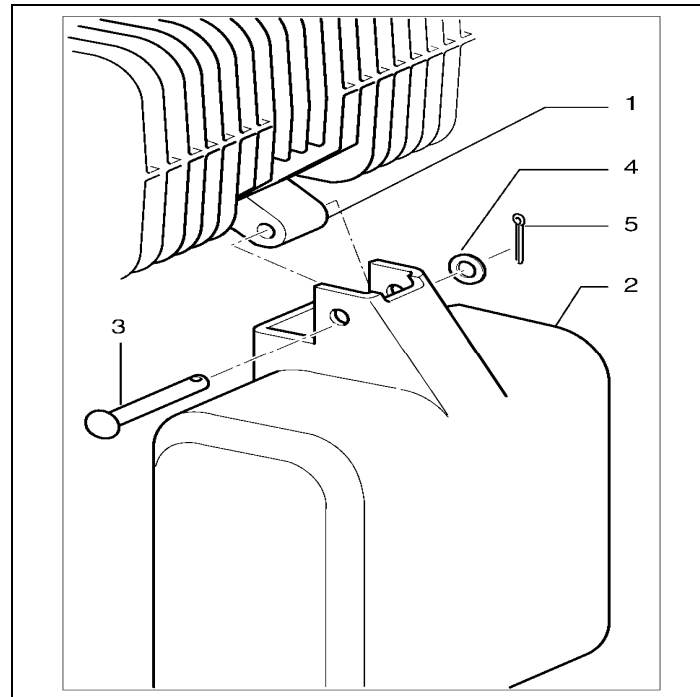
1. Remove cotter pin (item 1).
2. Slide up the tube (item 2).
3. Remove the two fall stop halves (item 3).
4. Slide tube (item 2) off load chain.

7.5.3 Fall Stop Installation (Figure 13)

1. Slide tube (item 2) onto load chain.
2. Position two fall stop halves (item 3) on a chain link so that the fall stop will be at least 6 inches [150mm] from end of load chain.
3. Slide tube (item 2) down over two fall stop halves (item 3).
4. Insert and secure cotter pin (item 1).

7.6 Chain Container

Figure 14. Chain Container Installation



CAUTION: Chain container must be installed for effective operation of travel limit switch.

7.6.1 Removing Chain Container (Figure 14)

1. Remove cotter pin (item 5) from end of pin (item 3).
2. Pull pin (item 3) out while supporting chain container (item 2).
3. Remove chain container (item 2).

7.6.2 Installing Chain Container (Figure 14)

1. Insert load chain into chain container (item 2). Position chain container (item 2) onto hoist mounting bracket (item 1).
2. Align holes and insert pin (item 3) through container (item 2) and hoist mounting bracket (item 1).
3. Place washer (item 4) onto pin (item 3).
4. Insert and secure cotter pin (item 5).

7.7 Vinyl Chain Bag (optional)

Figure 15. Vinyl Chain Bag Installation Connection



7.7.1 Installing Vinyl Chain Bag (*Figure 15*)

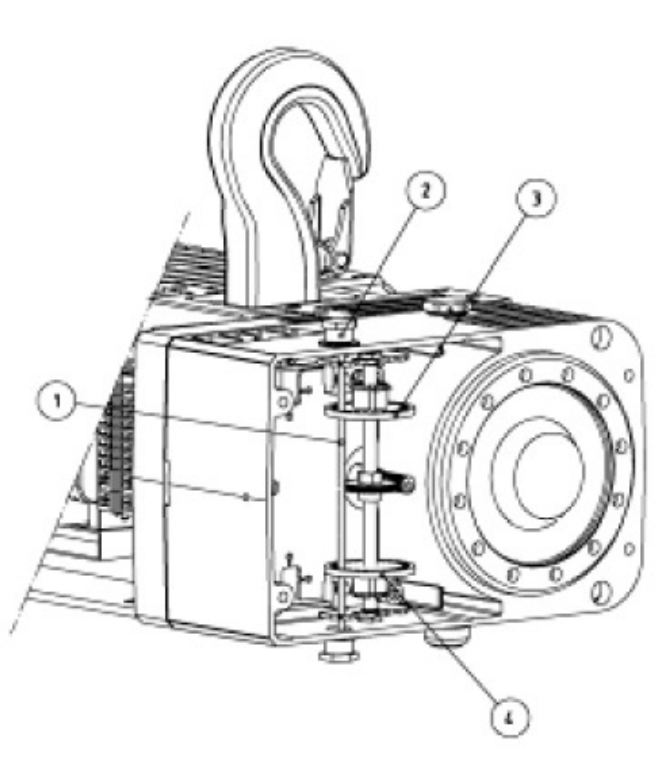
1. Insert load chain into vinyl chain bag. Position vinyl chain bag onto hoist mounting bracket.
2. Align holes and insert cotter pin through appropriate bag connection holes for the specific model.
 - 2.1. Use **Item 1** connection holes for the **Model 05** hoist.
3. Place washer onto pin.
4. Insert and secure cotter pin.

7.8 Limit Switches

7.8.1 Upper and Lower Gear Limit Switch

It is located into the brake cover and is adjusted in our works. This device limits the path of the hook.

Figure 16. Gear Limit Switches



The setting is done as follows (after load chain replacement for example):

1. Take off the cap of the upper part of the hoist.
2. Remove the guiding bar (1).
3. For upper limit switch: Move the adjustment disc (4) on the bottom side of the hoist.
4. For lower limit switch: Move the adjustment disc (3).
5. Put the guiding bar (1) back into the corresponding holes of the discs.
6. Check that the limit switches stop the direction at the desired positions.
If they don't, restart the adjustment from point 2.
7. Check that the hook or buffer doesn't touch the casing when stopping at high speed.
8. Put back the cap.

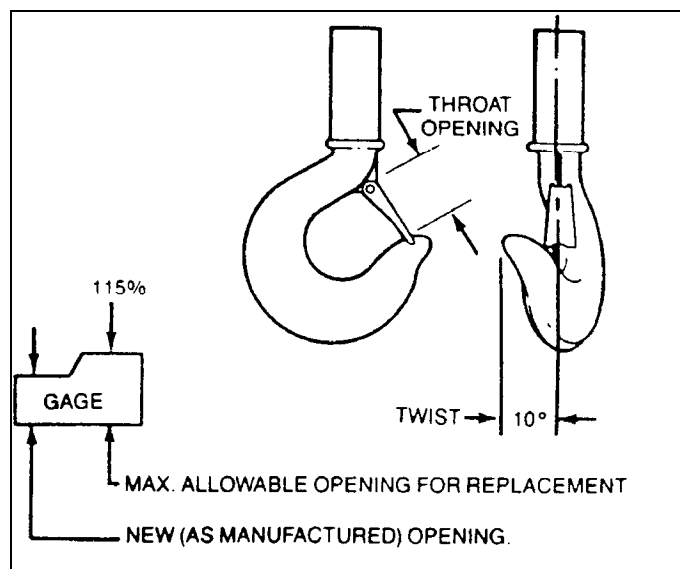
Note: Due to the deceleration ramp of the stepless speed control, the stopping position in high or low speed may vary.

7.9 Hooks

7.9.1 General





Check hooks for deformation or cracks. Hooks must be replaced if throat opening has increased by more than 15%, or if throat opening has more than 10-degree twist from plane of straight hook.

Figure 17. Measuring Hook Deformation



Due to many types and sizes of hooks that can be furnished and/or specified by the user / owner, it is recommended that user / owner measure the actual throat opening of hook as originally furnished. See *Figure 17*. Record the throat dimension on above sketch. Retain as a permanent record. This record can then be used for determining when hook must be replaced due to deformation or excessive throat opening.

CAUTION:

-  Abuse or overloading of hoist is indicated when any hook is twisted or has a throat opening in excess of normal. Other load bearing components **SHALL** be checked for damage.
-  Safety latches **SHALL** be replaced if missing, bent, or broken.
-  A safety latch **SHALL** function properly at all times.
-  Repairing hooks by welding or reshaping is strictly forbidden.

7.9.2 Inspection

Inspection for wear on top hook and load hook **SHALL** be checked routinely. Measure the throat opening. (dimension-a2). If throat opening exceeds maximum opening allowed, replace hook. Damaged safety latches **SHALL** be replaced immediately.

Maximum allowed throat opening:

Hook Class:	012T load hook	025T load hook	top hook
Maximum allowed opening:	0.905" [23 mm]	1.181" [30 mm]	1.456"[37mm]

7.9.3 Hook Dimensions and Specifications

Figure 18. Hook Dimensions

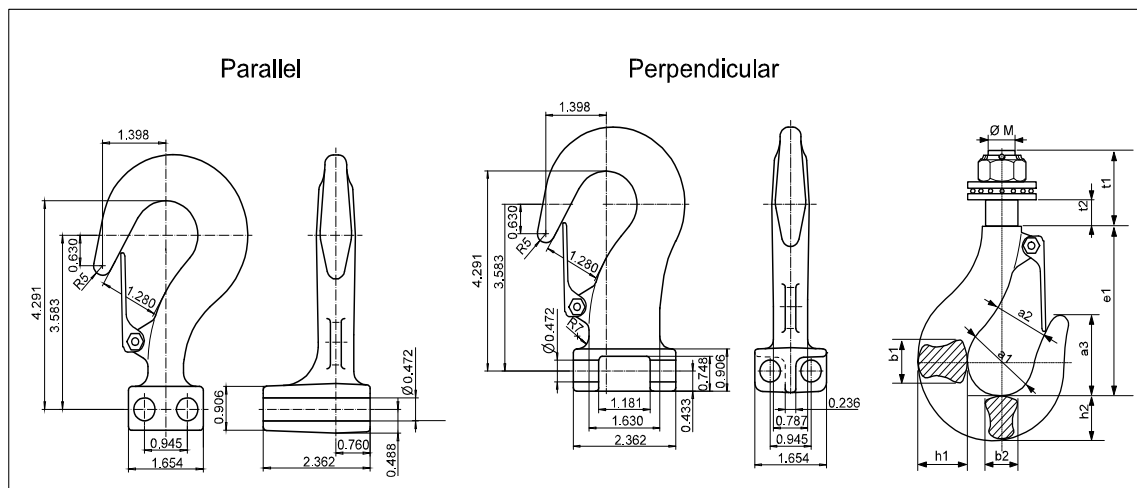


Table 3. Hook Dimensions

					DIMENSIONS - INCH / [mm]											
CAP TON	CAP KG	TEST LBS	FALLS	HOOK CLASS	øM	øa1	a2	a3	b1	b2	e1	h1	h2	t1	t2	
¼	250	1102	1	012T	0.551 [14]	1.181 [30]	0.787 [20]	1.339 [34]	0.748 [19]	0.591 [15]	3.268 [83]	0.866 [22]	0.748 [19]	1.260 [32]	0.394 [10]	
½	500	2205	1	012T	0.551 [14]	1.181 [30]	0.787 [20]	1.339 [34]	0.748 [19]	0.591 [15]	3.268 [83]	0.866 [22]	0.748 [19]	1.260 [32]	0.394 [10]	
			2	025T	0.630 [16]	1.417 [36]	1.024 [26]	1.614 [41]	0.866 [22]	0.748 [19]	3.780 [96]	1.102 [28]	0.945 [24]	1.496 [38]	0.512 [13]	
1	1000	4410	1	025T	0.630 [16]	1.417 [36]	1.024 [26]	1.614 [41]	0.866 [22]	0.748 [19]	3.780 [96]	1.102 [28]	0.945 [24]	1.496 [38]	0.512 [13]	

Mark: ISO 2766

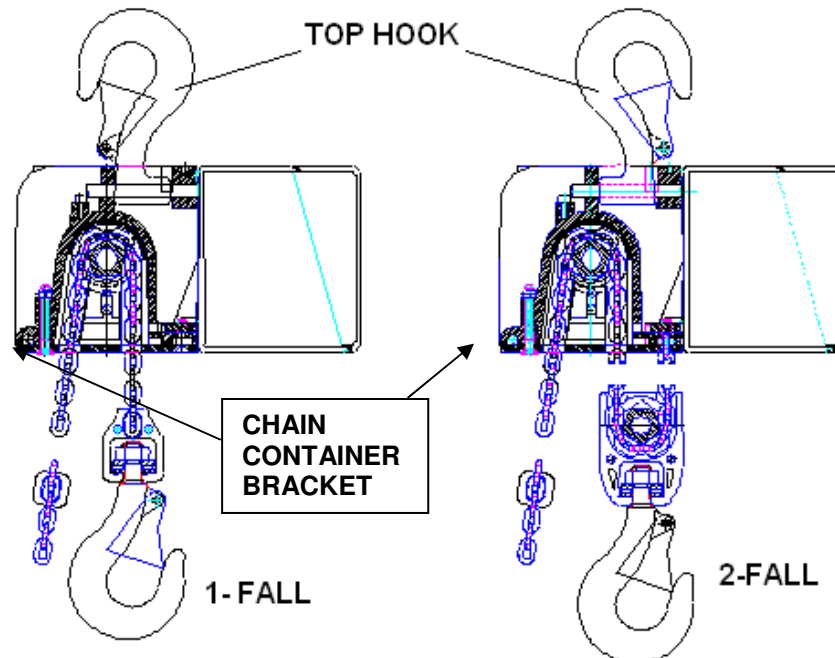
DIN model number: 15401

DIN 15400 Class: T

DIN 15401 Material: 35 CD 4

7.9.4 Top Hook

Figure 19. Top Hook Orientation



CAUTION: Before removing Top Hook, de-energize the power to the hoist per ANSI Z244.1 and make certain that any load is removed from the load hook. Also support the total weight of the hoist, including chain, prior to removing the Top Hook.

Removing Top Hook

1. Place hoist on workbench. Protect limit switches on bottom side of hoist.
2. Remove screw and retaining washer.
3. Pull pins out and remove hook.



CAUTION: Proper installation of top hook is critical for hoist balance.

Installing Top Hook

1. Place hoist on workbench. Protect limit switches on bottom side of hoist.
2. Determine number of chain falls: 1-fall or 2-fall. Reference Figure 19.
3. Select proper placement of top hook relative to number of chain falls:
 - If 1-fall, align top hook so that tip of hook faces toward chain container.
 - If 2-fall, align top hook so that tip of hook faces away from chain container.
4. Place hook into the slot on hoist body. Verify that top hook saddle and load hook saddle are in line with each other. Install pins and retaining washer. Secure retaining washer with screw.

7.10 Control Changes and Fuses

The control panel components are assembled onto a Printed Circuit (PC) Board. The layouts and wiring diagrams found within this section are for standard hoist controls. The hoist motor brake rectifier is an integral part of the Printed Circuit (PC) Board.

Stepless hoists are available for the 460 volt three-phase power supplies. The stepless hoist can only be connected to the specified serial plate voltage.

7.10.1 Control Circuit Fuses

The control fuse for three-phase control panels is located in a vertical, cylindrical fuse holder mounted to the printed circuit board. The fuse holder is identified as position F100. See Figure 20 for a typical panel view. The top rotates loose for replacement. There is only one top; therefore, the fuse is located in the position with the top.

Table 4. Control Fuses

POWER SUPPLY	CONTROL VOLTAGE	FUSE SIZE
3 – PHASE	115 VAC	500 mA
3 – PHASE	48 VAC	630 mA

7.11 Printed Circuit Board (Stepless)

Figure 20. Circuit board (Stepless)

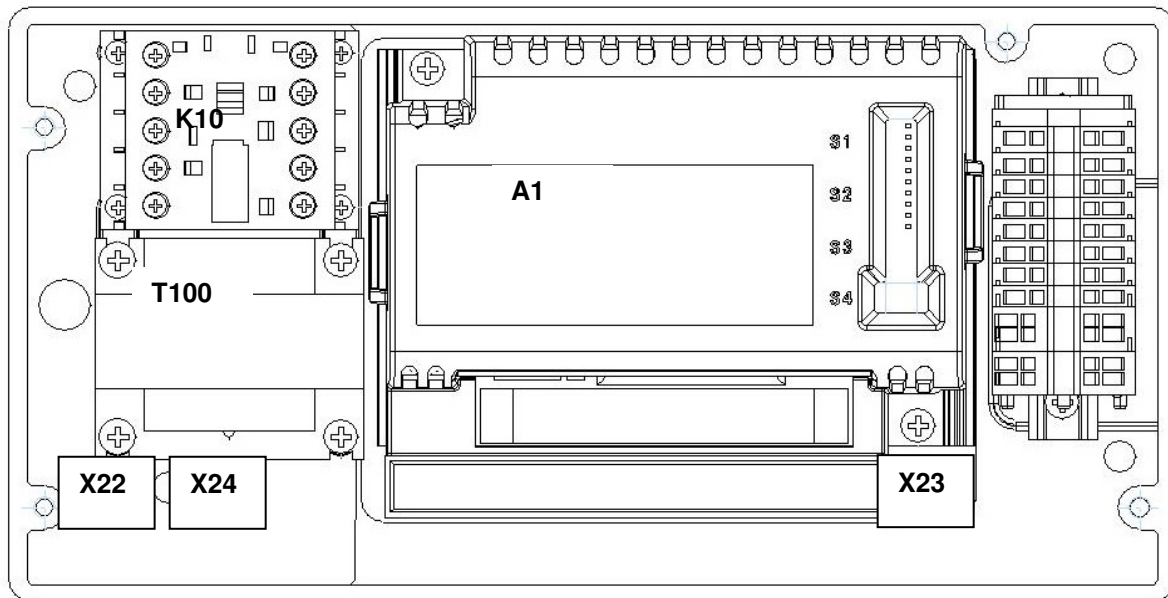


Table 5. Printed Circuit Board (Stepless)

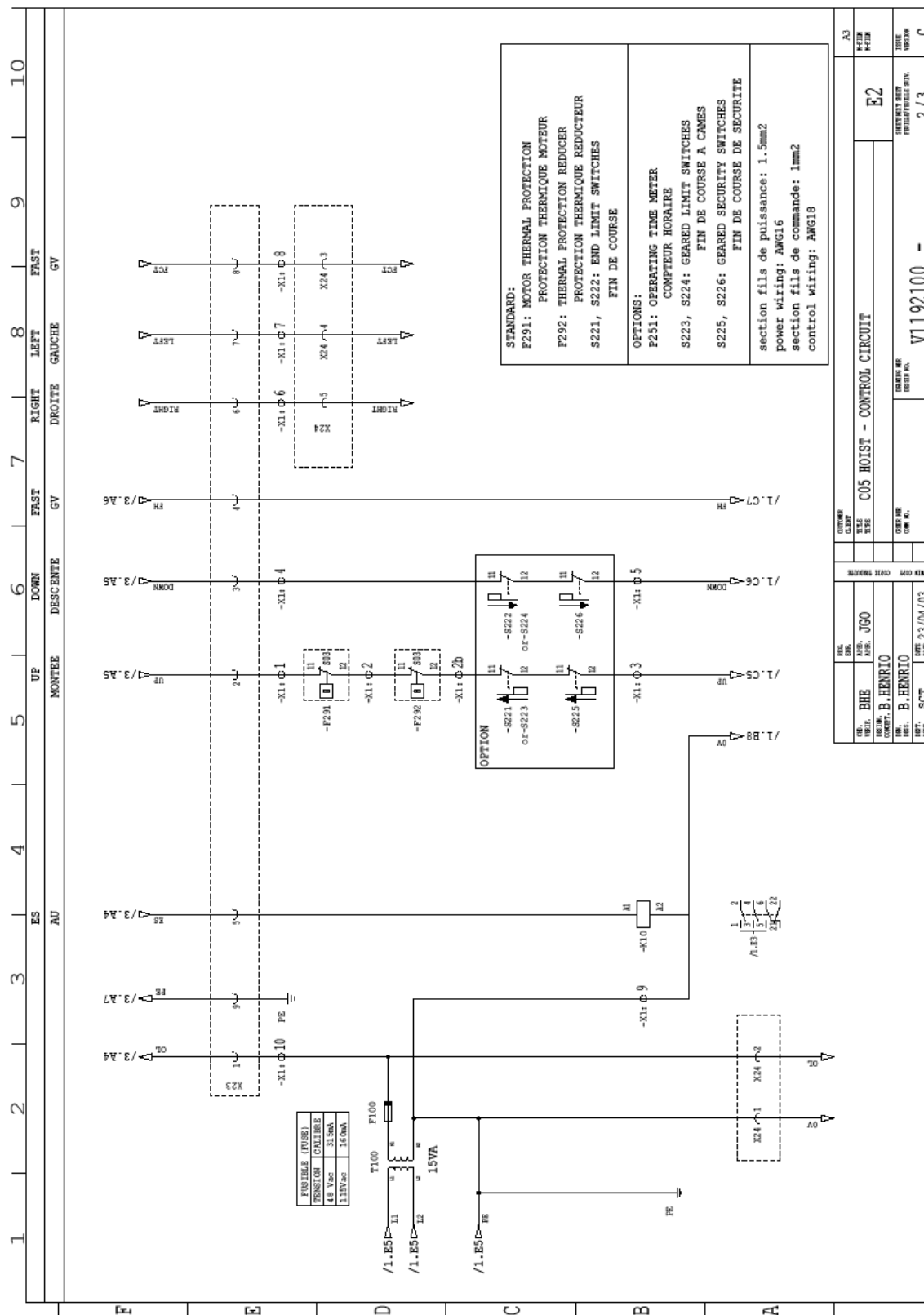
ITEM	DESCRIPTION
	HOIST SUPPLY
L1	HOIST POWER SUPPLY – (X22-1)
L2	HOIST POWER SUPPLY – (X22-2)
L3	HOIST POWER SUPPLY – (X22-3)
1U	MOTOR SUPPLY
1V	MOTOR SUPPLY
1W	MOTOR SUPPLY
	GROUND WIRES
PE	GROUND TERMINAL, 4 CONNECTIONS: MOTOR, INVERTER, TROLLEY CONNECTION (X24-9), POWER SUPPLY (X22-9)
	TROLLEY CONNECTION
X24	TROLLEY PLUG CONNECTION
L01	ELECTRIC TROLLEY SUPPLY (X24-6)
L02	ELECTRIC TROLLEY SUPPLY (X24-7)
L03	ELECTRIC TROLLEY SUPPLY (X24-8)
	PRINTED CIRCUIT BOARD - TROLLEY
6 – D1	RIGHT (X24-5)
7 – D2	LEFT (X24-4)
8 – F	ACCELERATION (HIGH SPEED) (X24-3)
9 – 0 V	COMMON (X24-1)
10 – 48 V	CONTROL POWER SUPPLY (X24-2)
	PRINTED CIRCUIT BOARD – CONTROL BOX
10	CONTROL POWER SUPPLY (X23-1)
1	LIFTING (X23-2)
4	LOWERING (X23-3)
-	HIGH SPEED (INVERTER) (X23-4)
-	EMERGENCY STOP (CONTACTOR K10) (X23-5)

Table 4. Printed Circuit Board (Stepless) - continued

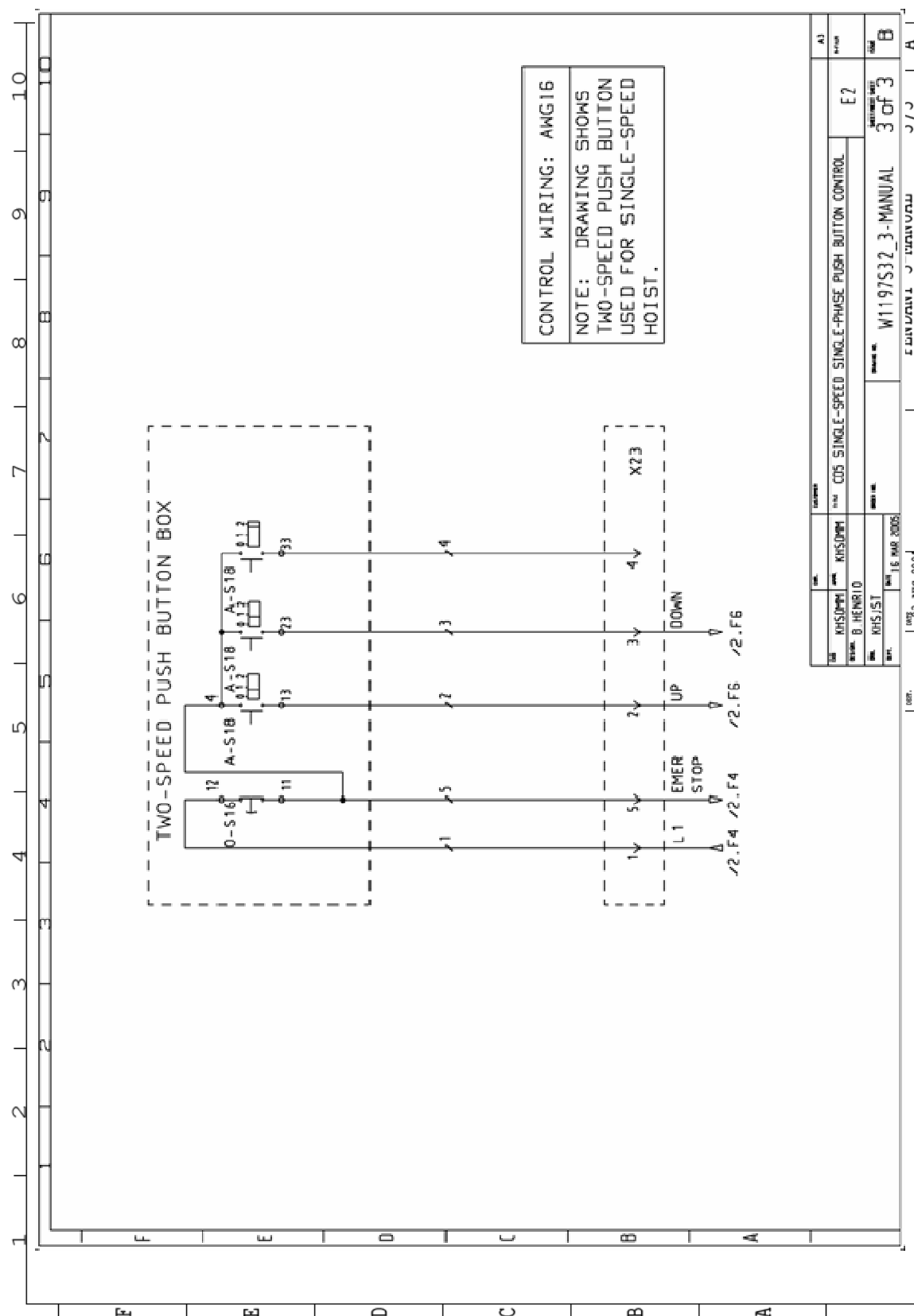
ITEM	DESCRIPTION
	PRINTED CIRCUIT BOARD - PROTECTIONS
1 – 2	MOTOR THERMAL PROTECTION (REPLACE THE SHUNT)
2 – 2b	GEAR THERMAL PROTECTION (REPLACE THE SHUNT)
2b - 3	UPPER LIMIT SWITCH (REPLACE THE SHUNT)
4 - 5	LOWER LIMIT SWITCH (REPLACE THE SHUNT)
	PRINTED CIRCUIT BOARD - ELEMENTS
Fuse	(SEE ELECTRIC DRAWINGS)
K10	EMERGENCY STOP CONTACTOR
A1	INVERTER
T100	CONTROL TRANSFORMER



7.13 Three Phase – Wiring Diagram – Stepless Hoist - 460 volts – Control Circuit

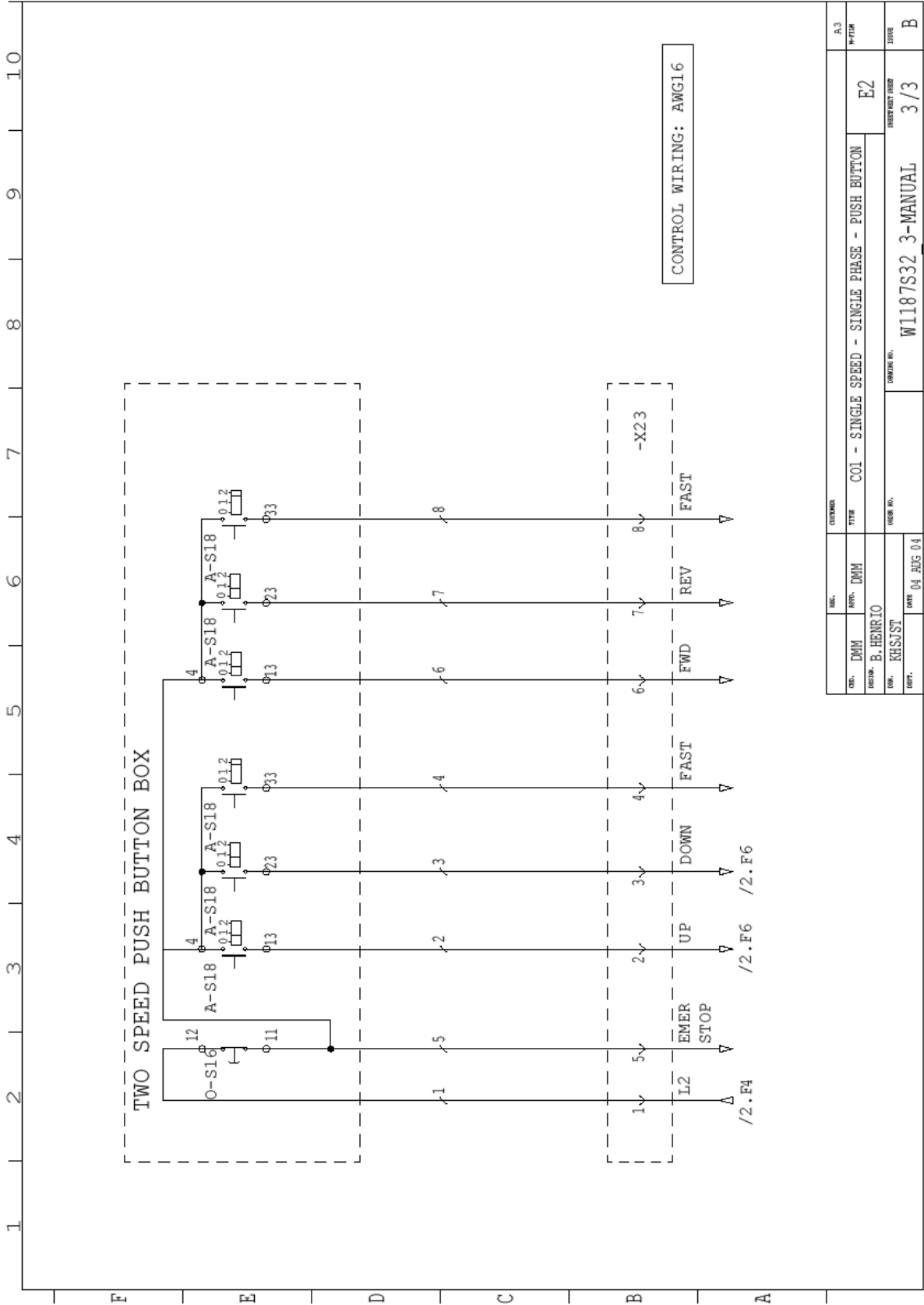


7.14 Wiring Diagram – 3 Button – Push Button





7.15 Wiring Diagram – 5 Button – Push Button



8 PREVENTATIVE MAINTENANCE

8.1 Maintenance and Inspection Table

Table 6. Maintenance and Inspection Schedule

INSPECTION CHECK	INTERVAL	QUALIFIED PERSON
BRAKE OPERATION FOR HOLDING AND RELEASING	DAILY	OPERATOR
LOAD CHAIN FOR DAMAGE	DAILY	OPERATOR
SUSPENSION SUPPORT OF P/ B ASSEMBLY	DAILY	OPERATOR
CLEANLINESS & LUBRICATION OF LOAD CHAIN	MONTHLY	OPERATOR
UPPER / LOWER LIMIT SWITCHES	DAILY	OPERATOR
CHECK LOAD CHAIN FOR WEAR – MEASURE AND RECORD	EVERY 3 MONTHS	QUALIFIED INSPECTOR
CHECK HOOKS FOR WEAR MEASURE AND RECORD	EVERY 3 MONTHS	QUALIFIED INSPECTOR
CHECK LOAD BLOCK HARDWARE TO VERIFY TIGHTNESS	EVERY 3 MONTHS	OPERATOR
CHECK TOP HOOK / COUPLING HARDWARE FOR TIGHTNESS	EVERY 3 MONTHS	OPERATOR
CHECK SLIP CLUTCH & HOIST BRAKE ADJUSTMENT	EVERY 3 -6 MONTHS	QUALIFIED MECHANIC
CHECK LUBRICATION OF OPEN WHEEL GEARING	EVERY 3 -6 MONTHS	QUALIFIED MECHANIC
CHECK WIRE TERMINALS TIGHTNESS	SEMI-ANNUALLY	QUALIFIED MECHANIC
LUBRICATE 2-FALL LOAD BLOCK SPROCKET	ANNUALLY	OPERATOR
CHECK ALL HARDWARE FOR TIGHTNESS AND CORROSION	ANNUALLY	QUALIFIED MECHANIC
CLEAN MOTOR COOLING FINS	ANNUALLY	QUALIFIED MECHANIC
LUBRICATE ALL GEARING	ANNUALLY	QUALIFIED MECHANIC
INSPECT LOAD BLOCK THRUST BEARING	ANNUALLY	QUALIFIED MECHANIC



CAUTION: INSPECTION AND MAINTENANCE INTERVALS SHOULD BE ADJUSTED BASED UPON OWNER / USER KNOWLEDGE OF APPLICATION, ENVIRONMENT, AND FREQUENCY OF USE TO PREVENT DAMAGE TO PEOPLE, EQUIPMENT, AND FACILITIES.

8.2 Lubrication

Figure 21. Lubrication Specifications

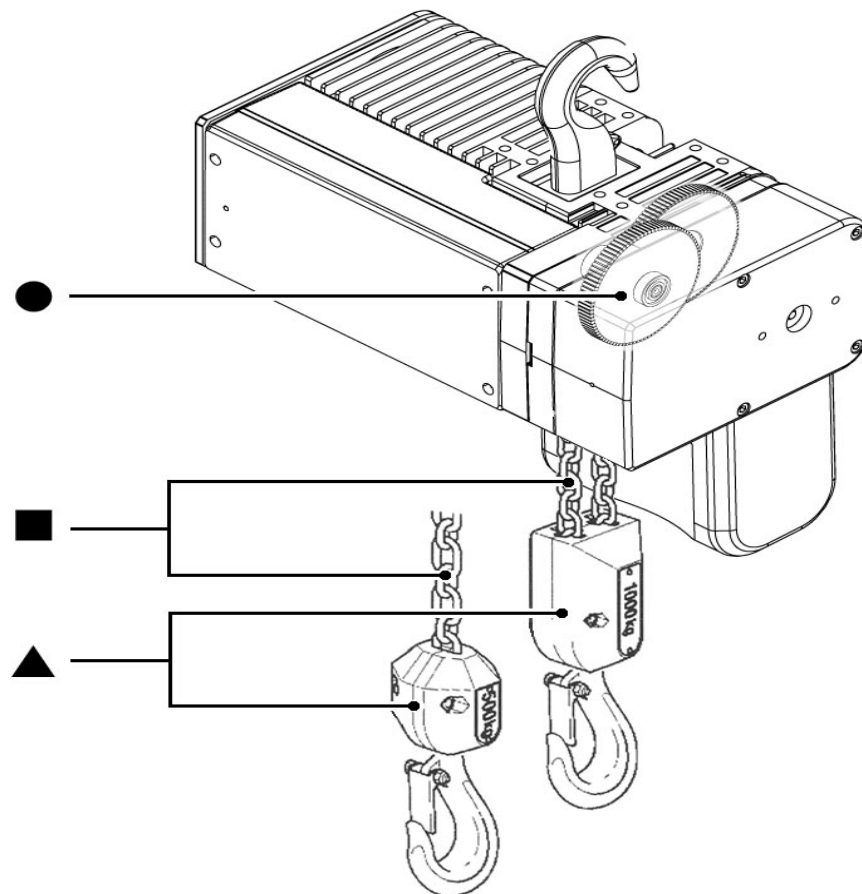


Table 7. Lubrication Specifications

LUBRICATION POINT	SPECIFICATIONS	ACCEPTABLE LUBRICANTS	QUANTITY
Chain ■	Oil or Liquid grease	Chain lubricating fluid (Ceplattyn or similar) EP-90	As required
Idler sprocket ▲ Slide bearing + bearing	Grease (without MoS2) KP 2 (DIN 51 502) Soap-based lithium Approx. drip point + 500 °F Worked penetration 509-563 °F Operating temperature - 4 °F - +266 °F	BP: BP Energrease LS - EP 2 Esso: Unirex N2 Mobil: Mobilgrease HP Shell: Shell Alvania EP Grease 2	As required
Gears ●	Oil	Shell: Transaxle Oil 75W-90	0.6 liter

Open Wheel Gearing: EP1 Mobilux or equivalent.

8.3 Recommended technical support for various spare parts

Table 8. Recommended Technical Support for Various Spare Parts

SPARE PART	REPLACED BY
Upper chain guide	Qualified Electrician & Mechanic
Output shaft	Qualified Electrician & Mechanic
PG cable gland	Qualified Electrician
Gear shaft + nuts	Qualified Mechanic
Motor end cap	Qualified Mechanic
Gearing (1st/2nd stage)	Qualified Electrician & Mechanic
Brake & end cap sealing	Qualified Mechanic
Other seals and O-rings	Qualified Mechanic
Brake-limiter	Qualified Electrician
Brake end cap	Qualified Mechanic
Lower chain guide	Qualified Mechanic
Rubber buffer	Qualified Mechanic
Electric box	Qualified Electrician
Inverter	Qualified Electrician
Plugs	Qualified Electrician
Chain	Qualified Mechanic
Chain bucket	Qualified Mechanic
Slack fall stop	Qualified Mechanic
Suspension hook	Qualified Mechanic
Hook block assembly	Qualified Mechanic
Control box	Qualified Electrician



NOTE: Once a part has been replaced, perform an operational check of hoist per Sections 3.3 and 3.4.

8.4 Screw Tightening Torque (lb-ft) Specifications

Table 9. Screw Tightening Torque Specifications

TYPE	M5	M6	M8	M10	M12
STANDARD SCREWS	4	7	18	35	61
SELF-TAPING SCREWS	4	6	15	30	53

8.5 Troubleshooting

Table 10. Troubleshooting

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Hoist does not lift or lower load	Emergency stop button is activated	Deactivate button
	Blown fuse	Replace the fuse
	Motor thermal protection activated	Allow motor to cool down
	Pendant plug pin pushed out	Reinstall plug pin
	Contactor terminal screws loose	Tighten screws
	Inverter terminal is badly fixed	Press on the terminal
	Mainline switch shut off	Turn switch on
Hoist does not lift load	Overload condition	Reduce load
	Slip clutch worn or incorrectly adjusted	Replace wear items or readjust slip clutch torque
	Upper limit switch is activated	Adjust
Load drifts more than 4 inches [100mm] during an emergency stop	Brake lining worn	Adjust the brake slipping clutch and replace the slipping clutch components if necessary.
Travel direction does not correspond to that indicated on push button	Connections of the pendant are incorrect.	Change wiring of pendant.
Abnormal noises while lifting or lowering	Load chain and its components are not lubricated	Clean and lubricate load chain.
	Load chain is worn	Replace chain
	Chain wheel or chain guide is worn	Replace chain wheel or chain guide
	Idler sprocket is worn	Replace idler sprocket
	A supply phase is missing	Connect the three phases
	Twist or kink in load chain	Remove twist or kink
Slow down distance is too long	Wrong inverter setting	Adjust slow down at inverter level

9 PARTS ILLUSTRATION

9.1 Hoist Body – Three Phase Power Supply

Figure 22. Three Phase Power Supply

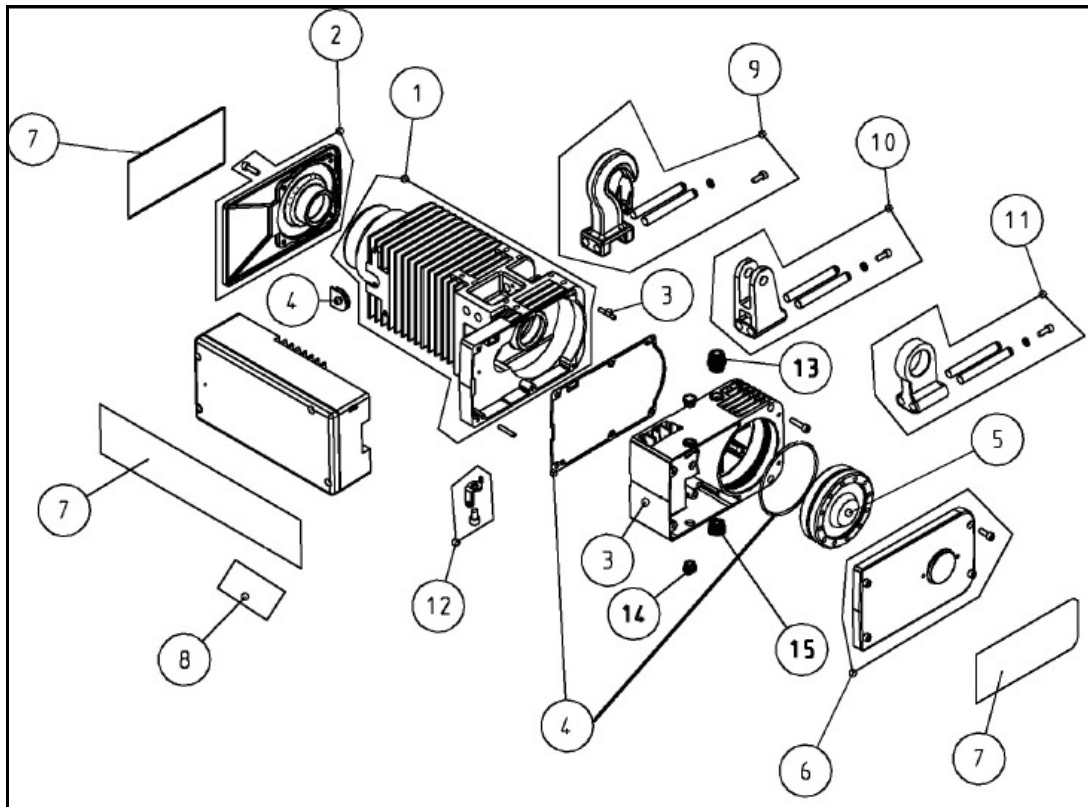


Table 11. Hoist Body Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
-	52391077	COMPLETE HOIST BODY 460V STEPLESS – ½ TON (500kg) 32 FPM	1
-	52391078	COMPLETE HOIST BODY 460V STEPLESS – ¼ TON (250kg) 64 FPM	1
1	52316250	CASING ASSEMBLED WITH STATOR 380V/480Vac 2ph BIM	1
2	52308741	MOTOR FLANGE ASSEMBLY	1
3	52339699	GEAR SET	1
4	52340062	SET OF SEALINGS	1
5	52339700	COVER SET FOR FRICTION DISK	1
6	52339701	BRAKE FLANGE ASSEMBLY	1
7	2406879025	SET OF STICKERS AND COVERS LM5	1
8	2219938	SET OF LOAD PLATE 125 KG (SET OF 10)	1
8	2219917	SET OF LOAD PLATE 160 KG (SET OF 10)	1
8	2219918	SET OF LOAD PLATE 250 KG (SET OF 10)	1
8	2219919	SET OF LOAD PLATE 320 KG (SET OF 10)	1
8	2219920	SET OF LOAD PLATE 500 KG (SET OF 10)	1
8	2219921	SET OF LOAD PLATE 630 KG (SET OF 10)	1
8	2219922	SET OF LOAD PLATE 1000 KG (SET OF 10)	1
9	2219955	UPPER HOOK SET PERP. + SHAFT AND SCREWS	1
9	2219954	UPPER HOOK SET PARA. + SHAFT AND SCREWS	
10	2229921	CROSSHEAD SET PERP. + SHAFT AND SCREWS	1
10	2229920	CROSSHEAD SET PARA. + SHAFT AND SCREWS	1
11	52308832	SUSPENSION EYE KPT	1
12	2218000	PUSH BUTTON STATION FIXING POINT	1
-	52308744	SET OF CAPS	1
-	2212017	STEEL PLATE SAFETY LATCH	1

9.2 Mechanism / Brake (Stepless)

Figure 23. Mechanism/Brake (Stepless)

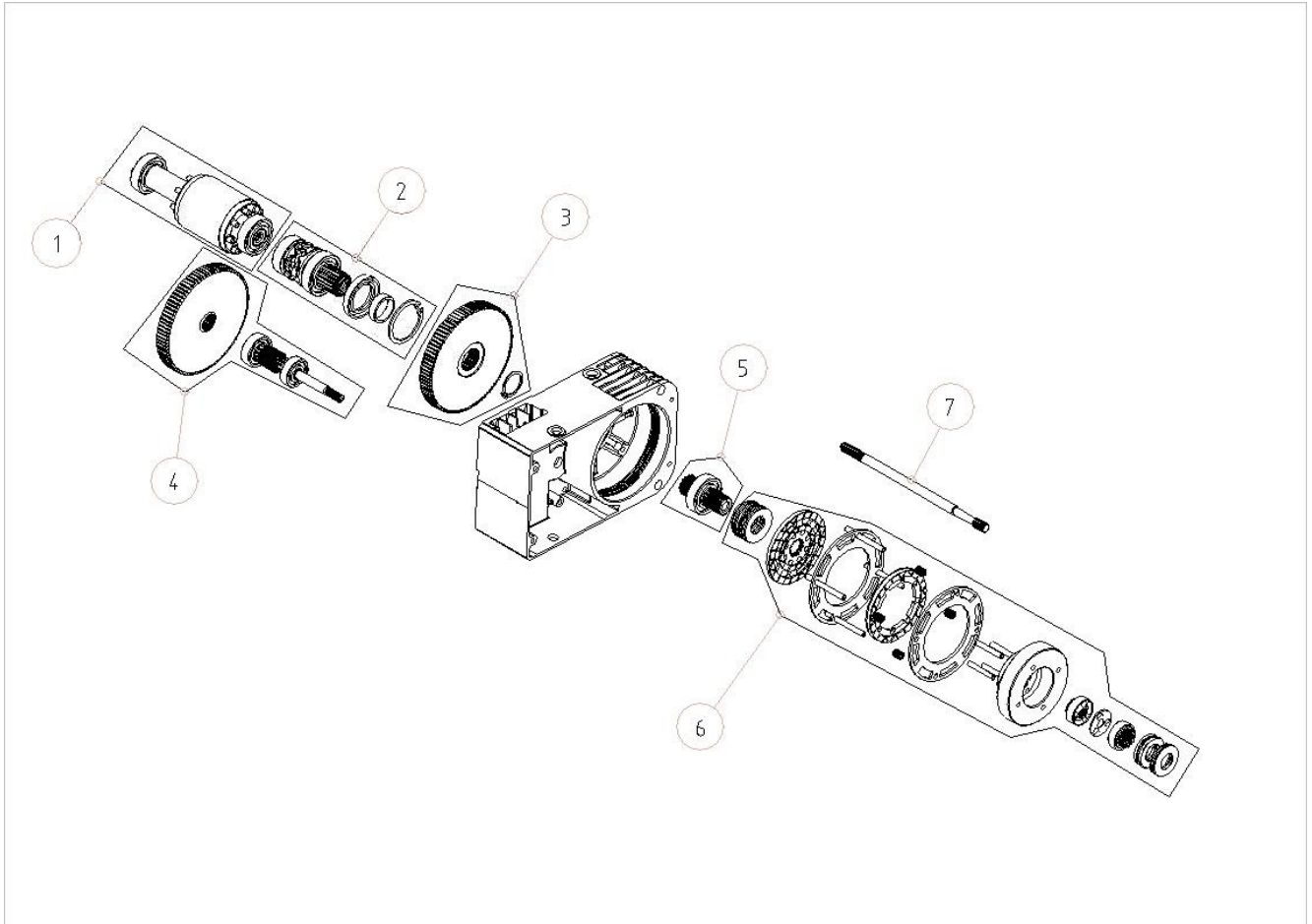


Table 12. Mechanism / Brake (Stepless) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52338099	ROTOR ASSEMBLY	1
2	52339702	CHAIN SPROCKET ASSEMBLY	1
3	52305473	GEAR WHEEL SET	1
4	52339704	GEAR ASSEMBLY	1
5	52338100	PINION	1
6	52339705	BRAKE SLIPPING CLUTCH SET	1
7	52339706	MOTOR SHAFT	1

THIS PAGE INTENTIONALLY LEFT BLANK

9.3 Lifting Assembly

Figure 24. Lifting Assembly

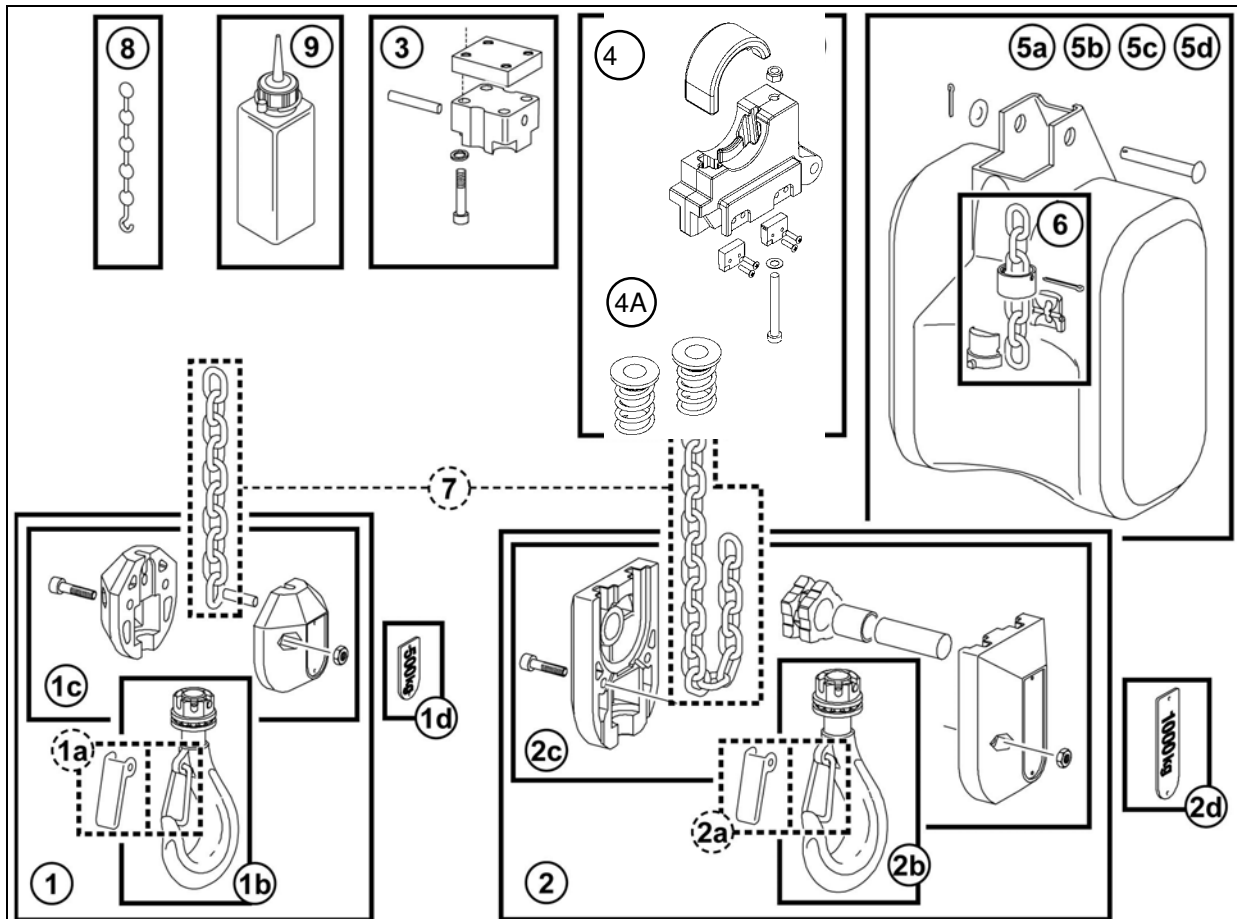


Table 13. Lifting Assembly Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	2219902	1-FALL LOAD BLOCK ASSY - STD HOOK	1
1	2212018	1-FALL LOAD BLOCK ASSY – SELF-LOCKING HOOK	1
1a	001512	1-FALL SAFETY LATCH – WIRE TYPE	1
1a	2212016	1-FALL SAFETY LATCH – STEEL PLATE TYPE	1
1b	2212011	1-FALL LOAD HOOK	1
1b	2217015	1-FALL LOAD HOOK – SELF LOCKING	1
1c	2219985	1-FALL LOAD BLOCK HALVES SET	1
1d	2213308008	1-FALL LOAD BLOCK CAPACITY STICKER – 250 KG	2
1d	2213308009	1-FALL LOAD BLOCK CAPACITY STICKER – 500 KG	2
1d	2213308001	1-FALL LOAD BLOCK CAPACITY STICKER – 1/4 TON	2
1d	2213308002	1-FALL LOAD BLOCK CAPACITY STICKER – 1/2 TON	2
2	2212020	2-FALL LOAD BLOCK ASSY – STD HOOK	1
2	2212028	2-FALL LOAD BLOCK ASSY – SELF-LOCKING HOOK	1
2a	001515	2-FALL SAFETY LATCH – WIRE TYPE	1
2a	2212017	2-FALL SAFETY LATCH – STEEL PLATE TYPE	1
2b	2217004	2-FALL LOAD HOOK – STD HOOK	1
2b	2247015	2-FALL LOAD HOOK – SELF-LOCKING	1
2c	2219987	2-FALL LOAD BLOCK HALVES SET	1
2d	2213333009	2-FALL LOAD BLOCK CAPACITY STICKER – 500 KG	2
2d	2213333010	2-FALL LOAD BLOCK CAPACITY STICKER – 1000 KG	2
2d	2213333002	2-FALL LOAD BLOCK CAPACITY STICKER – ½ TON	2
2d	2213333003	2-FALL LOAD BLOCK CAPACITY STICKER – 1 TON	2
3	52309350	CHAIN ANCHOR SET (2-FALL HOISTS)	1
4	52315430	CHAIN GUIDE ASSEMBLY SET W/ SWITCHES (STANDARD)	1
4a	52293583	SPRING & PLATE SET (SET OF 3)	1
5a	2219990	CHAIN CONTAINER SET – 25FT [8M] MAXIMUM CHAIN LENGTH	1
5b	2249925	CHAIN CONTAINER SET – 50FT [16M] MAXIMUM CHAIN LENGTH	1
5c	2249926	CHAIN CONTAINER SET – 75FT [30M] MAXIMUM CHAIN LENGTH	1
5d	2249932	CHAIN CONTAINER SET – 150FT [50M] MAXIMUM CHAIN LENGTH	1
6	2211050	SLACK FALL STOP ASSEMBLY	1
7a	2213500	LOAD CHAIN – STD ZINC PLATED	*
7b	2213501	LOAD CHAIN – BLACK	*
7c	2213502	LOAD CHAIN – STAINLESS STEEL – CHECK CAPACITY LIMITS	*
8	2211045	LOAD CHAIN INSERTION TOOL	1
9	9995008	CHAIN LUBRICANT	1



*** NOTE: REFER TO CHAIN HOIST LIFT AND NUMBER OF FALLS FOR CHAIN QUANTITY**

9.4 Controls (Stepless)

Figure 25. Controls (Stepless)

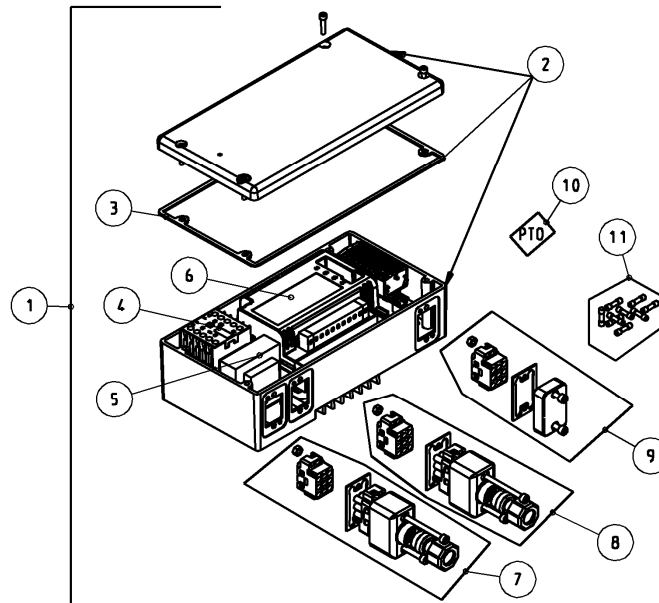


Table 14. Electric Box (Stepless) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52310090	ELECTRICAL CUBICLE 400V50&60Hz48vac	1
1	52340063	ELECTRICAL CUBICLE 460V50&60Hz115vac	1
2	52340064	EMPTY CUBICLE WITH SEALING	1
3	52312998	SEALING FOR ELECTRIC CUBICLE	1
4	7983061	CONTACTOR 48 Vac	1
4	1123051	CONTACTOR 115 Vac	1
5	52314654	TRANSFORMER 400V50&60Hz48vac	1
5	52314653	TRANSFORMER 460V50&60Hz115vac	1
6	52300287	INVERTER-FILTER SET 48 Vac	1
6	52300288	INVERTER-FILTER SET 115 Vac	1
7	2249982	CONNECTION PLUG SET FOR POWER SUPPLY	1
8	2249945	CONNECTION PLUG SET FOR PUSH-BUTTON BOX	1
9	2249946	CONNECTION PLUG SET FOR TROLLEY	1
10	52340081	GEAR THERMAL PROTECTION	1
11	52340092	SET OF 10 FUSES 48V	1
11	52340093	SET OF 10 FUSES 115V	1

9.5 Adjust Limit Switch (Stepless)

Figure 26. Adjust Limit Switch (Stepless)

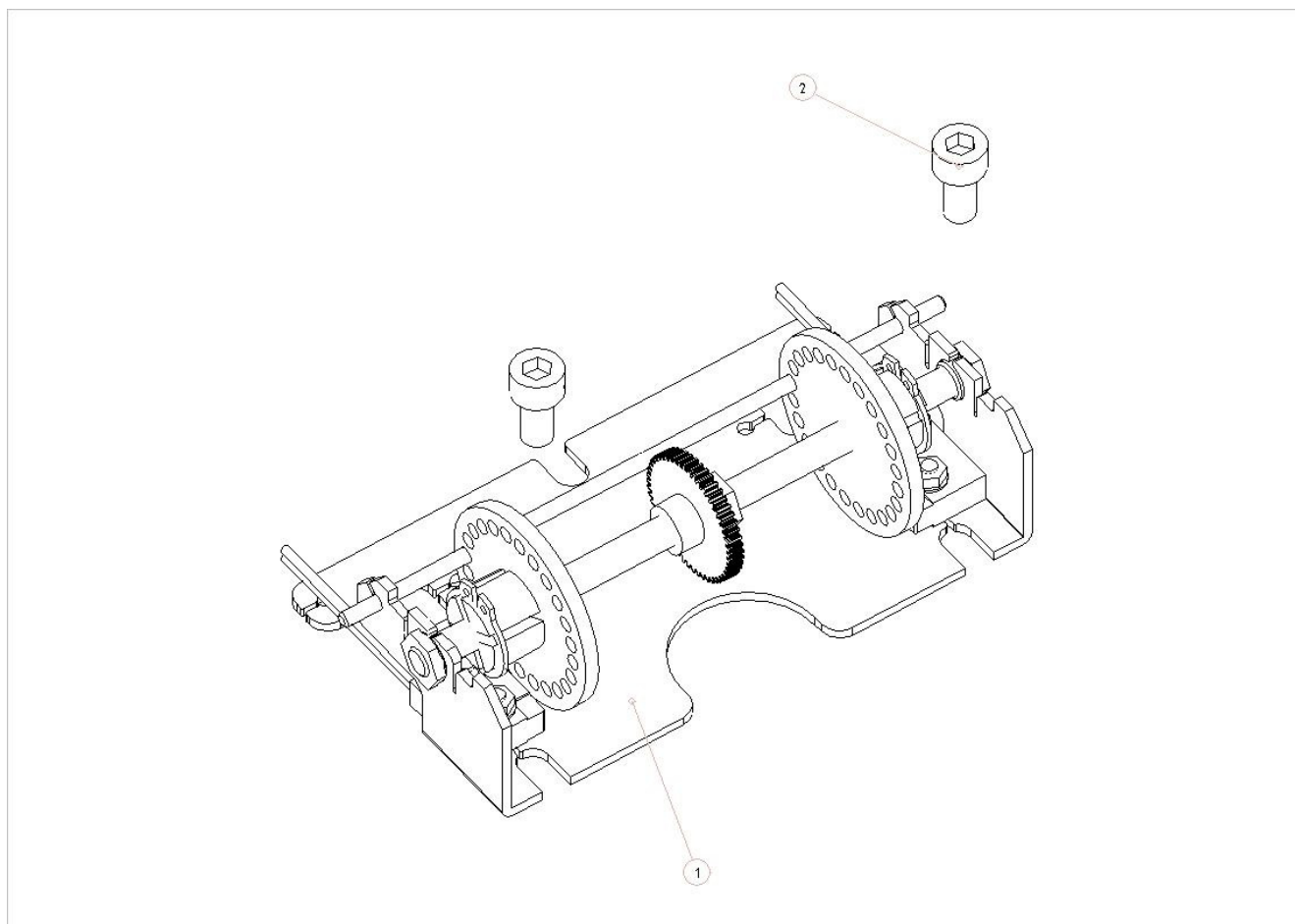


Table 15. Adjust Limit Switch (Stepless) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52337490	SET OF GEAR LIMIT SWITCH 40 m + SHAFT REP. 2	1
2	8010612	CHC SCREWS M6x12	2

9.6 Low Headroom Trolley

9.6.1 Low Headroom Trolley (Drive Components)

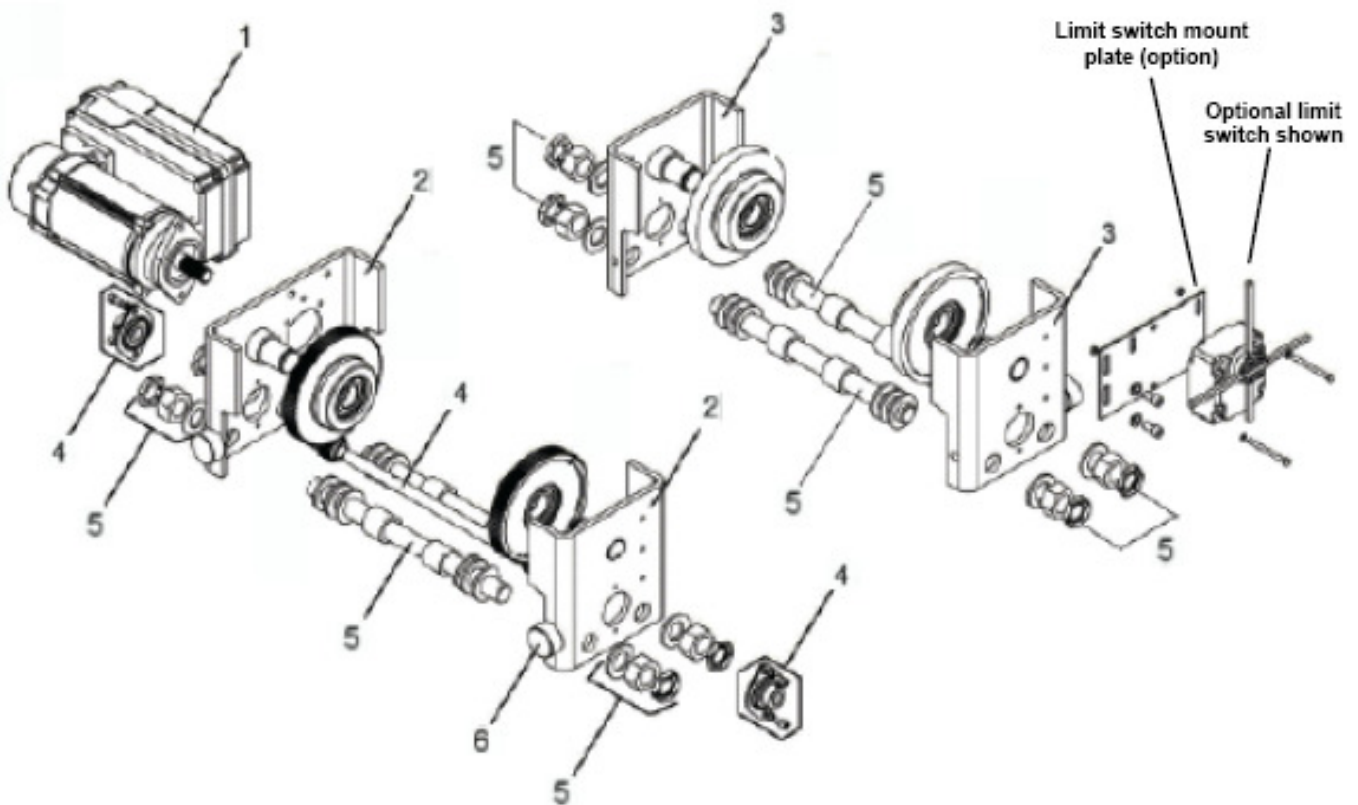


Table 16. Low Headroom Trolley Short Outreach (Drive Components)

ITEM	DESCRIPTION			C10 SHORT	
				QTY	CODE
1	Complete 2-speed motor drive 115Vc	460V	≤ 2 Ton (2000 Kg)	1	52306026
		575V		1	52306027
		208/230V		1	52306028
	Complete inverter motor drive 115Vc	460V	> 1 Ton (1000 Kg)	1	52299090
		575V 208/230V	> 1 Ton ≤ 2 Ton	1	52304881
2	Geared drive side plates			2	52391073
3	Ungeared idler side plates			2	52391072
4	Pinion drive assy			1	52311194
5	XHEAD assy 2.28 - 4.33 in. (set of 4)			4	556902
	XHEAD assy 4.45 - 6.69 in. (set of 4)			4	556903
	XHEAD assy 7.00 – 9.45 in. (set of 4)			4	556904
	XHEAD assy 9.76 – 12.20 in. (set of 4)			4	556905
6	Rubber buffer			4	558993
*	Transformer for inverter trolley	460V		1	52304748
		575V		1	52304749
		208/230V		1	52304746
*	Transformer mounting bracket			1	2309848001

* Not shown in diagram

9.6.2 Low Headroom Trolley (Suspension Components)

Figure 27. Low headroom trolley (suspension components)

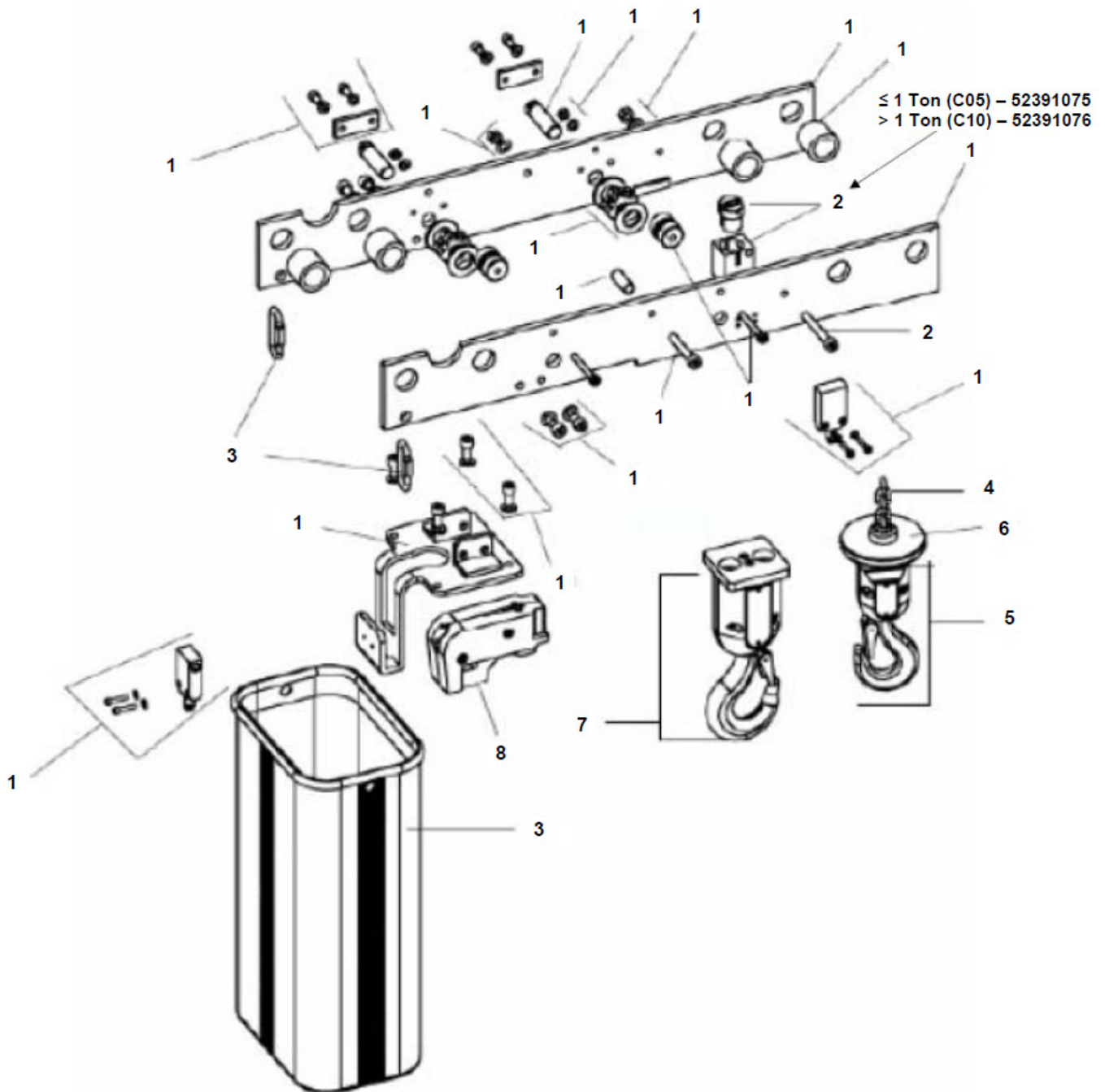


Table 17. Low Headroom Trolley (Suspension Components)

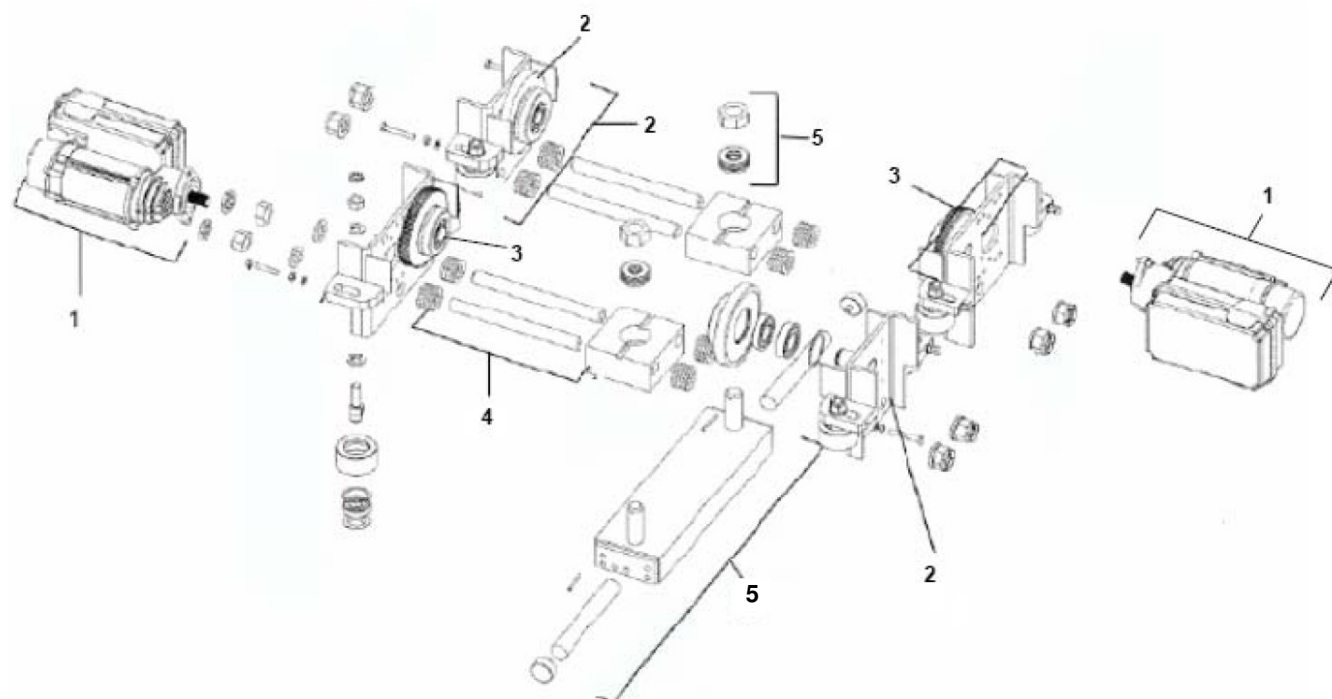
ITEM	DESCRIPTION		C10 SHORT	
			QTY	CODE
1	LH Short Outreach Frame Assy		1	52391065
2	Fixed point assy (not applicable for 1-fall hoists)		1	52391075
3	Chain bag (from 0 to 30 m)	to 65 ft.	1	52333407
		66 to 130 ft.	1	52328053
4	Lifting chain galva. (Length: HOL + 5 ft.)		-	2243500
5	Lower hook block assy 1 fall		1	52387611
6	Counterweight for 1 fall hook		1	557939
7	Lower hook block assy 2 falls		1	52387610
8	Chain guide		1	52391768



NOTE: When hoists are mounted on a low headroom trolley, they are supplied with aluminum chain guide.

9.7 Electric trolley (Swiveling trolley 0 to 3.2 Tons (3200 Kg))

Figure 28. Electric trolley (swiveling trolley 0 to 3.2 tons (3200 Kg))



NOTE: ECH is attached to swivel trolley through a mechanical connection. No top hook connection available.

Table 18. Electric trolley (Swiveling trolley 0 to 3.2 Tons (3200 Kg))

ITEM	DESCRIPTION			QTY	CODE
1	Complete 2-speed motor drive 115Vc	460V	≤ 3.2 Ton (3200 Kg)	2	52306026
		575V		2	52306027
		208/230V		2	52306028
	Complete inverter motor drive 115Vc	460V	≤ 1 Ton (1000 Kg)	2	52299090
		575V 208/230V	> 1 Ton ≤ 3.2 Ton	2	52304881
2	Idler side plate			2	52326596
3	Drive side plate			2	52326597
4	Swivel CHRD Kit 2.60 – 4.33 in. (set of 4)			1	556966
	Swivel CHRD Kit 2.60 – 4.33 in. (set of 4)			1	556967
	Swivel CHRD Kit 2.60 – 4.33 in. (set of 4)			1	556968
	Swivel CHRD Kit 2.60 – 4.33 in. (set of 4)			1	556969
5	Cross bar set for C05			1	52326598
	Cross bar set for C10			1	52326599
	Cross bar set for C16/20/25			1	52326602

9.8 Push Button Assembly – Horizontal Pairs of Buttons

Figure 29. Push Button Assembly – Horizontal Pairs of Buttons

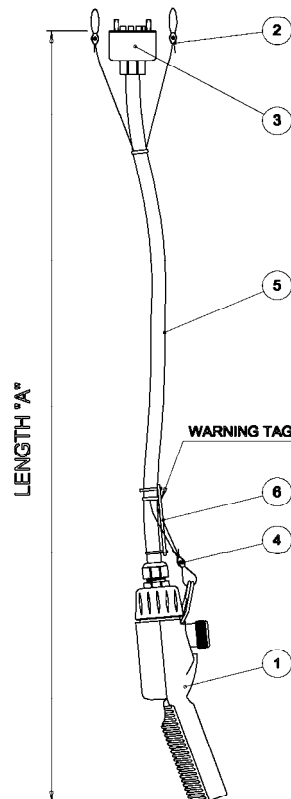


Table 19. Push Button Assembly (Horizontal Pairs of Buttons) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
-	2309765010	P/B ASSEMBLY 10 FT, E-STOP, TWO SPEED HOIST	1
-	2309765015	P/B ASSEMBLY 15 FT, E-STOP, TWO SPEED HOIST	1
-	2309765020	P/B ASSEMBLY 20 FT, E-STOP, TWO SPEED HOIST	1
-	2309767010	P/B ASSEMBLY 10 FT, E-STOP, TWO SPEED HOIST, TWO SPEED TROLLEY	1
-	2309767015	P/B ASSEMBLY 15 FT, E-STOP, TWO SPEED HOIST, TWO SPEED TROLLEY	1
-	2309767020	P/B ASSEMBLY 20 FT, E-STOP, TWO SPEED HOIST, TWO SPEED TROLLEY	1
1a	52301832	P/B ENCLOSURE ASSEMBLY – E-STOP – TS HOIST	1
1b	2213466004	P/B ENCLOSURE ASSEMBLY – E-STOP – TS HOIST, TWO SPEED TROLLEY	1
2	2218000	UPPER SUSPENSION KIT	1
3	7285036	P/B ASSEMBLY - PLUG KIT	1
4	558073	SUSPENSION UNIT	1
5	52292266	PUSH BUTTON ELECTRICAL CABLE 16 GAUGE / 12 CONDUCTOR RPC	1
6	2309414005	LM OPERATOR'S WARNING TAG - ENGLISH	1

9.9 Pushbutton Assembly – Horizontal Pairs of Buttons

Figure 30. Pushbutton Assembly – Horizontal Pairs of Buttons

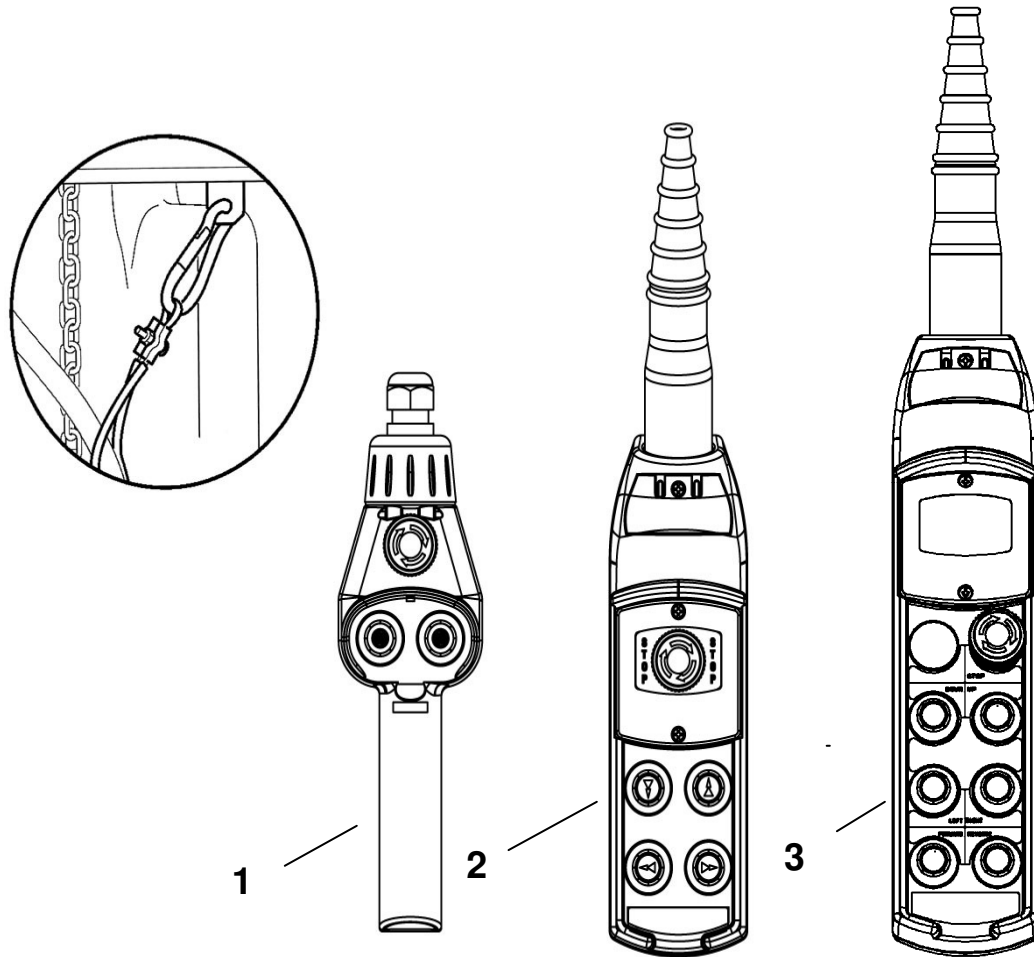


Table 20. Push Button Assembly – Horizontal Pairs of Buttons Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52301832	PISTOL GRIP P/B CONTROL ASSEMBLY – TWO SPEED	1
2	2213466004	P/B CONTROL ASSEMBLY – TWO SPEED – 5 BUTTON	1
3	2213466005	P/B CONTROL ASSEMBLY – TWO SPEED – 7 BUTTON	1

9.10 Push Button Assembly – Vertical Pairs of Buttons (Option)

Figure 31. Pushbutton Assembly – Vertical Pairs of Buttons (Option)

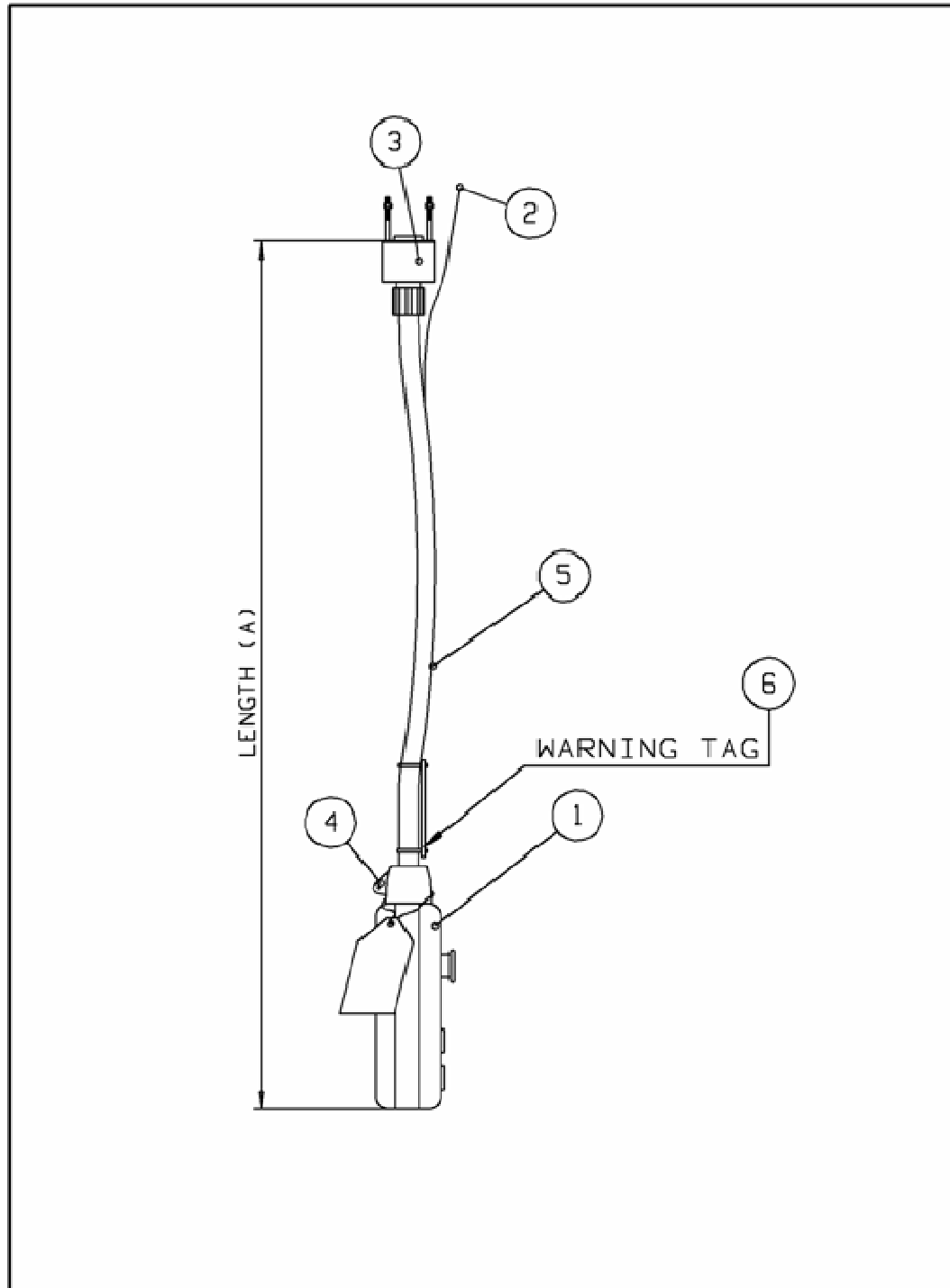


Table 21. Push Button Assembly – Vertical Pairs of Buttons (Option) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
-	2309673010	E-STOP, SINGLE SPEED HOIST – 10 FT P/B ASSEMBLY	1
-	2309673015	E-STOP, SINGLE SPEED HOIST – 15 FT P/B ASSEMBLY	1
-	2309673020	E-STOP, SINGLE SPEED HOIST – 20 FT P/B ASSEMBLY	1
-	2309674010	E-STOP, TWO SPEED HOIST – 10 FT P/B ASSEMBLY	1
-	2309674015	E-STOP, TWO SPEED HOIST – 15 FT P/B ASSEMBLY	1
-	2309674020	E-STOP, TWO SPEED HOIST – 20 FT P/B ASSEMBLY	1
1	2212932011	E-STOP, SS HOIST PUSHBUTTON ENCLOSURE ASSEMBLY	1
1	2212932012	E-STOP, TS HOIST PUSHBUTTON ENCLOSURE ASSEMBLY	1
2	2218000	UPPER SUSPENSION KIT	1
3	7285036	PLUG KIT	1
4	558073	SUSPENSION UNIT	1
5	52292266	PUSH BUTTON ELECTRICAL CONTROL CABLE	1
6	2309414005	LM PUSHBUTTON WARNING TAG - ENGLISH	1

9.11 Push Button Assembly – Vertical Buttons (Option)

Figure 32. Push Button Assembly – Vertical Buttons (Option)

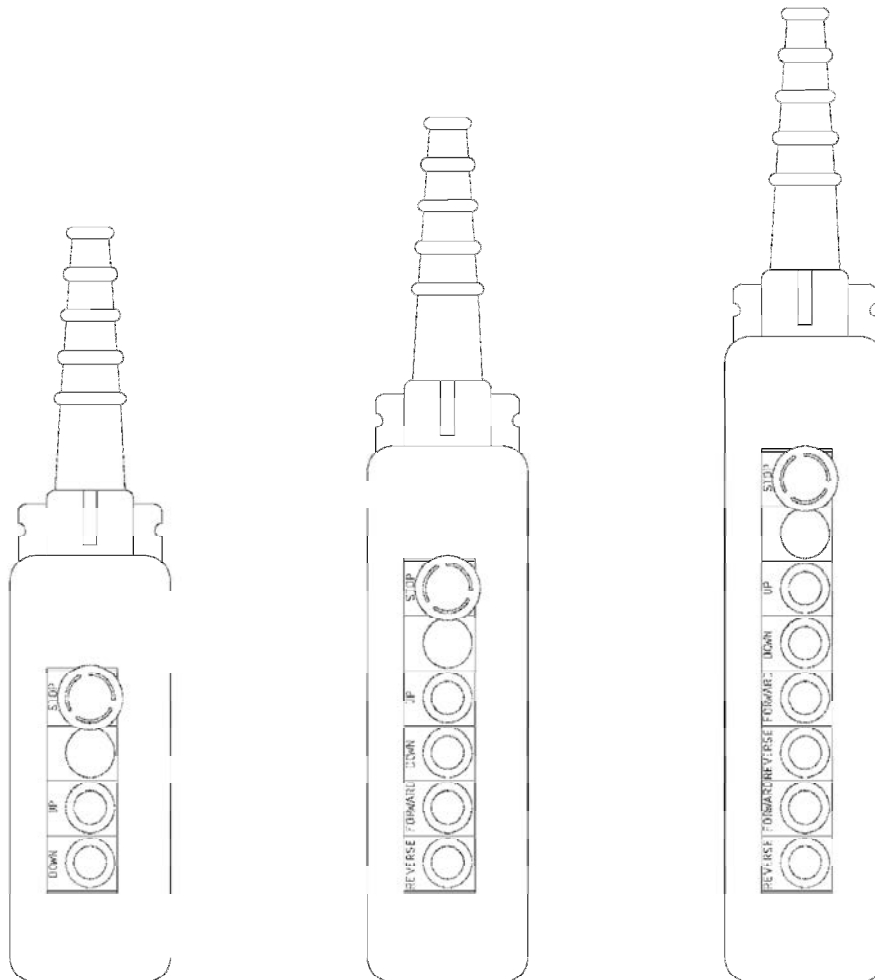


Table 22. Push Button Assembly - Vertical Buttons (Option) Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	2212932011	3 BUTTON P/B TELEMECANIQUE – S*, 1H	1
1	2212932012	3 BUTTON P/B TELEMECANIQUE – S*, 2H	1
2	2212932032	5 BUTTON P/B TELEMECANIQUE – S*, 1H, 2T	1
2	2212932033	5 BUTTON P/B TELEMECANIQUE – S*, 2H, 2T	1
3	2212932034	7 BUTTON P/B TELEMECANIQUE – S*, 2H, 2T, 2B	1
3	2212932035	7 BUTTON P/B TELEMECANIQUE – S*, 1H, 2T, 1B	1
3	2212932036	7 BUTTON P/B TELEMECANIQUE – S*, 2H, 2T, 1B	1
3	2212932037	7 BUTTON P/B TELEMECANIQUE – S*, 1H, 2T, 2B	1

THIS PAGE INTENTIONALLY LEFT BLANK