R&M MATERIALS HANDLING INC.

INSTALLATION AND MAINTENANCE MANUAL

STAGEMAKER® SM10

English

STD-R-KHA-F-CQD-ENG

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

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

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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 ***STAGEMAKER®*** COMPACT Concert 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 / site 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 ensuring 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 **STAGEMAKER® COMPACT Concert 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 operator, 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)

☞ NOTE: When using the ***STAGEMAKER***® Concert Electric Chain Hoist in the Inverted position, ASME B30.16 Section 16-0.1, states that this standard does not apply when "drawing both the load and the hoist up or down the load chain(s) or rope(s) of the hoist." See WARNING section 2.3.

Such training should also provide information for compliance with any Federal, State, or Local Code requirements, and existing plant / site 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 B30.11 Safety Standard for Monorails and Underhung Cranes

ASME B30.17 Safety Standard for Overhead and Gantry Cranes, Top Running Bridge, Single Girder, Underhung Hoist

☞ NOTE: 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.

☞ NOTE: 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, ***STAGEMAKER***® Concert 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, user, and operating personnel.

Only those Authorized and Qualified Personnel who have shown that they have read and have understood this manual and the ***STAGEMAKER®*** Concert Electric Chain Hoist Operator's Manual should be permitted to operate the hoist.

The owner / user SHALL ensure that all operators read and understand the ***STAGEMAKER®*** Concert 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 ***STAGEMAKER®*** Concert 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

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 the user / owner and shall be determined or verified by qualified personnel.

Read the instructions contained in this manual and the ***STAGEMAKER®*** Concert 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. The load chain requires lubrication prior to first use. Chain lubricant is included with shipment of each new chain hoist.

2.3 Mounting

*Figure 1. Basic Mounting Positions for **STAGEMAKER**® Concert Hoists*

INVERTED
(usually associated with a temporary installation)

NORMAL
(usually associated with a permanent installation)

WARNING:

Do not use hoist to lift people or suspend loads over people.

Do not leave a freely suspended load on hoist unattended.

A suspended load must always be tied off using appropriate chains, cables or other redundant load bearing means before access to the area beneath the load is permitted(1).

Failure to do so could result in property damage, death or serious injury to personnel.

(1) If the load cannot be tied off due to the nature of the application, redundancies and/or advanced safety features, including but not limited to multiple/redundant hoists, dual brakes on the hoist, a minimum ten to one safety factor on load bearing components, load monitoring devices, etc. used either individually or, as circumstances dictate, in conjunction with one another, must be incorporated into the design of the system.

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 gauge be made to provide a quick visual inspection for a bent hook as required during routine inspections. See section 6.13 for more detailed hook information.

3 ELECTRICAL CONNECTIONS & DIAGRAMS

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 / name plate.

CAUTION: Make sure that fuses and other current overload devices are in place to protect the hoist.

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 brakes and controls.

CAUTION: Do not use power supply cables with solid conductors.

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.

3.1 Control Circuit Fuses

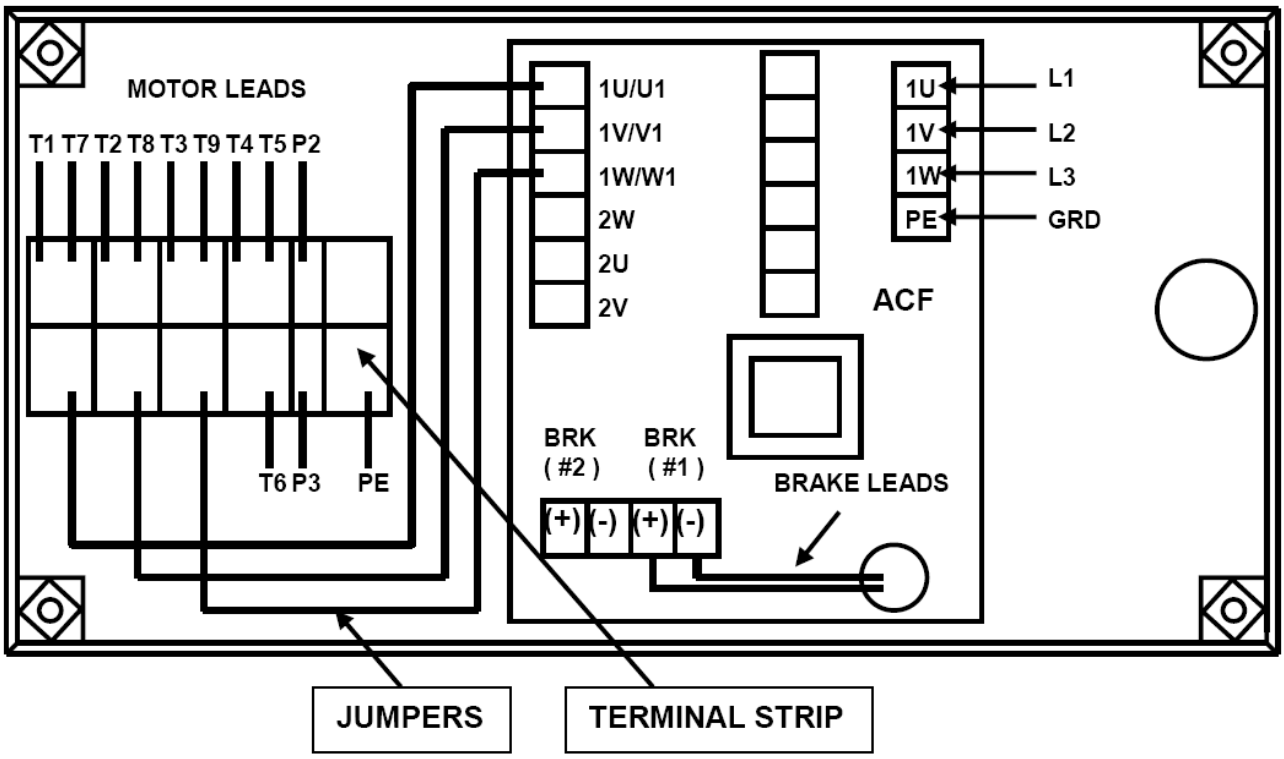
Table 1. Control Circuit Fuses

POWER SUPPLY	CONTROL VOLTAGE	FUSE SIZE		
		208V	230V	460V
3 – PHASE	115 VAC	500 mA	500 mA	500 mA
3 – PHASE	48 VAC	630 mA	630 mA	630 mA

3.2 Configuration A – Single-speed – 208 or 230 Volt Connections

Configuration A utilizes direct connection of a three-phase 208 or 230 volt main power supply to the hoist motor leads via a terminal strip. A motor brake rectifier circuit board (ACF) is provided to operate the D.C. hoist motor brake assembly.

Figure 2. Configuration A Connection Diagram



The above connection diagram shows the connection of the single-speed motor windings to the brake control board. The brake coil supply voltage from the AFC brake control card is 90 - 100 volts DC for 208/230 Volt power supply.

3.3 Configuration A – Pigtail Pin-out Connections – R&M Standard

Table 2. POWER ONLY – PIGTAIL WITH PLUG – CONFIGURATION A

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	MALE CE PLUG BLUE (ME420P9) PIN NUMBER	TWIST LOCK MALE PLUG (L16-20P) 3 POLE + GRD
BLACK	L1	L1	X
WHITE	L2	L2	Y
RED	L3	L3	Z
GREEN	PE (GROUND)	PE (GROUND)	G

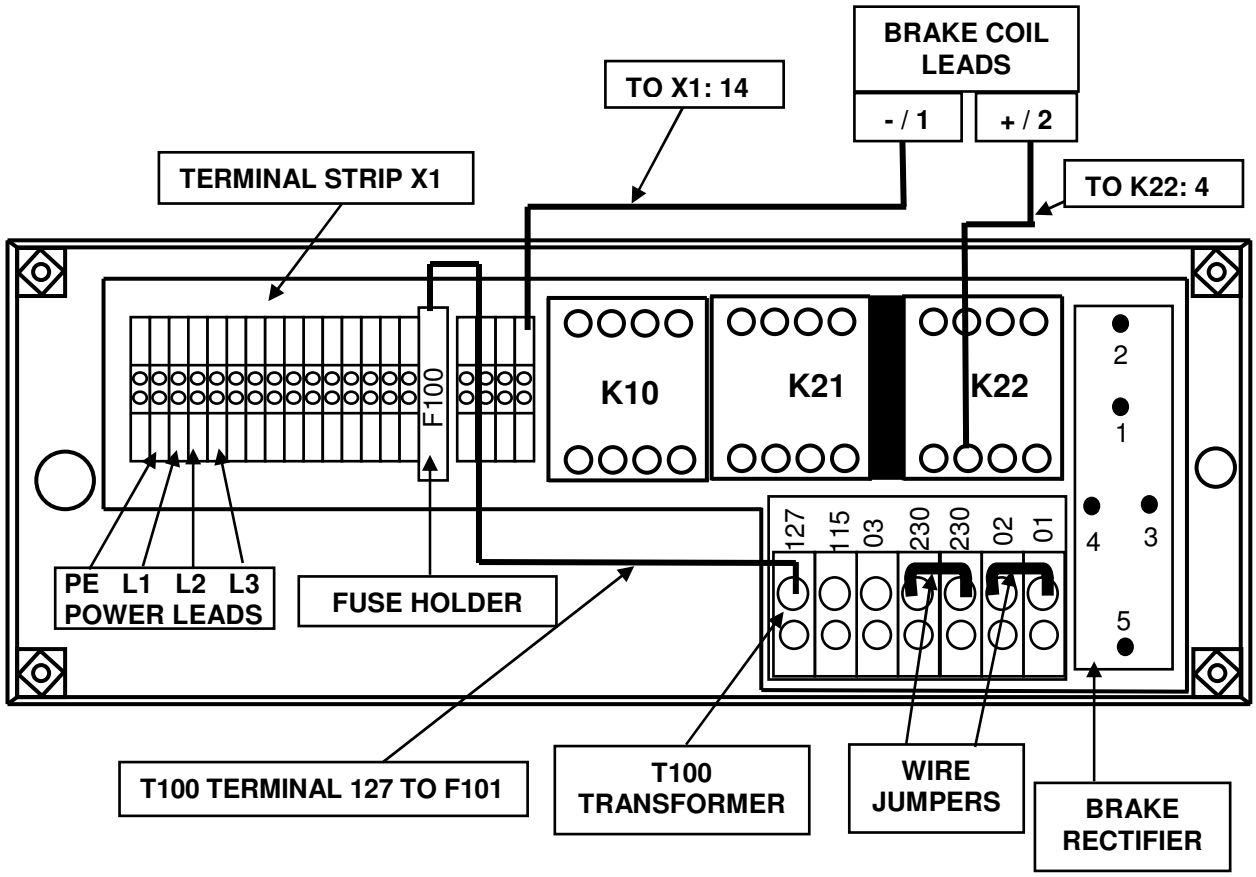
Table 3. WIRING DIAGRAM LABELS – CONFIGURATION A

CODE	DESCRIPTION
L1	POWER SUPPLY – PHASE ONE
L2	POWER SUPPLY – PHASE TWO
L3	POWER SUPPLY – PHASE THREE
PE	GROUND
(-)	MOTOR BRAKE COIL SUPPLY – VOLTS DC
(+)	MOTOR BRAKE COIL SUPPLY – VOLTS DC
T1 thru T9	MOTOR LEADS
P2, P3	THERMAL PROTECTION SWITCH LEADS

CAUTION: The above pin-out connections reflect R&M's standard connections. There are no industry standards for the above pin connections. Always check the wiring of any equipment before applying power.

3.4 Configuration B – Single-speed – 208 Volt Connections

Figure 3. Configuration B Connection Diagram – 208V



VERIFY 208 VOLT CONNECTIONS AS FOLLOWS:

BRAKE LEAD NUMBER 1 (-) TO TERMINAL X1: 14

BRAKE LEAD NUMBER 2 (+) TO K22 TERMINAL 4

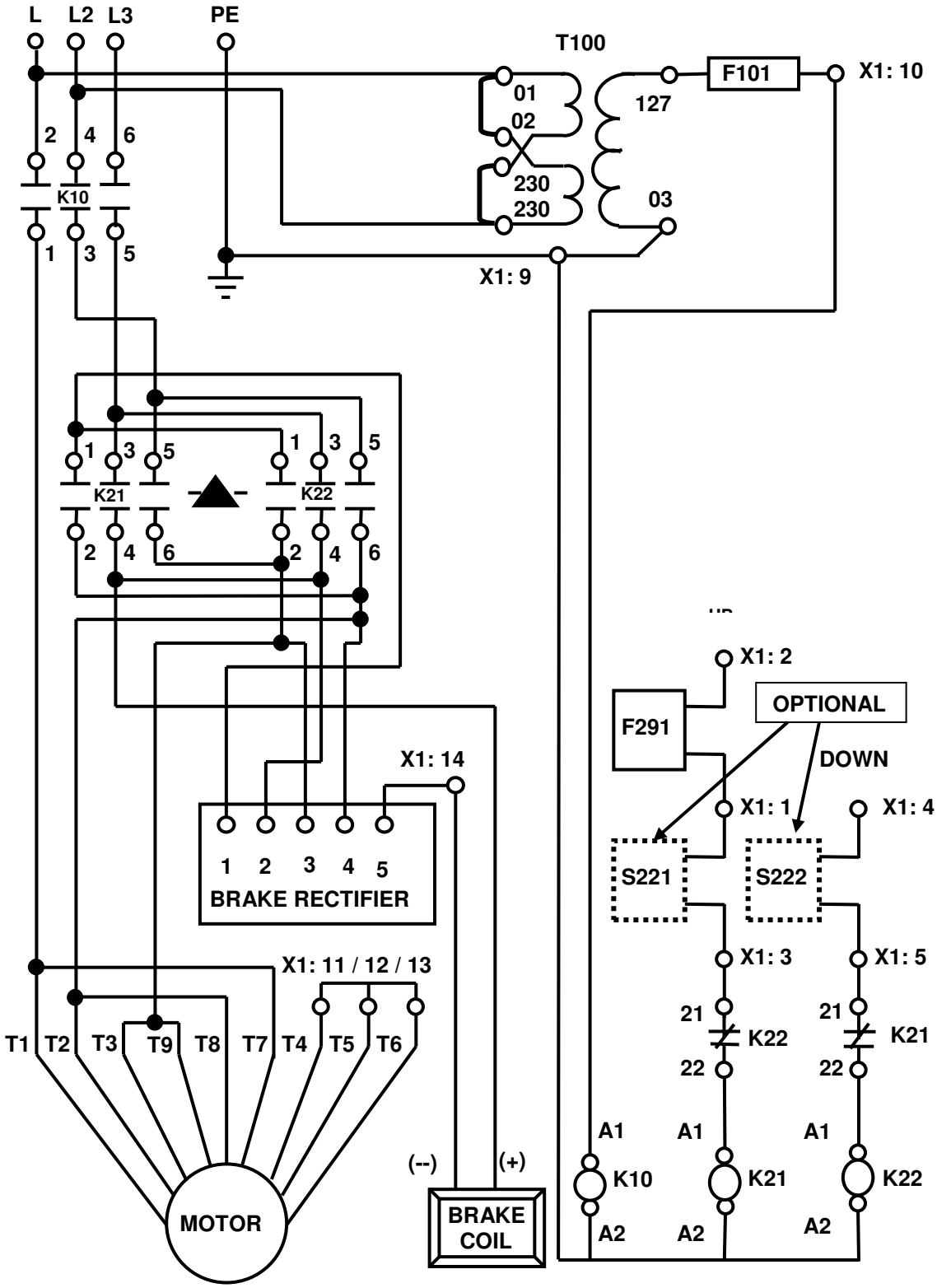
CONTROL TRANSFORMER SUPPLY TERMINAL 127 TO FUSE F100

CONTROL TRANSFORMER JUMPERS ON T100 PER ABOVE LAYOUT

MOTOR LEADS T1 THRU T9 PER 208 VOLT WIRING DIAGRAM

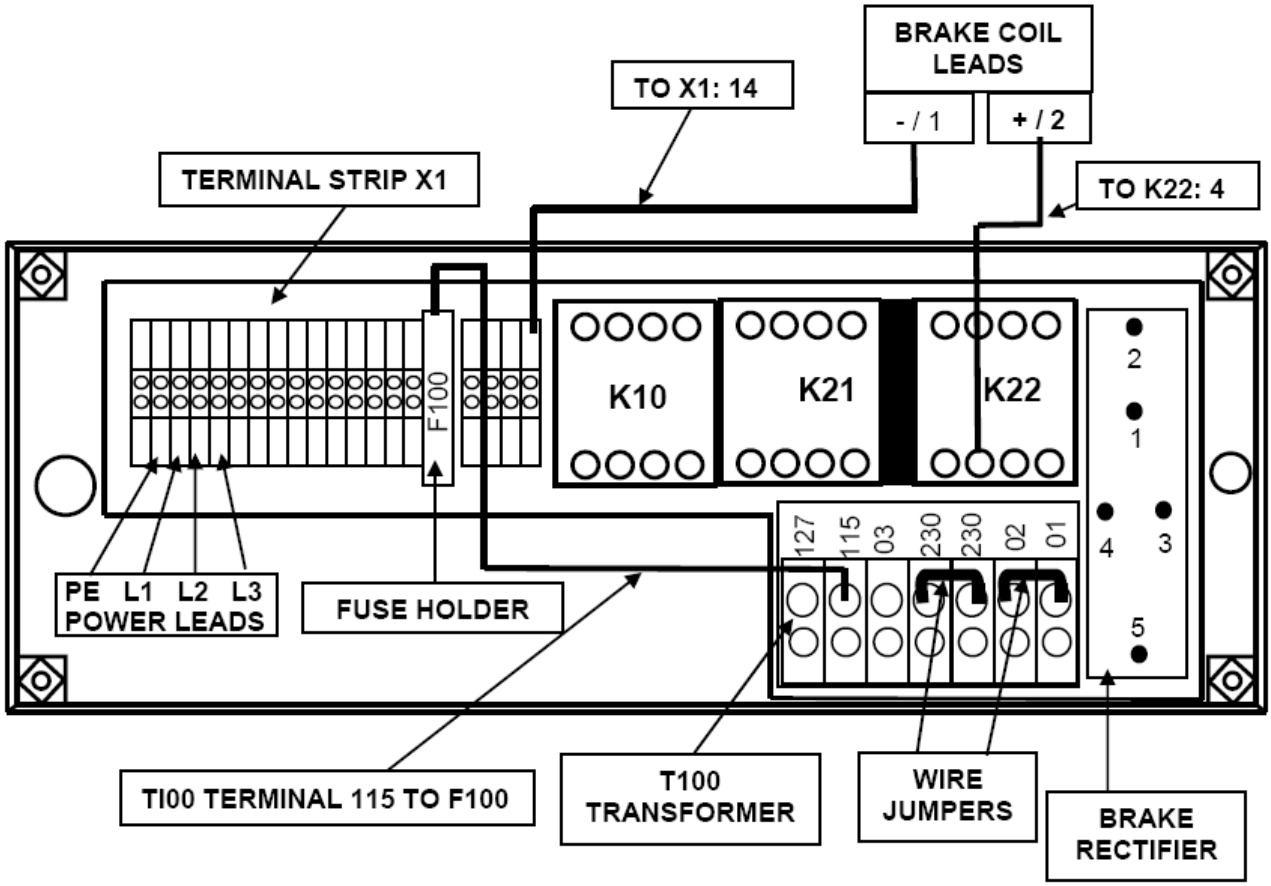
3.5 Configuration B – Single-speed – 208 Volt Wiring Diagram

Figure 4. Configuration B Wiring Diagram – 208V



3.6 Configuration B – Single-speed – 230 Volt Connections

Figure 5. Configuration B Connection Diagram – 230V

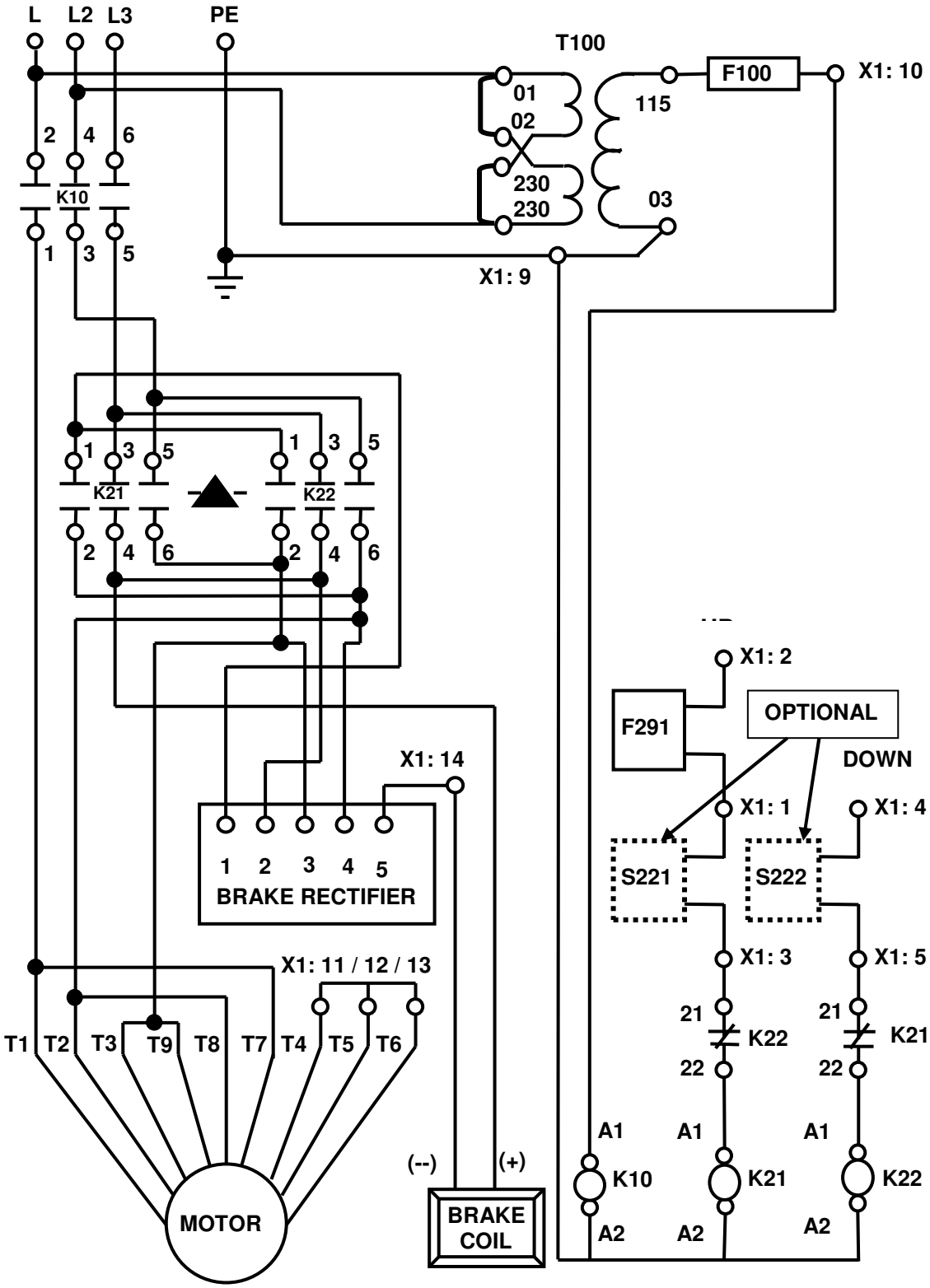


VERIFY 230 VOLT CONNECTIONS AS FOLLOWS:

1. **BRAKE LEAD NUMBER 1 (-) TO TERMINAL X1: 14**
2. **BRAKE LEAD NUMBER 2 (+) TO K22 TERMINAL 4**
3. **CONTROL TRANSFORMER SUPPLY TERMINAL 115 TO FUSE FI00**
4. **CONTROL TRANSFORMER JUMPERS ON T100 PER ABOVE LAYOUT**
5. **MOTOR LEADS T1 THRU T9 PER 230 VOLT WIRING DIAGRAM**

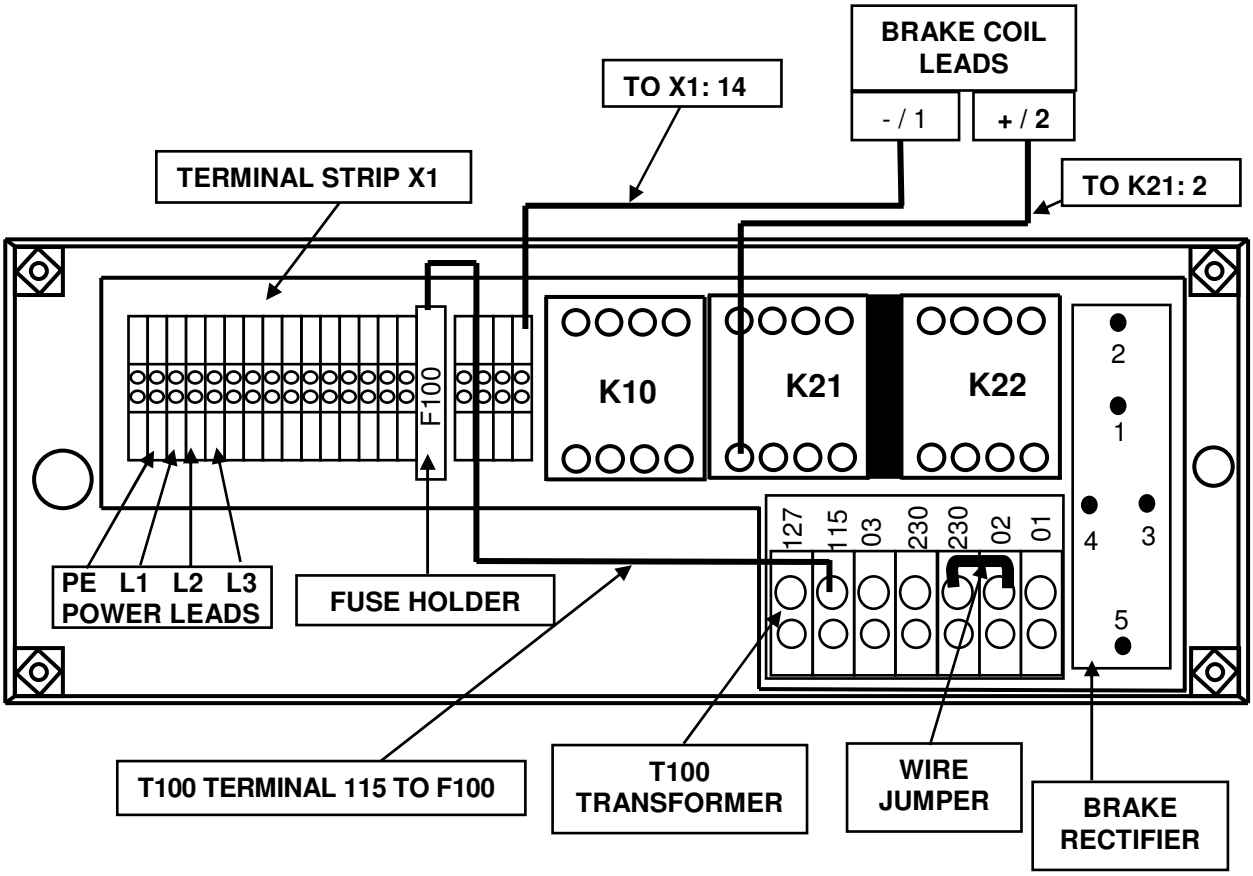
3.7 Configuration B – Single-speed – 230 Volt Wiring Diagram

Figure 6. Configuration B Wiring Diagram – 230V



3.8 Configuration B – Single-speed – 460 Volt Connections

Figure 7. Configuration B Connection Diagram – 460V

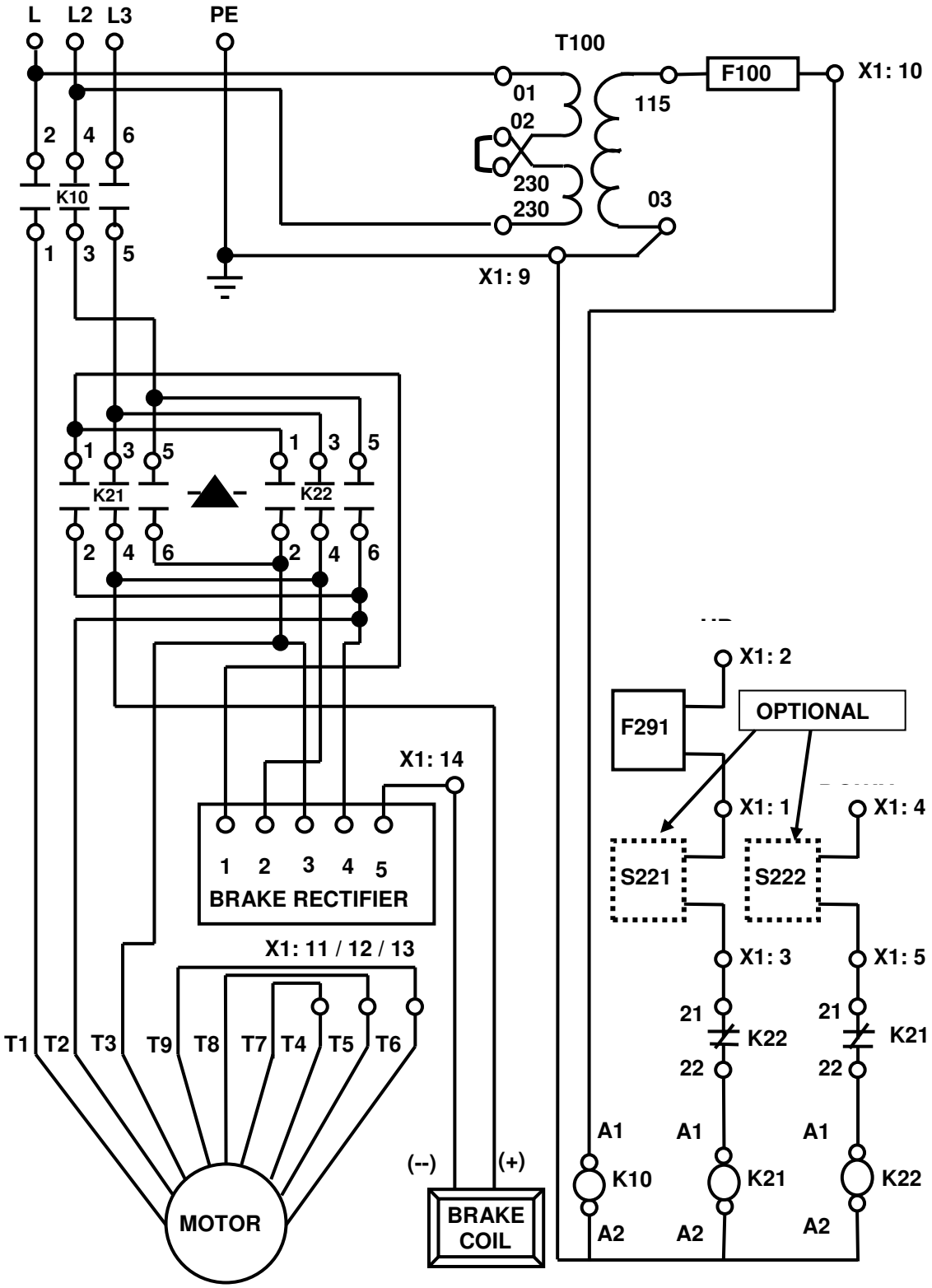


VERIFY 460 VOLT CONNECTIONS AS FOLLOWS:

1. **BRAKE LEAD NUMBER 1 (-) TO TERMINAL X1: 14**
2. **BRAKE LEAD NUMBER 2 (+) TO K21 TERMINAL 2**
3. **CONTROL TRANSFORMER SUPPLY TERMINAL 115 TO FUSE F100**
4. **CONTROL TRANSFORMER JUMPERS ON T100 PER ABOVE LAYOUT**
5. **MOTOR LEADS T1 THRU T9 PER 460 VOLT WIRING DIAGRAM**

3.9 Configuration B – Single-speed – 460 Volt Wiring Diagram

Figure 8. Configuration B Wiring Diagram - 460V



3.10 Configuration B – Wiring Diagram Labels

Table 4. Configuration B Wiring Diagram Labels

CODE	DESCRIPTION
A1	CONTROL VOLTAGE SUPPLY TO CONTACTOR COIL
A2	CONTROL VOLTAGE SUPPLY TO CONTACTOR COIL
F291	MOTOR THERMAL PROTECTION SWITCH
L1	POWER SUPPLY – PHASE ONE
L2	POWER SUPPLY – PHASE TWO
L3	POWER SUPPLY – PHASE THREE
PE	GROUND
(-)	MOTOR BRAKE COIL SUPPLY – VOLTS DC
(+)	MOTOR BRAKE COIL SUPPLY – VOLTS DC
T1 thru T9	MOTOR LEADS
K10	MAIN LINE CONTACTOR
K21	UP CONTACTOR
K22	DOWN CONTACTOR
T100	CONTROL TRANSFORMER
F100	CONTROL CIRCUIT FUSE – 230 VOLT OR 460 VOLT
F101	CONTROL CIRCUIT FUSE – 208 VOLT ONLY
S221	TRAVEL SAFETY LIMIT SWITCH: UP – OPTIONAL
S222	TRAVEL SAFETY LIMIT SWITCH: DOWN – OPTIONAL
X1 – 1	TERMINAL STRIP – CONTROL VOLTAGE SUPPLY – HOT
X1 – 2	TERMINAL STRIP – HOIST UP CONNECTION
X1 – 3	TERMINAL STRIP – HOIST DOWN CONNECTION
X1 – 4	TERMINAL STRIP – HOIST FAST CONNECTION - (NOT IN USE)
X1 – 9	TERMINAL STRIP – CONTROL VOLTAGE NEUTRAL
X1 – 30, 31	TERMINAL STRIP – MOTOR THERMAL CONNECTIONS
X1 – 21, 22	TERMINAL STRIP – UPPER LIMIT SWITCH CONNECTIONS
X1 – 23, 24	TERMINAL STRIP – LOWER LIMIT SWITCH CONNECTIONS
X5	MOTOR LEAD JUNCTION TERMINAL STRIP
X6	CONTROL TRANSFORMER TERMINAL STRIP
X7	MOTOR BRAKE COIL TERMINAL STRIP
X23	OPTIONAL CONTROL PLUG CONNECTION
X24	OPTIONAL TROLLEY SUPPLY CONNECTION

3.11 Configuration B – Pigtail Pin-out Connections – R&M Standard

Table 5. POWER ONLY – PIGTAIL WITH PLUG

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	TWIST LOCK MALE PLUG (L16-20P) 3 POLE + GRD
BLACK	L1	X
WHITE	L2	Y
RED	L3	Z
GREEN	PE (GROUND)	G

Table 6. CONTROL ONLY – PIGTAIL WITH PLUG

WIRE COLOR AWG 16 – 7 COND	CONTROL PANEL CONNECTIONS	TWIST LOCK FEMALE RECEPTACLE (L14-20R) 3 POLE + GRD
ORANGE	UP	W
BLUE	COMMON	X
BLACK on WHITE	DOWN	Y
GREEN	GROUND	G

Table 7. POWER & CONTROL – 7 PIN – PIGTAIL WITH PLUG

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	MALE PLUG - SOCAPEX 7 PIN (SX07LF) PIN NUMBER
BLACK	L1	1
WHITE	L2	2
RED	L3	3
BLACK on White	DOWN	4
GREEN	PE (GROUND)	5
ORANGE	UP	6
BLUE	COMMON	7

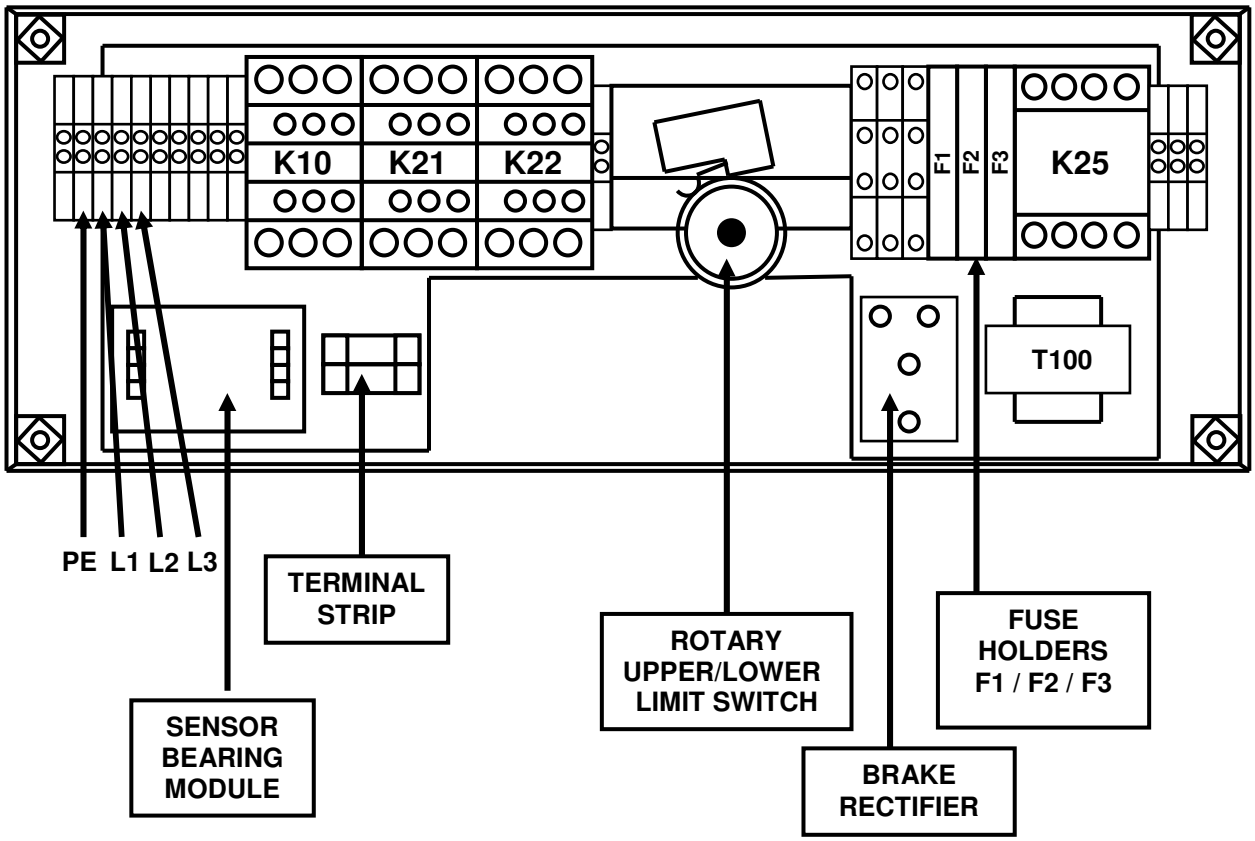
Table 8. POWER & CONTROL – 14 PIN – PIGTAIL WITH PLUG

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	MALE PLUG - 14 PIN PIN NUMBER
BLACK	L1	1
WHITE	L2	2
RED	L3	3
ORANGE	UP	4
BLACK on WHITE	COMMON	5
BLUE	DOWN	6
-------	-------	7
-------	-------	8
-------	-------	9
-------	-------	10
-------	-------	11
-------	-------	12
-------	-------	13
GREEN	PE (GROUND)	14

CAUTION: The above pin-out connections reflect R&M's standard connections. There are no industry standards for the above pin connections. Always check the wiring of any equipment before applying power.

3.12 Configuration C – Single-speed – 230 Volt Connections

Figure 9. Configuration C Connection Diagram – 230V



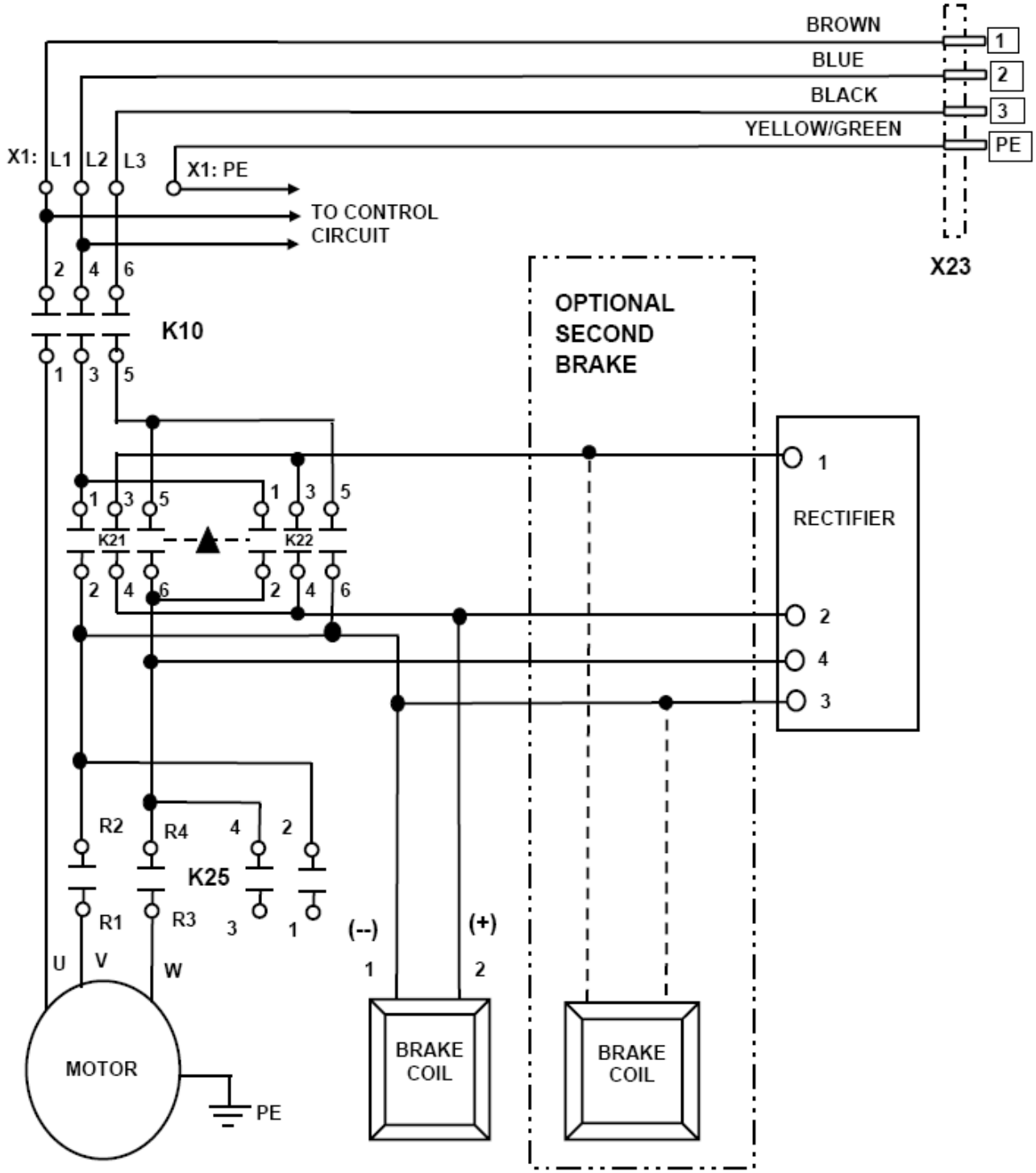
SENSOR BEARING:

MAX. SUPPLY CURRENT 50mA
SUPPLY VOLTAGE 11 - 30V
MAX. MODULATION 500mV
MAX. CURRENT 100Ma

TYPE GHT406593R

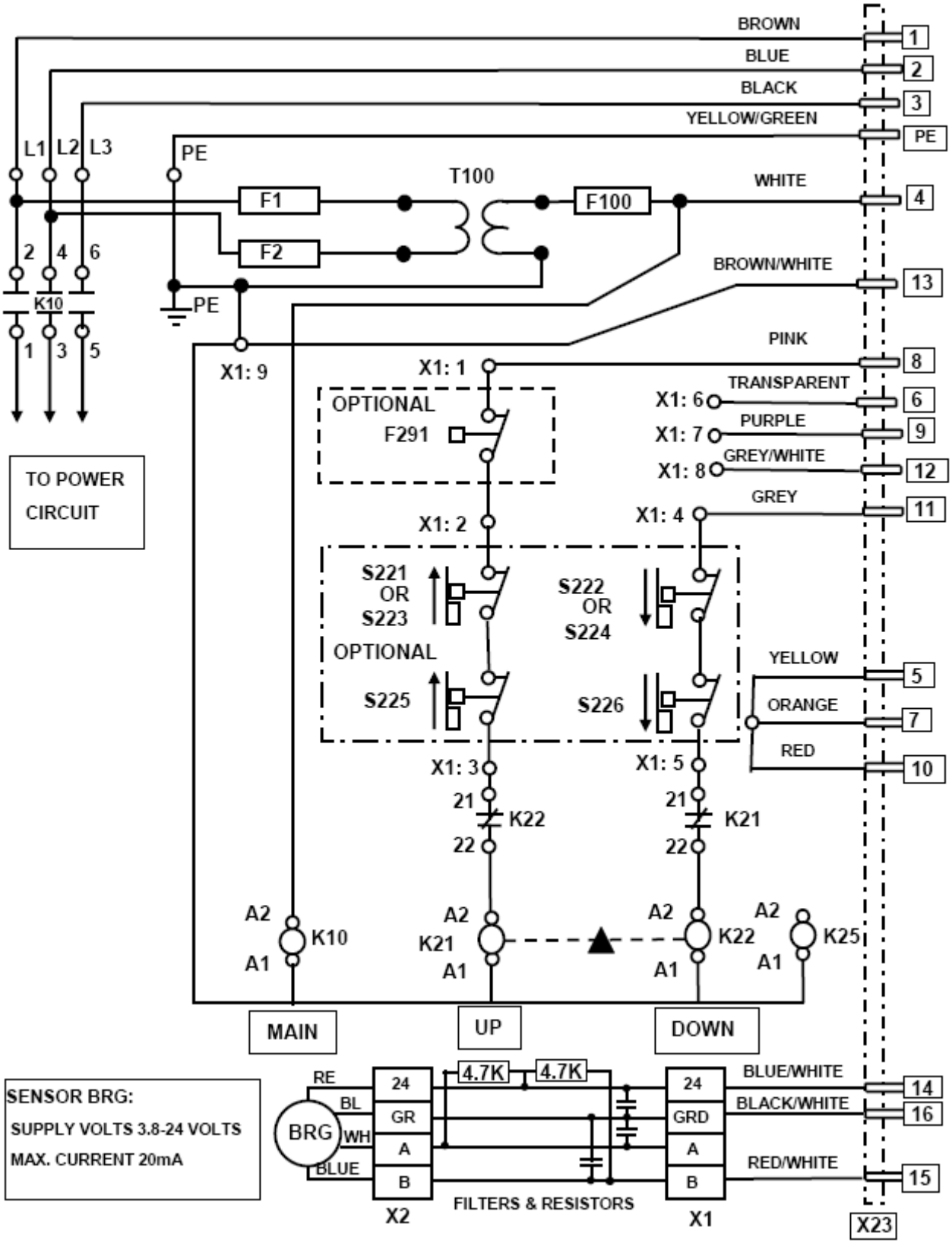
3.13 Configuration C – Single-Speed – 230V Wiring Diagram (Power Circuit)

Figure 10. Configuration C Wiring Diagram – 230V



3.14 Configuration C – Single-speed – 230V Wiring Diagram (Control Circuit)

Figure 11. Configuration C Wiring Diagram – 230V



3.15 Configuration C – Wiring Diagram Labels

Table 9. Configuration C Wiring Diagram Labels

CODE	DESCRIPTION
L1	POWER SUPPLY – PHASE ONE
L2	POWER SUPPLY – PHASE TWO
L3	POWER SUPPLY – PHASE THREE
PE	GROUND
(+)	MOTOR BRAKE COIL SUPPLY – VOLTS DC
T1 thru T9	MOTOR LEADS
K10	MAIN LINE CONTACTOR
K21	UP CONTACTOR
K22	DOWN CONTACTOR
K25	FAST CONTACTOR (NOT IN USE WITH SINGLE SPEED)
T100	CONTROL TRANSFORMER
F1 thru F3	CONTROL CIRCUIT FUSES
F291	MOTOR THERMAL PROTECTION DEVICE
S221	ROTARY GEARED UP LIMIT SWITCH
S222	ROTARY GEARED DOWN LIMIT SWITCH
A1	POWER SIDE OF CONTACTOR COIL
A2	NEUTRAL SIDE OF CONTACTOR COIL
X1: 1	TERMINAL STRIP – HOIST UP CONNECTION
X1: 2	TERMINAL STRIP – THERMAL PROTECTION
X1: 3	TERMINAL STRIP – UP LIMIT SWITCH CONNECTION
X1: 4	TERMINAL STRIP – HOIST DOWN CONNECTION
X1: 5	TERMINAL STRIP – DOWN LIMIT SWITCH CONNECTION
X1: 6	TERMINAL STRIP
X1: 7	TERMINAL STRIP
X1: 8	TERMINAL STRIP
X1: 9	TERMINAL STRIP – CONTROL NEUTRAL
X1: 10	TERMINAL STRIP – CONTROL VOLTAGE SUPPLY

3.16 Configuration C – Pigtail Pin-out Connections – R&M Standard

Table 10. CONTROL ONLY – PIGTAIL WITH PLUG

WIRE COLOR AWG 16 – 7 COND	CONTROL PANEL CONNECTIONS	TWIST LOCK FEMALE RECEPTACLE (L14-20R) 3 POLE + GRD
ORANGE	UP	W
BLUE	COMMON	X
BLACK on WHITE	DOWN	Y
GREEN	GRD	G

Table 11. POWER & CONTROL – 16 PIN – PIGTAIL WITH PLUG

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	MALE PLUG – HARTING 16 PIN PIN NUMBER
BLACK 1	L1	1
WHITE 1	L2	2
RED 1	L3	3
WHITE 2	COMMON	4
-------	-------	5
-------	-------	6
-------	-------	7
RED 2	UP	8
-------	-------	9
-------	-------	10
BLACK 2	DOWN	11
-------	-------	12
RED 3	0 VOLTS	13
WHITE 3	+24VDC	14
BLACK 3	ENCODER B	15
GREEN	GROUND VDC	16
GREEN	PE (GROUND)	PE

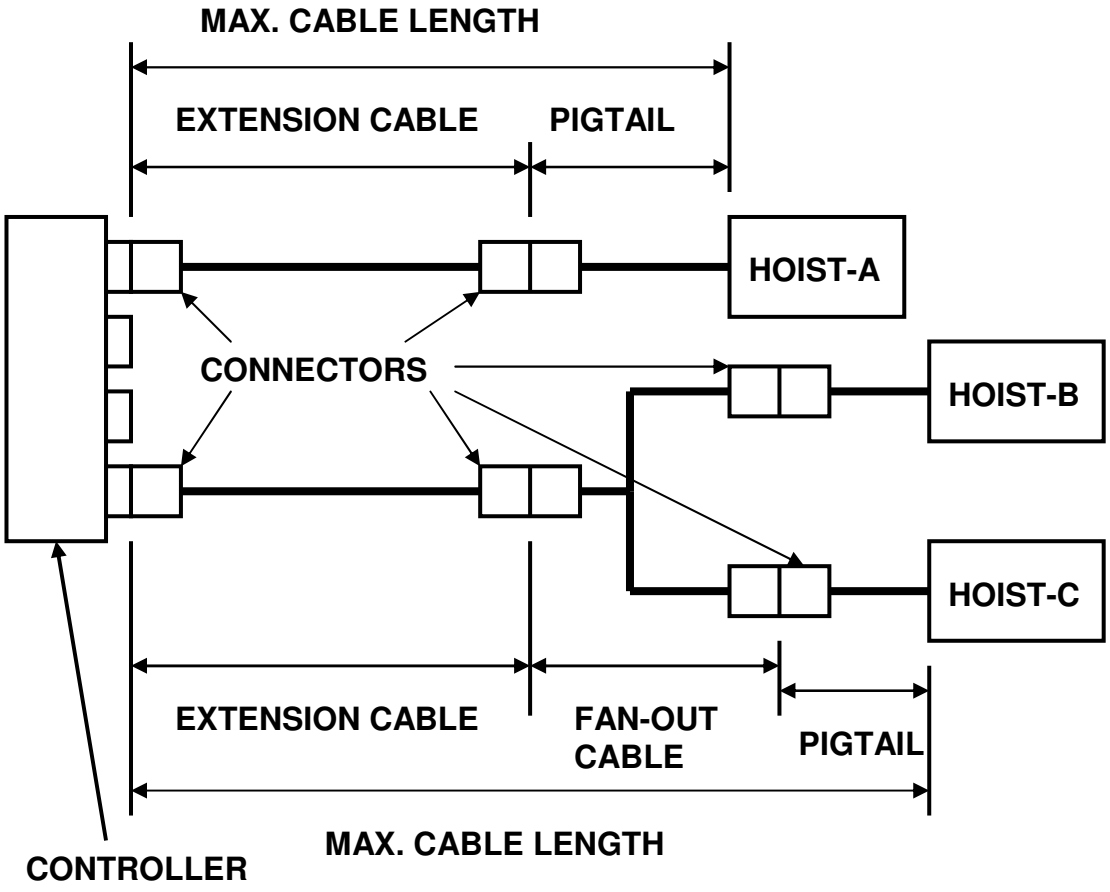
Table 12. POWER & CONTROL –19 PIN – PIGTAIL WITH PLUG

WIRE COLOR AWG 12 – 4 COND	CONTROL PANEL CONNECTIONS	MALE PLUG – SOCAPEX 19 PIN PIN NUMBER
BLACK 1	L1	1
WHITE 1	L2	2
RED 1	L3	3
WHITE 2	COMMON	4
RED 4		5*
-------	-------	6
WHITE 4		7*
RED 2	UP	8
-------	-------	9
BLACK 4		10*
BLACK 2	DOWN	11
GREEN 3	ENCODER A	12
RED 3	0 VOLTS	13
WHITE 3	+24VDC	14
BLACK 3	ENCODER B	15
GREEN 1	GROUND VDC	16
GREEN 4	PE (GROUND)	17
-------	-------	18
-------	-------	19
*PINS 5, 7, AND 10 NEED TO BE JUMPERED ON THE TERMIAL STRIP IN THE HOIST		

CAUTION: The above pin-out connections reflect R&M's standard connections. There are no industry standards for the above pin connections. Always check the wiring of any equipment before applying power.

3.17 Cable Assemblies

Figure 12. Cable Assemblies



CABLE SYSTEMS

CAUTION: The above cable systems schematic should be used in estimating the total connected length. This length should be compared to the maximum allowable in the following tables.

Table 13. Maximum Cable Lengths

SM10-208V CABLE SYSTEM	MAXIMUM CABLE LENGTH – FEET ---------- [MAXIMUM NOMINAL CURRENT – AMPS]		
	12AWG	14AWG	16AWG
ONE HOIST (HOIST: A)	58 FEET [7.8 AMPS]	36 FEET [7.8 AMPS]	23 FEET [7.8 AMPS]
TWO HOISTS (HOISTS: B+C)	29 FEET [7.8 AMPS]	----------	----------
NOTE: IF ANY CIRCUIT HAS TWO (2) WIRE SIZES, USE SMALLER WIRE SIZE VALUES			

SM10-230V CABLE SYSTEM	MAXIMUM CABLE LENGTH – FEET ---------- [MAXIMUM NOMINAL CURRENT – AMPS]		
	12AWG	14AWG	16AWG
ONE HOIST (HOIST: A)	74 FEET [7.2 AMPS]	46 FEET [7.2 AMPS]	29 FEET [7.2 AMPS]
TWO HOISTS (HOISTS: B+C)	37 FEET [7.2 AMPS]	23 FEET [7.2 AMPS]	----------
NOTE: IF ANY CIRCUIT HAS TWO (2) WIRE SIZES, USE SMALLER WIRE SIZE VALUES			

4 INITIAL START-UP

WARNING: Before connecting power to hoist, check all control buttons / switches to make sure that they operate freely without binding or sticking. Check power and control cables to ensure that they are not damaged.

4.1 General

Initial start-up procedures are as follows:

- Read all attached WARNING tags and placards affixed to hoist.
- Oil the 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 3 feet [91.4 cm] 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 the respective control button that is depressed. That is, does load hook (normal position) or hoist body (inverted position) travel **"UP"** when **UP BUTTON** is depressed? If OK, continue. If not, proceed to section 4.2.
- Perform no-load operational checks as described in section 4.3
- Run test with load as described in section 4.4.

4.2 Correcting the Direction of Hook Travel

WARNING: DO NOT change <u>control</u> leads in controllers or control leads at motor relays. DO NOT change nameplates on control assemblies. The limit switch (if provided) is wired in series with "UP" control circuit as furnished from factory. Changing 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.
- Use the phase reverse button when supplied with controller.

4.3 Operational Checks – No Load

- Check hoist motor brake function. Run hoist (if inverted position) or empty load hook (if normal position) up or down to check that load hook/hoist does not drift more than 1.0 inch [25mm]. If so, adjust brake as described in Section 6.
- Run hoist (if inverted position) or empty load hook (if normal position) down to check that fall stop (located on free end of load chain) makes proper contact with limit switch or hoist body and that limit switch or slip clutch functions properly. Note – limit switches are not provided for inverted position use.
- Run hoist (if inverted position) or empty load hook (if normal position) up to check that fall stop (located on free end of load chain) makes proper contact with limit switch or hoist body and that limit switch or slip clutch functions properly. Note – limit switches are not provided for inverted position use.
- Run empty load hook up and down several times while checking for proper tracking of load chain.

4.4 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.

5 HOIST OPERATION

For detailed information regarding the operational procedures and recommended safe operating practices for this hoist, please refer to the ***STAGEMAKER***® Concert Electric Chain Hoist Operator's Manual that was delivered with this hoist.

⚠ **WARNING: Before proceeding with the normal operation of this hoist, the operator(s) shall be trained in accordance with the *STAGEMAKER*® Concert Electric Chain Hoist Operator's Manual as supplied with this hoist.**

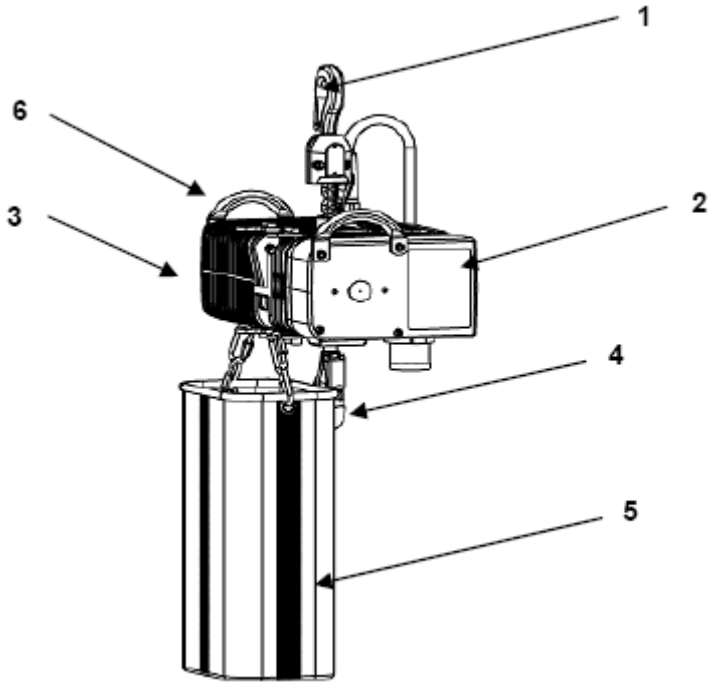
⚠ **WARNING: Failure to read and comply with any one of the limitations noted in this manual and the *STAGEMAKER*® Concert Electric Chain Hoist Operator's Manual furnished with this hoist can result in product failure, serious bodily injury or death, and / or property damage.**

⚠ **WARNING: Refer to section 1.0 of this manual for contact information if additional assistance is needed.**

6 MAINTENANCE

6.1 Basic Hoist Construction (Inverted Position)

Figure 13. Basic Hoist Construction (Inverted Position)

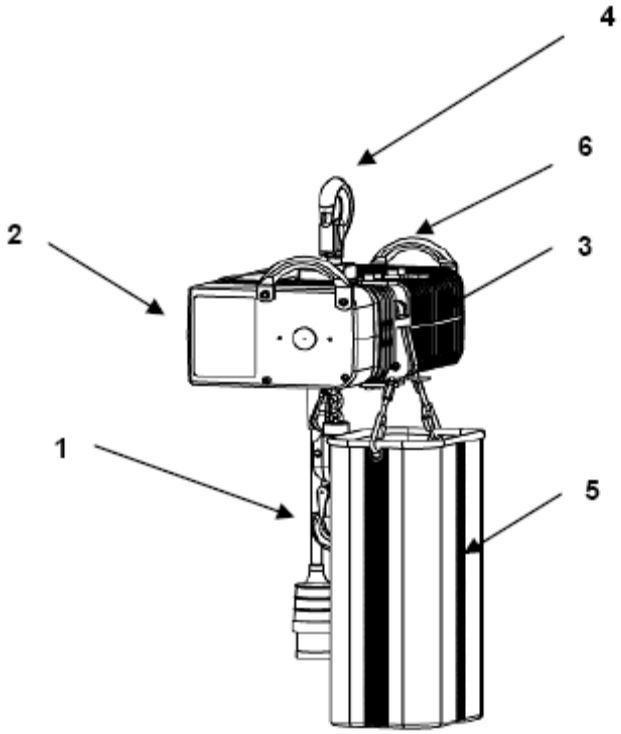


INVERTED POSITION

1. **SWIVEL LOAD HOOK ASSEMBLY**
2. **ELECTRICAL CONTROL ENCLOSURE**
3. **HOIST BODY / MOTOR**
4. **BODY HOOK ASSEMBLY**
5. **CHAIN CONTAINER AND HARDWARE**
6. **FLEXIBLE HANDLES**

6.2 Basic Hoist Construction (Normal Position)

Figure 14. Basic Hoist Construction (Normal Position)



NORMAL SUSPENSION

1. **SWIVEL LOAD HOOK ASSEMBLY**
2. **ELECTRICAL CONTROL ENCLOSURE**
3. **HOIST BODY / MOTOR**
4. **BODY HOOK ASSEMBLY**
5. **CHAIN CONTAINER AND HARDWARE**
6. **FLEXIBLE HANDLES**

6.3 Motor / Body

The hoist motors are designed to provide dependable hoisting service. The standard motors and control enclosures are enclosed for IP55 rated protection (NEMA 3R type) against normal hazards of dust and moisture. The motor bearings are sealed and do not require further greasing.

The hoist body is coated with epoxy paint and constructed of aluminum. Remove from service and replace the hoist body if damaged.

6.4 Hoist Motor Brake and Load-limiting Device

The hoist is equipped with a D.C. electromagnetic disc brake. The brake brings the load to a smooth and quick stop and holds the load when the motor is not energized. An energized coil releases the hoist brake.

A load-limiting device (slip clutch) 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.

6.5 Motor Brake Specifications

Table 14. Motor Brake Specifications

MAIN VOLTAGE	COIL VOLTAGE	SM10
208 or 230	90 - 100 VDC	320 OHMS
460	190 VDC	1100 OHMS

6.6 SM10 Motor Data – 60HZ MOTORS

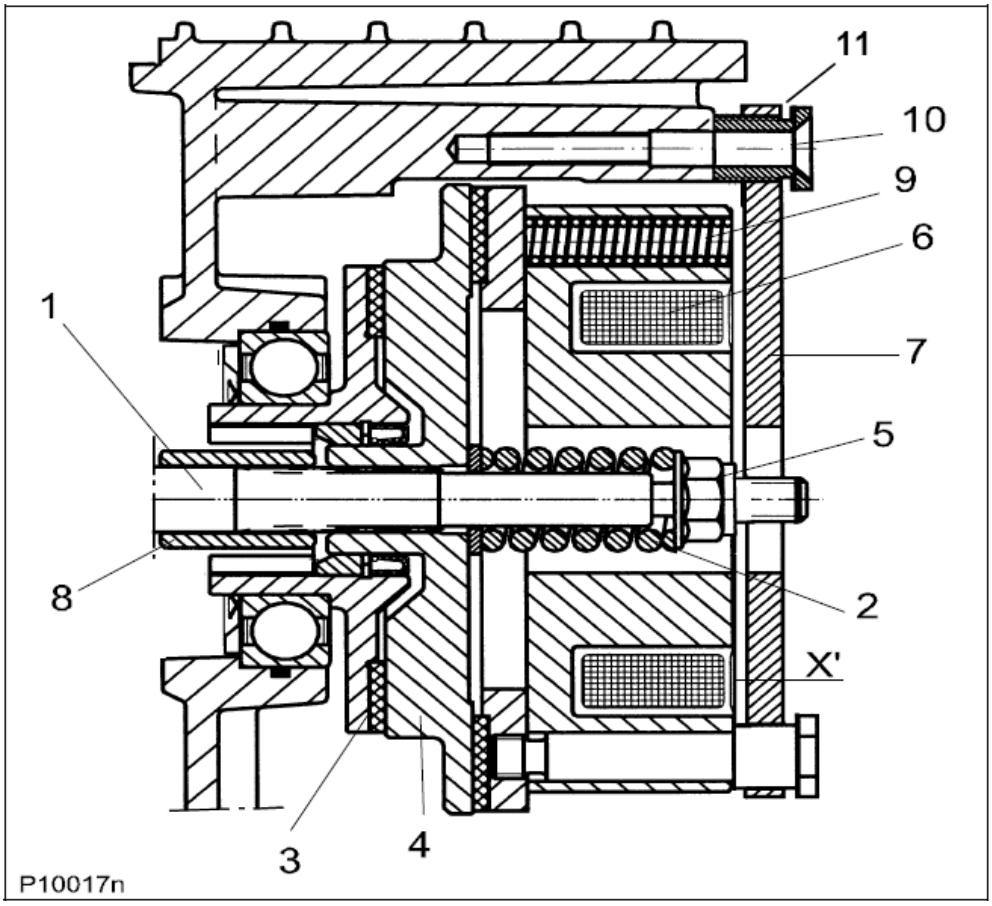
Table 15. SM10 Motor Data – 60Hz Motors

POWER SUPPLY	MOTOR TYPE	MOTOR RPM	HP	START AMPS	NOM. AMPS	NO LOAD AMPS	FIELD OHMS
208V / 3PH / 60HZ	SINGLE SPEED	3600	2.8	37.3	5.1	2.1	5.0
230V / 3PH / 60HZ	SINGLE SPEED	3600	2.8	33.8	8.6	3.6	2.9
460V / 3PH / 60HZ	SINGLE SPEED	3600	2.8	16.5	4.3	1.9	5.1
208V / 3PH / 60HZ	TWO SPEED	3600 / 900	2.8	38.9 / 13.2	8.28 / 5.52	3.4 / 5.7	3.3 / 11
230V / 3PH / 60HZ	TWO SPEED	3600 / 900	2.8	33.8 / 11	7.2 / 4.8	3.0 / 4.4	3.3 / 11
460V / 3PH / 60HZ	TWO SPEED	3600 / 900	2.8	16.5 / 5.5	3.5 / 2.2	1.6 / 2.2	10.6 / 46.4

SM10 HOIST WEIGHT (WITHOUT CHAIN)	CHAIN WEIGHT
113 LBS	0.726 LBS / FT

6.6.1 Slip Clutch Operation (see Figure 15)

Figure 15. Slip Clutch Adjustment



After the motor brake is energized and the motor is free to rotate to raise or lower the load, the slip clutch works as follows:

1. The slip clutch components are mounted on or around the motor shaft, item 1.
2. The motor shaft rotor, item 4, is connected to the motor shaft, item 1, by way of a spline connection.
3. Item 3, the friction rotor, is attached to the load sprocket gearing.
4. The contact area between item 3 and item 4 is the adjustable slip clutch friction surface.
5. Item 2, the slip clutch adjustment spring, pushes item 4 against item 3 to create the adjustable friction coupling between the load sprocket and the motor.
6. Increasing the pressure exerted by the spring, item 2, increases the amount of load that can be lifted by the motor and vice-versa.

Table 16. Slip Clutch and Motor Brake Assembly Parts List (see Figure 15)

ITEM	DESCRIPTION
1	MOTOR SHAFT
2	SLIP CLUTCH ADJUSTING SPRING
3	FRICTION ROTOR
4	MOTOR SHAFT ROTOR
5	SLIP CLUTCH ADJUSTING NUT
6	BRAKE COIL
7	STATIONARY BRAKE PLATE
8	GEAR PINION
9	BRAKE SPRING
10	BRAKE MOUNTING SCREW
11	BRAKE ADJUSTING NUT

SEE FIGURE 15

CAUTION: Make sure the motor is NOT running before placing a socket wrench on the adjusting nut, item 5, before making adjustments. Do not touch any moving components.

CAUTION: The slip-clutch generates heat when slipping. Items 3 & 4 absorb this heat. When these items become too hot, clutch adjustment may be difficult due to unstable behavior of friction surfaces. If this occurs, allow brake and 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.

6.6.2 Slip Clutch Adjustment after Installation

1. Hook a load of at least 110 percent but not more than 125 percent of nameplate capacity.
2. Remove plastic cap from inspection hole in brake cover casting.
3. Raise load at slow speed and fast speed to test slip clutch operation.
4. Insert a socket (13 mm) through inspection hole, and slide it over nut (item 5 - Figure 15).
5. Turn nut in required direction:
   - INCREASE CAPACITY - Turn nut clockwise to increase the torque.
   - DECREASE CAPACITY - Turn nut counterclockwise to decrease the torque AND then clockwise ¼ turn.
6. Repeat steps 3 and 4 until load can barely be lifted in fast speed.

⚠ **CAUTION: DO NOT OVERHEAT. If overheated, clutch may not adjust due to instability of friction surfaces.**

7. Once adjustment is completed, install plastic cap.
8. Check function of clutch at 100 percent of nameplate capacity while in fast speed.

☞ 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.

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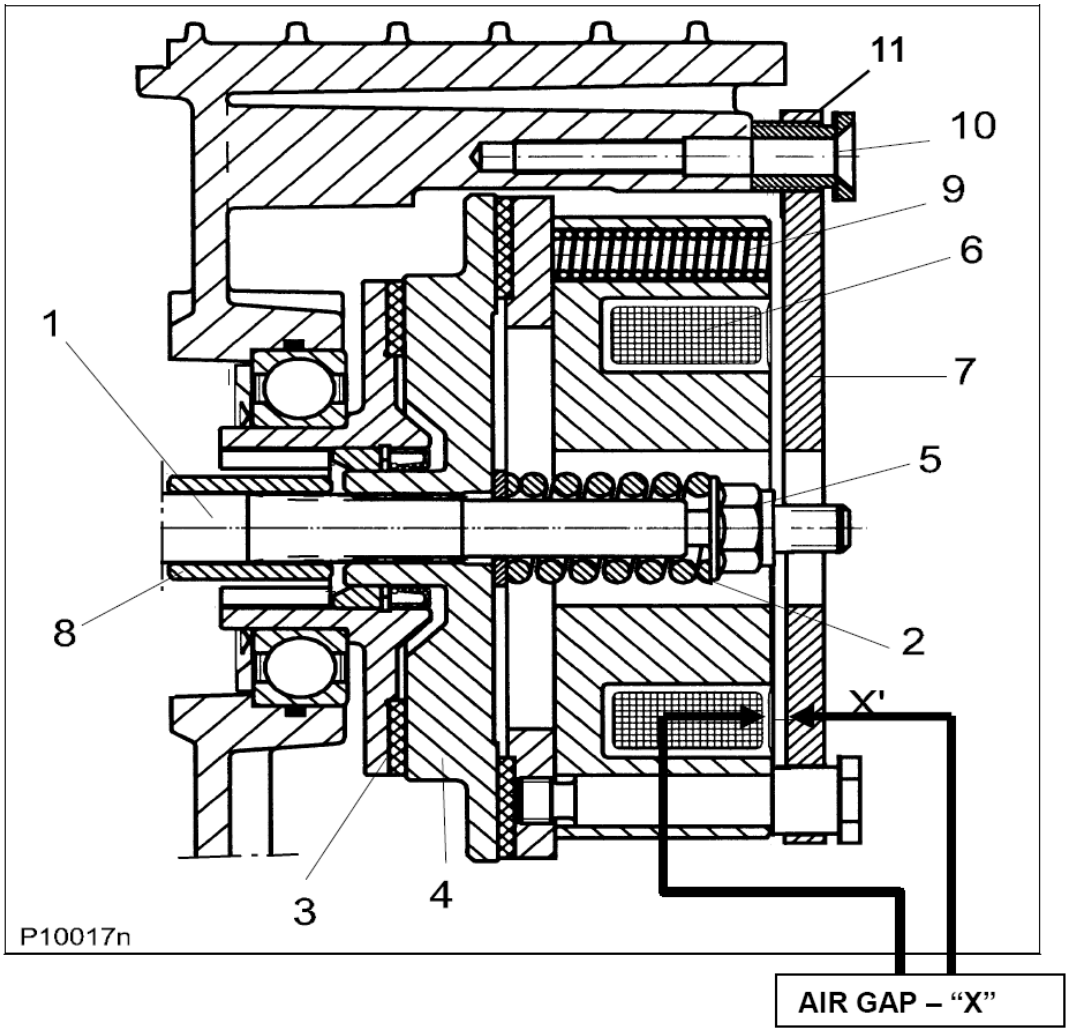
6.6.3 Hoist Motor Brake Adjustment

Figure 16. Hoist Motor Brake Adjustment



If the maximum air gap (item "X" - Figure 16) of the motor brake has been reached or will be exceeded before next inspection, re-adjust air gap.

Minimum air gap	Maximum air gap
X = 0.008" [0.2 mm]	X = 0.020" [0.5 mm]

Before adjusting brake, remove load. Per ANSI Z244.1, lockout and tag main disconnect switch in de-energized position. Follow other maintenance procedures outlined in this manual and ASME B30.16.

Table 17. Slip Clutch Settings

CONFIGURATION	A	B	C	D	E
SLIP CLUTCH SETTING AS: % RATED CAPACITY	125%	125%	125%	250%	125%

1. Remove brake cover casting and gasket.

2. With a feeler gauge 0.008", check three (3) places near each mounting bolts, ITEM 10. Measure air gap **(X)** between brake thrust disc, ITEM 7, and coil, ITEM 6. Note that brakes springs inside magnet assembly may interfere with feeler gauge insertion. Move along the gap until a space is available.

3. To adjust air gap use a 0.008" feeler gauge and proceed as follows:

   A. Slightly loosen (¼ turn) one of three motor brake mounting screws, ITEM 10.
   B. Use wrench and turn adjusting sleeve clockwise, ITEM 11, to reduce air gap, ITEM "X".
   C. Use feeler gauge to check air gap. Tighten until a snug, slip-fit is felt against feeler gauge.
   D. Tighten ITEM 10.
   E. Repeat for each of three mounting screws. Check gap beside each screw.
   F. After adjustment, check mounting screw tightness and air gap beside each screw.
   G. Remove all tools before making an operational check.

4. Check brake operation. Run hoist (inverted position) or load hook (normal position) up and down several times without a load to test operation of brake. Then, lift a capacity load about one foot above floor, stop, and check that brake holds load.
5. Install gasket and brake cover casting. Tighten all screws per torque settings in section 7.4.

6.7 Load Chain

Table 18. Hoist and Chain Weights

SM10 HOIST WEIGHT (WITHOUT CHAIN)	CHAIN WEIGHT
113 LBS	0.726 LBS / FT

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.

6.7.1 Load Chain Inspection

The hoist operator SHALL perform a visual inspection prior to first daily use. This inspection shall include the following:

- Wear or cracks of the links
- Twisted or deformed load chain
- Dirty or poor lubrication of load chain

A qualified person SHALL be designated to routinely conduct an in-depth inspection of load chain (see section 7 – Preventative Maintenance for schedule recommendations). This designated person SHALL inspect load chain using good judgment to evaluate 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.

NOTE: If load chain needs replacing, then inspect the chain guide and chain sprocket on hoist and idler sprocket in 2-fall load block (if supplied) 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.

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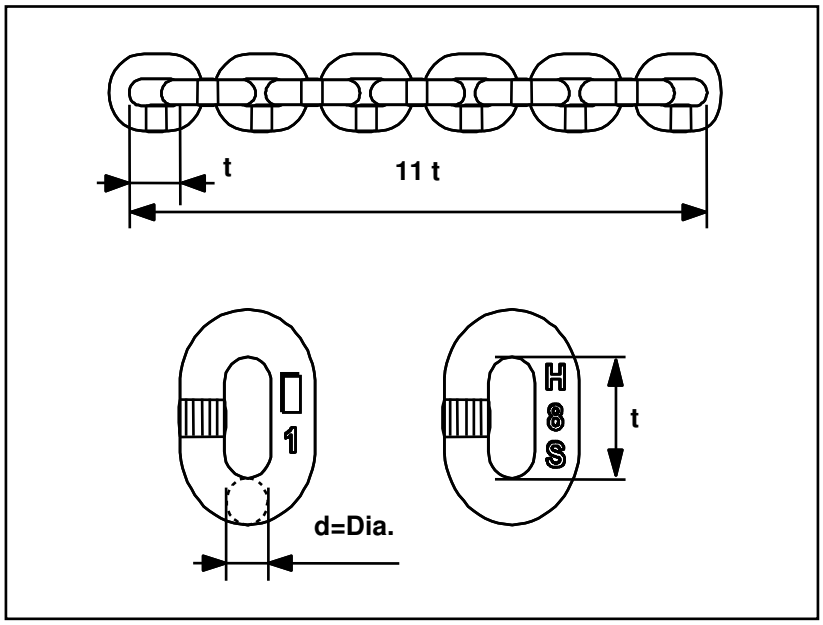
Figure 17. Load Chain Specifications



Measure the following chain dimensions at several points on chain (see Figure 17):

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

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

Maximum allowed wear:

Minimum link diameter allowed	(d):	0.240” [6.1 mm] MINIMUM
Maximum pitch allowed	(t):	0.736” [18.7 mm] MAXIMUM
Maximum length allowed	(11t):	7.862” [19.7 mm] MAXIMUM

6.7.2 Load Chain Specifications (see Figure 17)

Chain Feature:	Specification
Chain type:	Standard
Diameter (d) x pitch (t):	0.268” x 0.701” / (6.8 mm) x (17.8 mm)
Class:	DAT
Grade:	H8S or HE G80 RAS
Maximum working stress:	19,595 lbs/in^2 (135.1 N/mm^2)
Hardened surface:	580 or 700 HV (Vickers Hardness)
Surface treatment thickness:	0.006” (0.14 mm) to 0.011” (0.28 mm)
Standard:	DIN 5684 - 8
Marking (10 x t):	1 or 16
	H8S or A8
Maximum working load per one fall:	2200 lbs. (1000 kg)
Breaking load:	13,062 lbs (58 kN)
Maximum breaking stress:	116,030 lbs/in^2 (800 N/mm^2)
Total breaking elongation:	>10% min.
Weight for 100 links:	2.38 lbs. (1.08 kg)

6.7.3 Removing the Load Chain

1-FALL CHAIN

1. Remove load from load hook assembly or hoist body hook if inverted.
2. Remove load hook assembly from load chain. Some disassembly of 1-fall load hook assembly is required.
3. Attach the chain insert tool to the end of load hook assembly 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 the 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 load hook assembly or hoist body hook if inverted.
2. Run hoist in “UP” direction until load hook assembly is about 1.0 foot [30cm] from hoist body.
3. Unfasten load chain from chain anchor mounted on hoist body.
4. Remove load hook assembly from load chain by allowing chain to run through it. Attach the chain insertion tool to the load hook assembly 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.

6.7.4 Installing the Load Chain

Figure 18. Installing the Load Chain

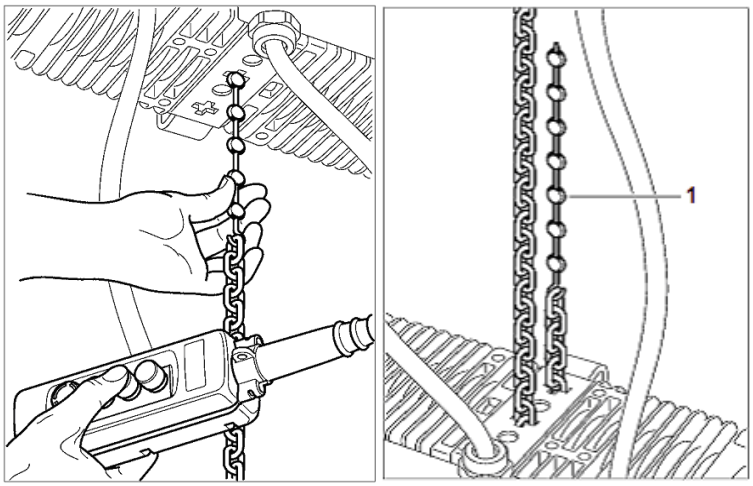
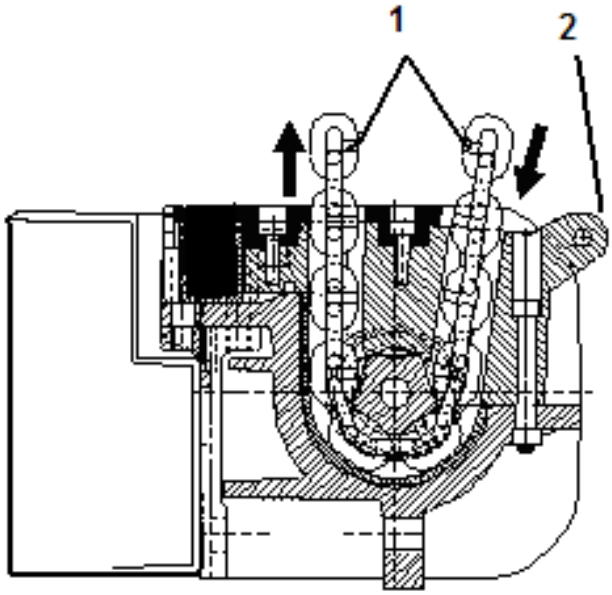


Figure 19. Load Chain Insertion



1-FALL CHAIN INSTALLATION

1. Attach last link of chain onto hook of CHAIN INSERTION TOOL (see Figure 18).
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.**

3. Run hoist "UP" in slow speed to feed chain through chain sprocket and out other side.
4. Attach fall stop at least 3 feet [91.4 cm] from end of chain (chain container side). Attach load hook assembly on other end of load chain. Refer to Figure 20 for details.
5. Make sure that load chain is not twisted or deformed.
6. Attach chain container. Lubricate chain.

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 (see Figure 18).
2. Insert other end of CHAIN INSERTION TOOL into chain opening closest to chain container side.

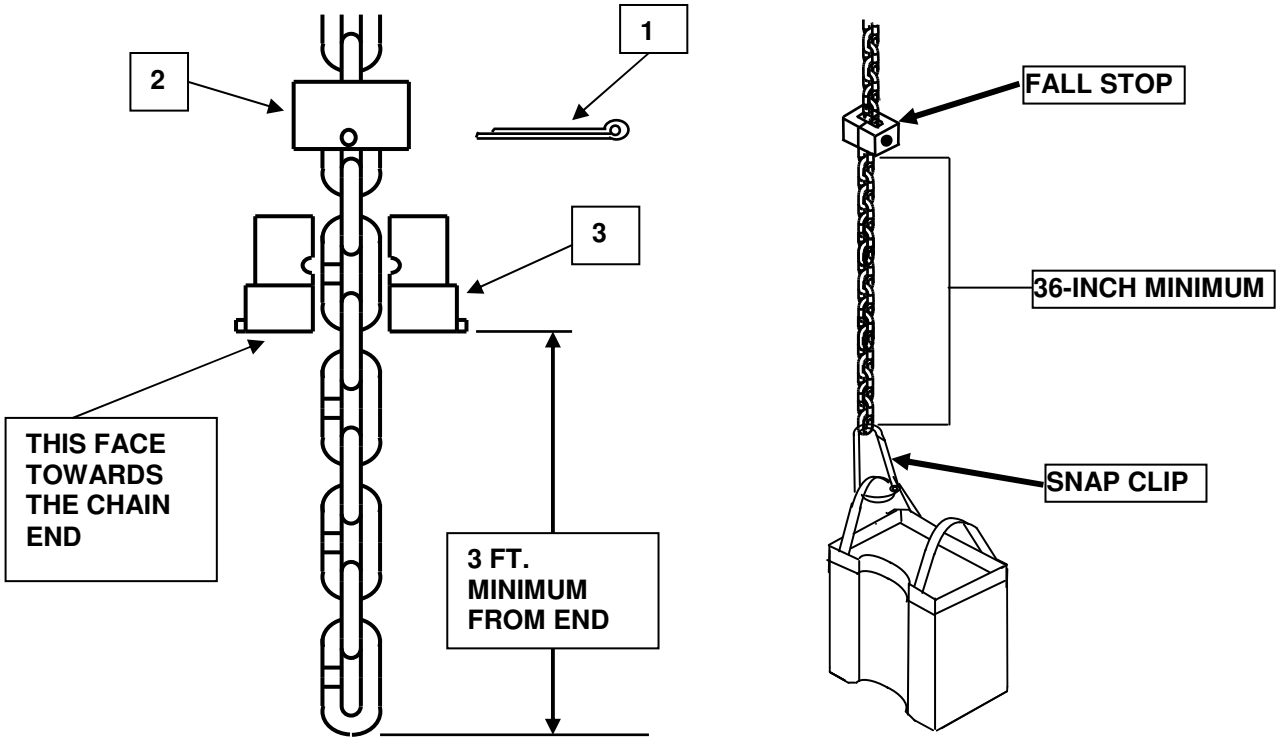
> ⚠ **CAUTION: For a 2-fall load hook assembly, make sure the chain weld on chain link faces inward toward chain wheel pocket on hoist and away from idler sprocket of hook block assembly. Follow steps outlined below:**

3. Run hoist in slow speed to feed chain through chain sprocket. Continue running until about 4.0 feet of chain is available out the other side.
4. Slide chain onto idler sprocket of load hook assembly making sure not to twist chain while inserting it. Link weld must face away from idler sprocket on load hook assembly.
5. Attach chain anchor and chain to hoist body. Tighten chain anchor bolts per recommended torque settings in Section 7.4.
6. Attach fall stop 3 feet [91.4 cm] from end of chain (chain container side). See Figure 20 for details.
7. Make sure that chain is not twisted or kinked.
8. Attach chain container. After chain installation is complete, run the load hook assembly up and down to verify that the chain is not twisted. Lubricate chain.

6.8 Fall Stop Assembly

The slack fall stop is a safety stop, not a functional stop. The fall stop must be located at least 3 feet [91.4 cm] from end of last chain link. Attach the end of the chain to the chain container strap with the snap clip provided.

Figure 20. Fall Stop Assembly



6.9 Removing fall stop (see Figure 20)

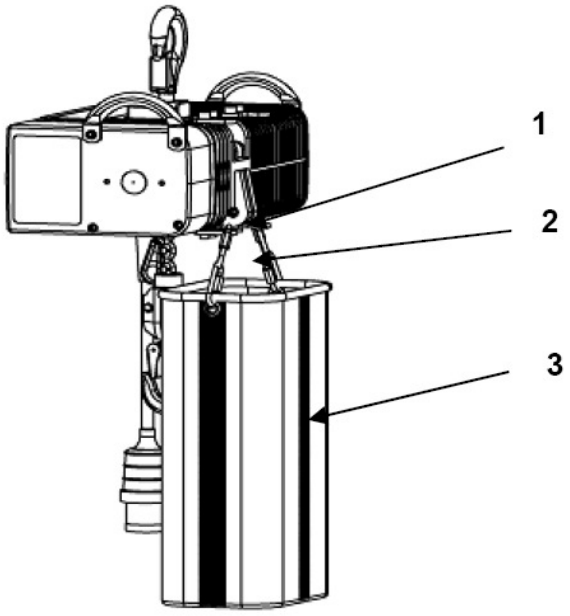
1. Remove cotter pin (item 1).
2. Slide up the tube (item 2).
3. Remove the two fall stop halves (item 3).
4. Slide tube (item 2) off load chain.

6.10 Installing fall stop (see Figure 20)

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 3 feet [91.4 cm] 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).

6.11 Chain Container Installation (Normal Position)

Figure 21. Chain Container Installation



Removing Chain Container

1. Run chain out of container until fall stop approaches hoist body.
2. Open threaded links (item 3).
3. Remove chain container by slipping handles of chain container from threaded links.

Installing Chain Container

1. Reverse the above process.
2. Slip handles into open threaded links.
3. Close and tighten threaded links.
4. Guide end of chain into chain container.
5. Run chain into chain container.

6.12 Limit Switches

NOTE: When the hoist is supplied in an inverted position, the limit switches are not included. The slip clutch provides the means to stop the hoist when load chain travel limits are exceeded.

6.12.1 Upper and Lower Travel Safety Limit Switch

These limit switches are supplied as standard equipment when the hoist is sold for use in the NORMAL position.

The upper and lower travel limit switches reset automatically and are wired into the “UP” and “DOWN” control circuits. The switch housing is recessed into the underside of hoist body as part of the lower chain guide assembly.

NOTE: The upper and lower travel limit switches and/or the slip clutch are emergency protection devices and are not to be used as automatic stops during normal hoist operations.

When mounted in the NORMAL position, the hook block activates the upper limit switch as it contacts the limit switch that is located on bottom side of the hoist body. Once this switch is activated, the “up” circuit is opened. The fall stop activates the lower limit switch when load hook is lowered to its lowest travel position. The limit switch is activated and opens the “down” circuit.

The lower limit position is adjustable between the lowest travel and maximum lift. A fall stop SHALL always be located at least 3 feet [91.4 cm] from end of last chain link. The upper limit position is adjustable only when an additional fall stop assembly is added (1-fall units only) between the load hook assembly and the hoist body.

6.12.2 Rotary Geared Limit Switch

The rotary geared limit Switch assembly for the SM10 is mounted inside the body underneath the brake cover. This feature adds flexibility in adjusting the limits of hoist travel. The mounting of the switch assembly has an IP55 rating / NEMA 3R type rating.

TWO CONTACTS:

Position 1: Upper limit switch

Position 2: Lower limit switch

FOUR CONTACTS:

Position 1: Lower limit switch

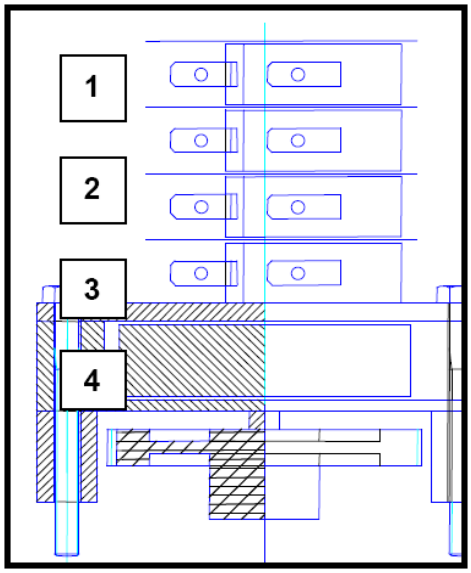
Position 2: Intermediate limit*

Position 3: Intermediate limit*

Position 4: Upper limit switch

(*) Designation of limit switch use may vary with application.

Figure 22. Rotary Geared Limit Switch



6.12.3 Rotary Geared Limit Switch Assembly Part Numbers

Table 19. Rotary Geared Limit Switch Assembly Part Numbers

TOTAL CHAIN LENGTH (FT)	RATIO	2 SWITCHES	4 SWITCHES
0 – 42 FT.	4.06 to 1.0	2249076	2249077
43 – 98 FT.	15 to 1.0	2249078	2249079

Table 20. Rotary Geared Limit Switches by Configuration

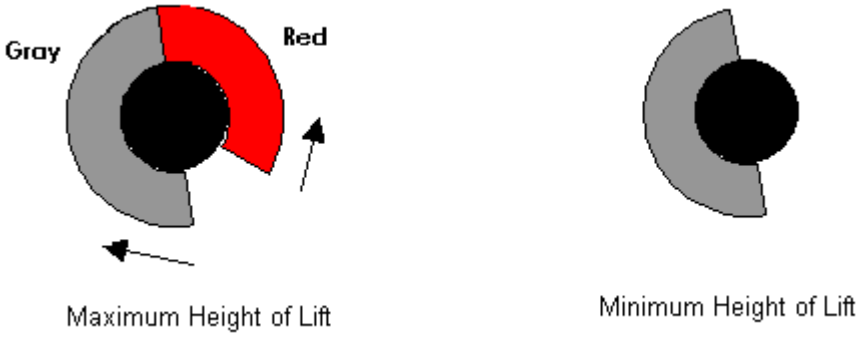
Configuration – SM 10	Rotary limit with 2 switches	Rotary limit with 4 switches
A	NOT AVAILABLE	NOT AVAILABLE
B	OPTIONAL	OPTIONAL
C	OPTIONAL	OPTIONAL
D	MUST USE 4-SWITCH LIMIT	STANDARD
E	OPTIONAL	OPTIONAL

NOTE: Rotary limit switch assembly cannot be added to a hoist in the field. The hoist must have the rotary limit switch assembly provided at time of initial production.

Adjustment

The position of the air-gap between the two discs (red – gray) determines the stopping place. This position can be found by gently turning the two discs. The length of air gap determines length of reset play in opposite direction.

Figure 23. Air Gap Adjustment



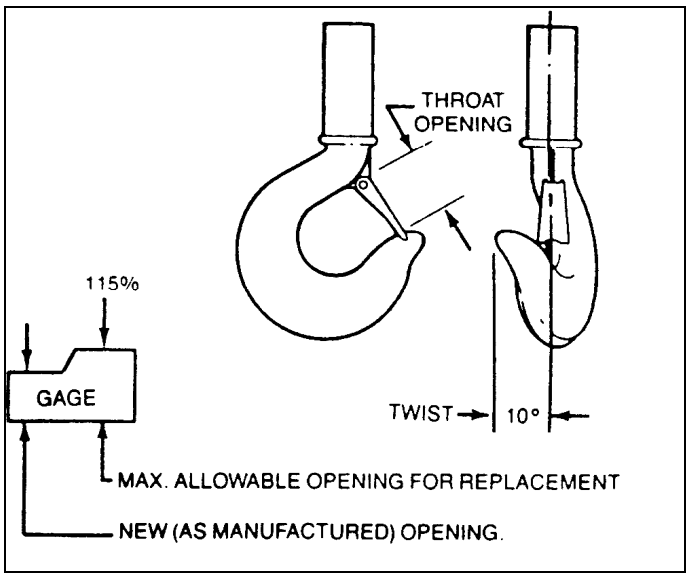
To reset rotary limit once it has tripped, load hook assembly must travel a total of 11” [27cm] in opposite direction.

NOTE: The geared limit switch is not designed as a precision limit switch and should be used as a safety stop only. The geared limit switch accuracy is dependent on the height of the fall (accurate to within +/- 15”).

6.13 Hooks

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

Figure 24. Hook dimensions



Due to the many types and sizes of hooks that can be furnished and specified by the user / owner, it is recommended that user / owner measure actual throat opening of hook as originally furnished (see Figure 24). Record 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.

CAUTION: Safety latches SHALL be replaced if missing, bent, or broken.

CAUTION: A safety latch SHALL function properly at all times.

CAUTION: Repairing hooks by welding or reshaping is strictly forbidden.

6.13.1 Hook Inspection

The wear on the body hook and the load hook shall be checked routinely. Measure the throat opening (dimension A2). If the throat opening exceeds the maximum opening allowed, replace the hook. Damaged safety latches shall be replaced immediately.

Figure 25. Hook Inspection

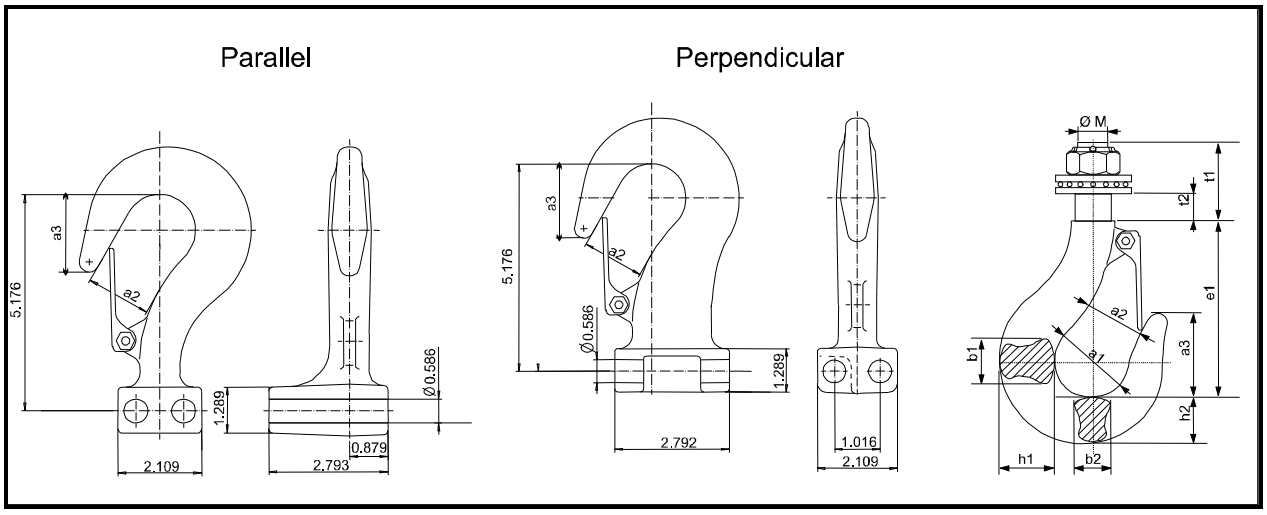


Table 21. Hook Characteristics

LOAD CAPACITY (LBS)	TEST LOAD (LBS)	FALLS	MINIMUM FAILURE LOAD (LBS)	CLASS
1389	2778	1	8752	025T
2205	4409	1	11023	025T
2756	5512	2	17361	05T
4409	8818	2	22046	05T

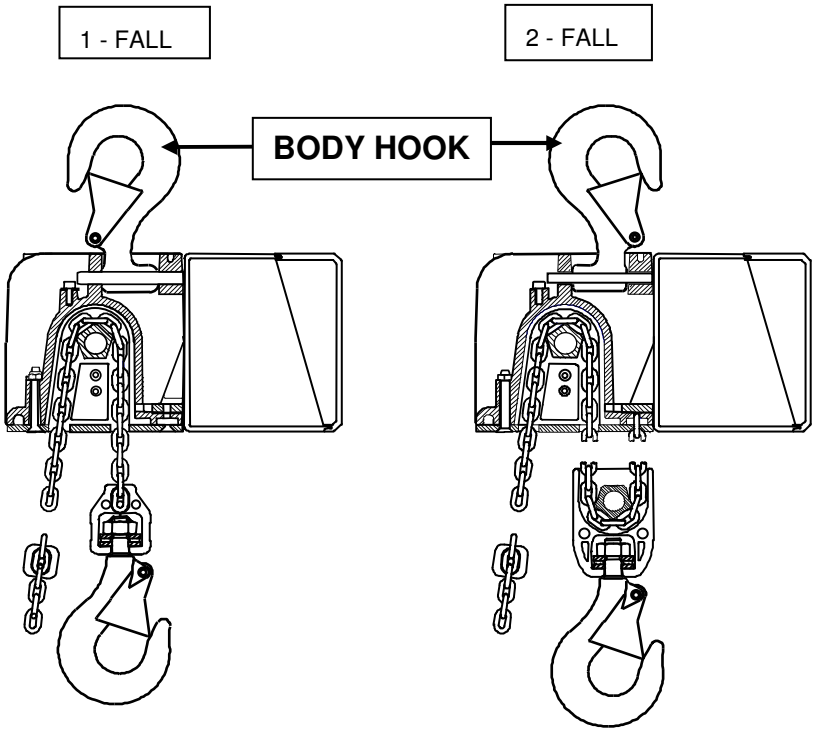
Table 22. Hook Dimensions

HOOK DIMENSIONS – INCHES										
ØM	Øa1	a2	a3	b1	b2	e1	h1	h2	t1	t2
0.630	1.417	1.024	1.614	0.866	0.748	3.780	1.102	0.945	1.496	0.512
0.630	1.417	1.024	1.614	0.866	0.748	3.780	1.102	0.945	1.496	0.512
0.787	1.693	1.339	1.929	1.142	0.945	4.134	1.457	1.221	1.496	0.551
0.787	1.693	1.339	1.929	1.142	0.945	4.134	1.457	1.221	1.496	0.551

Initial Dimension – a2	Max. Allowed Dimension	Mark: ISO 2766
1.024 inches	1.178 inches maximum	DIN Model Number: 15401
1.339 inches	1.540 inches maximum	DIN 15400 Class: T
		DIN 15401 Material: 35 CD 4

6.13.2 Body Hook (Normal Position)

Figure 26. Body Hook (Normal Position)



CAUTION: Before removing body 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 Body Hook

1. Remove locking plate and pin.
2. Pull pin out and remove hook.

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

Installing Body Hook

1. Determine number of chain falls: 1-fall or 2-fall.
2. Select proper placement of body hook relative to number of chain falls:
3. If 1-fall, align body hook so that tip of hook faces toward chain container.
4. If 2-fall, align body hook so that tip of hook faces away from chain container.
5. Place hook into the slot on hoist body. Verify that body hook saddle and load hook saddle are in line with each other. Install locking plate and pin.

7 PREVENTATIVE MAINTENANCE

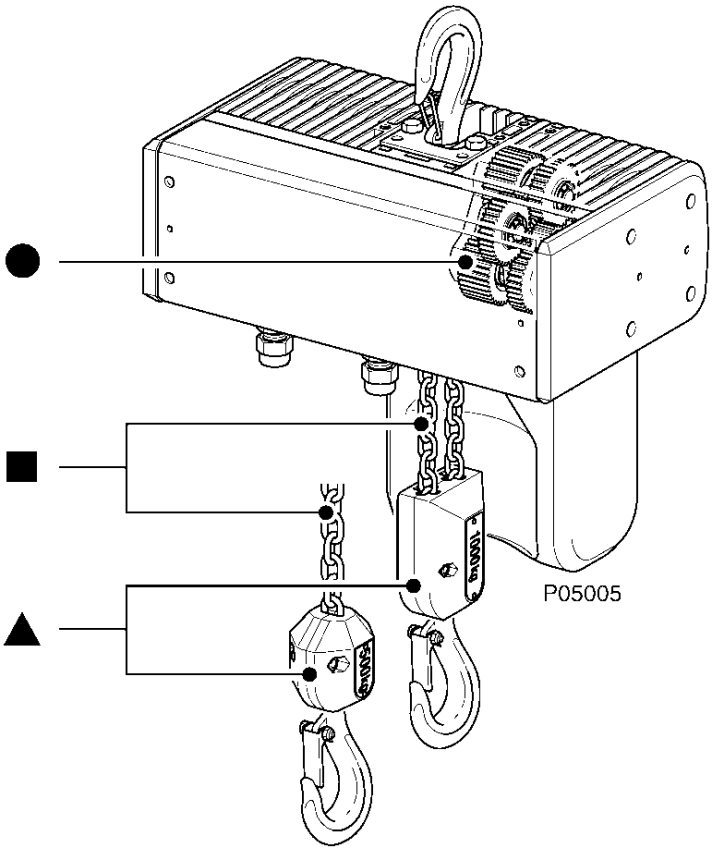
7.1 Maintenance and Inspection Table

Table 23. Maintenance Schedule

INSPECTION CHECK	INTERVAL	QUALIFIED PERSON
BRAKE OPERATION FOR HOLDING AND RELEASING	DAILY	OPERATOR
LOAD CHAIN FOR DAMAGE	DAILY	OPERATOR
POWER AND/OR CONTROL CABLE SUPPORTS	DAILY	OPERATOR
CLEANLINESS & LUBRICATION OF LOAD CHAIN	MONTHLY	OPERATOR
UPPER / LOWER LIMIT SWITCHES	MONTHLY	OPERATOR
CHECK LOAD CHAIN FOR WEAR – MEASURE AND RECORD	QUARTERLY	INSPECTOR
CHECK HOOKS FOR WEAR MEASURE AND RECORD	QUARTERLY	INSPECTOR
CHECK CHAIN HOOK BLOCK HARDWARE TO VERIFY TIGHTNESS	QUARTERLY	OPERATOR
CHECK TOP(BODY) HOOK / COUPLING HARDWARE FOR TIGHTNESS	QUARTERLY	OPERATOR
CHECK SLIP CLUTCH & HOIST BRAKE ADJUSTMENT	QUARTERLY	MAINTENANCE
CHECK LUBRICATION OF OPEN WHEEL GEARING	QUARTERLY	MAINTENANCE
CHECK WIRE TERMINALS TIGHTNESS	SEMI-ANNUALLY	MAINTENANCE
LUBRICATE 2-FALL CHAIN HOOK BLOCK SPROCKET	ANNUALLY	OPERATOR
CHECK ALL HARDWARE FOR TIGHTNESS AND CORROSION	ANNUALLY	MAINTENANCE
CLEAN MOTOR COOLING FINS	ANNUALLY	MAINTENANCE
LUBRICATE ALL GEARING	ANNUALLY	MAINTENANCE
INSPECT LOAD HOOK THRUST BEARING	ANNUALLY	MAINTENANCE

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.

7.2 Lubrication



OPEN WHEEL GEARING: MOBILUX EP1 OR EQUIVALENT

Table 24. Lubrication Specifications

LUBRICATION POINT / QTY	SPECIFICATIONS	POSSIBLE BRANDS
■ AS REQUIRED	Oil or liquid grease	Chain lubricant (Ceplattyn or similar) EP-90
▲ AS REQUIRED	GREASE (without MoS2) KP 2 (DIN 51 502) Soap-based lithium Temperature -4°F to 266°F	BP Energrease LS - EP 2 ESSO Unirex N2 Mobil grease HP Shell Alvanio EP Grease 2
● 0.05 LITER	KP 0 K grease (DIN 51502) Soap-based lithium + MoS2 Temperature -30°C to 130°C	Mobil grease special BP Multi-purpose grease L 21 M Shell Retimax AM Texaco Molytex grease EP 2

7.3 Recommended Technical Support for Various Spare Parts

Table 25. 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
PC-boar	Qualified electrician
Plugs	Qualified electrician
Chain	Qualified mechanic
Chain container	Qualified mechanic
Slack fall stop	Qualified mechanic
Body hook	Qualified mechanic
Load hook assembly	Qualified mechanic
Control box	Qualified electrician

☞ NOTE: Once a part has been replaced, check the operation of the hoist per sections 4.3 and 4.4.

7.4 Torque (lb-ft) Specifications

Table 26. Screw Tightening Torque Specifications

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

7.5 Troubleshooting

Table 27. Troubleshooting

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Hoist does not lift or lower load	Emergency stop button is activated	Release button
	Blown fuse	Replace the fuse
	Motor thermal protection activated	Allow motor too cool down
	Contactor terminal screws loose	Tighten screws
	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 re-adjust slip clutch torque
	Brake not releasing	Check brake coil resistance. Check air gap setting. Adjust if necessary. Check rectifier output voltage.
Load drifts more than 4 inches [100mm]	Brake lining worn Air gap on brake is too wide	Replace wear items as necessary Adjust air gap setting
Travel direction does not correspond to that indicated on push button	Power supply incorrectly connected	See section 4
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

8 PARTS ILLUSTRATION

8.1 Hoist Body

Figure 27. Hoist Body

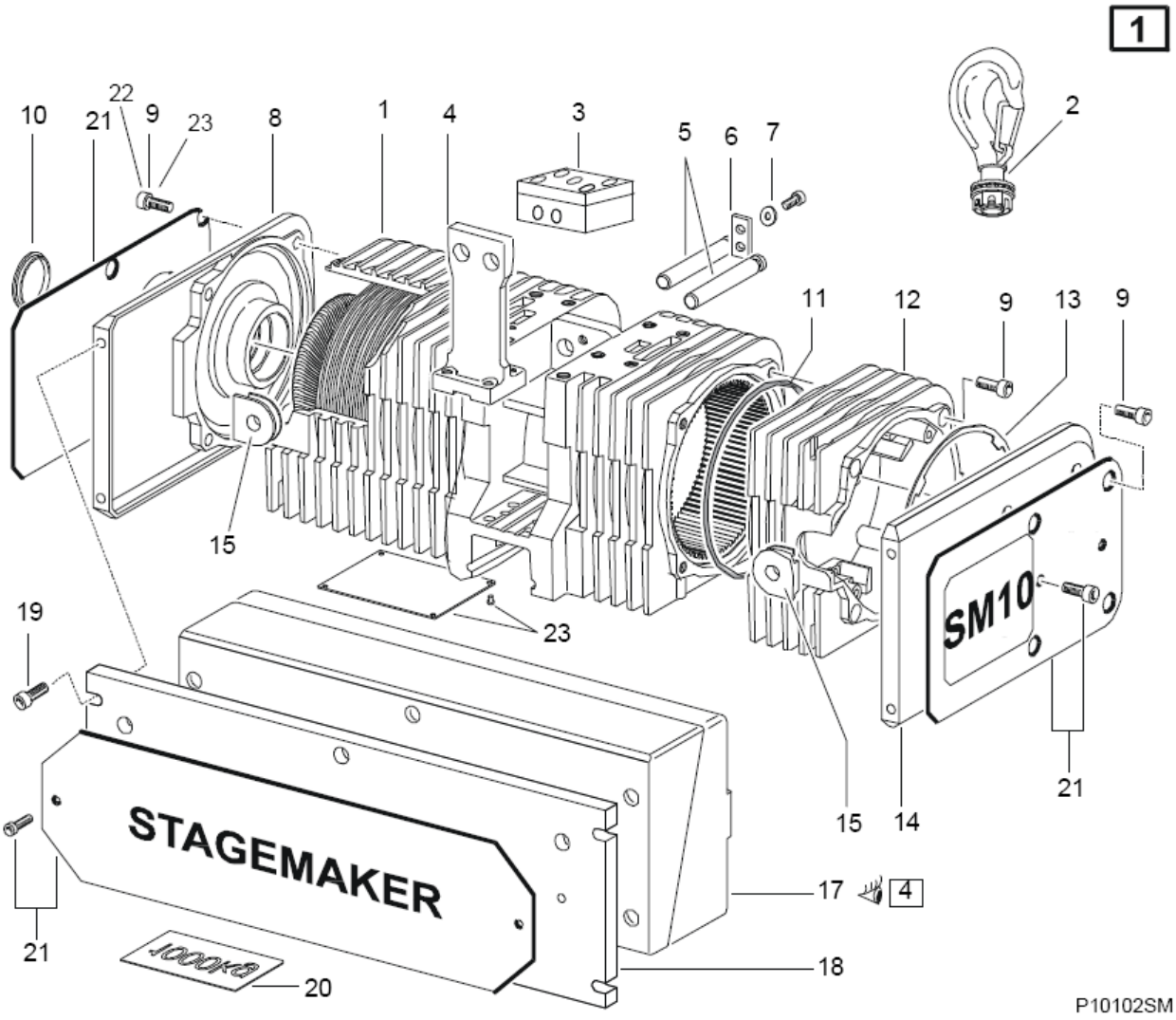


Table 28. Hoist Body Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
-	52293133	COMPLETE BODY ASSY – CONF. A – 208/230V SINGLE SPD	1
-	52306003	COMPLETE BODY ASSY – CONF. B – 208-460V SINGLE SPD	1
-	POA	COMPLETE BODY ASSY – CONF. C – 230V SINGLE SPD	1
2	2247016	BODY SWIVEL HOOK SET – (3+5+6+7)	1
4	2242011	BODY HOOK SUPPORT PLATE	1
6	2247007	DOWEL PIN	2
7	830909	M6 x 20 SCREW	1
-	8560610	WASHER	1
-	2249904	MOTOR END CAP SET (8+9+10)	1
8	-	MOTOR END CAP	1
9	-	M6 SCREW	13
10	-	DUST CAP	1
11	2240013	O-RING	1
12	2240011	BRAKE HOUSING	1
13	2240013	SEAL	1
-	2249903	BRAKE END CAP SET (14+9)	1
14	-	BRAKE END CAP	1
17	-	ELECTRICAL ENCLOSURE – SEE CONTROLS	1
20	2213309008	CAPACITY STICKER – 500 kg	1
20	2213309009	CAPACITY STICKER – 1000 kg	1
20	2213309016	CAPACITY STICKER – 1500 kg (2-FALL ONLY)	1
20	2213309010	CAPACITY STICKER – 2000 kg (2-FALL ONLY)	1
20	2213309002	CAPACITY STICKER – ½ ton	1
20	2213309003	CAPACITY STICKER – 1 ton	1
20	2213309014	CAPACITY STICKER – 1.5 ton (2-FALL ONLY)	1
20	2213309004	CAPACITY STICKER – 2 ton (2-FALL ONLY)	1
21	2216562	STAGEMAKER BRANDING – FRONT PANEL	1
21	2216563	STAGEMAKER BRANDING – SIDE PANELS	2
22	2213547001	CLAMP (NOT SHOWN)	1
23	2213547002	RING (NOT SHOWN)	1

8.2 Gear Mechanism With Motor Brake

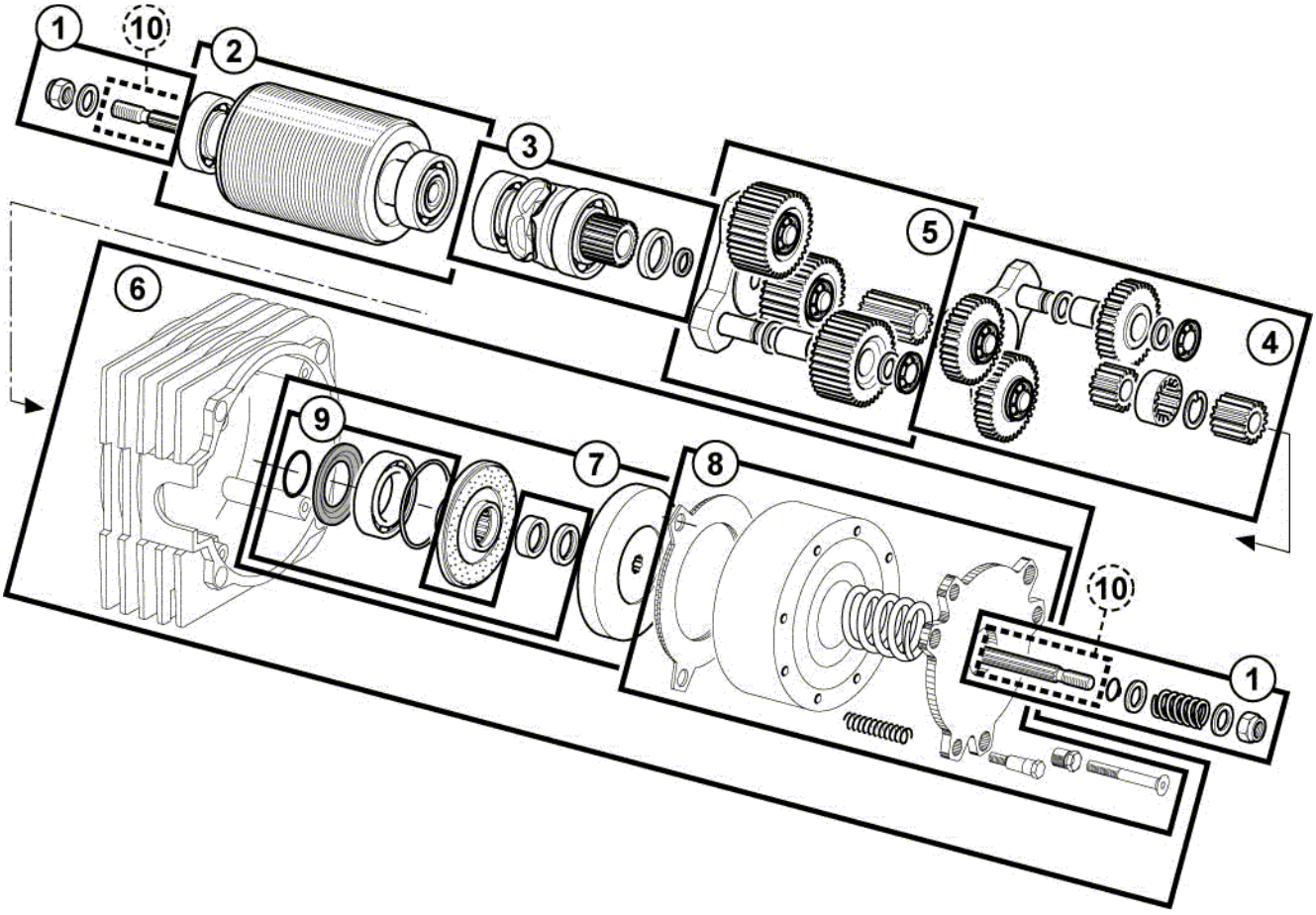


Table 29. Gear Mechanism Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	2249940	TORQUE ADJUSTING NUT & SPRING SET	1
2	2245025	ROTOR ASSEMBLY – 1 & 2 SPEED MOTORS	1
3	2249941	CHAIN SPROCKET ASSEMBLY	1
4	2249937	PLANETARY GEARING – 1ST STEP	1
5a	2249938	PLANETARY GEARING – 2ND STEP – 16 FPM	1
5b	2249951	PLANETARY GEARING – 2ND STEP – 32 FPM	1
6a	2241074	BRAKE CAP & BRAKE ASSEMBLY – 190VDC for 460VAC	1
6b	2241073	BRAKE CAP & BRAKE ASSEMBLY – 100VDC for 208-230VAC	1
7	2249972	SLIP CLUTCH ASSEMBLY	1
8a	2248001	BRAKE ASSEMBLY – 190VDC for 460VAC	1
8b	2248000	BRAKE ASSEMBLY – 100VDC for 208-230VAC	1
9	2240012	SEAL SET FOR BRAKE CAP	1
10	2241501	MOTOR SHAFT	1

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8.3 Load Chain & Lifting Hardware

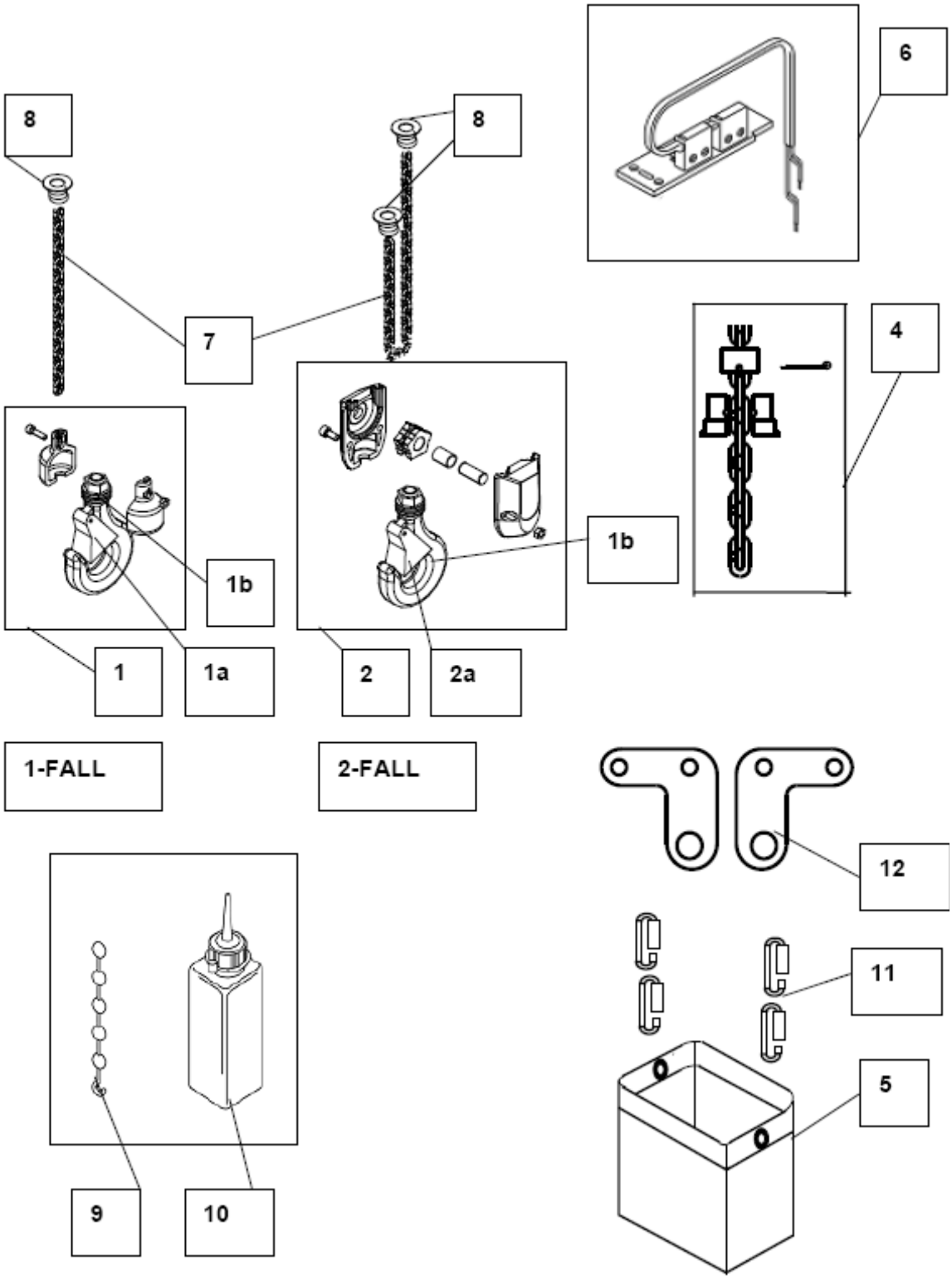

Table 30. Lifting Assembly Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY PER
1	2249905	1-FALL LOAD HOOK ASSEMBLY	1
1a	2212017	1-FALL SAFETY LATCH – STEEL PLATE TYPE	1
1b	2217004	1-FALL LOAD HOOK – STANDARD	1
1b	2247015	1-FALL LOAD HOOK – SELF LOCKING (OPTIONAL)	1
1c	2213333004	1-FALL LOAD HOOK CAPACITY STICKER – 1 TON	2
1c	2213333011	1-FALL LOAD HOOK CAPACITY STICKER – 1000 kg	2
2	2249906	2-FALL LOAD HOOK ASSEMBLY	1
2a	2242017	2-FALL SAFETY LATCH – STEEL PLATE	1
2b	2242021	2-FALL LOAD HOOK – STANDARD	1
2b	2267015	2-FALL LOAD HOOK – SELF-LOCKING	1
2c	2213333005	2-FALL CAPACITY STICKER – 2 TON (2-fall only)	1
2c	2213333012	2-FALL CAPACITY STICKER – 2000 kg (2-fall only)	1
3	2243523	CHAIN ANCHOR ASSEMBLY (2-fall only)	1
4	2249942	SLACK FALL STOP ASSEMBLY	1
5a	52328053	CHAIN CONTAINER - 65 FT. CAPACITY	1
5b	52328054	CHAIN CONTAINER - 160 FT. CAPACITY	1
6	--See 8.7--	U / L SAFETY LIMIT SWITCH & GUIDE ASSY (normal position only)	1
7a	2243501	LOAD CHAIN – BLACK	N
7a	2243500	LOAD CHAIN – ZINC-PLATED	N
8	2241068	WASHER & SPRING SET (SET OF 3) (normal position only)	1
8	52313011	RUBBER BUFFER (inverted position only) (1-fall only)	2
9	2241045	LOAD CHAIN INSERTION TOOL	1
10	9995008	LOAD CHAIN LUBRICANT	1
11	NPN	THREADED LINKS	4
12	2247019	CHAIN CONTAINER BRACKETS	2

8.4 Electrical Enclosure – 3-Phase Power Supply – Configuration A

Figure 28. Electric Enclosure – 3-Phase Power Supply – Configuration A

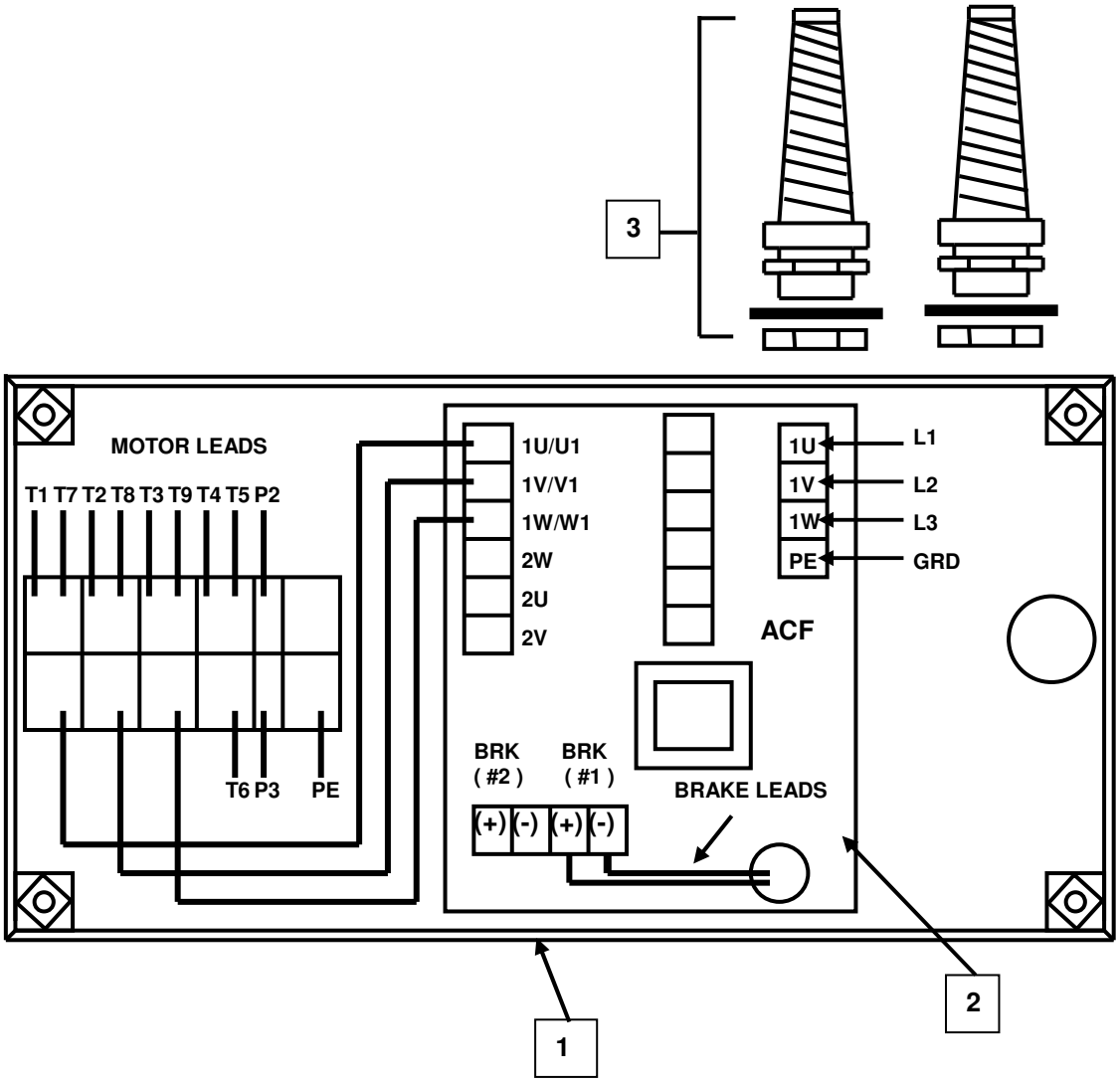

Table 31. Electrical Enclosure Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY PER
1	52307759	METAL ELECTRICAL ENCLOSURE (COVER & BASE)	1
2	834176	AFC BRAKE CONTROL CARD (208V / 230V)	1
3	52283994	FLEXIBLE CABLE PROTECTOR	2

8.5 Controls – Configuration B

Figure 29. Controls – Configuration B

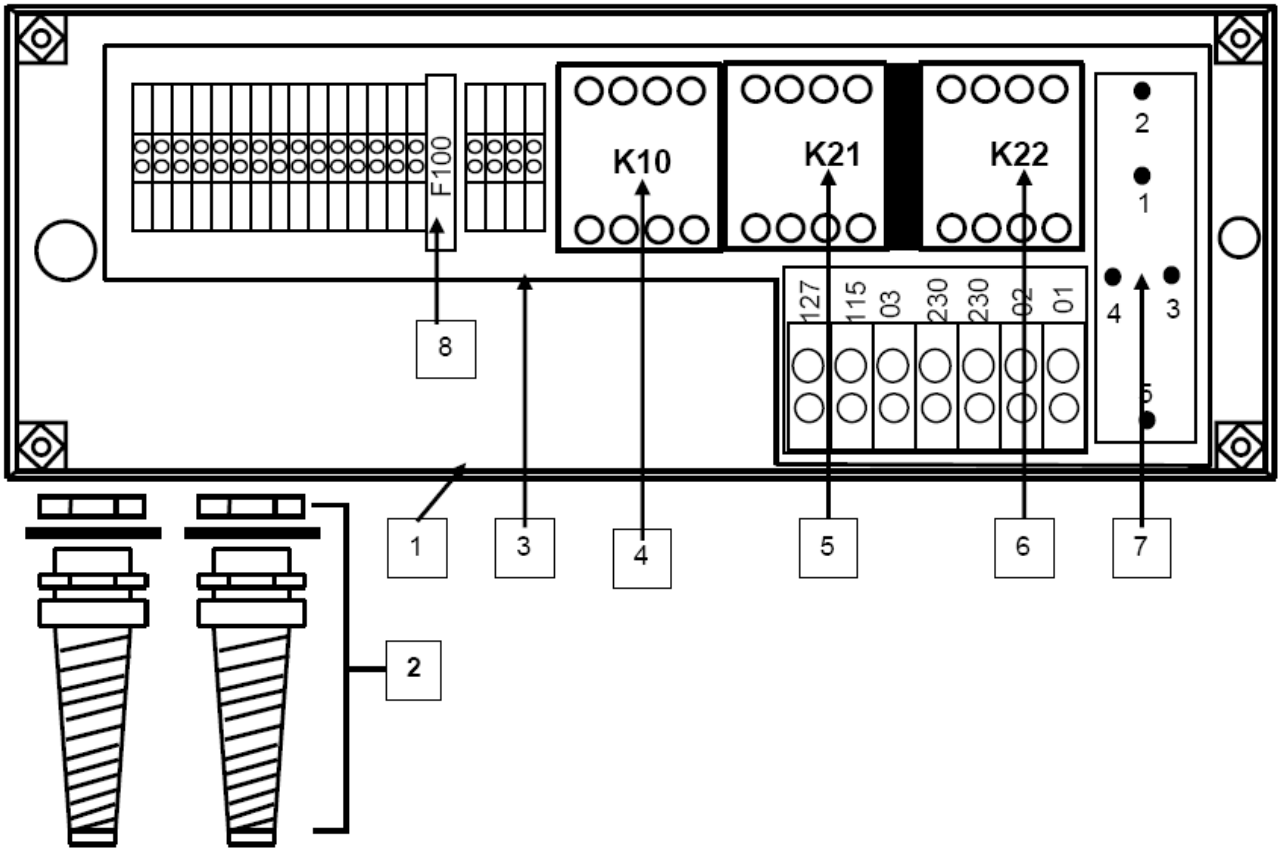

Table 32. Controls – Configuration B – Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52307759	METAL ELECTRICAL ENCLOSURE (COVER & BASE)	1
2	52283994	FLEXIBLE CABLE PROTECTOR	2
3	2245062	CONTROL PANEL ASSEMBLY – SINGLE SPEED 208 / 230 / 460V - 115V CONTROL VOLTAGE	1
4	8040111	K10 MAINLINE CONTACTOR – 115V CONTROL VOLTAGE	1
5	8040112	K21 “UP” CONTACTOR – 115V CONTROL VOLTAGE	1
6	8040300	K22 “DOWN” CONTACTOR – 115V CONTROL VOLTAGE	1
7	2243061	BRAKE RECTIFIER – 5 WIRES	1
8	2249979	FUSES FOR 115V CONTROL VOLTAGE – SET OF 10	1

8.6 Controls – Configuration C

Figure 30. Controls – Configuration C

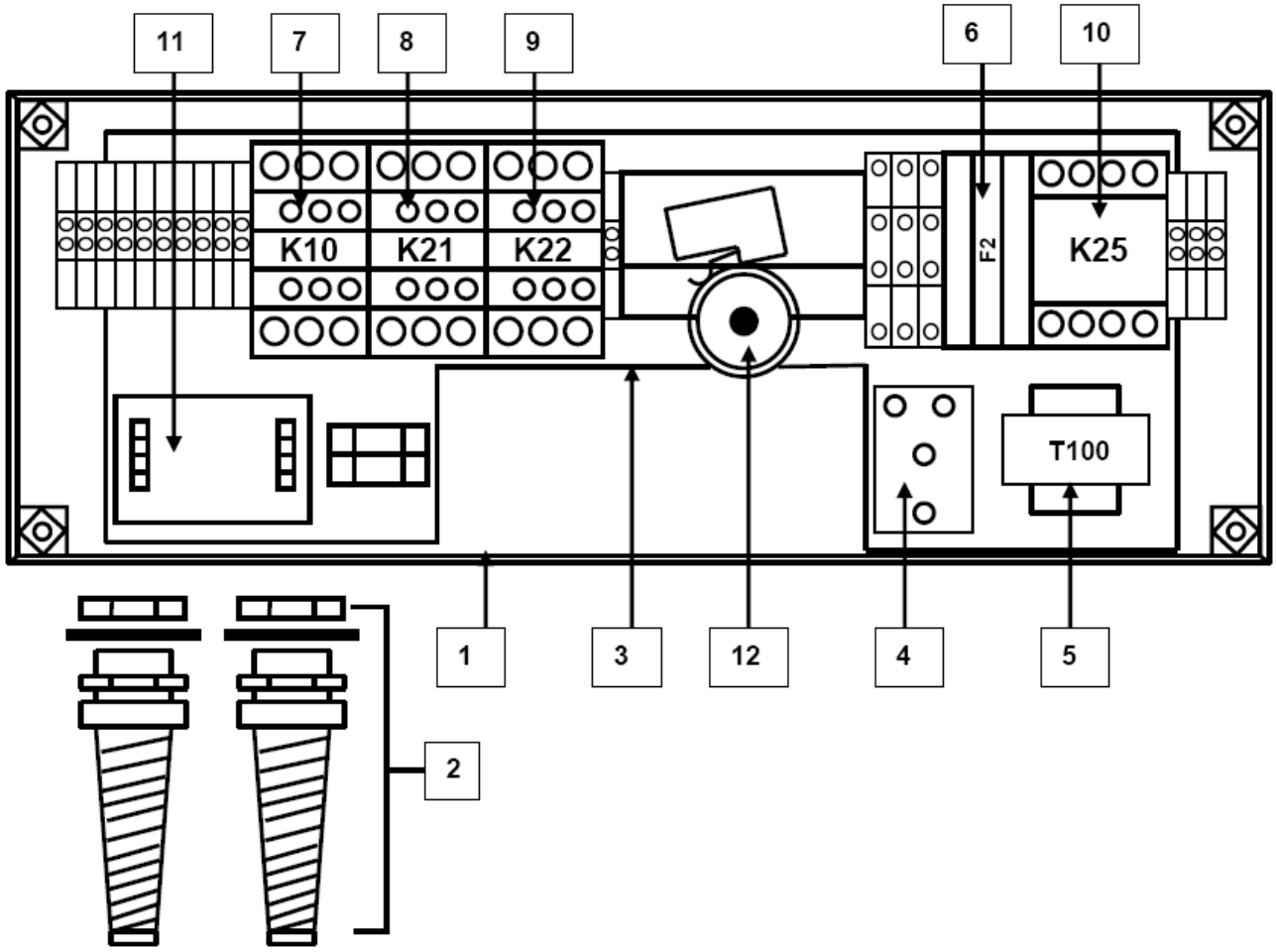

Table 33. Controls – Configuration C – Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	52307759	METAL ELECTRICAL ENCLOSURE (COVER & BASE)	1
2	52283994	FLEXIBLE CABLE PROTECTOR	2
3	POA	CONTROL PANEL ASSEMBLY – 2-SPEED – 230 / 48V 115V CONTROL VOLTAGE – (USED WITH SINGLE-SPEED ALSO)	1
4	2243060	BRAKE RECTIFIER – 4 WIRES	1
5	7983023	CONTROL TRANSFORMER – 230 / 48V	1
6	2249979	FUSE (SET OF 10)	1
7	7983061	K10 MAINLINE CONTACTOR (230V / 48V CONTROL VOLTAGE)	1
8	7983062	K21 CONTACTOR (230V / 48V CONTROL VOLTAGE)	1
9	7983062	K22 CONTACTOR (230V / 48V CONTROL VOLTAGE)	1
10	7983063	K25 CONTACTOR (230V / 48V CONTROL VOLTAGE)	1
11	POA	SENSOR BEARING CONTROL MODULE	1
12	-	ROTARY LIMIT SWITCH ASSY – SEE SECTION 8.8	1

8.7 Chain Guide Assemblies

Figure 31. Chain Guide Assemblies

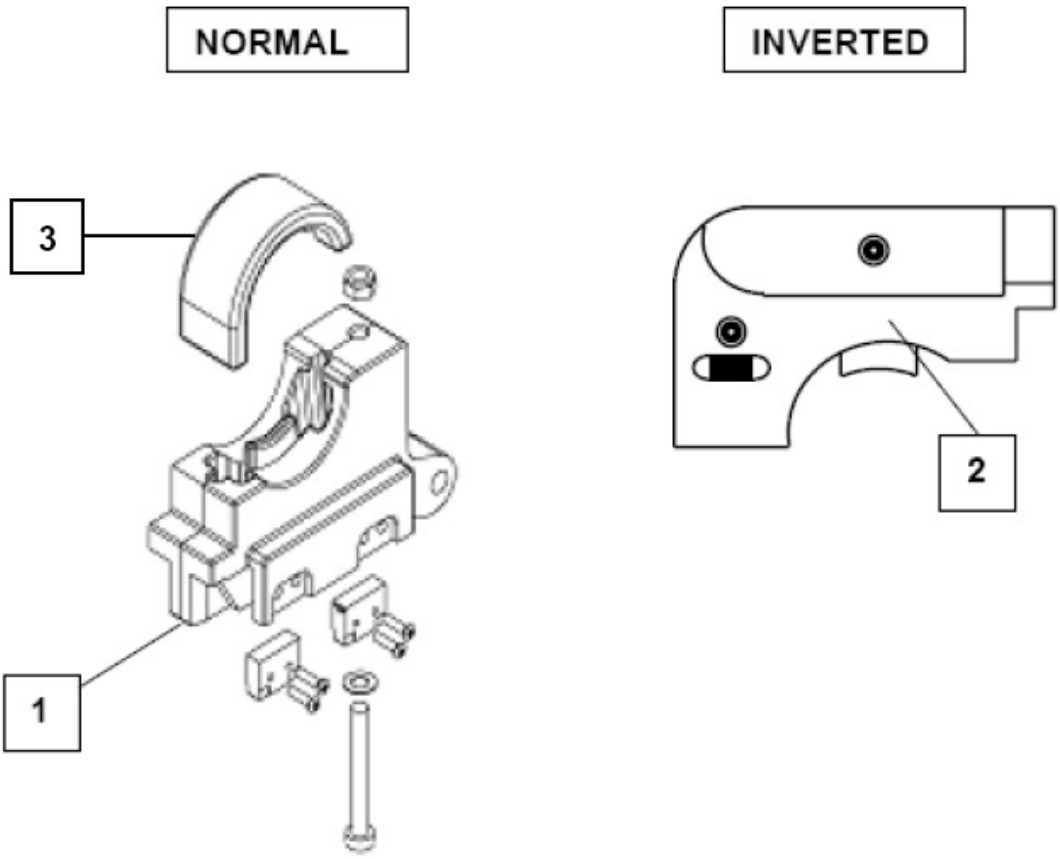

Table 34. Chain Guide Assembly Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY PER
1	2243050	COMPLETE CHAIN GUIDE ASSEMBLY W/ SWITCHES (Normal Position Only)	1
2	52329198	CHAIN GUIDE ASSEMBLY (Inverted Position Only) (Plastic) (Old)	1
2	52425117	CHAIN GUIDE ASSEMBLY (Inverted Position Only) (Metal) (New)	1
3	2244011	UPPER CHAIN GUIDE	1

8.8 Rotary Limit Switch

Table 35. Rotary Limit Switches

ITEM	PART NUMBER	DESCRIPTION	QTY
1a	2249076	2-POS SWITCH SET: 0 – 43 FT OF CHAIN	1
1b	2249078	2-POS SWITCH SET: 44 – 98 FT OF CHAIN	1
1c	2249077	4-POS SWITCH SET: 0 – 43 FT OF CHAIN	1
1d	2249079	4-POS SWITCH SET: 44 – 98 FT OF CHAIN	1

8.9 Connectors for Pigtails

Table 36. Connectors for Pigtails

PIGTAILS		CONNECTOR PART NUMBERS		
CONF.	TYPE CONNECTOR	POWER ONLY CONNECTOR	CONTROL ONLY CONNECTOR	POWER & CONTROL CONNECTOR
A	CE STYLE 3P + G	2213428001	--------	--------
A	NEMA L16 – 20P 3P + G	2213428017	--------	--------
B	NEMA L16 – 20P 3P + G	2213428017	--------	--------
B	NEMA L14 – 20R 3P + G	--------	2213428014	--------
B	SOCAPEX 7 PIN MALE PLUG	--------	--------	2213428015
B	P14	--------	--------	2309888001
C	NEMA L14 – 20R 3P + G	--------	2213428014	--------
C	WEILAND 16 PIN MALE PLUG	--------	--------	2309818003
C	19 PIN SOCAPEX	--------	--------	2309868001
D	WEILAND 16 PIN MALE PLUG	--------	--------	2309818003

8.10 Pickle Assembly

Figure 32. Pickle Assembly

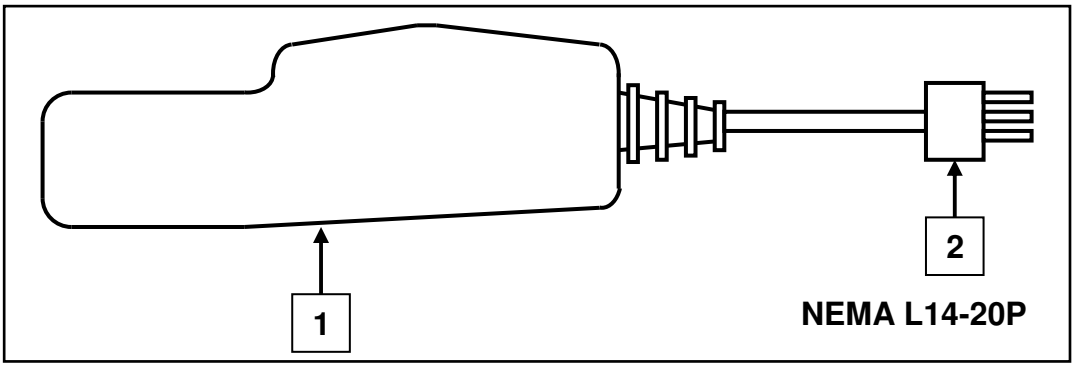

Table 37. Pickle Assembly Parts List

ITEM	PART NUMBER	DESCRIPTION
-	2309772102	COMPLETE ASSEMBLY – 18 INCH PIGTAIL WITH PLUG
1	2212932060	"PICKLE" – 2-SPEED UP AND DOWN PUSHBUTTON
2	2213428013	NEMA L14 - 20P MALE PLUG – TWIST LOCK