STAGEMAKER® COMPACT Concert Hoist

SM5

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

JOB NO. : _____

SERIAL NO. : _____

(RECORD HOIST SERIAL NUMBER FOR FUTURE REFERENCE)

Before proceeding with the installation, operation or maintenance of the hoist it is important that installation, operating and maintenance personnel read this bulletin carefully in order to ensure the safe and efficient use of the hoist.

It is strongly recommended that personnel responsible for the operation, inspection and servicing of this hoist, read and follow the Safety Standard ANSI B30.16-1993 (or current revised edition). This standard covers Overhead Hoists (under-hung) as promulgated by the American National Standards Institute and is published by the American Society of Mechanical Engineers. Copies of this publication are available from the Society at United Engineering Center, 345 East 47th St., New York, NY 10017.

If any instructions are unclear, contact the manufacturer or distributor of this hoist before attempting to install or use the hoist.

IMPORTANT

Electrical wiring diagrams are included with this manual. Also, if an optional push or motorized trolley has been purchased, a manual is included with the trolley.

If these items are missing, contact the manufacturer or distributor before attempting to install or use the hoist.

R&M Materials Handling, Inc.
4501 Gateway Boulevard
Springfield, OH 45502
Tel. 937-328-5100
Fax 937-325-5319

Visit our website: www.rmhoist.com

TABLE OF CONTENTS

FOREWORD

This manual has been prepared to acquaint you with the procedures necessary for the installation, operation and maintenance of the hoist you have purchased.

Proper installation is important for the performance of your equipment. Careful study of and adherence to the instructions will help ensure safe, dependable operation. It is recommended that this manual be readily accessible to operators as well as maintenance and safety personnel.

Information in this manual is subject to change without notice.

Warranty
R&M Materials Handling, Inc. provides a two (2) year limit warranty on electric chain hoists. Please contact your Distributor for warranty details.

Parts and Service
R&M Materials Handling, Inc. distributes its products through a network of distributors. Please contact your Distributor for parts, service, and warranty. A list of R&M Master Distributors is listed on our website: www.rmhoist.com.

Claims for Damage in Shipment
All shipments are inspected and delivered to our carrier in good order. If damage is observed, refuse shipment until the carrier makes the proper notation to that effect.

In the event of concealed loss or damage, notify the carrier immediately. By following these suggestions you will encounter less difficulty collecting your claim.

SECTION 1
INSTALLATION

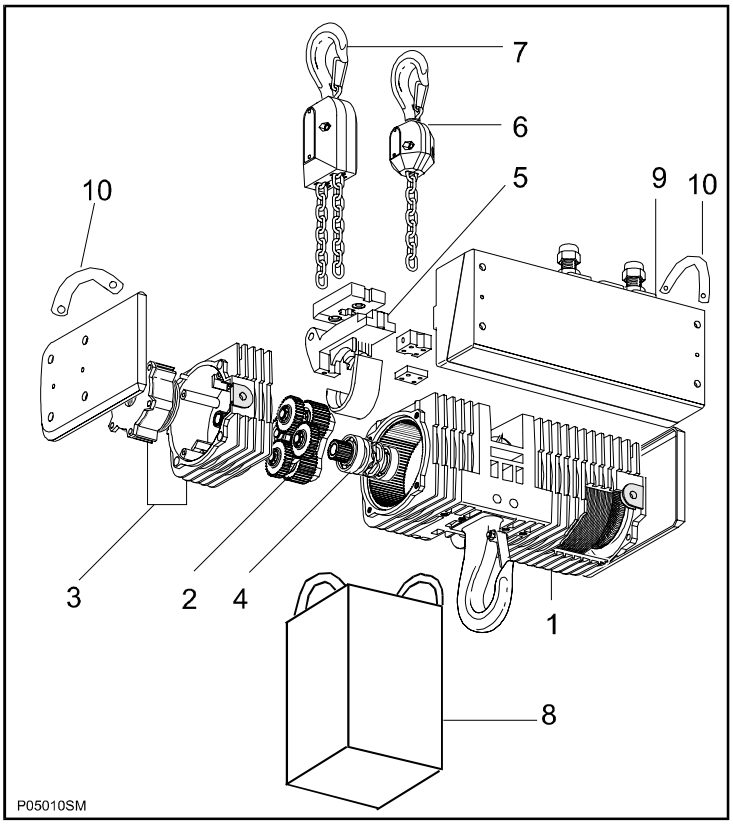


Figure 1-1

1- Hoist body/motor
2- Gears
3- Brake/limiter/housing assembly
4- Chain sprocket with output shaft
5- Chain guide assembly
6- 1-fall hook block
7- 2-fall hook block
8- Chain container
9- Electrical control panel
10-Handle

IMPORTANT

Hoists are designed for lifting of material only. Under no conditions or circumstances are hoists to be used for lifting or transporting of personnel. Do not transport any load over personnel without additional safety precautions.

General

Each complete electric chain hoist is load tested in accordance to ANSI B30.16 at the factory at 125% of nameplate rated capacity, and is usually shipped assembled, unless otherwise stated on order inquiry.

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

Prior to permanent or field installation, units shall be checked thoroughly by qualified personnel for damage during shipment or handling at the job site. Particular attention shall be taken to make sure that the load chain and other mechanical or electrical components have not been damaged through improper handling.

Read the instructions contained in this manual and observe the warning tags attached before installation is started.

Hoist Configuration

STAGEMAKER® COMPACT concert hoists are offered in five basic configurations, each with its own control type and hoist features.

- **Configuration A**: Direct motor control without control voltage. Full line voltage controller furnished separately.
- **Configuration B**: Magnetic controls including a control transformer for controls and controller.
  - **Configuration B1**: Standard (upright) hoist mounting position only. PC Board controls and pendant controller furnished on the hoist.
  - **Configuration B2**: Inverted or standard hoist mounting position. PC Board controls furnished on hoist and controller ordinarily furnished separately.
- **Configuration C**: Programmable controller in conjunction with PC Board controls. Controls furnished on the hoist and controller furnished separately.
- **Configuration D**: Mandatory safety features are standard. PC Board controls furnished on the hoist and controller furnished separately.
- **Configuration E**: Variable Frequency Drive (inverter). VFD furnished by others separate from hoist.

PC Board controls utilize magnetic (low voltage) controls. PC Board controls for the SM5 concert hoists consist of controls (contactor, transformer, etc.) that are soldered to a circuit board, which provides most of the internal connections.

WARNING

Before installing the hoist, make certain that the main power switch supplying power to the hoist is in the open position.

Mounting

The hoist body should be mounted from its suspension hook allowing the body to move in the direction of the load chain pull and to hang in a straight line between the suspension hook and load block during hoisting. Non compliance to this principle may result in severe damage to the equipment. This is true if the hoist is used in the normal or inverted configuration.

Lubrication

The hoist gear reducer is lifetime grease lubricated needing no regular checking or maintenance.

Make sure the load chain is free from contamination or dirt and adequately lubricated with SAE 80 grade oil. Bottom block must hang straight and load chain must be free of kinks or twists.

Load Hook Throat Opening

ANSI B30.16-1993 recommends that the throat opening of the load hook be measured and recorded prior to putting the hoist into service and that a gage be made to provide a quick visual inspection for a bent hook as required by monthly inspections. See Section 4.

Power Connections

Make sure that power supply voltage is the same as that shown on the hoist nameplate and that fuses or other current overload devices are provided to protect the power supply. The power source/conductors must have sufficient capacity to maintain the voltage at the hoist at ±10% of the nominal voltage under all operating conditions. Standard nominal voltages are 230 and 460V. Poor voltage maintenance can cause motor overheating or sluggishness, and chattering or inoperative motor brakes and controls.

A wiring diagram is included in this manual showing the identification of the power lead connections. Refer to this wiring diagram prior to start up and/or any electrical work. If the diagram has been misplaced you may obtain one from R&M upon request. Be sure to mention the serial number of the unit.

CAUTION

Make sure the main disconnecting switch is off and locked in the open position before making any electrical connections.

The customer must supply power cable, power distribution set, installation fusing and main disconnect switch.

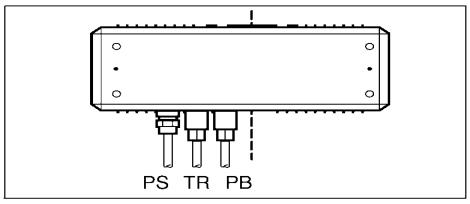


Figure 1-2

PS: Power supply connection for hoist configuration A
Combined power and controls for hoist configuration C or configuration D
PB: Controls, hoist configuration B1 or configuration B2
TR: Trolley connection, if motorized trolley is supplied, for hoist configuration B1 only.

Connection:
If the hoist is not supplied with a power cable pigtail or power plug at the hoist electrical enclosure, then proceed as follows:

1. Remove the control box cover.
2. Insert the cable (PS) into the box through the PG cable gland. Cable gland accepts a cable diameter of 8-15mm.
3. Connect phases L1, L2, L3 to K10 contactor, and the ground wire to the terminal board (2).
4. Check that the terminals are correctly tightened, even unused terminals.
5. Tighten the power round cable PG gland.
6. Reinstall the control box cover. (Do not over-tighten cover screws.)
7. Check the hoist operation.

Note: When making electrical connections, refer to the wire identification markers for the various power and control leads that are shown on the electrical diagrams. By doing so, this will help prevent improper electrical connections which might cause severe damage to the equipment or personnel.

Note: This electric chain hoist is furnished with motor and control circuit protection as standard, which, in the Company's interpretation, meets requirements of the National Electrical Code in effect at time of shipment from our factory. The protective devices required for the power feed are outlined in Article 610 of the NEC and are the responsibility of the user. It is recommended that the user review Article 610 as well as other applicable Articles of NEC for compliance requirements.

Follow National, State and Local Codes when providing electrical service to the hoist.

Only a qualified electrician shall make all electrical connections.

SECTION 2
INITIAL START-UP

WARNING

Before connecting the hoist to the power supply, check all "motion" buttons or selector switches on your controller or push button station to ensure that none of them bind or stick in any position. Check pendant or controller cables to ensure that they are not damaged and are wired to desired hoists.

Once power has been supplied to the hoist, several important no-load checks must be made.

Proper Hook Motion (Hoist Motor Rotation)

Since rotation direction of any three-phase AC motor can be changed by reversing any two of the three lines feeding the motor, it is important that the direction of motion is correct with respect to the button being depressed, or the selector setting.

To check/correct hook motion (motor rotation), *carefully* inch the *up button* and observe hook motion. If hook does not travel up, stop the hoist and open the main power source disconnect.

WARNING

Do *not* attempt to reverse hoist motion by changing control leads in the push button, controller or at the contactor, and do not change the nameplate on the P/B. Safety switches of the control circuit wiring as furnished from the factory are directional sensitive. Changing the push button control leads, wiring inside the controller or nameplates will prevent the safety switches from functioning properly. This might create dangerous situations.

IMPORTANT

Do not run the hoist with the DOWN button if direction is reversed. To correct the direction of the hook block travel, reverse any two leads supplying power to the controller, at the main power source or at the lead in connections to the hoist. Do not change the internal wiring of the hoist nor the controller.

No Load Operational Checks

- ✓ Check the hoist motor brake function.
- ✓ Run the empty hook block up or down to check that the hook drift does not exceed more than 1 inch (25mm). If so, adjust the brake as described in Section 4, Operation/Maintenance.
- ✓ Run the empty hook block down to check that the slack fall stop on the free end of the chain (inside the chain container) makes proper contact with the buffer or the limit switch, if furnished in place of the buffer. If furnished, check that the limit switch functions correctly.
- ✓ Run the empty hook block up to check that the load block makes proper contact with the rubber buffer or the limit switch, if furnished in place of the buffer. If furnished, check that the limit switch functions properly.
- ✓ Run the empty hook block up and down several times while checking for proper tracking of the load chain.

Torque Limiter

The electric chain hoist is equipped with a torque-limiting device to help protect against damage from attempts to lift an over-capacity load. This device is not intended as a measuring device and shall not be used as such. The device is adjusted at the factory for the rated load capacity of the hoist. Sound operating practices shall be followed to avoid attempts to lift over-capacity loads.

Load/Run Test

While each complete hoist is load tested at the factory, the user should perform a full load test after installation of the hoist and completion of no load operational tests.

Lift a near capacity load about 1 foot (30cm) above floor level and check that the brake holds the load. Also, check the holding capability of the brake when lifting/lowering and stopping the load.

SECTION 3
SAFE OPERATING PRACTICES

General

There is no one single factor that is more important for minimizing the possibility of personal injury to the operator and those working in the area, or damage to property, equipment, or material, than being familiar with the equipment and using *Safe Operating Practices*.

Hoists are designed for *lifting and transporting of material only*. Under no circumstances, either during initial installation or in any other use, shall the hoist be used for lifting or transporting of personnel.

No operator shall be permitted to use the equipment if he is not familiar with its operation, is not physically and mentally fit, or has not been schooled in safe operating practices. The misuse of hoists can lead to certain hazards which cannot be protected against by mechanical means; hazards which can only be avoided by the exercise of intelligence, care, and common sense.

Safe Operating Practices also include a program of periodic inspection and preventative maintenance (see Section 5). Part of the operator's training shall be an awareness of potential malfunctions/hazards requiring adjustments or repairs, and bringing these to the attention of supervision for corrective action.

Supervisory management has an important role to play in any safety program. They must ensure that a maintenance schedule is adhered to. Also, that the equipment provided to the operators is suitable for the job intended without violation of any of the rules covering safe operating practices and good common sense.

The Safe Operating Practices shown are taken in part from the following publications:

American National Standard Institute (ANSI)
Safety Standards for Cranes, Derricks, Hoists
ANSI B30.2 - Overhead and Gantry Cranes
ANSI B30.16 - Overhead Hoists

Do's and Don'ts (Safe Operation of Hoists)

The following are Do's and Don'ts for safe operation of overhead hoist. Taking precedence over any specific rule listed here, however, is the most important rule of all: **USE COMMON SENSE.** A few minutes spent reading these rules can make an operator aware of dangerous practices to avoid and precautions to take for his own safety and the safety of others. Frequent examinations and periodic inspections of the equipment as well as a conscientious observance of safety rules may save lives as well as time and money.

DO'S - HOISTS

1. READ and follow manufacturer's Instruction, Installation and Maintenance manuals. When repairing or maintaining a hoist use only manufacturer's recommended parts and materials.

2. READ and follow all instruction and warning information on, or attached to the hoist.

3. REMOVE the hoist from service and thoroughly inspect and repair, as necessary, if unusual performance or visual defects (such as peculiar noise, jerky operation, travel in wrong direction, or obviously damaged parts) are noticed.

4. ESTABLISH a regular schedule of inspection and maintain records for all hoists with special attention given to hooks, load chains, brakes, and limit switches. See SECTION 5.

5. CHECK operation of brakes for excessive drift.

6. MAKE SURE you never lift loads over people, unless additional safety precautions are taken.

7. CHECK for damaged hooks and load chains.

8. KEEP load chain clean and well lubricated.

9. CHECK the load chain for improper seating, twisting, kinking, wear, or other defects before operating the hoists.

10. MAKE SURE a load clears neighboring stockpiles, machinery, or other obstructions when raising, lowering, or traveling the load.

11. CENTER hoist over the load before operating.

12. AVOID swinging of load or load hook when traveling the hoist.

13. BE SURE the load attachment is properly seated in the saddle of the hook. Balance load properly before handling. Avoid hook tip loading.

14. PULL in a straight line.

15. TAKE up slack slowly.

16. KEEP load chain clear from any objects.

DON'TS - HOISTS

1. NEVER lift or transport a load until all personnel are clear and do not transport the load over personnel, unless additional safety precautions are taken.

2. DO NOT allow any unqualified personnel to operate hoist.

3. NEVER pick up a load beyond the capacity rating appearing on the hoist. Overloading can be caused by jerking as well as by static overload.

4 NEVER carry personnel on the hook or the load.

5. DO NOT operate hoist if you are not physically fit.

6. DO NOT operate hoist regular to extreme limits of chain travel against the rubber buffer.

7. DO NOT operate hoist regular to extreme limits of chain travel without first checking for proper limit switch action if fitted.

8. AVOID sharp contact between two hoists or between hoist and end stops.

9. DO NOT tamper with or adjust any parts of the hoist unless *specifically authorized* to do so.

10. NEVER use the load chain as a sling.

11. DO NOT divert attention from load while operating hoist.

12. NEVER leave a suspended load unattended.

13. DO NOT use the buffer stop for normal operating stop(s). This effects the setting of the over load device, which is a safety device only. Adjustment shall be checked on a regular basis for proper operation (see Section 4.2).

14. DO NOT use limit switches for automatic stops. These switches are a safety device only and shall be checked on a regular basis for proper operation.

13. NEVER operate any hoist that has an inherent or suspected mechanical or electrical defect.

14. DO NOT use load chain as ground for welding. NEVER touch a live welding electrode to the load chain. Isolate load hook to prevent grounding.

15. DO NOT jog controls unnecessarily. Hoist motors are generally high torque, high slip types. Each start causes an inrush of current greater than the running current and leads to over-heating and heat failure, or burnout, if continued to excess.

16. NEVER place hands on moving load chain or near moving chain pinch points.

SECTION 4
OPERATION/MAINTENANCE

Typical Construction

While each electric chain hoist may have some slight variations in design/arrangement, all hoists have same basic elements.

1. *Motor* - basic drive package.

2. *Chain Sprocket* - moves the load chain to lift and lower the load

3. *Gear case Assembly* - couples the motor to the chain sprocket

4. *Brake/Torque Limiting Device* - to stop and hold the load as well as to help prevent lifting of excessive loads which may damage the hoist.

5. *Frame (Hoist Body)* - basic structural components that support the load to be handled.

6. *Bottom Block and Load Wheel* - includes bottom block and chain sprocket.

7. *Load Chain* - load chain and end connections for picking up the load.

8. *Limit Switch* – a device for over-travel protection. (Optional for some hoist configurations)

9. *Controls* - devices for supplying power to motor and reversing direction of the motor.

The following details the operation/maintenance instructions for each basic element. In Figure 4.1 the basic components inside the frame and the basic kinematics are shown.

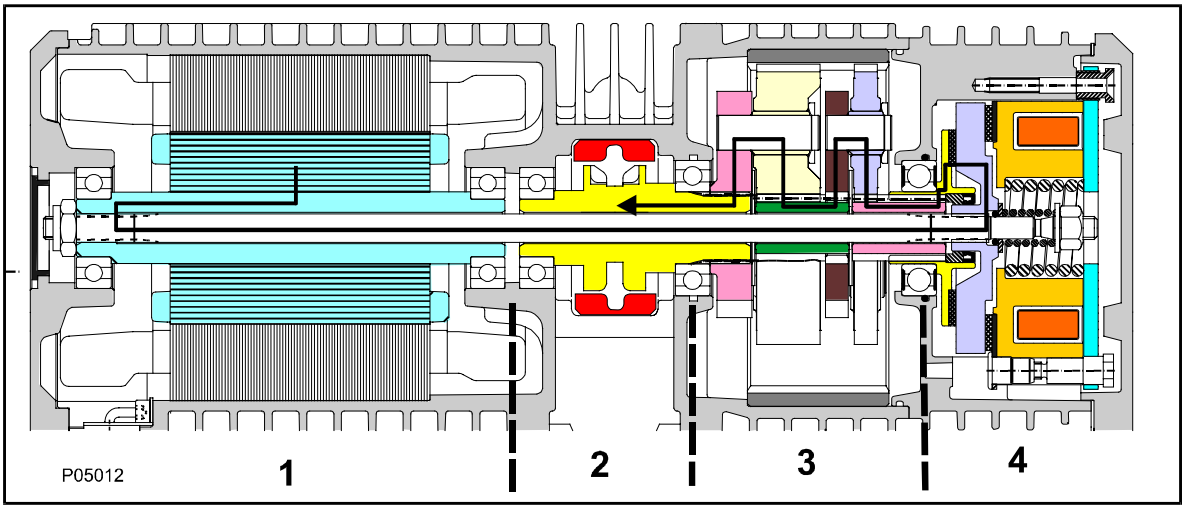


Figure 4-1
1. Motor
2. Chain sprocket
3. Gear
4. Brake/limiter

Motors

The hoist motors are designed to provide dependable hoisting service. The standard motors are enclosed for protection against normal hazards of dust and moisture. The bearings are sealed and lifetime lubricated and they do not require regreasing.

Brake/Torque Limiting Device

The hoist brake is a D.C. disc type. The function of the hoist brake is to minimize hook drift by bringing the motor to a quick and smooth stop, and to hold loads suspended from the hook with the power off.

In addition to the hoist brake, the hoist is furnished with a torque-limiting device, integral with the hoist brake. The torque-limiting device helps prevent the lifting of excessive loads, which may damage the hoist.

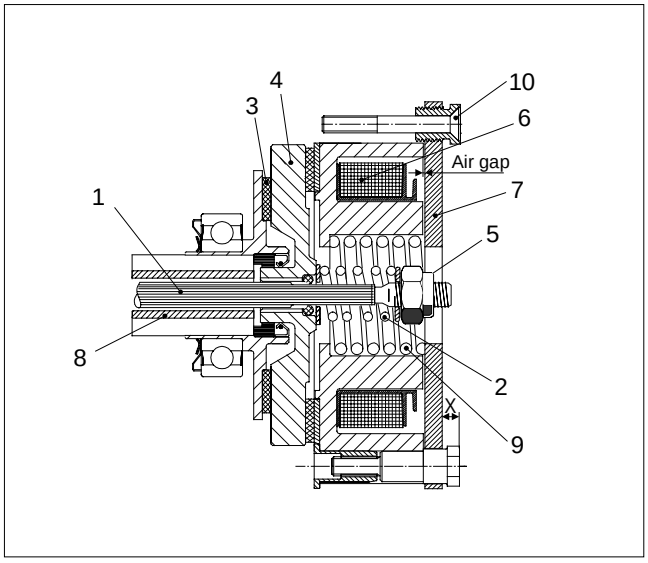


Figure 4-2 – Hoist Brake/Torque-limiter

Operation of Brake/Torque-limiter

Even if the torque-limiter slips, once power is removed the brake will engage and hold.

The parts of the limiter and the brake disc are mounted on the gear input shaft (1). Other brake parts are mounted to the brake housing.

The spring (2) keeps the limiter (3) and the brake discs (4) plated together and defines the maximum torque that can be transferred through the limiter.

The nut (5) maintains the assembly on the gear-input shaft.

When the coil (6) is energized, during lifting or lowering, it moves against the anchor disc (7), which is fixed to the brake housing by an attachment screw (10) *(there is an air gap for this purpose).* The discs (3 and 4), that are connected together by the friction of the limiter, turn freely, transmitting the movement to the pinion (8).

Braking occurs when the coil is no longer energized and the spring (9) drives back coil (6).

Adjustment of the Limiter (Refer to Figure 4-3)

WARNING

Make sure that the main switch supplying power to the hoist is in the opened and locked position before adjusting the torque-limiter.

1. Hook a load of the percentage indicated in the table below onto the hoist.

Configuration	A	B1	B2	C	D	E
Test load: % of rated capacity	125%	125%	125%	125%	250%	125%

2. Remove the brake end cap and the seal.
3. Raise the load at slow and fast speed.
4. Turn the adjusting nut (5) in the required direction.
   - Turn the adjusting nut clockwise to increase the torque.
   - Turn the adjusting nut counterclockwise to decrease the torque.

WARNING

When decreasing the torque, make sure that there is no load connected to the load block. Failure to remove load from the load block before performing this procedure may result in personal injury.

5. Repeat steps 3 and 4 until the load can barely be lifted at fast speed. The limiter is now adjusted.

CAUTION

The limiter will generate heat whenever it is slipping. As a result of this, a massive clutch plate will absorb most of this heat. When the clutch plate becomes too hot, adjusting the limiter may be difficult due to unstable behavior of friction surfaces. If this happens let the limiter cool down for a while and then readjust the limiter.

6. Fit the brake end cap and seal.
7. Check, at fast speed, the lifting of a nominal load.

WARNING

Never adjust the torque limiter to allow lifting of more than the maximum capacity shown on the hoist. Failure to adhere to this restriction may result in personal injury or property damage.

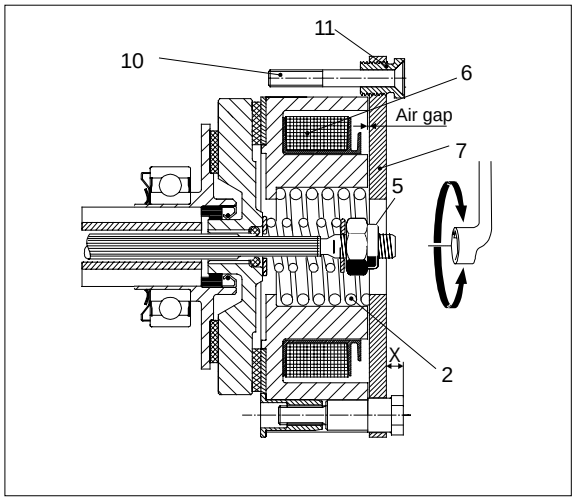


Figure 4-3

Adjustment of the Brake (Refer to Figure 4-3)

The maximum air gap of the brake is 0.022"[0.55mm]. If this value has been reached or will be exceeded before next inspection, the brake must be adjusted.

WARNING

When adjusting the brake make sure that the main power switch applying current to the hoist is in open and locked position and remove the load from the hook. When testing the brake function, be sure not to touch moving and rotating parts. Before pressing the control button on the pendant station, check that the adjusting nut is clear of any misplaced items such as tools.

1. Remove the brake end cap and the seal.
2. Measure the air gap between the anchor disc (7) and the outer ring of the coil with a feeler gauge. Measure the air gap at least at 3 different points around the coil.
3. Set the air gap to 0.012" [0.3mm].
4. Slightly open the three screws, (10) so that the adjustment nut (11) still touches to the brake housing. Turn the adjustment nut (11) counterclockwise to reduce the air gap. Turning the adjustment nut clockwise increases the air gap.
5. Check the air gap after adjusting the brake and make sure that the three screws, (10) are properly tightened to the Torque Specification in SECTION 5.
6. Check the brake function and adjustment.
7. Run the load chain up and down several times without a load to test the function of the brake. Then, lift a near-capacity load about 1 foot above the floor level and check that the brake holds the load.
8. Reinstall the seal and the brake end cap.

Frame (Hoist Body)

The frame (hoist body) is constructed of aluminum and, unless damaged from abuse (impact with another hoist or building structure), requires no maintenance. Any hoist with a frame that is no longer serviceable for any reason should be referred to the factory for replacement/repair.

Load Chain

CAUTION

A hoist shall never be used if the load chain shows any evidence of mechanical damage or excessive wear.

The replacement load chain shall be of exact size, grade and construction as the original load chain that was furnished with the hoist from the factory. Only use R&M load chain as specified in this manual.

Clean and lubricate the load chain at regular intervals.

Improper load chain storage or installation procedure can render the load chain unusable prior to the first lift.

Load Chain Inspection

Load chain inspection shall be conducted weekly by a designated person using good judgment in evaluating the remaining service life. Any deterioration of the load chain resulting in appreciable loss of the original strength, such as situations described below, shall be noted and evaluated. If any of the links show cracks or signs of distortion, the chain must be replaced immediately.

A monthly inspection shall include a written record, dated and signed by the inspector.

Test the hoist under load in lifting and lowering directions and observe the operation of the chain and sprockets. The chain should feed smoothly into and away from the sprockets.

If the chain binds, jumps, or is noisy, first see that is clean and properly lubricated. If the trouble persists, inpect the chain and mating parts for wear, distortion, or other damage.

Examine visually for gouges, nicks, weld splater, corrosion, and distorted links. Slacken the chain and move the adjacent links to one side to inspect for wear at the contact points. If wear is observed or if stretching is suspected, measure the chain for wear as outlined in Load Chain Replacement Section.

Main items to record regularly:

1. Poor lubrication of load chain.
2. Wear of link on outside and on inside contact points.
3. Crushing, kinking, or signs of distortion.
4. Reduction of original diameter by more than 10%.

During inspections evaluate those sections of chain, which are normally hidden, such as sections that pass over load wheels.

Load Chain Replacement

Chain Specification:	Load chain
Chain type:	Standard
Diameter (d) x Pitch (t):	0.189 x 0.492" (4.8 x 12.5 mm)
Class:	DAT
Grade:	H8S or HE 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, 1 fall:	1100 lbs. (500 kg)
Breaking load:	6519.50 lb$_f$s (29 kN)
Maximum breaking stress:	116,030 lbs/in^2 (800 N/mm^2)
Total breaking elongation:	>10% min.
Unit Weight: lb/ft [kg/m]	0.363 lbs./ft [0.54 kg/m]

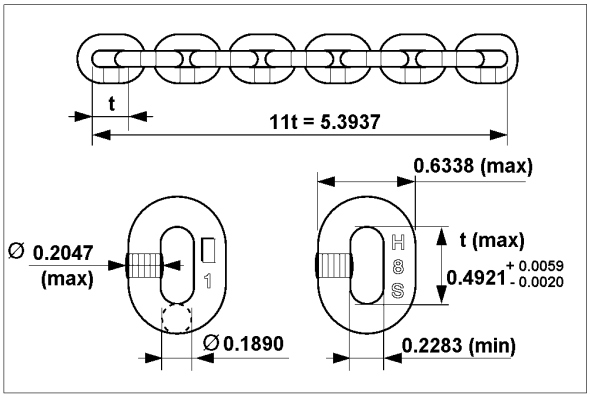


Figure 4-4

Measuring the load chain for wear

Measuring the load chain for wear should be performed at several points.

- Measure the diameter (d) and the pitch (t) of several links.
- Measure the chain length over 11 links (11 t).

Load Chain Wear Limits:

Minimum link thickness allowed (d):	0.1693" (4.30 mm)
Maximum pitch allowed (t):	0.5157" (13.10 mm)
Maximum length allowed (11 t):	5.5216" (140.25 mm)

If any one of these load chain wear limits is exceeded, the **load chain must be replaced immediately**. If a single load chain link is defective in any way, the **whole chain must be replaced**. In addition, the chain guide and the chain sprocket must be checked for excessive wear. If necessary, replace the chain guide and the chain sprocket. A worn chain sprocket or chain guide usually leads to premature chain wear.

Load Chain Removal

1-fall chain

1. Remove the load from the hook.
2. Disassemble the hook block.
3. Drive the chain into the chain container.
4. Remove the chain container, unscrew and remove the lower chain guide.

2-fall chain

1. Raise the hook block to about 12” (30 cm) from the hoist body.
2. Remove the chain container.
3. Carefully remove the anchor of the load chain from the hoist body.
4. Disassemble the chain pin and the chain from the anchor.
5. Remove the 2-fall hook block, without disassembling it, letting the chain run through it.
6. Let the rest of the chain slide through the chain sprocket.

Load Chain Installation

The load chain should always be installed using the flexible plastic insertion tool (1 in Fig 4-5). Using this tool helps to ensure that the load chain is installed correctly. Support the chain during installation to prevent the insertion tool from distortion. Insertion tool is available from R&M.

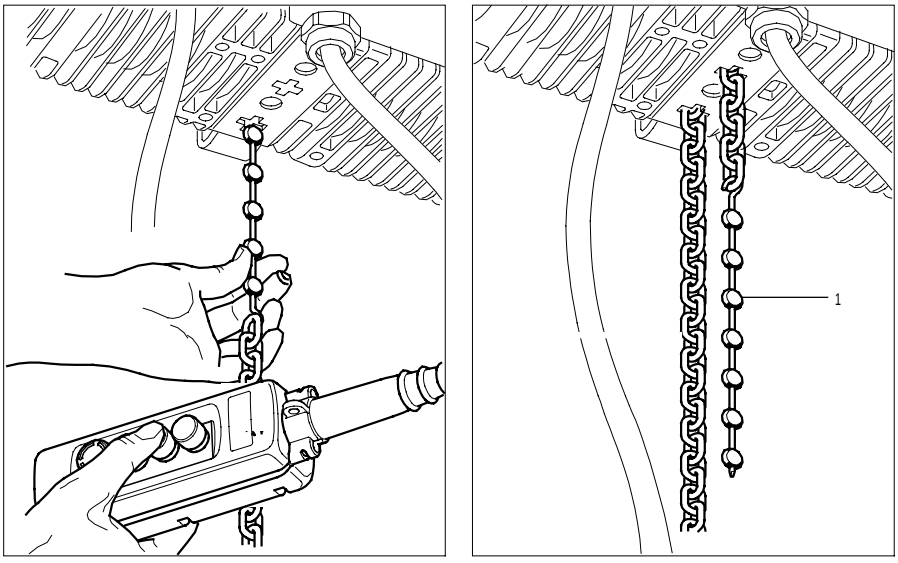


Figure 4-5

1-fall chain:

1. Insert the last chain link onto the small plastic hook of the insertion tool.
2. Insert the other side of the tool in the sprocket as shown in Figure 4-5.
3. Place the load chain on the chain sprocket so the chain link welds are **toward** the pocket as shown in Figure 4-6.
4. Raise the chain at slow speed so that the tool and the chain come out the other side of the sprocket.

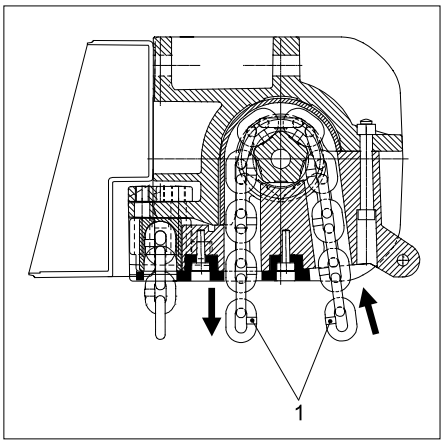


Figure 4-6

Note: The weld (1) of the vertical chain links shall be **towards** the chain sprocket

2-fall chain

1. Insert the last chain link in the small plastic hook of the insertion tool.
2. Insert the other side of the tool up through the sprocket, entering the chain container side.
3. Run the hoist at slow speed so that the tool and the chain come out the other side of the sprocket. Continue until about 20” (50 cm) of chain becomes available.
4. Put the chain through the idler sprocket, **making sure not to twist the chain during installation.**
5. Remove the limit switch by removing the two screws.
6. Remove the chain anchor from the hoist body.
7. Disassemble the chain pin from the anchor.
8. Insert the chain end to anchor and place the chain pin into its place to fix the chain.
9. Reattach the chain anchor to the hoist body. Properly tighten bolts according to Torque Specification, SECTION 5.
10. Reinstall the limit switch to the chain guide. Properly tighten screws according to Torque Specification, SECTION 5.

Run the load chain up and down a few times without load and make sure the load chain is not twisted. Lubricate the load chain.

Fall Stop Assembly

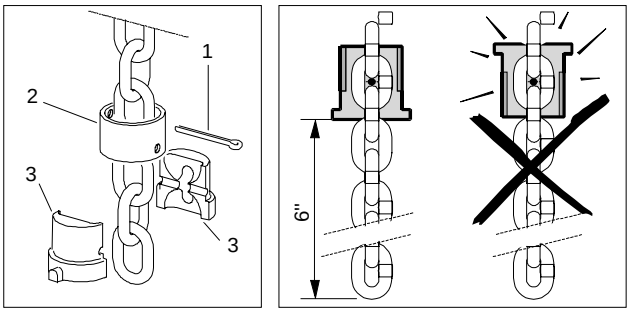


Figure 4-7

REMOVAL:

1. Remove the cotter pin.
2. Slide the ring up from the stop.
3. Remove the stop.
4. Slide the ring off the load chain.

REPLACEMENT:

1. Slide the ring onto the free end of the load chain.
2. Properly position the two halves of the stop around the chain (Figure 4-7), locating it approximately six inches from the free end of the load chain.
3. Insert the tube around the stop.
4. Insert the cotter pin through the stop.

Note: Make sure that the stop is correctly fitted to the chain as illustrated in Figure 4-7. The locking tube shall be turned towards the hoist.

Bottom Block, Load Wheel and Suspension Hook

Load wheels showing evidence of scored grooves or broken/cracked flanges or sharp edges generated from wear, shall be replaced. Worn load wheels can greatly reduce the life of the load chain.

Check hooks for deformation or cracks. Hooks having a throat opening more than 115% of normal, or more than 10-degree twist from the plane of the unbent hook, must be replaced. See Figure 4-8 below.

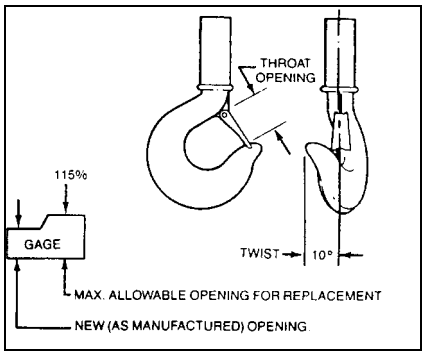


Figure 4-8

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

Note: Any hook that is twisted or has a throat opening in excess of normal indicates abuse or overloading of the unit. Other load bearing components shall be checked for damage.

Safety latches shall be replaced if bent or broken to the extent that they no longer provide proper closure of the throat opening of the hook.

CAUTION

Repairing hooks by welding or reshaping is strictly forbidden.

Hook Specification

Load capacity (lbs.)	Test load (lbs.)	No of falls	Minimum ruin load (lbs.)	Hook I.D.	Dimensions (inch) Ø M	Ø a1	a2	a3	b1	b2	e1	h1	h2	t1	t2
353	705	1	1764	012T	0.551	1.181	0.787	1.339	0.748	0.591	3.268	0.866	0.748	1.260	0.394
551	1102	1	3472	012T	0.551	1.181	0.787	1.339	0.748	0.591	3.268	0.866	0.748	1.260	0.394
705	1411	1-2	3527	012T/025 T	0.551	1.181	0.787	1.339	0.748	0.591	3.268	0.866	0.748	1.260	0.394
1102	2205	1-2	5512	012T/025 T	0.630	1.417	1.024	1.614	0.866	0.748	3.780	1.102	0.945	1.496	0.512
1389	2778	2	8752	025T	0.630	1.417	1.024	1.614	0.866	0.748	3.780	1.102	0.945	1.496	0.512
2205	4409	2	11023	025T	0.630	1.417	1.024	1.614	0.866	0.748	3.780	1.102	0.945	1.496	0.512

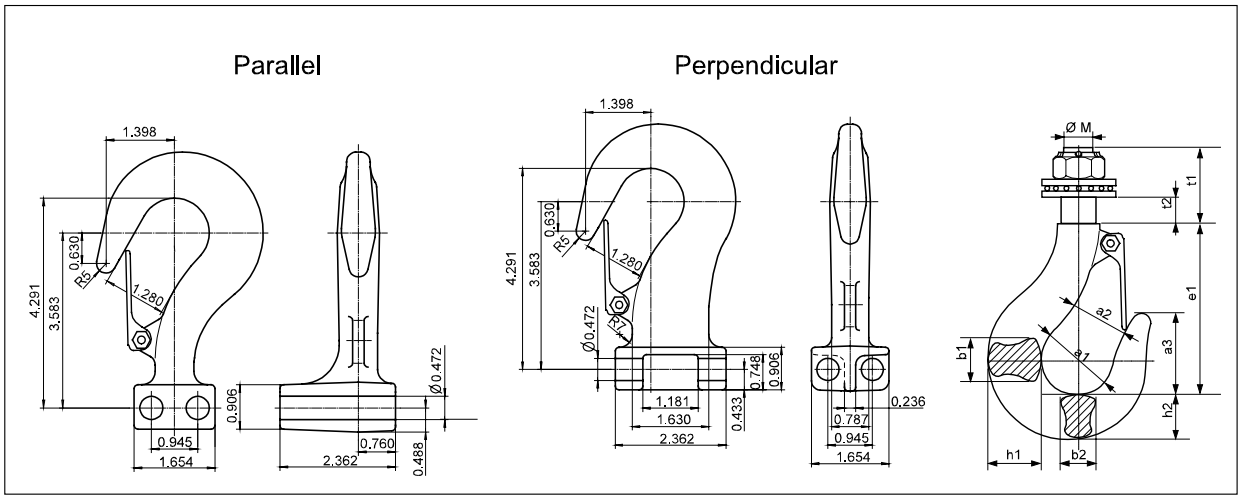


Figure 4-9

Mark: ISO 2766
DIN model number: 15401
DIN 15400 class: T
DIN 15401 material: 35 CD 4

Suspension Hook

Removal:

1. Remove the attaching screw and the locking plate.
2. Slide the two connection pins out of their holes and remove the hook.

Replacement:

1. Check if the suspension is for a 1-fall (1/1) or for a 2-fall (2/1) hoist. The hook is asymmetrical so that by turning the hook half a turn the correct position can be selected.
2. Attach the hook into the slot in the hoist body so that the hook neck and the ball of the hook are in the same line of the correct fall marking at the hoist body (see fig 4-10).

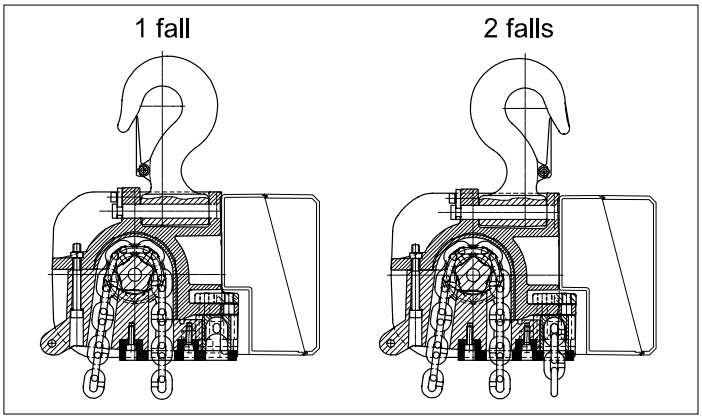


Figure 4-10

Measurement of the Wear on the Suspension and Lifting Hooks

The wear of the suspension and lifting hooks (dimension *a2* - see fig 4-9) shall be checked regularly.

Damaged safety latches shall be replaced immediately.

If the maximum dimension (*a2*) of the throat opening is greater than the initial dimension by more than 15%, the hook shall be replaced immediately.

Hook Identification:	012	025
a2, max. allowed:	0.905” (23 mm)	1.181” (30 mm)

Upper & Lower Limit Switch

The upper and lower limit switches are furnished as standard on the concert hoist, configuration B1 only. The weight-operated limit switch, which is only effective if the hoist is mounted in the normal position, is an automatic reset, control circuit type. The switch housing is recessed into the underside of the hoist body.

The upper and lower limites switch are emergency over-travel protection devices only and are not to be used as automatic stops.

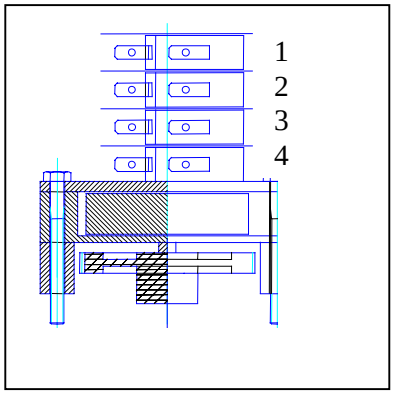
The hook block activates the upper switch as it approaches the hoist body and once it is activated, only the UP circuit is opened. When the hook block is lowered to it lowest limit of travel, the fall stop, mounted on the free-end of the load chain, activates the lower limit switch, which opens the DOWN circuit only.

Rotary Limit Switch

The rotary limit switch is an adjustable type and provides over-travel protection for the upper and lower limits of hoist travel. The limit switch is a control circuit type. Limit switches are not available for hoist configuration A - direct (full line voltage) control.

Designation of the limit switches

2 position (contacts) limit switch:
Position 1: upper limit switch,
Position 2: lower limit switch



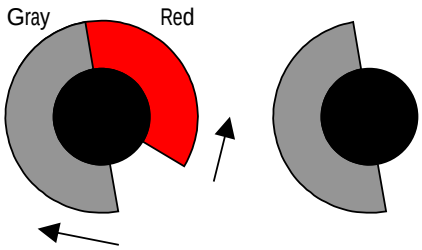
4 position (contacts) limit switch:
Position 1: lower limit switch,
Position 2: intermediate limit switch *,
Position 3: intermediate limit switch *,
Position 4: upper limit switch

Limit switch codes:

Hoist type	Chain (m)	Ratio	2 contacts	4 contacts
SM5	0-13	4+1/6	2249076	2249077
SM5	13-30	15	2249078	2249079

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 the air gap determines the length of the reset play in the opposite direction.



Maximum height of lift Minimum height of lift

Once the limit switch is tripped, the load must travel 18” [50cm] minimum in the opposite direction to reset the switch.

When furnished, the rotary limit switch, regardless of type, is mounted to the outside of the SM5 hoist body. This increases some hoist body outline dimensions.

*Designation of limit may vary on application. Switch number 2 and number 3 could have different functions.

Controls

WARNING

Before removing or checking any electrical component, ensure that the power supply is shut off and the power disconnect switch is locked in open position.

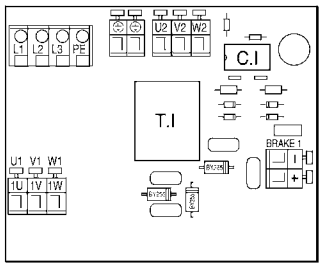
Standard basic control components consist of either of the following:

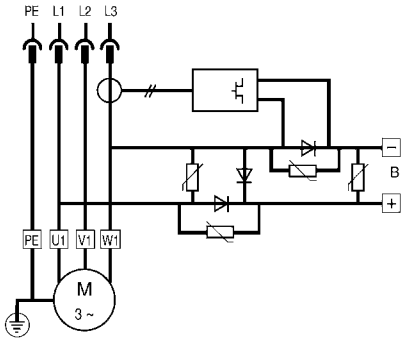
1. **ACF Board** - for direct full line voltage control (hoist configuration A)

ACF board is located in the hoist electrical enclosure on the hoist and it controls the hoist brake when the hoist utilizes direct control. ACF board provides rapid brake release and engagement. ACF 1 is used for single speed hoist motors and ACF 2 is used for two speed hoist motors.

The hoist motor must be connected to a power supply of either 208 volts or 230 volts. The electrical connection to the motor is the same for either 208 or 230 volts. Direct control is not being offered for higher voltages such as 460.

ACF 1: Single Speed Hoists





MOTOR CONNECTIONS:

230V		400V		
	U1 W2		U1	U2
	V1 U2		V1	V2
	W1 V2		W1	W2

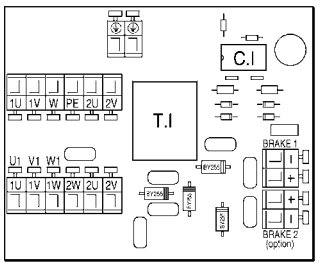
208/230Vac max.

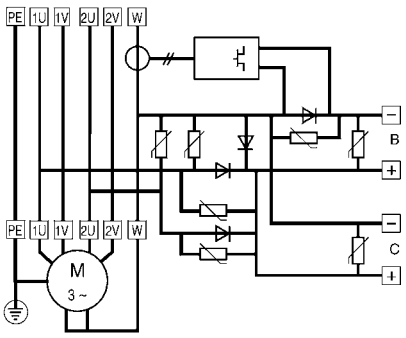
POWER SUPPLY: L1 L2 L3 PE

B- BRAKE:
+ – brake

208/230Vac: brake coil = 100Vdc

ACF 2: Two Speed Hoists





MOTOR CONNECTIONS:

230V		400V		
	U1 W2		U1	U2
	V1 U2		V1	V2
	W1 V2		W1	W2

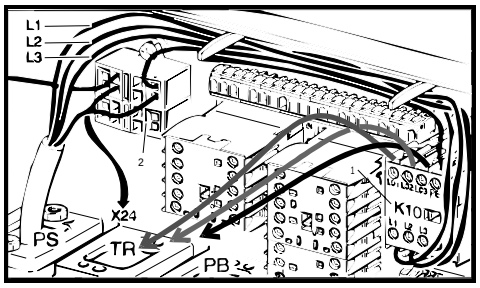
208/230V max.

POWER SUPPLY: L1 L2 L3 PE

B- BRAKE:
+ – brake

208/230Vac: brake coil = 100Vdc

2. **PC Board** - control transformer and contactors are soldered to a circuit board. PC Board is furnished on the hoist for configuration B1, B2 or C. A special PC Board is furnished on the hoist for configuration D.



Note: The number, size and quantity of control devices vary considerably, depending on the number and types of motors and the many control options that are available. Refer to wiring diagram for specific details on power/control devices.

No specific rules can be given as to the frequency of replacement of electrical devices. Deterioration of electrical components is directly related to the heat generated (over time) in contactor coils and transformers, and the arcing of contactors when the motor circuit is opened (starts/stops).

The single speed concert chain hoist furnished with PC Board controls is available for a power supply of 208/230 volts or 460 volts.

Single speed hoist furnished with a special PC Board could be voltage reconnectable for 230/460 volts if ordered that way.

- To convert a voltage reconnectable single speed chain hoist with a special PC Board (contactor control) from 230 (208) volts to 460 volts, the connection changes include:
  - Checking that fuse (F100) is being used for control transformer (T100).
  - Reconnecting primary line connections to control transformer.
  - Reconnecting hoist motor leads.
  - Reconnecting hoist motor brake.

Chain hoists with two-speed hoist motion are not voltage reconnectable.

Hoist Circuit Diagram-Standard

Hoist circuit (wiring) diagrams, shown on page 4-19 and after are standard for the indicated hoist configuration.

When hoists of configuration B2 or C are equipped with PC Board controls with a mainline contactor, they are wired for single speed (low speed is not connected) and the mainline contactor is disabled. The function of the mainline contactor is taken over by the controller. By doing so, group control through a single standard controller is simplified.

Manuals and wiring diagrams for controls and controller are furnished with the controller when they are supplied separate from the hoist.

TWO SPEED HOIST: 208V/230V or 460V (Hoist configuration B1 or B2)

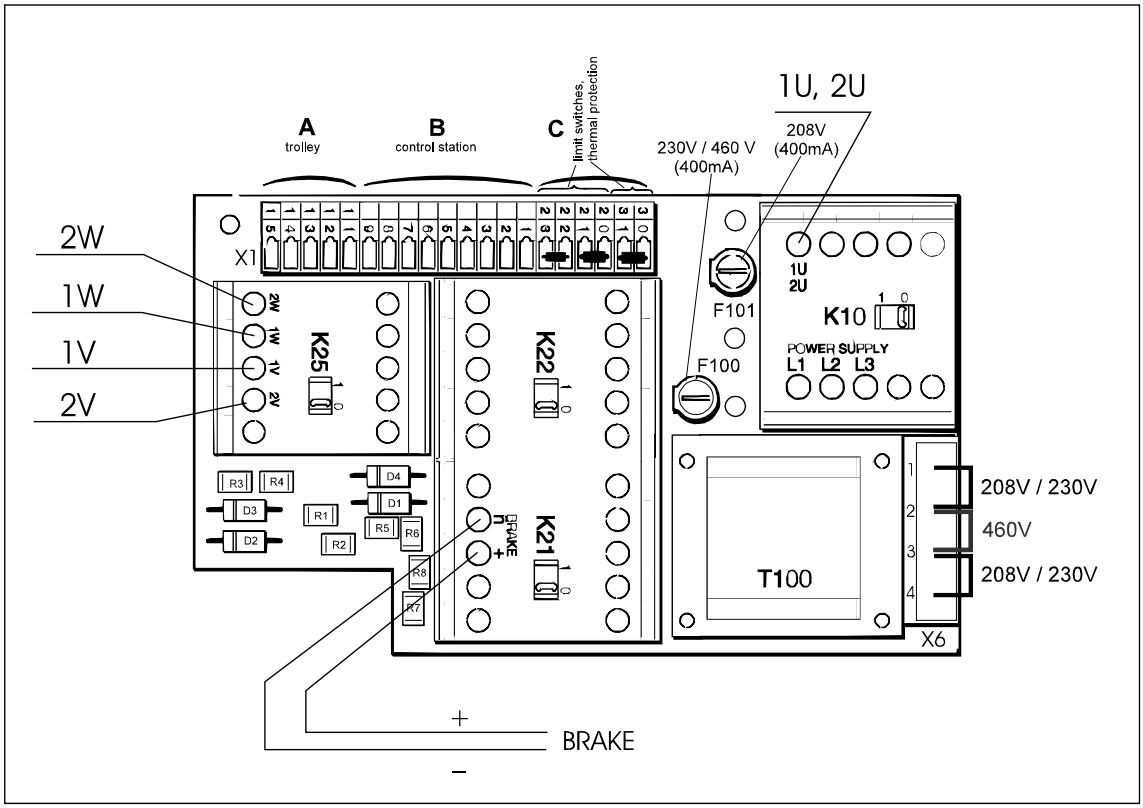


Figure 4-13

HOIST SUPPLY

L1	hoist supply
L2	hoist supply
L3	hoist supply
BRAKE n	–brake
BRAKE +	+brake
1U	motor supply
2U	motor supply
1V	motor supply
2V	motor supply
1W	motor supply
2W	motor supply

GROUND WIRES

ground terminal, 4 connections
(see also figure 4-11)

PE	motor
PE	p.c. board (K10)
PE	trolley connection
PE	power supply

PRINTED CIRCUIT BOARD

TAG STRIP X1
Terminal No: X24 plug

A	**Trolley**	**Pin No:**
11	Control Voltage	1
12	SD: low speed	2
13	F: high speed	3
14	D2: left	4
15	D1: right	5

X23 plug

B	**Push button**	**Pin No:**
1	common	1
2	hoist up	2
3	hoist down	3
4	hoist fast	4
5	emergency stop	5
6	trolley fwd	6
7	trolley rev	7
8	trolley fast	8
9	-	

C Protections

30-31	Thermal prot. F291
20-21	Upper limit switch S221
22-23	Lower limit switch S222
K10	Emergency stop contactor
K21	Hoist UP contactor
K22	Hoist DOWN contactor
K25	Hoist FAST contactor
T100	Control Transformer
F100	Fuse 400 mA, with 230V and 460V
F101	Fuse 400mA, with 208V

SINGLE SPEED HOIST: 208V/230V (Hoist configuration B1 or B2)

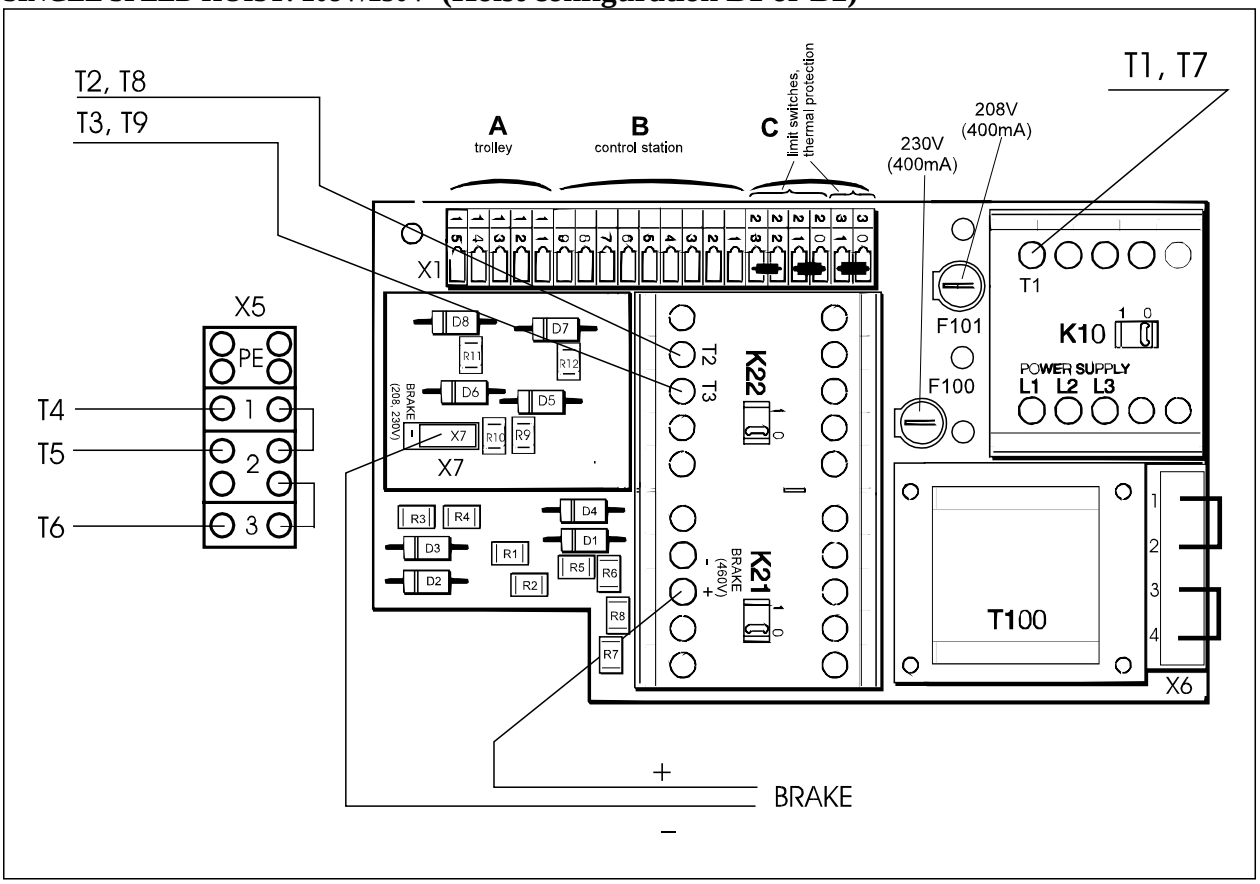


Figure 4-14

HOIST SUPPLY

L1	hoist supply
L2	hoist supply
L3	hoist supply
Terminal X7	– brake
BRAKE +	+ brake
T1-T9	motor supply

GROUND WIRES

ground terminal, 4 connections
(see also figure 4-11)

PE	motor
PE	p.c. board (K10)
PE	trolley connection
PE	power supply

PRINTED CIRCUIT BOARD

TAG STRIP X1
Terminal No:

A	**Trolley**	**X24 plug Pin No:**
11	Control Voltage	1
12	SD: low speed	2
13	F: high speed	3
14	D2: left	4
15	D1: right	5

B	**Push button**	**X23 plug Pin No:**
1	common	1
2	hoist up	2
3	hoist down	3
4	hoist fast	4
5	emergency stop	5
6	trolley fwd	6
7	trolley rev	7
8	trolley fast	8
9	-	

C Protections

30-31	Thermal F291
20-21	Upper limit switch S221
22-23	Lower limit switch S222
K10	Emergency stop contactor
K21	Hoist UP contactor
K22	Hoist DOWN contactor
T100	Control Transformer
F100	Fuse 400 mA with 230V
F101	Fuse 400mA with 208V

SINGLE SPEED HOIST: 460V (Hoist configuration B1 or B2)

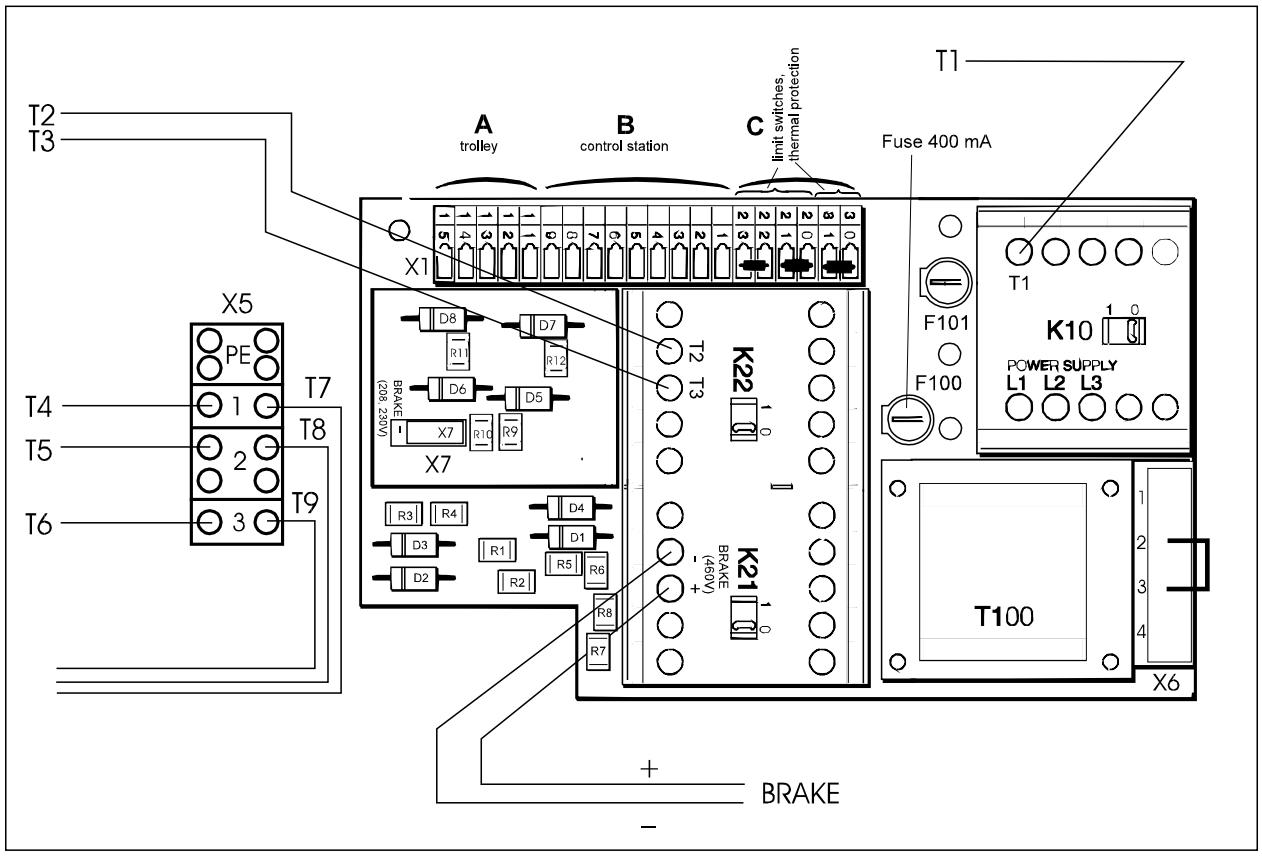


Figure 4-15

HOIST SUPPLY

L1	hoist supply
L2	hoist supply
L3	hoist supply
BRAKE-	– brake
BRAKE +	+brake
T1-T9	motor supply

GROUND WIRES

Terminal X5

ground terminal, 4 connections (see also figure 4-11)

PE	motor
PE	p.c. board (K10)
PE	trolley connection
PE	power supply

PRINTED CIRCUIT BOARD

TAG STRIP X1

Terminal No:

A	**Trolley**	**X24 plug Pin No:**
11	Control Voltage	1
12	SD: low speed	2
13	F: high speed	3
14	D2: left	4
15	D1: right	5

X23 plug

B	**Push button**	**Pin No:**
1	common	1
2	hoist up	2
3	hoist down	3
4	hoist fast	4
5	emergency stop	5
6	trolley fwd	6
7	trolley rev	7
8	trolley fast	8
9	-	

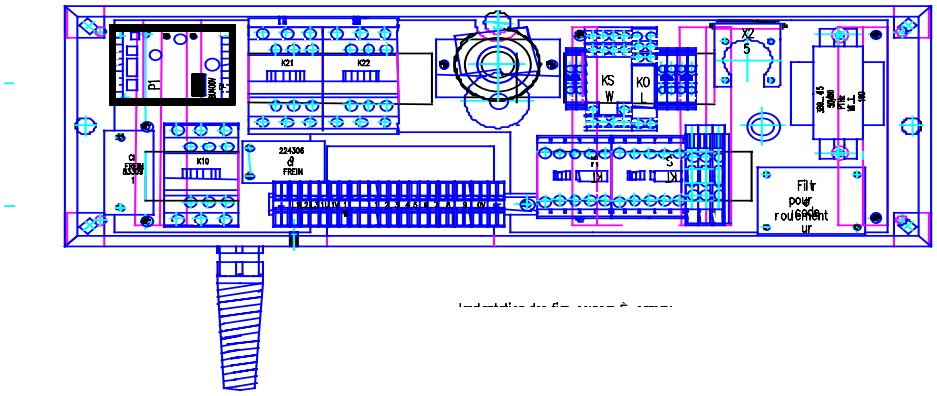
C Protections

30-31	Thermals F291
20-21	Upper limit switch S221
22-23	Lower limit switch S222
K10	Emergency stop contactor
K21	Hoist UP contactor
K22	Hoist DOWN contactor
T100	Control Transformer
F100	Fuse 400 mA

SINGLE SPEED HOIST (Hoist configuration D)

Configuration D hoists are equipped with a multi connector, which are wired as follows:

PLUG PIN N°	LEAD COLOR	FUNCTION	HOIST TERMINAL
1	BROWN	L1 POWER	L1
2	BLUE	L2 POWER	L2
3	BLACK	L3 POWER	L3
4	WHITE	48VAC	1
5	YELLOW	E STOP	5
6	TRANSPARENT	-	
7	ORANGE	SIGNAL ↑	8
8	PINK	ACTION ↑	2
9	PURPLE	"BY-PASS"	4
10	RED	SIGNAL ↓	8
11	GREY	ACTION ↓	3
12	GREY/WHITE	-	
13	BROWN/WHITE	0 VOLT	9
14	BLUE/WHITE	-	
15	RED/WHITE	-	
16	BLACK/WHITE	-	
PE	YELLOW / GREEN	EARTH	PE



HOIST SUPPLY

L1 hoist supply
L2 hoist supply
L3 hoist supply
BRAKE - - brake
BRAKE + + brake
U1-V1-W1 motor supply

GROUND WIRES

Terminal X

PE motor
PE p.c. board
PE power cell
PE load cell

PRINTED CIRCUIT BOARD

Controls

1 common
2 hoist up
3 hoist down
5 emergency stop

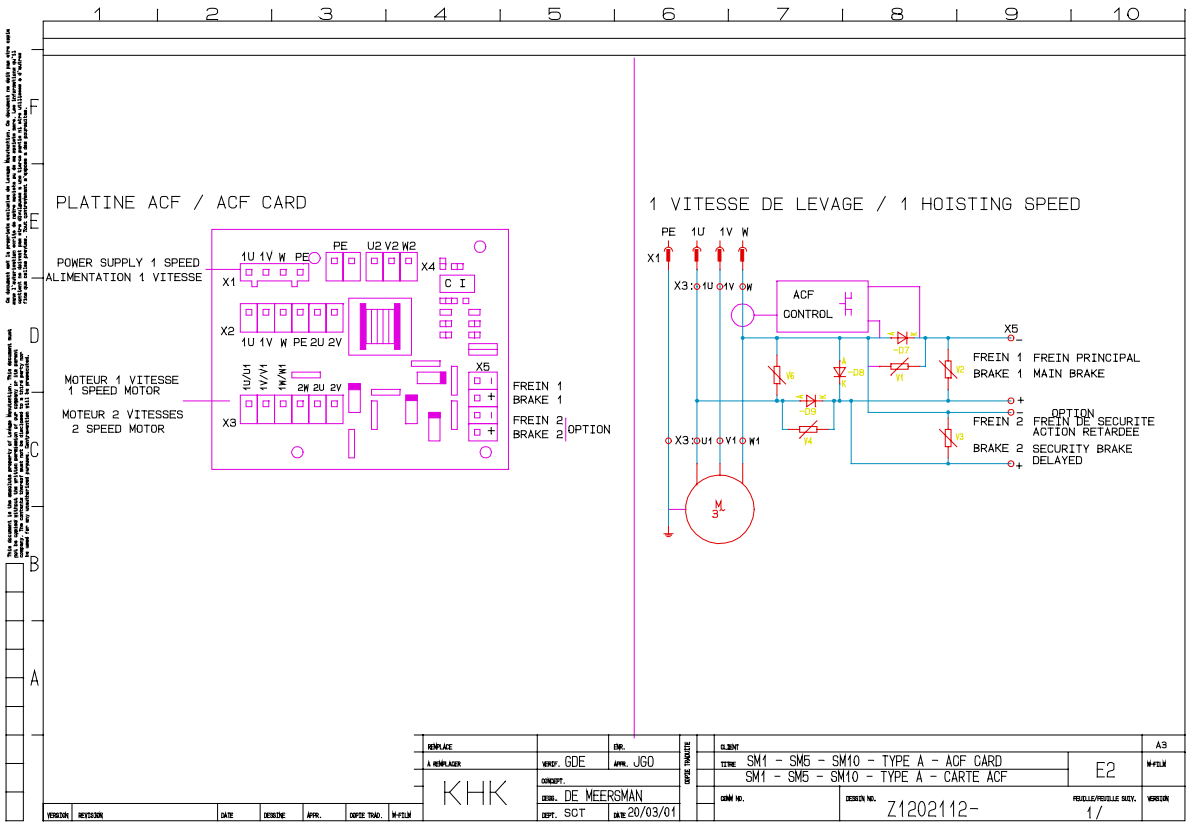
PROTECTION

Terminals X25 test facility

F291 Thermal protection
P1 Overload device
S221-1 Upper rotary limit switch
S222-1 Lower rotary limit switch
S221-2 Intermedary rotary limit switch
S222-2 Intermedarty rotary limit switch
K10 Emergency stop contactor
K21 Hoist UP contactor
K22 Hoist DOWN contactor
KOL Overload signal relay
KTS Main brake test relay
KTM Brake test relay
KSW U/L Limits test relay
T100 Control transformer
F102 Secondary fuse
F100 Primary fuse
F101 Primary fuse

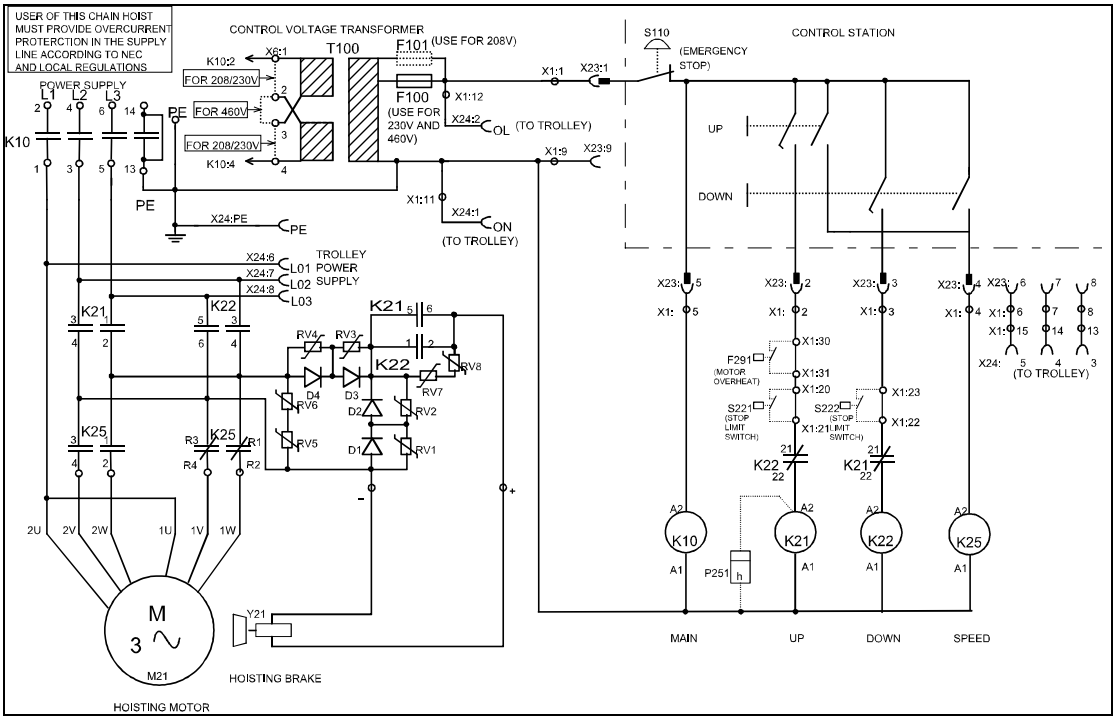
Hoist Circuit Diagram-Standard

SINGLE SPEED HOIST: 208V / 230V (Hoist configuration A)



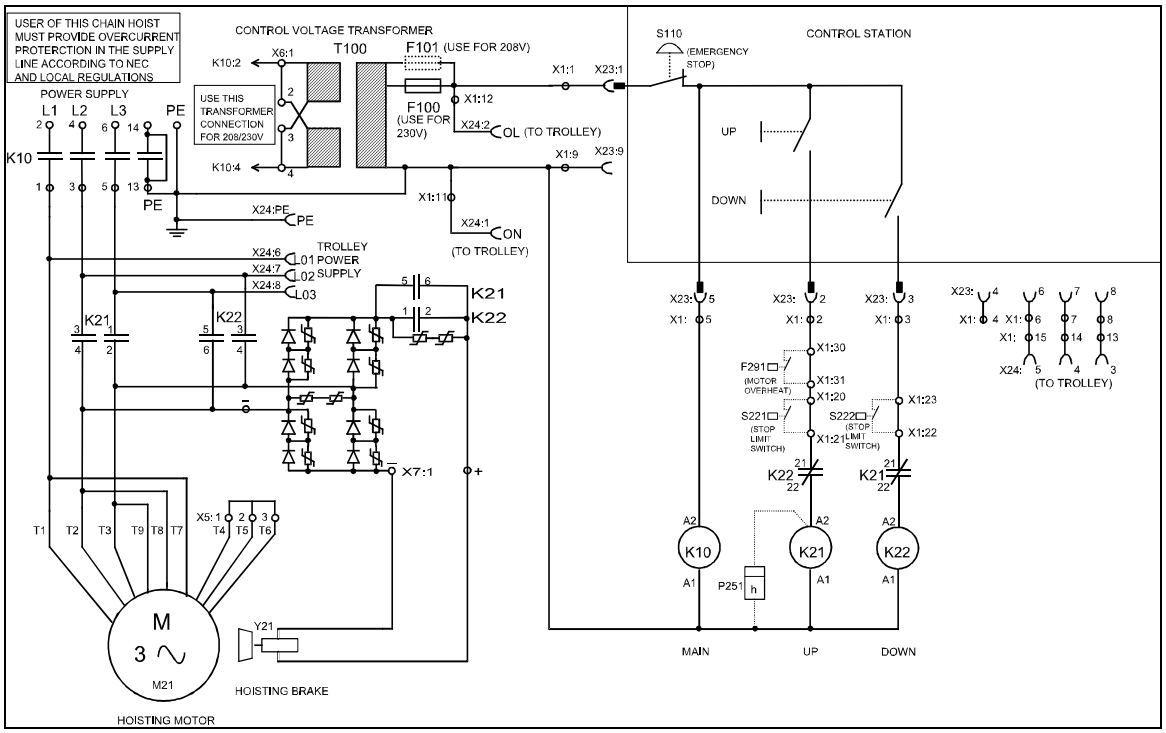
Hoist Circuit Diagram-Standard

TWO SPEED HOIST: 208V/230V or 460V (Hoist configuration B1 or B2)

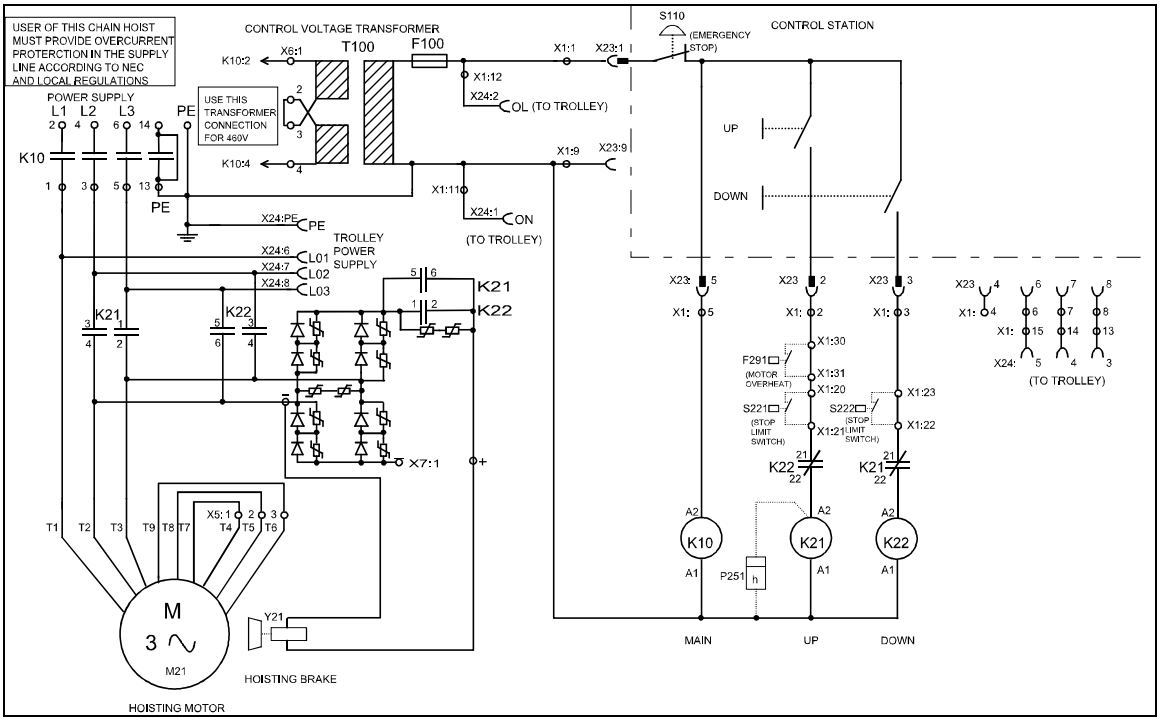


Hoist Circuit Diagram-Standard

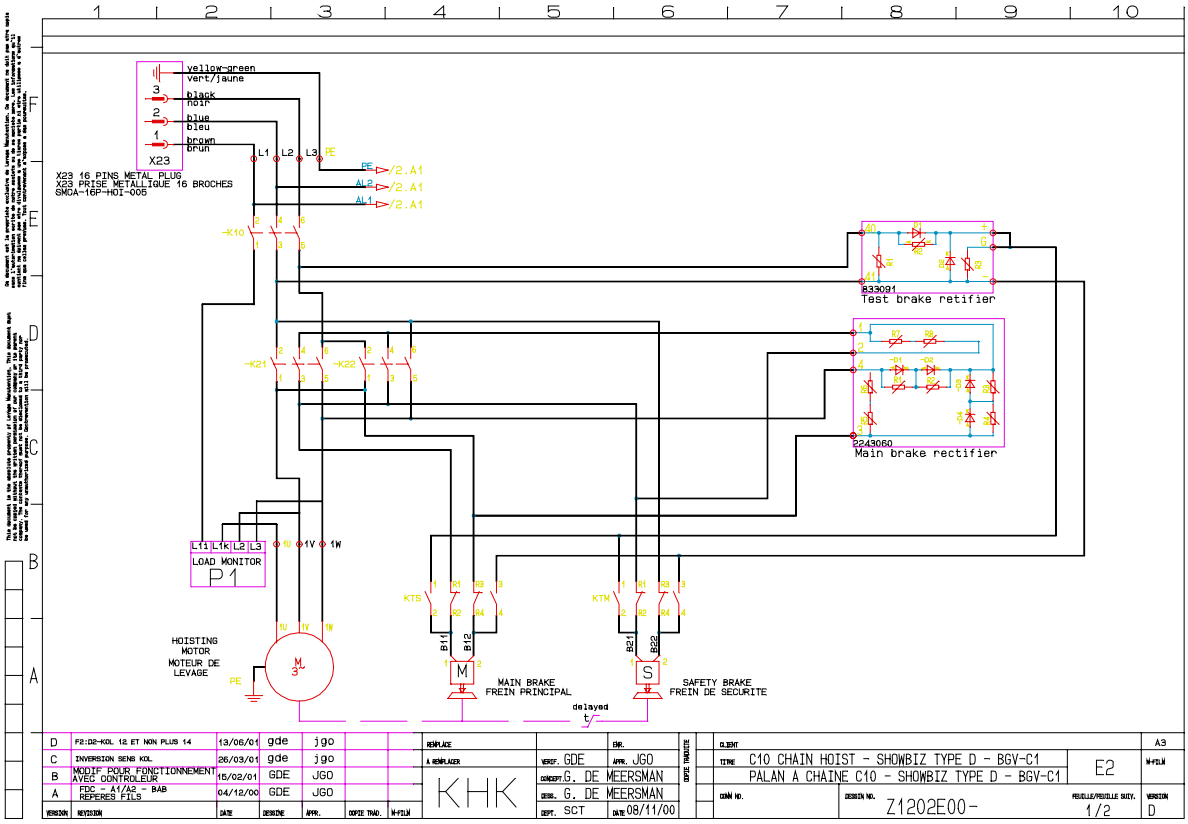
SINGLE SPEED HOIST: 208V/230V (Hoist configuration B1 or B2)

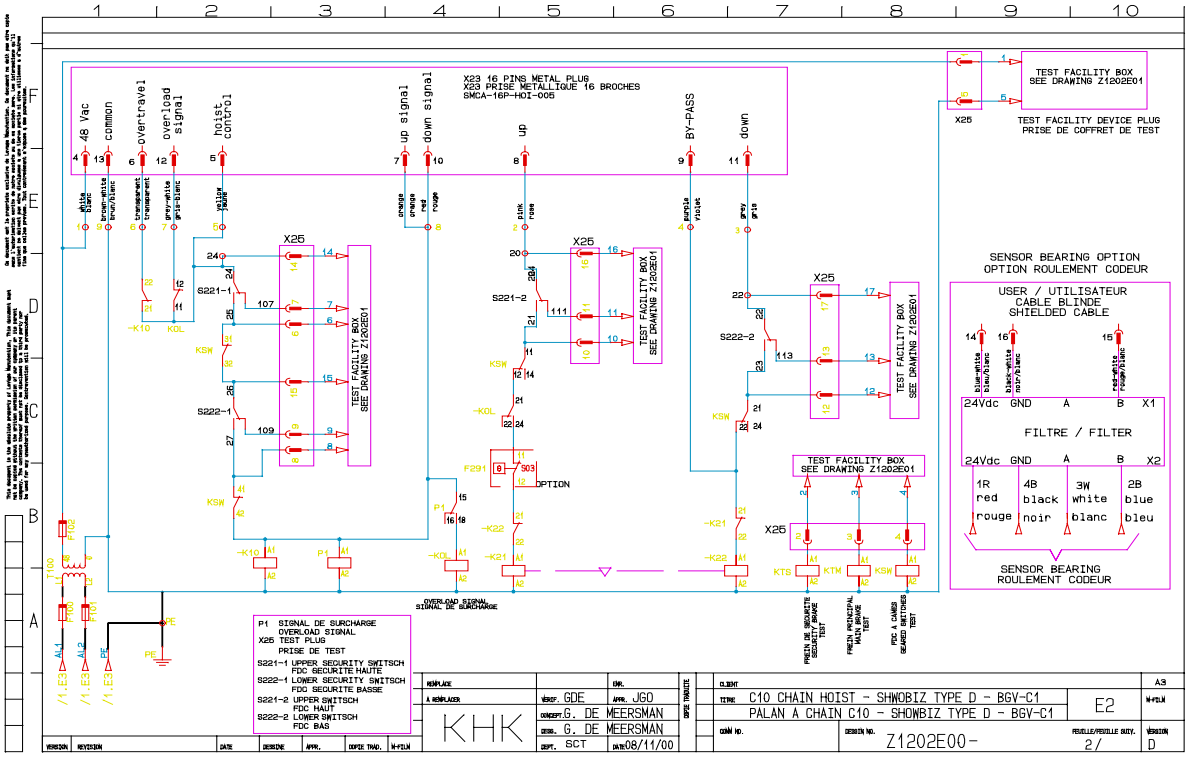


SINGLE SPEED HOIST: 460V (Hoist configuration B1 or B2)



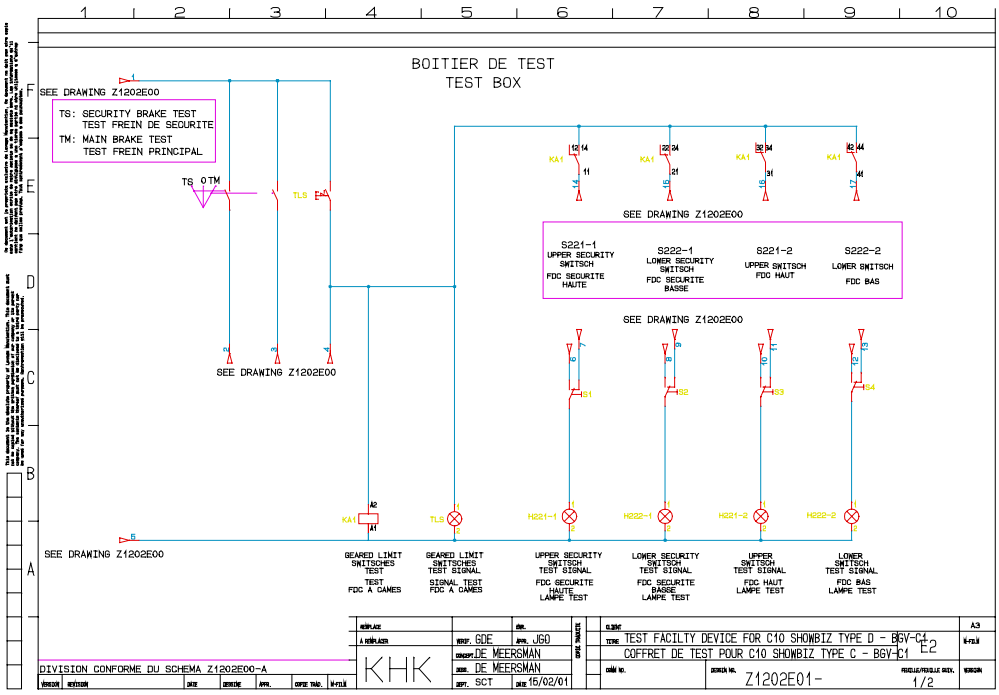
Hoist Circuit Diagram (Hoist configuration D)





Hoist Circuit Diagram (Hoist configuration D)

Test facility



SECTION 5
PREVENTATIVE MAINTENANCE

Maintenance table

Check	Interval	Qualification of the customer's personnel
Brake operation for holding and releasing	Daily	Operator
Visual inspection of the load chain	Daily	Operator
Suspension of the pendant station	Daily	Operator
Cleanliness and lubrication of the chain	Monthly	Operator
Torque limiter operation	Monthly	Operator
Measure for wear on the chain	Every 3 months	Operator
Measure for wear on the hooks	Every 3 months	Operator
Tightness of the load block screws & nuts	Every 3 months	Operator
Check the suspension hook/coupling locking plate screws	Every 3 months	Operator
Adjustment of the limiter and hoist brake	3 to 6 months	Qualified mechanic
Lubrication of open wheel gearing	3 to 6 months	Qualified mechanic
Tightness of wire terminal screws and terminal connections	Semi-annually	Qualified mechanic
Lubrication of the load block idler sprocket	Annually	Operator
Tightness of all screws to Screw Tightening Torque Specifications and check for signs of corrosion.	Annually	Qualified mechanic
Clean motor cooling fins	Annually	Qualified mechanic
Lubrication of the gears	Lubricated for life	

CAUTION! These intervals shall be shortened if the hoist is used heavily with maximum loads or in extreme ambient conditions.

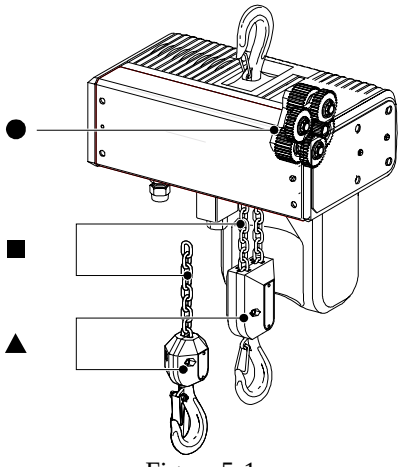


Figure 5-1

Lubricants

Lubrication point	Specifications	Possible brands	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	Aral : Aralub FK 2 BP : BP Energrease LS - EP 2 Esso : Unirex N2 Mobil : Mobilgrease HP Shell : Shell Alvanio EP Grease 2 DEA : Paragon EP 2 Fuchs : Renolit Duraplex EP 2	As required
Gears ●	NLGI Class 00 Synthetic hydrocarbon liquid with lithiumcomplex soap Approx. Drip point +550 °F Worked penetration 415-420°F Operating temperature –55 - +390 °F	Mobil: Mobilith SHC 007	0.11 lbs.

Open Wheel Gearing: EP1 Mobilux or equivalent.

Spare Parts Replacement Table

Spare part	To be replaced by	Qualification of the personnel
Upper chain guide	Authorized manufacturer personnel	Qualified electrician & mechanic
Output shaft	Authorized manufacturer personnel	Qualified electrician & mechanic
PG cable gland	Authorized manufacturer personnel	Qualified electrician
Gear input shaft + adjusting nuts	Authorized manufacturer personnel	Qualified mechanic
Motor end cap	Authorized manufacturer personnel	Qualified mechanic
Gearing (1st/2nd stage)	Authorized manufacturer personnel	Qualified electrician & mechanic
Brake cap/end cap sealing	Customer	Qualified mechanic
Other seals and O-rings	Authorized manufacturer personnel	Qualified mechanic
Brake-limiter	Authorized manufacturer personnel	Qualified electrician
Brake end cap	Customer	Qualified mechanic
Lower chain guide	Customer	Qualified mechanic
Rubber buffer	Customer	Qualified mechanic
Electric box	Authorized manufacturer personnel	Qualified electrician
PC-board	Authorized manufacturer personnel	Qualified electrician
Plugs	Customer	Qualified electrician
Chain	Customer	Qualified mechanic
Chain bucket	Customer	Qualified mechanic
Slack fall stop	Customer	Qualified mechanic
Suspension hook	Customer	Qualified mechanic
Hook block (1/1; 2/1)	Customer	Qualified mechanic
Control box	Authorized manufacturer personnel	Qualified electrician

Once a part has been replaced, check the operation of the hoist.

Screw Tightening Torque (lb. ft) Specification

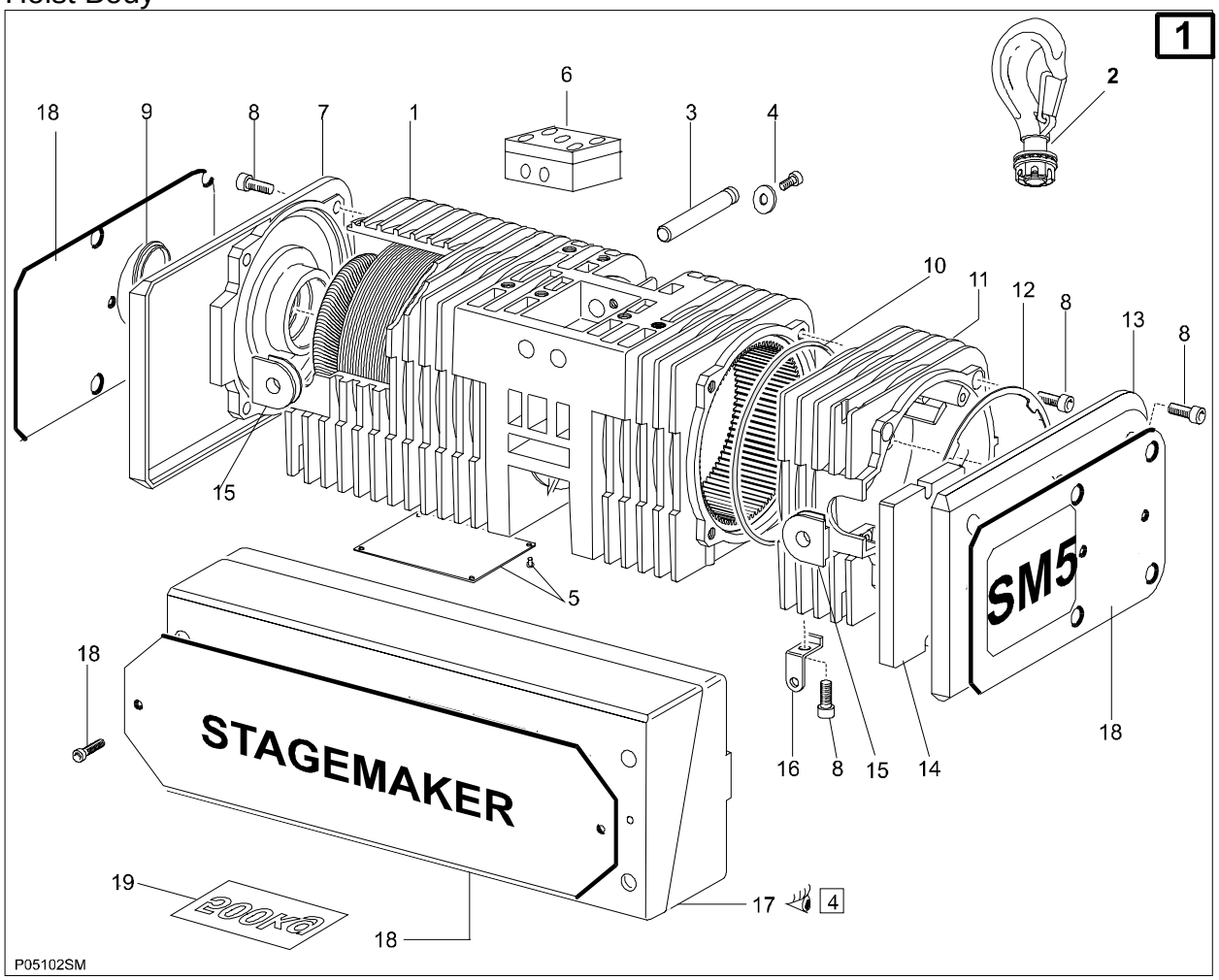
	M5	M6	M8	M10	M12
Standard screws	4	7	18	35	61
Self-tapping screws	4	6	15	30	53

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
	Pendant plug pin pushed out	Reinstall plug pin
	Contactor terminal screws loose	Tighten screws
	Mainline switch shut off	Turn switch on
Hoist does not lift load	Overload condition	Reduce load
	Worn load chain and torque limiter prevents lifting.	Replace load chain
	Torque limiter worn or incorrectly adjusted	Replace torque limiter wear items or properly adjust torque limiter
	Brake not releasing	Check brake coil resistance Check air gap setting. Adjust if necessary Check rectifier output voltage
Brake drift more than 4 inches (100mm)	Brake lining worn	Adjust brake air gap setting and replace wear items as necessary
Travel direction does not correspond to that indicated on push button	Power supply incorrectly connected	See SECTION 2
Abnormal noises while lifting or lowering	Load chain and its components are not lubricated	Lubricate load chain
	Load chain is worn	Replace chain
	Sprocket or chain guide is worn	Replace sprocket or chain guide
	Idler sprocket is worn	Replace idler sprocket
	A supply phase is missing	Connect the three phases
	Twist in load chain	Remove twist

Index of Exploded Illustrations and Parts Lists

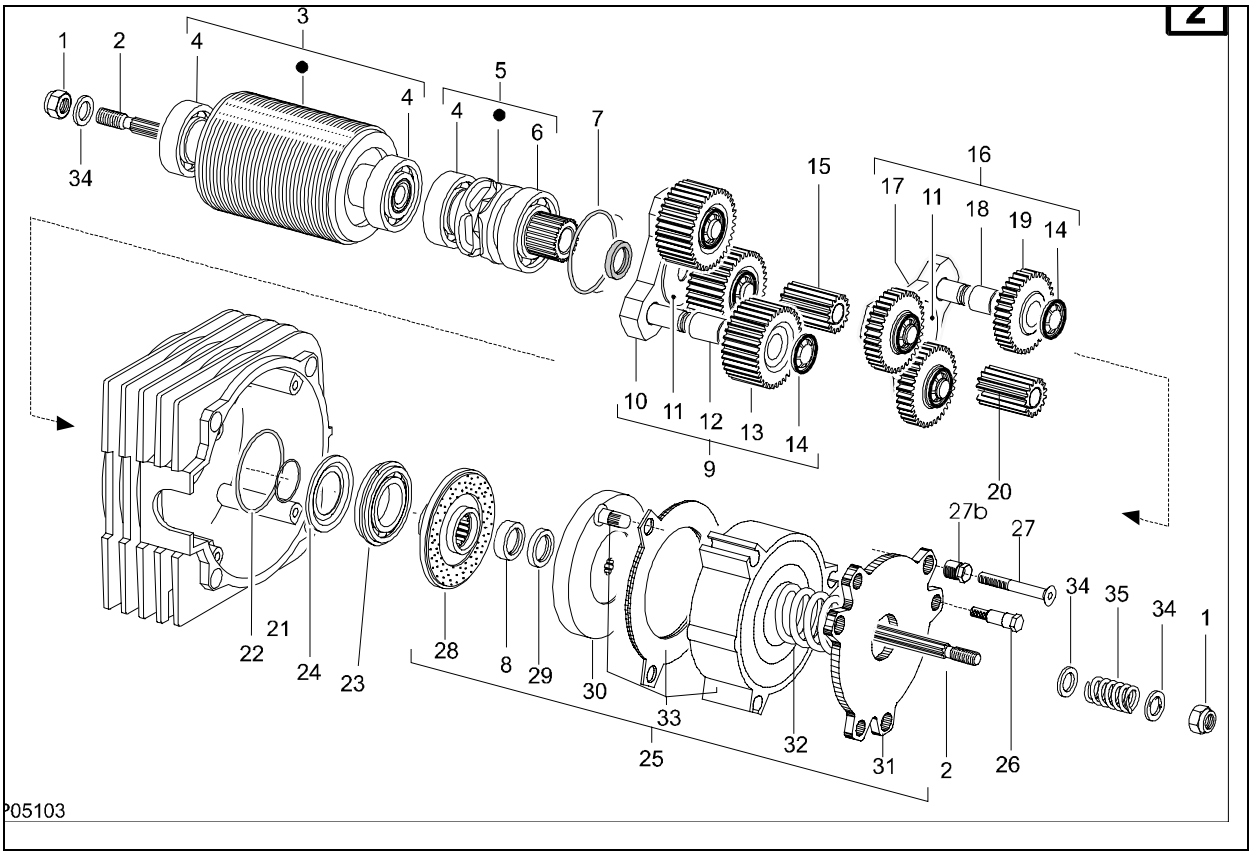
Hoist Body


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
SM5
STAGEMAKER
200Kg
4
P05102SM

Hoist Body

Item	Part Number	Description	Comments	Qty	
1		Hoist body		1	
		Stator			
2	2257016	Rotating hook set	Incl. item 3-4 and 6	1	
3		Dowel pin		2	
4		M8 Screw and plate		1	
6		Hook housing		1	
	2219961	Motor endcap & hardware set		1	
7		Motor endcap		1	
8		M6 Screw		13	
9		Cap		1	
10	8380202	O-ring 2 x 120-NB70		1	
11	2210004	Brake end cap		1	
12	2218002	Seal ring		1	
13	2219962	Brake endcap with counterweight		1	
15	2219960	Cable gromet		2	
16	2218004	Suspension kit for pendant		1	
17		Steel control enclosure		1	
18		Body branding label set		1	
19		Self adhesive load plate	Specify capacity When ordering	1	

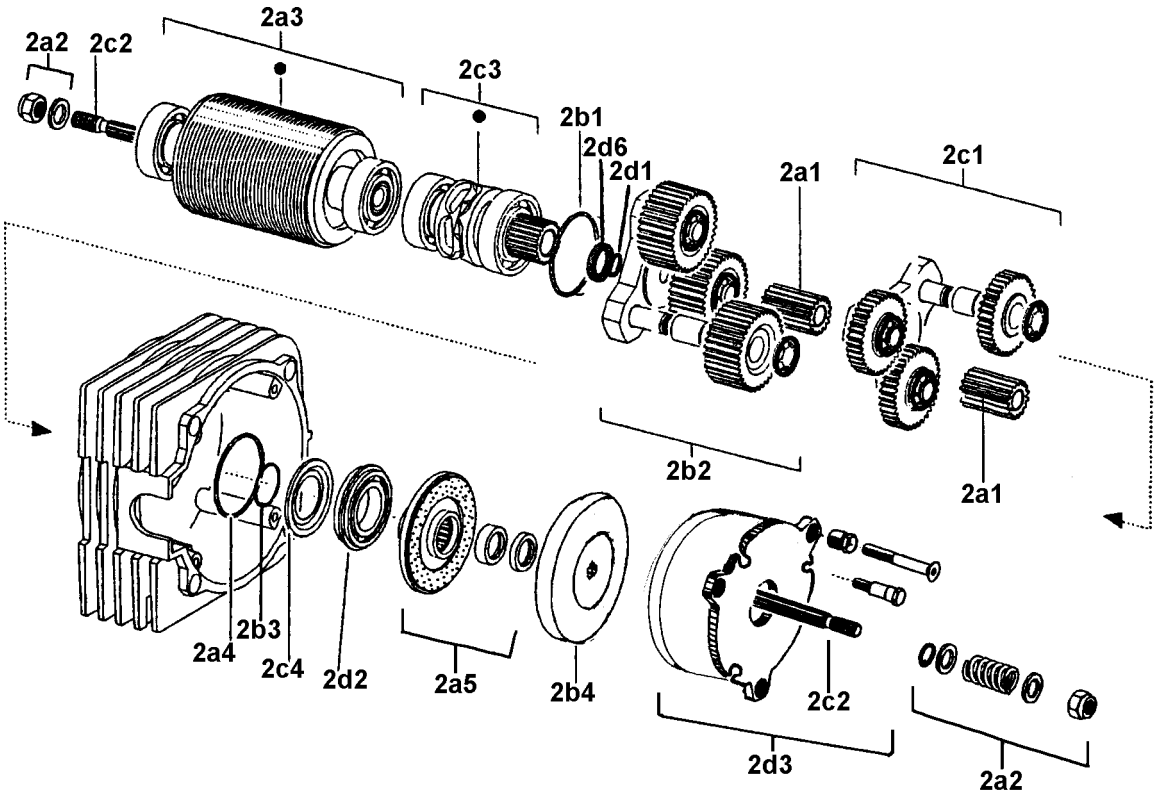
Gear Mechanism & Brake (Brake version 2A)



Gear Mechanism & Brake (Brake version 2A)

Item	Part Number	Description	Comments	Qty	
1		Self locking nut		2	
2	2211501	Gear input shaft set		1	
3	2215000	Rotor assembly	Two speed	1	
3	2215001	Rotor assembly	Single speed	1	
4		Bearing		1	
5	2214001	Chain sprocket set assembled		1	
	2219983	Sprocket equipment		1	
6		Bearing		1	
7		Bushing		1	
8		Bushing		1	
9	2210500	Planetary gear assembly, 2nd step	16 fpm	1	
9	2210520	Planetary gear assembly, 2nd step	32 fpm	1	
10		Planet carrier		1	
11		Brass washer			
12		Self lubricating bushing		3	
13		Planet wheel		3	
14		Retaining ring		6	
15	2210503	Pinion 2nd step		1	
16	2210510	Planetary gear assembly, 1st step		1	
17		Planet carrier		1	
18		Self lubricating bushing		3	
19		Planet wheel		3	
20	2210503	Pinion 1st step		1	
	2219984	Metal sealing ring set	=21+22+23+24	1	
21		Circlip		1	
22		O-ring		1	
23		Bearing		1	
24		Metal sealing ring set		1	
25	2211070	Complete brake & slip clutch assy	380-480V	1	
25	2211071	Complete brake & slip clutch assy	200-240V	1	
25		Complete brake & slip clutch assy	500-575V	1	
26		Screw		3	
27		Screw		3	
27b		Adjustment nut		3	
28	2211018	Slip clutch friction disk assembly	=8+28+29	1	
29		Lipseal		1	
30	2211020	Brake pressure disk		1	
31	2211026	Anchor disk		1	
32	2211021	Brake spring		1	
33	~~2211023~~	Coil assembly 190Vdc **use version 2B**	200-240V	1	
33	~~2211024~~	Coil assembly 100Vdc **use version 2B**	380-480V	1	
33	~~2211025~~	Coil assembly 240Vdc **use version 2B**	500-600V	1	
	2211016	Slip clutch spring set	=1+34+34+34+37+35+1	1	
34		Washer		3	
35		Limiter spring		1	
36	2211022	Friction disk		1	

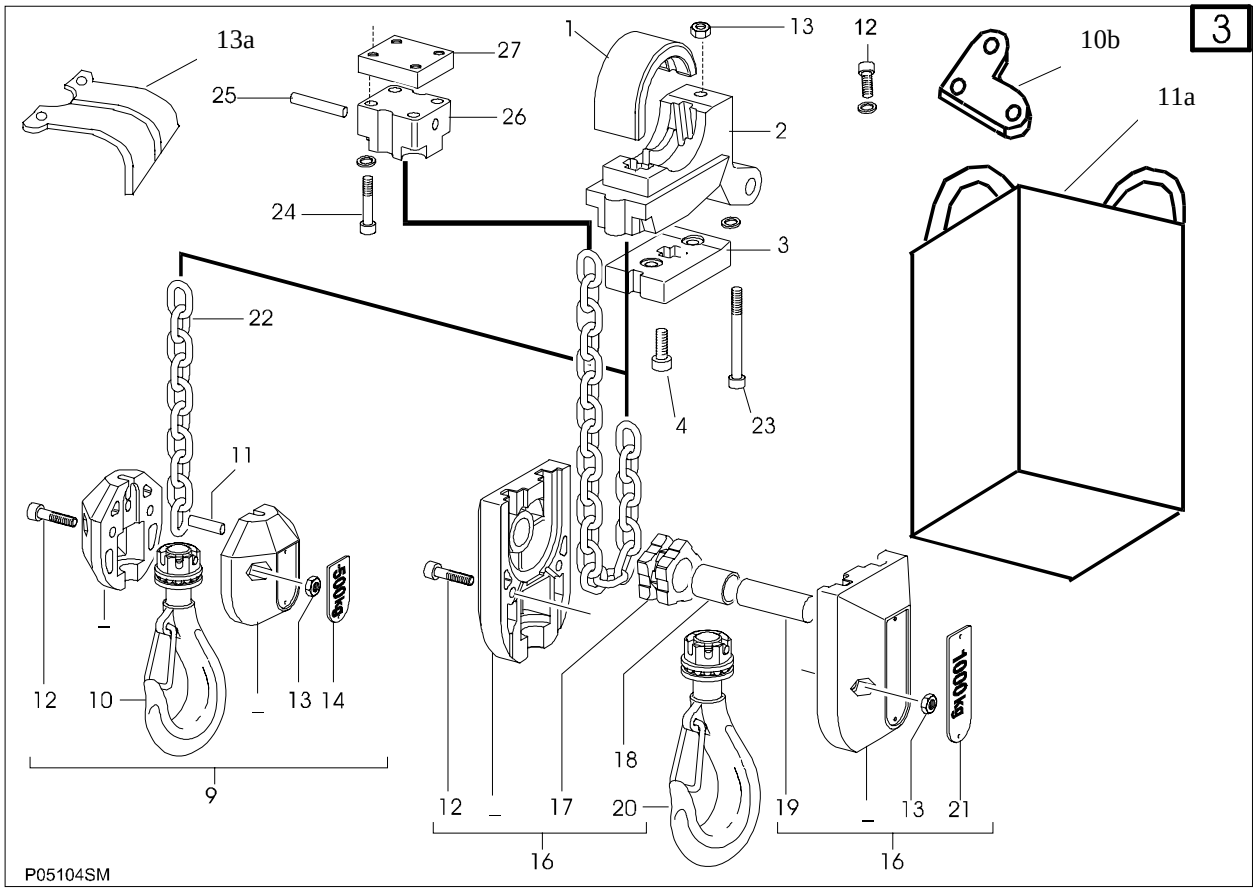
Gear Mechanism & Brake (Brake version 2B)



Gear Mechanism & Brake (Brake version 2B)

Item	Part Number	Description	Comments	Qty	
2a1	2210503	Pinion		1	
2a2	2211016	Limiter spring set		1	
2a3	2215000	2 speed rotor assembly	Two speed	1	
2a3	2215001	1 speed rotor assembly-1800 rpm	Single speed	1	
2a3	2215055	1 speed rotor assembly-3600 rpm	Single speed	1	
2a4	8384702	O-ring 2 x 47-NB70		1	
2a5	2211018	Clutch disc set-number 2		1	
2b1	300077	Circlip 47 x 1.75		1	
2b2	2210500	Planetary gear assy-2nd reduction	16 fpm	1	
2b2	2210520	Planetary gear assy-2nd reduction	32 fpm	1	
2b3	8262501	Retaining ring		1	
2b4	2211020	Clutch disc set-number 1		1	
2c1	2210510	Planetary gear assy-1st reduction		1	
2c2	2211501	Gear input shaft		1	
2c3	2214001	Chain sprocket assembly		1	
2c4	8182543	Metal seal ring		1	
2d1	8381806	Lip seal		1	
2d2	833706	Ball bearing		1	
2d3	2211081	Coil assembly 190VDC	380-480V	1	
2d3	2211080	Coil assembly 100VDC	200-240V	1	
2d3	2211082	Coil assembly 240VDC	500-600V	1	
2d6	8552528	Sprocket tube		1	

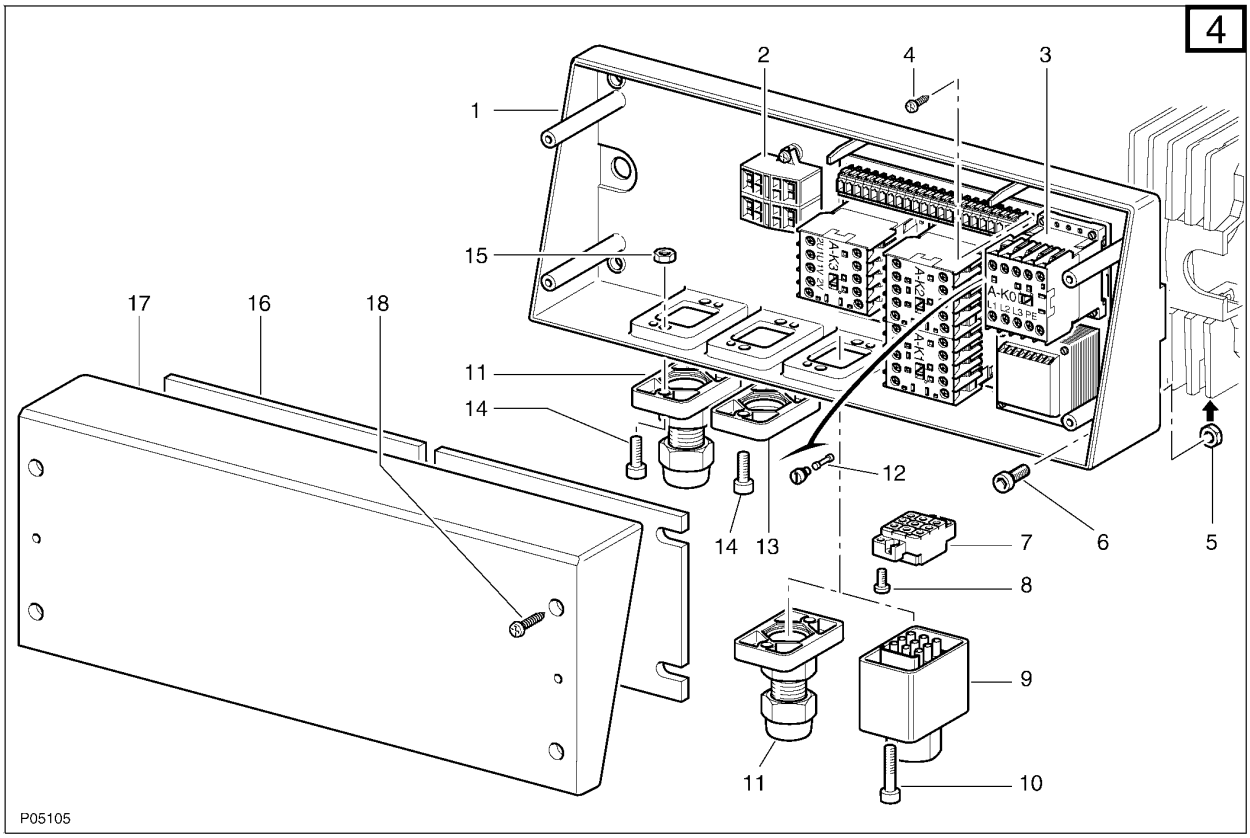
Lifting Assembly



Lifting Assembly

Item	Part Number	Description	Comments	Qty	
1	2214011	Upper chain guide		1	
2	2214014	Lower chain guide assembly	=2+3+4+4+13+23	1	
3	2214013	Rubber plate set		1	
4	830931	Screw		2	
5 - 8		Standard chain bucket hoist configuration B1 only	Specify chain length when ordering		
7	2211050	Slack fall stop		1	
9	52293185	Hook block complete-1 fall	=10+11+12+13+14+15+16	1	
10		Hook assembly-1 fall	Size 025	1	
10a	001512	Safety latch (1 fall)		1	
10b		Suspension plate for chain bucket		4	
11		Shaft		1	
11a	2211056	Chain bucket with hardware	100 ft	1	
12		Screw		2	
13		Self locking nut		2	
13a		External chain guide		1	
14	2213308GRP	Self adhesive load plate	Specify capacity when ordering	2	
16	2219902	Hook block complete-2 fall		1	
17	2214003	Idler sprocket assembly		1	
18	8191620	Self lubricating bushing		1	
19	2217008	Shaft		1	
20	2217004	Hook assembly-2 fall	Size 025	1	
20a	001515	Safety latch (2 fall)		1	
21	2213308GRP	Self adhesive load plate	Specify capacity when ordering	2	
22	2213500	Load chain 4.8 x 12.5		Ar	
23	830910	Screw		1	
	2211045	Chain fitting tooling		1	
24-27	2213523	Chain anchor assembly	=24+25+26+27	1	

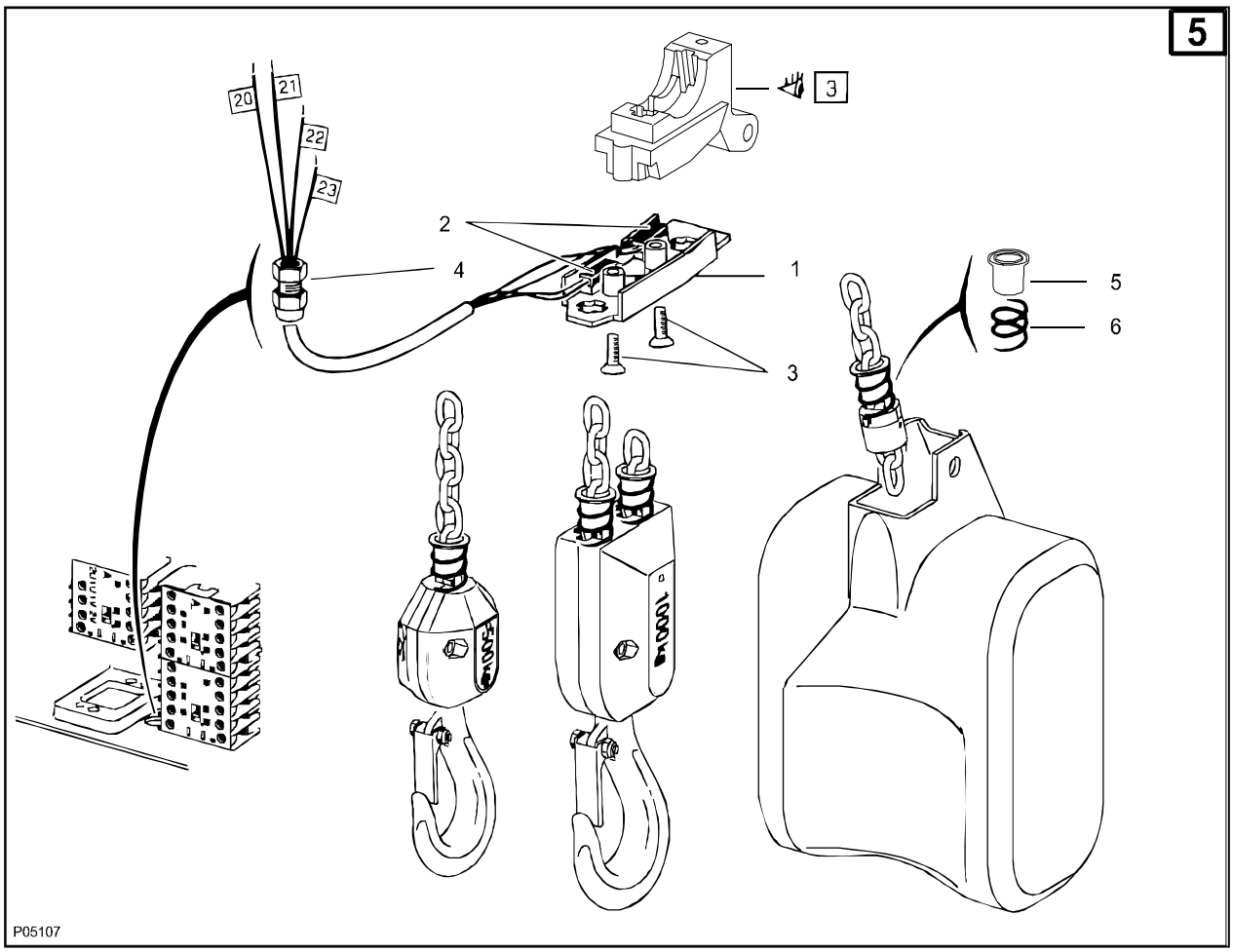
Controls



Controls

Item	Part Number	Description	Comments	Qty	
1	2219963	ABS Control box base & hardware	Configuration B1 only	1	=1+6+5
1a	2213010	Steel control box complete	Includes cover	1	
2	7383020	Ground PE terminal board		1	
2	2219092	Hour counter		1	
3	2213017	PC board 208/230/460V/60Hz/115V	Two speed	1	
3	2213018	PC board 208/230/460V/60Hz/115V	Single speed	1	
3	2213016	PC board 575V/60Hz/115V	Two speed	1	
3	2213004	ACF PC board 208/230/415V	Configuration A only	1	
4		Screw		5	
5		Stop nut		4	
6		Screw		4	
7	7285039	Female connector + wire harness	Configuration B1 only	1	
8	8090411	Plastic screw	Configuration B1 only	2	
	2249946	Plug set for trolley	Configuration B1 only	1	
	2249982	Plug set for power supply	Configuration B1 only	1	
9		Plug	Configuration B1 only	1	
10		Screw	Configuration B1 only	2	
11	2219808	Cable gland set		1	
12	833130	Fuse		1	
13a	2219814	Closing plate set	Configuration B1 only	1	
13		Closing plate	Configuration B1 only	1	
14		Screw	Configuration B1 only	4	
15		Nut	Configuration B1 only	4	
16		Counterweight	Configuration B1 only	1	
17	2213001	Control box cover, cwt. & screw	Configuration B1 only	1	=16+17+18
18		Screw	Configuration B1 only	4	

Upper & Lower Limit Switch for Upright position (Configuration B1 only)



Attention:
The limit switch, when furnished, is installed in place of the rubber buffer. Use screws 6x30mm.

Item	Part Number	Description	Comments	Qty	
	2213059	Complete limit switch	=1+2+3+4+5+6	1	
1		Switch plate		1	
2		Switch set		1	
3		M8 x 25 screw		1	
4		Cable gland		1	
5	2219002	Spring plate	1 fall/2 fall	2/3	
6	2219003	Spring	1 fall/2 fall	2/3	