

# Mobile Column Lift Set MSC-13K-B

MSC-13K-B-226, MSC-13K-B-452 & MSC-13K-B-678

Capacity 13,200lbs / Each Column

**Installation - Operation - Service Manual** 





# **IMPORTANT!!**

READ MANUAL THOROUGHLY BEFORE INSTALLING, OPERATING, SERVICING OR MAINTAINING LIFT

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# **PREFACE**

Prior to the operation of your lift make sure that you have read the instructions thoroughly. These instructions are found in this manual. Please note that your warranty can be voided if you do not read the manual and understand its content.

If you have any questions, concerning operation, safety, or application of your lift, please contact your distributor.

# 1. GENERAL

# 1.1 SPECIFICATIONS

OEM Item # / Model #	167215B / MSC-13K-B
Capacity	13,200 lbs. / Each Column
Pressure Relief Valve	2,030 psi Sealed Ex-Works
Pump motor	3HP (DC24V, Max 110 Amps) / Each Column
Battery charger power supply	Input: 100-140 , 60Hz, Single Phase Output: 24VDC, Max 15 Amps
Operational Voltage	24 VDC
Lifting Height	67.1"
Column L / W / H	45.7" / 44.1" / 88.6" (Max Ht. 155.5")
Fork Adjustable Range	6.3" - 22"
Fork length	14"
Lifting / Lowering Time	75 Sec / 60 Sec at load of 13,200 lbs. / each column
Noise Level	Max. 70 dB(A)
Set-up	Indoors
Unit Weight	1,200 lbs. per Column
Maximum Distance between Columns	32.8'
Min. Concrete Surface Strength	3,000 Psi

# 1.2 DIMENSIONS (mm / inch)

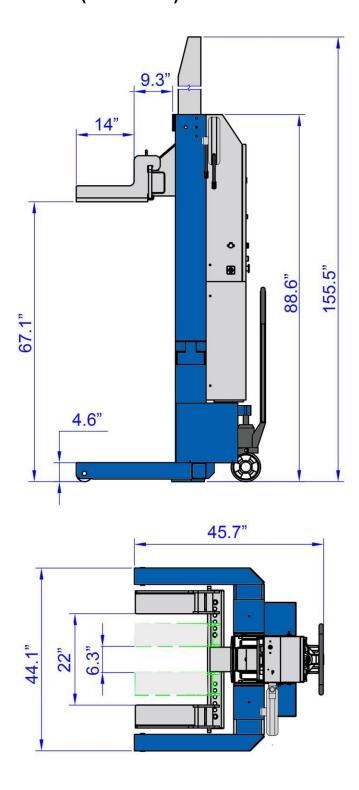


Fig. 1 MSC-13K-B Lift Dimensions

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#### 1.3 DESCRIPTION OF THE LIFTING SYSTEM

The mobile column lift is a movable electrically driven hydraulic column lift used for lifting heavy vehicles. It is used in set of four columns. But at least two lifting columns are required to work at same time for lifting a vehicle.

The main components of the mobile column lift are shown below: (See Figure 2):

- 1) Height Sensor / Encoder
- 2) Safety Lock Mechanism
- 3) Control Case
- 4) Motor Pump
- 5) Pallet Jack
- 6) Battery (Not Included)
- 7) Front Roller
- 8) Battery Case
- 9) Forklift Pocket
- 10) Lifting Fork
- 11) Carriage
- 12) Hydraulic Cylinder

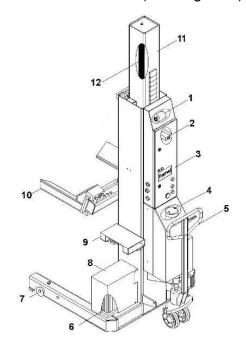


Fig. 2 Column Components

Each lifting column has a lifting capacity of <u>13,200</u> lbs. Consequently, four columns have a total lifting capacity of 52,800 lbs.

Each column has DC batteries to drive the motor pump (hydraulic power unit).

The control system on the lifting columns ensures that the columns are raised or lowered synchronically. Each lifting column is equipped with a position sensor, which transmits the height readings to the control system. The control system controls and protects the lifting system during lifting or lowering as follows:

- If a difference in height occurs between the lifting columns to be over 3/4" (20mm) and less than 2" (50mm), an extra adjustment valve in the hydraulic system opens and remains open until the difference has been cancelled out. The adjustment happens to the specific lifting column, which has the most height difference.
- If a difference in height is over 2" (50mm), lifting or lowering is interrupted for the specific lifting column, as it will stop to until the difference has been cancelled out.

In addition, the control system has been designed so that:

- Each lifting column can be operated separately
- Any pair of axles can be handled individually

#### 1.4 STRUCTURE OF THE MOBILE COLUMN LIFT

#### "Hydraulic Power Unit

The hydraulic system consists of an electrically driven pump, flow control valves, control valves and an oil reservoir.

#### "Column and Lifting Cylinder

The column and lifting cylinder form a major part of the portable column lift. In the U-section of the column there are a guide block and rollers. The rollers enable the guide block to move along the full length of the column. The hydraulic lifting cylinder provides the lifting capacity.

#### "Control Panel

The control panel has all the functions controlling the use of the lifting column. The control panel components and functions have been specified in GENERAL USE sections.

#### "Pallet Jack Mechanism

The two-wheel pallet jack mechanism serves to move the lifting column. The two wheels protect the lifting column from being turned over at the back when it is moved. The pallet jack mechanism lifts the column off the floor so that the column can be easily moved.

#### "Mechanical Safety Lock

If the hydraulic pressure fails while a vehicle is on the lifting system or is lifted or lowered, a mechanical safety lock ensures that it cannot drop.

The characteristic clicking of the safety lock when rising indicates that it is activated. During lowering the pawl is retracted by a solenoid magnet.

#### "Adjustable Forks

The adjustable forks are designed for different vehicles with different wheels. The forks can be adjusted manually to accommodate a wide range of tire sizes. The mechanical lock-pins prevent the forks from moving sideways under load.

#### 2. SET-UP / INSTALLATION

**NOTE:** Only move the lifting column with the **forklift**. Only raise the lifting column at the correct points. Damage to lifting column and /or injury to persons may occur if the lifting column is not moved in the correct manner.

#### 2.1 UNPACKING AND HANDLING THE LIFTING COLUMN

#### **STEP 1. Handling of Lifting Columns**

- 1. Remove the cover from the crate or, when using a stand, remove the straps.
- 2. Carefully insert forklift forks into the forklift pockets. The pockets are bolted/welded to the column before leaving factory. (Figs. 3a & 3b).

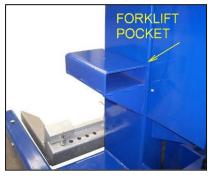






Fig. 3a & 3b

(Forklift Pocket on Column)

Fig. 4

3. Lift up the column then move it to the working position.

#### STEP 2. Fill the Tank

- 1. Remove the cover from the hydraulic unit. Remove the plug from the fill opening and fill the tank with hydraulic oil: AW32, 46 or other good grade Non-detergent hydraulic oil SAE-10, filleted at 4 micron max, about 15L (3.3 Gal). (Fig. 4)
- 2. Install the breather cap on the fill opening.
- 3. Install the cover back on the hydraulic unit.
- 4. Check for oil leakage.

### STEP 3. Battery Installation

(Batteries Not Included)

- 1. Remove Battery Covers (Fig. 5a)
- 2. Seat and fasten the batteries on the column base, secure to base using provided metal straps.
- Connect the power cables to batteries. (Fig. 5b)





Fig. 5a

Fig. 5b

**NOTE:** Ensure to correctly connect terminals: Red / Pos. = (+), Black / Neg. = (-)

4. Install the battery covers back on lift, secure covers to lift with provided thumb screws.

#### STEP 4. Cable Reel Installation

- 1. Carefully take out the cable reels from the carton.
- 2. Insert the holding frame into the base on the upper cover (Figs. 6a & 6b)







Fig. 6a

Fig. 6b

Fig. 6c

- 3. Pull up and pull down the upper & down lock button, the reel can turn aside. (Fig. 6c)
- 4. Fix the reel on the base by the screw. (Fig. 6d)







Fig. 6e

- 5. Put the cable plug into the socket. (Fig. 6e)
- 6. Repeat the above steps for the other three columns

#### 3. CHARGING BATTERIES

After one days operation or the battery indicator shows the voltage is low, it is suggested to charge the batteries. Different batteries need different charging time. Please refer to the manual of the battery.

- a) Move the columns near the AC power supply ports on the wall.
- b) Connect the charger to the AC power supply. (Figs. 7a, 7b & 7c)
- c) Turn the power switch to the right position (CHARGE) on each column.
- d) While charging, the red CHARGING indicator will be lighted. After the batteries are fully charged (about 10 hours), the green FINISH indicator will be on, and red indicator will go off.



Fig. 7a

Battery Charger Socket



Fig. 7b Socket Switch



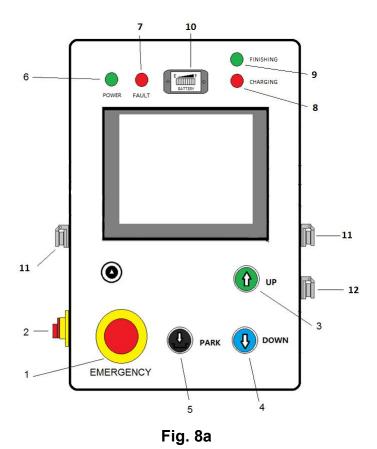
Fig. 7c

Battery Charger Indicator

#### 4. OPERATION INFORMATION

#### 4.1 CONTROL PANEL FEATURES

The Main Control Panel controls the main power. All other functions of the lifting system are controlled from the Control Panels on the columns. The functions of the switches, buttons on the control system are described below.



Main Control Panel - #1 Column

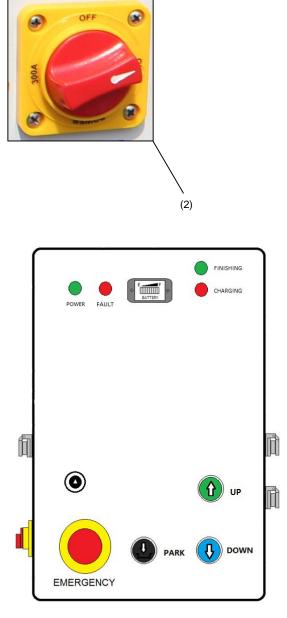


Fig. 8b
Sub Control Panels - #2, #3 & #4

#### 4.2 CONTROL PANEL DETAILS

#### 1. EMERGENCY BUTTON:

Stop movements (lifting or lowering) immediately.

#### 2. MAIN POWER & BATTERY SWITCH:

Controls the power supply to the control panel or to charge the batteries.

Can also be used as an Emergency Shut-Off Switch

#### 3. '↑' (UP) BUTTON:

Controls the lifting of the columns forks.

#### 4. '↓' (DOWN) BUTTON:

Controls the lowering of the column forks.

#### 5. '\_' (PARK) BUTTON:

Controls the locking of the column forks to rest on mechanic safety locks.

#### 6. 'POWER' LIGHT:

Illuminates when the control panel is powered on.

#### 7. 'FAULT' LIGHT:

Illuminates during operational error, or when EMERGENCY button is pressed down.

#### 8. 'CHARGING' LIGHT:

Illuminates when the batteries are in charging mode.

#### 9. 'FINISHED' LIGHT:

Illuminates when the batteries are fully charged.

#### 10. BATTERY INDICATOR:

Indicator gauge shows each columns output voltage / batteries capacity.

#### 11. CABLE PORT:

Plug-in port used for communication cable connections.

#### 12. HAND / REMOTE CONTROLLER PORT: (Optional)

Plug-in Port used for hand-held remote controller connection.

#### 4.3 POSITIONING THE COLUMNS

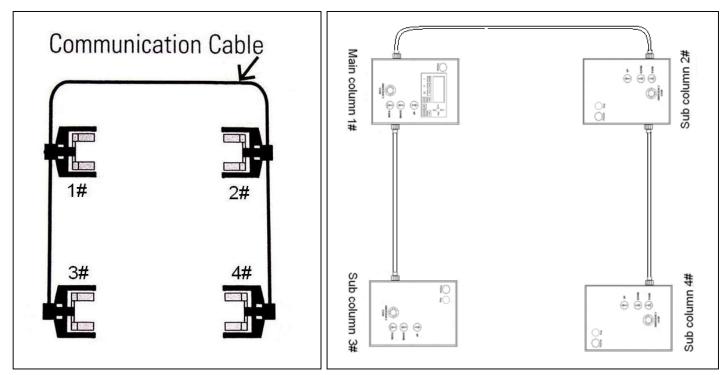
A full combination consists at least of 4 lifting columns.

The position of the main column #1 should be located opposite of column #2 for loading the same axel of vehicle.

The #3 column must be at the right hand side of #1 column.

The #4 column shall be at the other end of the same vehicle axel with #3 (Figs. 9a &9b).

The distance between columns shall be according to the distance between the vehicles wheels.



Figs. 9a &9b
Positioning Columns

A set has a maximum lifting capacity of **52,800 lbs**. This is the maximum lifting capacity of a standard Set of 4 lifting columns of **13,200 lbs**. each.

#### 4.4 FAMILIARIZING WITH THE MOBILE COLUMN LIFTS

The mobile column lifts are designed in such a way as to offer maximum flexibility and convenience. The mobile column lifts can consist of 2 or 4 or 6 lift columns. The control system is equipped with the following features:

- Simultaneous operation of all lifting columns.
- Operation of one lifting column.
- Operation of pair/axle lifting columns.

Each lifting column is provided with these control functions. But the RUNNING MODE shall be settled by the MODE buttons on the Main #1 Column Control Panel only.

The mobile column lifts are **set up** as following:

- 1. Position the lifting columns and connect cables as indicated in Figs. 9a & 9b.
- **2.** Then turn ON the battery power switch for each column. (Fig.10a)



Fig. 10a



Fig.10b

- **3.** Set the control panel select switch (Fig. 10b) on each of the (#2, #3 & #4) sub columns to the ON position first. The green power light indicator will be on.
- **4.** Next, turn the select switch (Fig. 10b) on (#1) main column to ON (left) and the LCD screen is lighted. Wait until the LCD screen changes to the 3rd display, then touch the first left button on the screen to start running of the system.



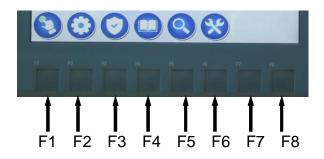


1st LCD Screen

2nd LCD Screen

(NOTE: the following description is applied four column mode.)





3rd LCD Screen (HOME PAGE)

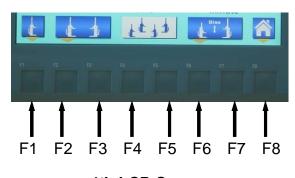
Fig. 11

#### (NOTE: 3rd LCD Screen, four colored columns indicates column set connections)

- **5.** About the touch screen buttons and lower **£**qFunction buttons on the screen.
  - <1>There are 8ea £qfunction buttons on the lower part of screen (Fig. 11).
  - <2>The touch screen buttons displayed in 3rd LCD Screen (Home Page) have the same function as the £qbuttons below it.
  - (a) START Button -----> F1, Start lift operation
  - (b) SET Button ------> F2, Enter unit & stroke setting step
  - (c) SAFETY Button -----> F3, Read the safety instructions
  - (d) : INSTRUCTION Button -----> F4, Read the operation instructions
  - (e) S: TROUBLESHOOTING Button -----> F5, Read the troubleshooting guide

  - (g) : BLANK -----> F7 & F8, No function on display
  - <3>Some touch screen buttons displayed (4th LCD Screen) may have the same function with the arrow ( ) pointed to lower £qbuttons below them.



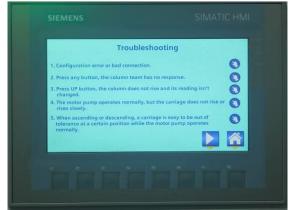


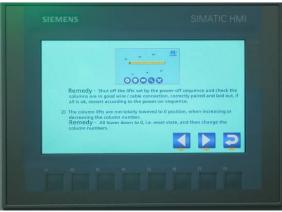
4th LCD Screen

- (h) : SINGLE WHEEL MODE Button -----> F1 Operates single column.
- (i) AXLE MODE Button -----> F2 Operates two columns for one axle.
- (j) ALL/VEHICLE MODE Button -----> F4 Operates all columns.
- (k) BIAS SETTING Button -----> F6, Set-up custom's bias reference.
- (I) : HOME Button -----> F8, Returns back to the HOME Page display.

NOTE: When the touch screen button is white in color, the lift is in work mode, which if there is no arrow below it, the 'F' button has no function.

<4> Other touch screen buttons displayed (5th & 6th LCD Screens) brings to the: sub information menu, next page, previous page or return to the data entering screen.





5th LCD Screen

6th LCD Screen

- (m) :JUMP Button ----->(NOT real button), Jumps to pointed pages.
- (n) : NEXT PAGE Button -----> F7, Go to next page.
- (o) PREVIOUS PAGE Button, -----> F6, Go to previous page.
- (p) : RETURN TO ENTERING Page,----> F8, Go to entering page.
- **6.** To change the lifts unit measurement (inches / centimeters) & stroke height settings:
  - Press SET Button to enter unit & stroke height setting page (7th LCD Screen).
  - <1>The upper 'in' in red color, means the unit of height reading is in inches. Touch this red color section, it will change to be 'cm' in red color. After exiting this page, the height readings will be displayed in centimeters.

Same, when the screen shows 'cm' in red color, after touching it, the unit will be 'in' in red color again. Thus, the height readings will be displayed in inches.



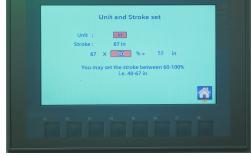


7th LCD Screen

8th LCD Screen

<2>The lower '100' in red means the percentage % of the lift stroke height distance. 100% is for full lift height stroke. When touching the red section, the screen will display the key pad (8th LCD Screen).





9th LCD Screen

10th LCD Screen

Type in the stroke percentage number (min. 60%) then touch the confirm key The 10th LCD Screen shows the stroke height has been modified to be 80% or 53 inches

NOTE: Stroke height changes in segments of 2 inches (5 centimeters).

If the stroke need to be changed again, repeat the above steps. Touch the HOME Button (F8) to return Home Page Screen (3rd LCD Screen)



- 7. Check to ensure that the EMERGENCY STOP Buttons for each column are pulled out to be released & disengaged.
- 8. Touch the START Button (F1) on the screen to continue.

#### 4.5 ADJUSTING LIFTING FORKS

The Mobile Lift Columns can be used to lift vehicles with a wheel diameter of R7 / 9+ (228mm) to R22.5 / 45+(1140mm). The forks can easily slide to the correct dimension:

- **1.** Lift lock-pin to unlock the fork.
- 2. Use both hands to slide the fork sideways. Adjust both forks so that they are equally spaced in relation to the center of the column.
- **3.** Adjust so that the forks at floor height just fit around the tire (to prevent the rim falling through, if tire becomes deflated) (Fig.12)
- **4.** Make sure that the lock-pins are locked into place for each fork set.

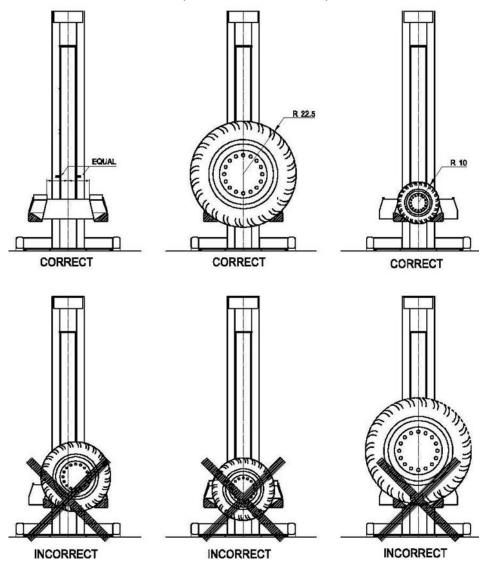


Fig.12
Adjust Forks to Correctly Fit each Wheel

#### 4.6 OPERATION FOR PALLET LIFTING MECHANISM

In order to move the Mobile Lift Columns, the pallet jack mechanism shall be operated by means of the handle bar and the lever inside the bar. (Fig. 13)

#### The lever has two positions:

- 1. When the lever is pulled up in the upper position (1), the pallet jack mechanism can be raised by moving the handle bar up & down.
- 2. If hand is released, the lever will automatically go back to its neutral position. The pallet jack mechanism is lowered, and the lift will rest on ground.

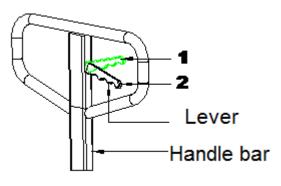


Fig. 13
Pallet Lifting Handle

#### Steps to move the column lift with pallet jack:

- 1. Pull up the lever to position (1) and hold, while applying ±p & downqpumping movement with the handle bar to raise the lift column. Once raised, the lift column lift can then be relocated to the desired location.
- 2. Release the lever to position (2) to lower the lift column to the floor after the lift column is positioned.

NOTE: Always ensure the pallet lifting mechanism is fully lowered, with the lever to the neutral position (2), when raising a vehicle.

#### 5. LIFTING OPERATION INSTRUCTIONS

The assembled Mobile Lift Columns must be checked for correct operation and setting adjustments. A complete operational test should be carried out by using a typical vehicle.

#### Remarks:

- When using this Mobile Lift Columns, leave a minimal space of 24+(600mm) for wide passage around the lifting columns & vehicle, which can serve as escape route.
- Before using the Mobile Lift Columns, ensure that the maximum load for each lifting column is not more than the max capacity of 13,200 lbs.
- Ensure that before use, the Mobile Lift Columns are placed to be seen from both the sides as well as from the front and back.
- Make sure that the pallet jack mechanisms for each of the Mobile Lift Columns are fully lowered before lifting a vehicle.

#### 5.1 PREPARATION & IMPORTANT NOTICE

- **1.** Place all the four of lifting columns around the vehicle.
- **2.** Ensure that the forks for each lifting column are engaged around the wheel as far as possible.
- 3. Position column forks under wheels & adjust according to 4.5, (Fig 12).
- **4.** Lower the pallet jack mechanism by releasing the lever inside the handle bar.
- **5.** Make sure all of the power switches on the control boxes are set to 0 (OFF).
- **6.** Make sure that the Emergency Release buttons are unlocked / popped out on all the lifting columns.
- 7. Set all the power switches to left position (ON). (Main column to be the last one)
- 8. Press START or (F1) Button on the main control box screen to run the software.
- 9. Set the mode to be WHEEL / SINGLE by pressing or (F1) Button.
- **10.** Press the green UP Button on panel to raise forks of the column to touch the tire. Repeat for the other three columns.
- **11.** If necessary, (for deflated air bag suspension and/or flat tire) press BIAS to choose customized zero-point (see later chapter).
- 12. Set the mode to ALL / VEHICLE by pressing or F4 button.

#### 5.2 RAISING & LOWERING ALL LIFT COLUMNS

WARNING: To wait for the Red FAULT Lamp to go off (about 3 seconds) after one button is released, and before another one is pressed.

WARNING: ALWAYS KEEP AN EYE ON THE VEHICLE IN LIFTING.
In case the vehicle is not leveling, stop the lifting forks from moving by pressing down the EMERGENCY Button or by turning off the BATTERY Switch.

Press Green ±JPqor Blue ±DOWNqButton to raise or to lower the vehicle to desired height. When the ±DOWNqButton is pressed, the columns lifting forks will raise a small distance, allowing the mechanical locks unlock, to lower.

Once desired height has been reached, it is recommended that the lift be lowered into the mechanical locks by pressing the Black PARKqButton.

Before beginning to work under the vehicle, it is recommended to support the vehicle with the safety stands (optional) before turning the Power Switch to the  $\mathfrak{L}$ FFq(middle) position.

#### 5.3 EXPLANATION OF MESSAGES ON TOUCH SCREEN

#### 1. Synchronous Adjusting

Because the PLC software monitoring the height readings of each fork, if for some reason, any column is out of sync (too quick raising or lowering) causes the height reading difference to be greater than 3/4+(19mm), the lifting forks will be slowed down automatically. The screen will display 'Synchronous Adjustingq automatically.

#### 2. Suspending Automatically & Stop

If the height reading difference becomes greater than 2+ (50mm), and the difference keep increasing, the column will be suspended & stop automatically. The screen will display 'Synchronous Suspendingqautomatically. If the columns are not moving, the screen will display 'Stop'.

#### 3. Times & Minutes

When in ALLqMode, there may be ±ime & minqnoted on the bottom line on the screen. It shows when the software was installed, along with how many times the motors have been started, and how long they operated.

#### 4. Locked Column

When one button is pressed down, or if within 3 seconds just after being released, (the Red £AULTqLamp will light-up), any other Button is pressed, the controls box of the later button will be locked / no function.

To unlock the buttons on that column, any button on another column has to be pressed one time.

#### 5.4 EMERGENCY STOP AND LOWERING

In emergency situations, it is possible to stop the lifting forks movement manually by pressing down on the Emergency Button. (Fig. 14)

NOTE: If the motor keeps running after the EMERGENCY Button is pressed down, please immediately turn off the battery switch to stop lift fork movement. (Fig. 15)



Fig. 14 Emergency Button



Fig. 15 Battery Switch

CAUTION: If Manual Lowering procedure is ultimately required, it must be performed by a qualified technician only.

#### 5.5 RUNNING MODE CHANGE

All system functions are available by pressing the  $\pm$ MODEqButtons when the lift columns are not in operation (No of button is pressed).

- When the ±MODEqis ALL / Vehicle (II..II)
  - -Pressing one operation button will cause ALL columns to move.
- When the ±MODEqis WHEEL / Single (I)
  - -Pressing one operation button will cause only that column to move.
- When the Mode is **AXLE / Pair (II)** 
  - -Press any one button will cause only the two columns for same axle to move.

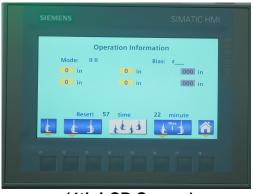
NOTE: In WHEEL or AXLE mode, the operation can only be maintained for 5 seconds. To go on, press down the mode button(s) again.

#### 5.6 UNIFORM & CUSTOMIZED HEIGHT REFERENCE

In the 4th LCD Screen, the 'Bias Z\_\_\_q means the system is in uniform height reference. The height reading is zero while the lifting fork at the bottom / ground as it was set in the factory. Under \(\frac{1}{2}\)/EHICLE / ALLqMode or \(\frac{1}{2}\)/XLEqMode, the moving lift forks will be close to the same height while raising or lowering.

If for any reason, the height of different columns shall be kept differently, (differ is greater than 2+/50mm), the **Customized Height Reference** shall be set as follows:

1. When all lift carriage forks are at the ground, touch ₩HEEL / SINGLEqicon, to change the screen to 11th LCD Screen.



(4th LCD Screen)

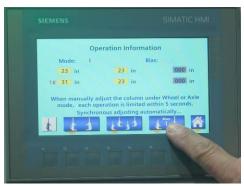


11th LCD Screen

2. Press ±JPqButton on the column to raise its lift forks individually to desired height. Repeat for other columns. (Example the heights are to be 31, 23, 23 inches)

WARNING: In this step, the height of each column shall keep the vehicle in horizontal. Never try to raise up one wheel too much or it will cause vehicle to move, drop and/or to fall down.

NOTE: Each button operation can only keep lift forks moving for about 5 seconds.



12th LCD Screen



13th LCD Screen

3. Press BIAS (F6) Button for 2 to 4 seconds (12th LCD Screen). The system changes into customized height reference system: £-\_-± The LIFTING MODE will change to £LL / VEHICLEquutomatically (13th LCD Screen).

Thus, the customized height (31, 23, 23 inches) in the 13th LCD Screen is memorized as the customized zero point of each column. Also, the height difference is always kept before uniform zero-point bias is applied again.

#### SPECIAL NOTES:

- 1. The customized zero-point height reference can only be performed just after 4th LCD Screen is displayed. Any lifting operation (UP, DOWN, PARK) in MODE ALL or AXLE will cancel the performance and keep the reference system to be UNIFORM immediately.
- 2. Under customized zero-point height reference, if all columns' heights are below theirs customized zero points and at least one column is within 6" (150mm) to the ground, the lifting forks will stop moving. If so, press the 'PARK' Button to lower down to ground and reference will go back to uniform reference. The 'Z ' will be shown on the screen again.
- 3. So, to change the height reference in system (also stroke or unit) a second time, operator shall wait until all lifting forks are in the lowest (ground) position, and the 4th LCD Screen shows with 0 cm / in to appear again.

#### 5.7 ADDING OR DECREASING NUMBER OF COLUMNS

Normally, a mobile column lift set consists of 4 columns. It is possible to apply and use only 2 columns by decreasing the number of columns.

- <1>For an already configured 4 column mobile lift set, Turn ON Power as described in the previous chapter.
- <2>LOWER all lift forks to the ground for height reading to = 0.
- <3>Turn OFF All columns.
- <4>Disconnect the Comm. Cable from #1 column to #3 and from #2 column to #4.
- <5>Only Turn ON Power to #2 column, then for #1 main column (14th LCD Screen)





14th LCD Screen

15th LCD Screen

<6> After press START or F1 Button, the display becomes 15th LCD Screen.

- <7> Now, only the two columns (#1 main & #2 sub) columns can be operated.
- <8> If needing to add (#3 & #4 sub) columns, it almost the same step, except connecting two more communication cables, followed by turning Power On for all four columns. (See previous chapters)

WARNING: This adding or decrease the column quantity can only be applied when all forks are fully lowered to ground with height reading = 0. Otherwise error will appear, and the system will stop operation.

#### 5.8 OTHER MESSAGES

	MESSAGE	EXPLANATION
1	Configuration Error	<ul><li>a. Missing one or more columns.</li><li>b. Columns are not in pairs.</li><li>c. Add one pair of column not in RESET state.</li></ul>
2	PLC Comm Error: (L2)	(Example) Communicating of column #2 failed in self-checking or running:  a. Column #2 is without power or in error  b. Address of column #2 is not correct.
3	Encoder Comm Error: (L2)	<ul><li>(Example) Encoder of column #2 does not communicate with main PLC:</li><li>a. Encoder of column #2 is not working</li><li>b. Address of encoder of column #2 is not correct.</li></ul>
4	Stop!	<ul><li>a. One emergency button is pressed.</li><li>b. Communication between columns is broken.</li><li>c. One or more column is power off.</li><li>d. Within 2 second after button is released.</li></ul>
5	Arrive at Travel End	One column stops after reaching its height limit. (This column will not raise when lower down)
6	Voltage Deficient	After moving stopped, one or more columns were found battery to have low voltage. The lift will not raise up any more but may be lowered down.
7	Reset!	RESET mode. Lift is back in ZERO bias. Free movement is possible, and pair of columns can be added or taken away. Any operation will leave this RESET mode.
8	Free Move, Max 5s / Step	Under RESET mode, when single wheel operation is chosen. In FREE MOVEMENT, Max. 5 sec. in single pressing can be carried out.
9	Too Light & Too Slowly!	Because of light loading, lowering speed is below 10mm/s.
10	Acceleratingõ	System accelerates the lowering speed automatically in order to reach the floor within 4 minutes.

## 6. STORING MOBILE COLUMN LIFTS

After all the work has been completed on vehicle, lower down all the lifting forks.

- **1.** When one of the lifting forks touches the ground, release the DOWN Button for 2 seconds. Press the DOWN Button again to lower all the lifting forks to the ground.
- 2. Then, Turn Off ALL Power Switches to the middle OFF Position.
- 3. Using the Pallet Jack mechanism, carefully remove the Lifting Columns from the fully lowered vehicle & position Mobile Lift Columns in a safe & dry storage area.

#### 7. MAINTENANCE

NOTE: All maintenance for the mobile column lifting equipment must be performed ONLY by trained lift service technicians.

During inspection and maintenance the lifting forks should be fully lowered, and the power switches should be Turned OFF. (Power switches to middle OFF position.)

The power switch should be turned on again only for maintenance adjustments and service checks, as required.

## 7.1 DAILY (BY OPERATOR)

- Check for any visible damage to columns and lifting forks.
- Check for any hydraulic oil leaks for hoses, tubing and cylinders.

### 7.2 MONTHLY (BY OPERATOR)

- Check hydraulic fluid level and replenish, as necessary.
- Check the emergency release mechanism by:
  - 1. Push the emergency stop button when the columns are moving. All the columns should stop immediately.
  - **2.** To release the emergency stop button by turning it counterclockwise, set the main switches to 0 and then to 1 to restore control power.
- Check proper functionality for the mechanical safety locks.
- Examine lifting system for fluid leaks and signs of damaged or worn parts.
- Examine electrical & communication cables and connectors for signs of damage.
- · Apply oil to dry cylinder piston shaft. Clean area as required.
- Grease all rollers, applying lithium grease using the zerk fittings shown below:







#### 7.3 YEARLY (BY OPERATOR)

- Clean the filter/mesh of the electro-magnet valve of the motor pump (See 7.4).
- Check the DC motor contactor and change with a new one every two years.
- Change the hydraulic oil every two years.

## 7.4 CLEANING (BY OPERATOR)

When Power Unitos cycle running time (up & down) accumulates up to 300 minutes since being operated for the first time, it is suggested to manually inspect & clean the electro-magnetic release valves by:

- **1.** Lower the lifting forks to ground or rest it on lock. (PARK)
- 2. Turn (OFF) the control panel switch & battery switch.
- **3.** On each power unit motor, remove jam nut to remove the coil off the electro-magnetic release valve stem.
- **4.** Carefully remove electro-magnetic release valve from valve body.
- Clean the filter / mesh with compressed air and/or cleaning solution (Fig. 16)
- **6.** Carefully install the electro-magnetic release valve back into valve body.
- 7. Attach & secure coil back onto valve stem for electro-magnetic release valve.



- **1.** Lower the lift completely to floor.
- 2. Remove the oil from the tank.
- **3.** Refill with approximately 13.5 Liters of hydraulic oil meeting AW32 or 46, filtrated to 4 micrometer.
- **4.** Check the oil level in oil tanks on each column, add if necessary.



Fig. 16

# 8. TROUBLE SHOOTING

FAULT	POSSIBLE CAUSE	REMEDY
	Battery voltage is too low.	Charge the batteries.
	Oil level too low.	Add oil as necessary; refer to lubricating instructions on lifting column.
	Air in hydraulic pump (after the tank was empty).	Select single wheel mode and press the 1 (UP) button until the lifting column rises (max. 1 min).
Column Does Not	Safety valve not properly adjusted	Have valve adjusted, contact Service Department to check the valve.
Lift.	Pump has insufficient yield.	Replace the pump.
	Power interrupted by broken fuse in control box.	Replace the broken fuse. If the defect occurs again, contact the service department.
	Maximum height difference (more than 2"/50mm) exceeded.	Set the MODE to WHEEL/SINGLE. Raise or lower the specified column to minimize the height difference. If the defect occurs again, contact the service department.
	Battery voltage is too low.	Charge the batteries.
	Safety latch pawl not disengaged from locking system.	Raise column approximately 2" and then lower.
Column Does Not Lower	The electrically operated lowering valve on the hydraulic unit does not open.	No power for solenoid or lowering valve is faulty. Have fault corrected by the Service Department.
	Dirty lowering valve.	Have valves cleaned or replaced by service department.
	Maximum height difference (more than 2"/50mm) exceeded.	Set the MODE to WHEEL/SINGLE. Raise or lower the specified column to minimize the height difference. If the defect occurs again, contact the service department.
	The cylinder seal is damaged, oil leaks continually.	Have seals or cylinder replaced by service department.
Column Lowers by	Leaks in the oil line couplings.	Tighten couplings and coupling nuts.
itself.	Dirty or damaged non-return valve.	Clean or replace valve.
	Dirty or damaged lowering or correction valve.	Clean or replace valve.
Column Rises by itself	Defective DC motor contactor (Emergency Button does not stop lifting)	Change the contactor with a new one.

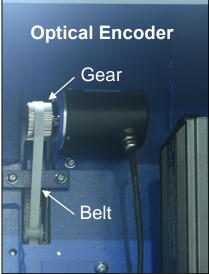
FAULT	POSSIBLE CASE	REMEDY
	Oil level in tank too low.	Add oil as necessary; refer to lubricating instructions on lifting column.
Column Does not	Pump drawing-in air.	Tighten the suction filter fastening or crimp tighter.
Lift Properly.	The steel plug has not been replaced by the breather cap	Install the breather cap
	Breather cap blocked.	Clean breather cap.
Column Height Reading Not Reaching Zero	Sensor zero point is not correct	Do encoder alignment
	Fuse blown.	Check the fuses F1, F2 and F3. If necessary, replace the fuse(s) in the control panel. If fault occurs again, contact the Service Department.
No Control Power	Power switch is OFF.	Set power switch to ON.
No Control Fower	Broken cable or loose connector.	Check cable and connector.
	The emergency stop button has not been unlocked.	Release the emergency button. Set the main switch(es) to OFF and ON.
	No power supply.	Have fault corrected by qualified electrician.
No Power (Power Indicator are Off)	Main fuse blown.	Replace fuse.
,	Main switch(es) OFF.	Set power switch(es) ON.

#### 9. OPTICAL ENCODER ALIGNMENT

The lifting height is detected by the sensor called optical encoder. The zero point of the sensor is checked in following steps.

- 1. Connect columns, then turn on power as normal procedure.
- 2. Fully lower all columns lifting forks to the ground.
- 3. The screen shall present the height readings of every column. They shall be 0 (zero). If not, that one columns lift forks shall be aligned.
- 4. To adjust, please open the upper panel cover on the column not reading zero. Then, gently separate the belt from the encoder gear of the sensor (Fig.18).
- 5. Slightly rotate the encoder gear to increase or decrease the reading on the corresponding column until the height reading goes to zero (4th LCD Screen).
- 6. Carefully apply the belt back onto encoder gear, double checking that the fully height reading is at 0. If reading is 0, close the upper cover.





(4th LCD Screen)

Fig. 17

# 10. HAND-CONTROLLER (Optional)

As an option, the MSC-13K-B mobile column lifts can apply one Hand-Controller for every mobile column lift set. (Fig. 18) The hand controller has one EMERGENCY Button and UP, DOWN, PARK Buttons.





Fig. 18

Fig. 19

**NOTE:** Every control box on column has a special plug portq for the Hand Controller (Fig. 19). The Operator has the option to put the hand controller plug into any one of the column ports, as the operation buttons will serve the same function as the buttons on control panel(s).

#### 11. BATTERY CHARGER INFORMATION

#### 11.1 TECHNICAL SPECIFICATIONS

Input voltage: 100-140 VAC, 60Hz

• Input power: 230W (Max)

Output voltage: 24VDC (Grading adaptive)

• Output current: 7.0A±10%

• Charge time: 9-11 hours (battery was discharged deeply 80%)

• Size: 200\*150\*60 mm

Weight: 850g

#### 11.2 CHARGER PANEL

**1.** Charging indicator (*It becomes green and red charging indicator on control box panel*)

- 2. Power indicator
- 3. Output cord
- 4. Power input socket







#### 11.3 LED PERFORMANCE INDICATOR

- 1. After the battery charger is powered on, the POWER INDICATOR (#2) will be On.
- **2.** The CHARGING INDICATOR (#1) will go to On, only if the battery is connected. It will be red when battery is in fast charging mode. When the battery is fully charged, the indicator will go to green.

NOTE: If CHARGING INDICATOR (#1) is flashing, the charger has an error.

#### 12. BATTERY REQUIREMENT INFORMATION

• Battery Quantity: 2ea per Column - (Not included with MSC-13K-B)

Battery Dimension: 13" L x 7" W x 12" H

Battery Cover Size: 15" L x 8" W x 14" H

Battery Type: DC Deep Cycle Batteries, 12VDC

• Battery Size: BCI Group 29 - 31

Battery Terminals: Threaded Stud Terminals

Battery Rating: 105 - 120 AMP / HR

• Battery Start Current: 350 CCA - 500 CCA

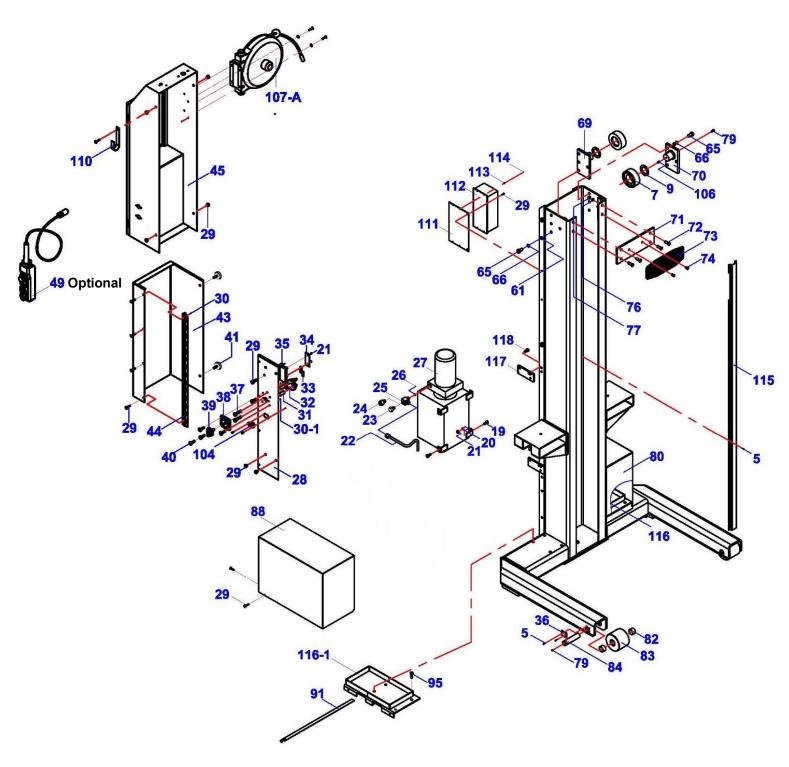
#### **Recommendations:**

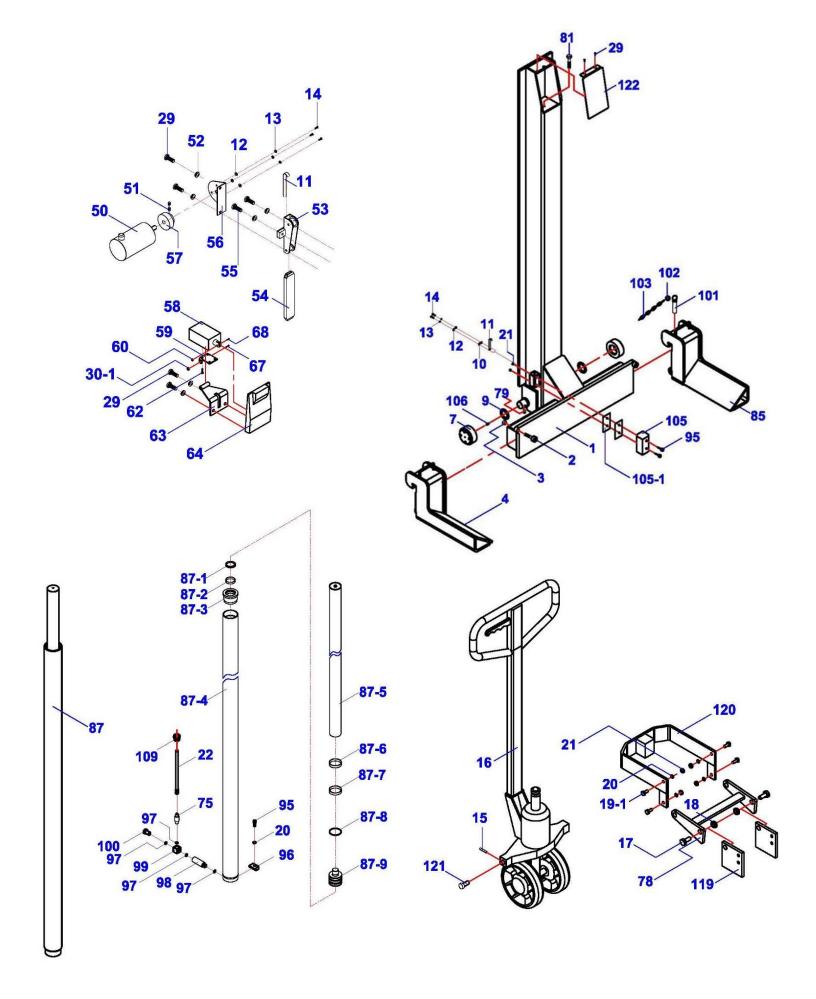
1. When **%Low Voltage On**" or "Voltage Deficient" is on the screen, lower down the vehicle, shut off the lift, then charge the batteries immediately. Continued use of the low voltage batteries will shorten the life of batteries.

- 2. Charge the batteries soon after the service job is finished. This will help to prolong the life of the batteries.
- 3. When in storage, the batteries shall be fully charged first. Every six months charge again. Discharge the batteries once a year at 30%, then charge fully.
- **4.** It is better to disconnect & remove the batteries from the lift for prolonged storage periods. Keep batteries secured indoors, not resting directly on concrete.
- **5.** Check batteries once a month for out looking, output voltage (open circle) and etc. to keep it in a good condition.

# MSC-13K-B EXPLODED VIEWS & PARTS LISTS

**Column Assembly** 





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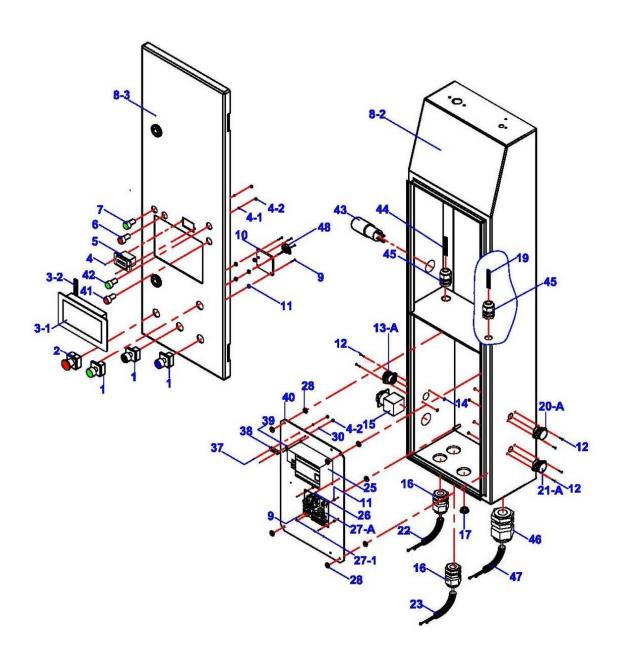
# MSC-13K-B Column Assembly Parts List

ITEM	M-CODE	DESCRIPTION	QTY
1	DJ03-02000-000	Carriage	1
2	5102-12035-000	Bolt, M12 x 35mm	2
3	5202-00012-000	Nut, M12	2
4	DJ03-04000-000	Right Lift Fork	1
5	5114-05014-000	Screw, M5 x 14mm	12
7	DJ02-02200-000	Roller	4
9	DJ02-02004-000	Washer	4
10	DJ02-00021-000	Plate	1
11	DJ02-00017-000	Timing Belt	1
12	5302-00004-000	Flat Washer, D4	5
13	5306-00004-000	Spring Washer, D4	5
14	5110-04010-000	Screw, M4 x 10mm	7
15	5402-05030-000	Cotter Pin, D5 x 30mm	2
16	DJ01-15000-100	Pallet Jack	1
17	5102-16035-000	Bolt, M16 x 35mm	2
18	5202-00016-000	Nut, M16	2
19	5102-08020-000	Bolt, M8 x 20mm	8
19-1	5102-08025-000	Bolt, M8 x 25mm	4
20	5302-00008-000	Flat Washer, D8	8
21	5202-00008-000	Nut, M8	12
22	DJ02-12000-000	Hydraulic Hose	1
23	SJ03-14005-000	End Nut	1
24	SJ03-14002-000	Connector	1
25	SJ03-14001-000	T-Connector	1
26	5901-00118-000	O-Ring, D11.8x x1.8mm	1
27	DBZ22A-00	Motor Pump	1
28	DJ03-12001-000	Side Board	1
29	5115-06012-000	Screw, D112 x 3.55mm	1
30	5202-00006-000	Lock Nut, M8 x 80mm	2
30-1	5202-00005-000	Lock Nut, D10 x 260mm	2
31	DJ02-00006-A00	Switch Fixer	2
32	BZ22-05503-000	Battery Switch, 24VCD	2
33	BZ22-05516-000	Copper Bar, IFC-06-4	1
34	BZ22-05515-000	Fuse	2
35	BZ22-05514-000	Fuse Case	1
36	SL01-00047-A00	Plate, 24VDC/200A	2
37	5110-06045-000	Screw	2
38	DJ02-00017-A00	Switch Panel	1
39	DJ02-00018-A00	Switch	1
40	5110-05014-000	Screw, M5 x 14mm	4
41	5116-06012-000	Hand Screw, M6 x 12mm	2

43	DJ03-12100-000	Cover	1
44	DJ03-12002-000	Hinge	1
45	QK05AS-00	Control Unit	1
49	DJ020S-FJ4	Hand/Remote (Optional)	1
50	DJ02-00016-000	Optical Encoder	1
51	5306-04005-000	Threaded Pin, M4 x 5mm	2
52	5306-00006-000	Spring Washer, D6	6
53	DJ02-11000-000	Wheel Frame	1
54	DJ02-00018-000	Weight Bar	1
55	5110-06020-000	Screw, M6 x 20mm	3
56	DJ02-00015-000	Fixing Frame	1
57	DJ02-00019-000	Gear	1
58	DJ02-00006-000	Electric Magnet	1
59	DJ02-00004-000	Magnet Base	1
60	5202-00004-000	Lock Nut	1
61	5302-00012-000	Flat Washer, D12	8
62	5107-03010-000	Screw, M3 x 10mm	4
63	DJ03-07000-000	Magnet Frame	1
64	DJ03-06000-000	Mechanical Lock	1
65	5102-12025-000	Bolt, M12 x 25mm	8
66	5306-00012-000	Spring Washer, D12	8
67	5102-05040-000	Bolt, M5 x 40mm	1
68	5110-04020-000	Screw, M4 x 20mm	1
69	DJ03-09000-000	Roller Pin Shaft (RH)	1
70	DJ03-08000-000	Roller Pin Shaft (LH)	1
71	DJ03-00003-000	Board	1
72	5114-10030-000	Screw, M10 x 30mm	4
73	SJ06-00004-000	Rubber Pad	1
74	5114-10020-000	Screw, M10 x 20mm	2
75	DJ02-09000-000	Safety Valve	1
76	5302-00010-000	Flat Washer, D10	4
77	5202-00010-000	Nut, M10	4
78	DJ03-11000-000	Joining Frame	1
79	JP02-00007-000	Nipple, M6	6
80	DJ02-00002-A00	Battery Cover (LH)	1
81	5102-10030-000	Bolt, M10 x 30mm	2
82	5603-30030-000	Bearing, D30 x 30mm	4
83	DJ03-00001-000	Roller	2
84	DJ03-00002-000	Roller Pin	2
85	DJ03-03000-000	Left Lift Fork	1
87	DJ03-05000-000	Hydraulic Cylinder	1
87-1	5906-00060-000	Dust Ring, D60xD66.8x5mm	1
87-2	DJ03-05003-000	Guide Belt #1, D65xD60x15mm	1
87-3	DJ03-05002-000	Guide Ring	1
87-4	DJ03-05100-000	Cylinder Body	1

87-5	DJ03-05200-000	Piston Rod	1
87-6	DJ03-05005-000	Position Slot	1
87-7	DJ02-05005-000	Guide Belt #2	1
87-8	5903-00060-000	Seal Ring, D75xD60x10mm	1
87-9	DJ03-05001-000	Piston	1
88	DJ02-00001-A00	Battery Cover (RH)	1
91	BZ22-00002-000	Hose Clamp	4
95	5105-08025-000	Bolt, M8 x 25mm	9
96	DJ03-00015-000	Plate	1
97	DJ02-05007-000	Combined Washer, D16	4
98	DJ03-05004-000	Connector	1
99	DJ02-05010-000	Swivel Connector	1
100	DJ02-05011-000	Oil Connector	1
101	DJ02-00011-000	Pin	2
102	DJ02-00010-000	Keyring	4
103	DJ02-05008-000	Chain	2
104	SL02-00041-A00	Socket	1
105	DJ03-00009-000	Nylon Block	2
105-1	DJ03-00011-000	Adjust Shim	4
106	5109-08008-000	Threaded Pin, M8 x 8mm	4
107-A	QK04-00100-M00	Cable Reel	1
109	DJ02-00030-000	Rubber Ring	1
110	DJ02-00034-000	Hook	1
111	DJ03-00012-B00	Charger Board	1
112	BZ22-05509-100	Charger	1
113	5302-00003-000	Flat Washer, D3	4
114	5110-03010-000	Screw, M3 x 10mm	4
115	DJ03-00007-000	Guide Slot	1
116	DJ03-19000-B00	Battery Base (LH)	1
116-1	DJ03-20000-B00	Battery Base (RH)	1
117	DJ03-01004-000	Frame	2
118	5102-08014-000	Bolt, M8 x 14mm	4
119	DJ03-00004-000	Jack Connector Plate	2
120	DJ03-10000-000	Frame	1
121	DJ03-00005-000	Pin	2
122	DJ03-00013-000	Cover	1

MSC-13K-B
Control Panel Assembly

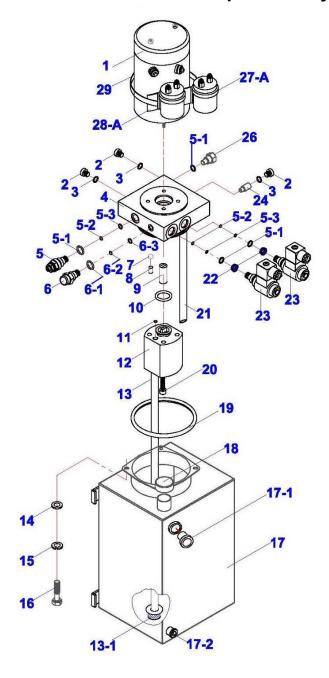


# MSC-13K-B Control Panel Assembly Parts List

ITEM	M-CODE	DESCRIPTION	QTY
1	DJ02-20002-000	Button, LA42P (Green, Blue & Black)	3
2	DJ02-20003-000	Emergency Button, LA42J, Red	1
3-1	QK02-20010-UL0	Touch Screen, Simatic HMI KTP700	1
3-2	QK02-20011-C70	Cable	1
4	5110-00004-000	Screw, M4 x 12mm	2
4-1	5203-00004-000	Spring Washer, D4	2
4-2	5202-00004-000	Nut, M4	4
5	QK04-00012-000	Battery Indicator	1
6	DJ02-20006-000	Red Lamp, LD56-16C,D16	
7	DJ02-20005-000	Green Lamp, LD56-16C, D16	1
8-2	DJ03-13100-000	Control Case Body	1
8-3	QK02-11001-UL0	Panel (Main Column)	1
8-3A	QK02-12001-C00	Panel (Sub Column)	1
9	5110-03008-000	Bolt, M3 x 8mm	12
10	QK02-20200-L70	Connection Board	1
11	QK02-10013-000	Separator, M3 x 10mm	8
12	5110-03015-000	Screw, M3 x 15mm	6
13-A	QK06-50700-M00	Communication Cable, XS1	1
14	5202-00003-000	Nut, M3	6
15	DJ04-20001-100	Power Switch, LW42A2-21820	1
16	DT01-06023-000	Cable Nut, M16	2
17	QK04-00011-000	Hole Cover 1, D16	2
18	JK01-00003-000	Cable Nut, M12	6
19	DJ02-00200-000	Electro-Magnet Cable	1
20-A	QK04-50800-M00	Communication Cable, XS7	1
21-A	QK02-50900-M00	Remote Controller Cable, XS15	1
22	QK04-30300-000	Charger Cable, RVV2x1.5 Red / Black	1
23	QK04-30100-000	Power Supply Cable, RVV2x1.5 Red / Black	1
25	QK02-10002-SMT	Main PLC: S7-200-Smart-ST30	1
25-A	QK02-10003-SMT	Sub PLC: S7-200-Smart-ST20	1
26	DJ02-10032-000	Screw, 3.5 x 15mm	2
27-A	QK04-13300-MZ3	PCB	1
27-1	JK01-10113-100	Fuse 3.15A (Delay)	2
28	5202-00006-000	Nut, M6	8
30	5301-00005-000	Flat Washer, D5	2
37	5110-04004-000	Screw, M4 x 4mm	2
38	JK01-10010-000	Ground Terminal - 5 Pos	1
39	JK01-JD000-000	Ground Label	1
40	QK06-10001-100	Bottom Board	1
41	QK05-20006-H00	Red Charger Lamp, LAS1-AY-D/R/6V	1

42	QK05-20005-H00	Green Charger Lamp, LAS1-AY-D/G/6V	1
43	QK04-80002-FJ5	LED Lamp Socket	1
44	QK04-00015-000	LED Lamp Power Cable, RVV2x0.5 Red / Black	1
45	JK01-00004-000	Cable Nut, M20	2
46	DJ02-00007-000	Cable Nut, M25	1
47	QK04-00013-M00	Battery Indicator Cable, RVV2x0.5 Red / Black	1
48	JK01-00008-000	Buzzer, SFM-27 24VDC	1

MSC-13K-B
Power Unit / Motor Pump Assembly



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# MSC-13K-B Power Unit / Motor Pump Parts List

ITEM	M-CODE	DESCRIPTION	QTY
1	BZ22-05001-F00	DC Motor, 24VDC,2.2KW, 110A	1
2	BZ01-04008-000	Plug Fitting, 9/16-18UNF	3
3	5901-00118-000	O-Ring, D11.8xD1.8	3
4	BZ22-04001-F00	Valve Block	1
5	BZ20-04002-000	Overflow Relief Valve, YF06-00 25Mp	1
5-1	5901-00160-000	O-Ring,D16xD2	4
5-2	5901-00125-000	Circlips, D12 x 1.5mm	3
5-3	5901-00095-000	O-Ring, D9.6xD1.8	3
6	BZ20-04024-100	Main Compensating Valve, LFR-10-M8	1
6-1	5901-00190-000	O-Ring, D19x2	1
6-2	5901-00130-000	Circlips, D13 x 1.5mm	1
6-3	5901-00130-000	O-Ring, D13xD1.8	1
7	5601-00800-000	Ball, D8	1
8	5109-10010-000	Threaded Pin, M10 x M1 x M10	1
9	BZ22-00003-000	Coupler, D18 x 53mm	1
10	5901-00277-000	O-Ring, D27.7x2.4	1
11	5901-00925-000	O-Ring, D9.25x1.78	1
12	BZ01-03000-F00	Gear Pump, 2.1ml/rev - 21Mpa	1
13	BZ20-01000-000	Suction Tube, D18x350	1
13-1	BZ01-01002-000	Filter Mesh Cap	1
14	5301-00006-000	Flat Washer, D6	4
15	5303-00006-000	Spring Washer, D6	4
16	5101-06012-000	Bolt, M6 x 12mm	4
17	BZ22-02100-A00	11 Liter Tank (Metal)	1
17-1	DJ02-00042-000	Oil Level Bar, M22 x 1.5mm	1
17-2	BZ20-02101-000	Oil Plug, M12 x 10mm	1
18	BZ20-02200-000	Tank Cover	1
19	5901-01120-000	O-Ring, D112x3.55	1
20	5105-08080-000	Screw, M8 x 80mm	2
21	BZ20-00001-000	Return Tube, D10x260	2
22	BZ01-04011-000	Filter Mesh Screen	2
23	BZ13-04100-000	Release Valve, 24VDC	2
24	BZ20-04026-000	Sub Compensating Valve, IFC-06-4	1
26	BZ20-04007-000	Single-Way Check Valve	1
27-A	BZ22-05002-002	Motor Contactor, 24VDC / 200A	2
28-A	BZ22-05003-000	Motor Frame	2
29	BZ01-00002-000	Contactor Clamp	1

#### LIMITED WARRANTY

#### **Structural Warranty:**

The following parts and structural components carry a five year warranty:

Columns Arms Uprights Swivel Pins

Legs Carriages Overhead Beam Tracks Cross Rails Top Rail Beam

#### **Limited One-Year Warranty:**

Tuxedo Distributors, LLC (iDEAL) offers a limited one-year warranty to the original purchaser of Lifts and Wheel Service equipment in the United States and Canada. Tuxedo will replace, without charge, any part found defective in materials or workmanship under normal use, for a period of one year after purchase. The purchaser is responsible for all shipping charges. This warranty does not apply to equipment that has been improperly installed or altered or that has not been operated or maintained according to specifications.

#### Other Limitations:

This warranty does not cover:

- 1. Parts needed for normal maintenance
- 2. Wear parts, including but not limited to cables, slider blocks, chains, rubber pads and pulleys
- 3. Replacement of lift and tire changer cylinders after the first 30 days. A seal kit and installation instructions will be sent for repairs thereafter.
- 4. On-site labor

Upon receipt, the customer must visually inspect the equipment for any potential freight damage before signing clear on the shipping receipt. Freight damage is not considered a warranty issue and therefore must be noted for any potential recovery with the shipping company.

The customer is required to notify Tuxedo of any missing parts within 72 hours. Timely notification must be received to be covered under warranty.

Tuxedo will replace any defective part under warranty at no charge as soon as such parts become available from the manufacturer. No guarantee is given as to the immediate availability of replacement parts.

Tuxedo reserves the right to make improvements and/or design changes to its lifts without any obligation to previously sold, assembled, or fabricated equipment.

There is no other express warranty on the Tuxedo lifts and this warranty is exclusive of and in lieu of all other warranties, expressed or implied, including all warranties of merchantability and fitness for a particular purpose.

To the fullest extent allowed by law, Tuxedo shall not be liable for loss of use, cost of cover, lost profits, inconvenience, lost time, commercial loss or other incidental or consequential damages.

This Limited Warranty is granted to the original purchaser only and is not transferable or assignable.

Some states do not allow exclusion or limitation of consequential damages or how long an implied warranty lasts, so the above limitations and exclusions may not apply. This warranty gives you specific legal rights and you may have other rights, which may vary from state to state.

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