CHAMPION AUTOLIFT .COM

CHAMPION DISTRIBUTORS LLC

# INSTALLATION MANUAL & OPERATION INSTRUCTIONS

## TP12-HD

# WARNING

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## WARNING

- This instruction manual is an essential integral part of this product. Please read all instructions.
- Properly keep this manual for use during the maintenance.
- This equipment is only used for its clearly designed purpose, and never use it for other purposes.
- The manufacturer is not responsible for any damage caused by improper use or other purposes of use.

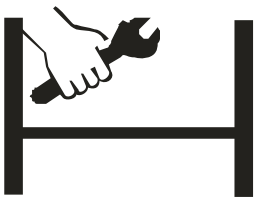
## PRECAUTION

- Only the qualified personnel having undergone special training can operate this machine. Without the permission of the manufacturer or not following the requirement of the manual, any changes in the machine part and in the usage scope may cause direct or indirect damage to the machine.
- Don't keep the lift in the extreme temperature and humidity environment. Avoid installation beside the heating equipment, water tap, air humidifier or stove.
- Prevent the lift from contacting large amount of dust, ammonia, alcohol, thinner or spray adhesive, and prevent it from rain shower.
- During the machine operation, non-operators should be kept away from the machine.
- Inspect machine daily ,do not use lift with damaged parts or being damaged .Use original components to replace damaged parts
- The lift can't be overloaded. The rated load of the lift is already marked on the nameplate.
- Please don't raise the lift when there are people in the vehicle. During the operation, the customer and spectators shouldn't stand in the lifting area.
- Keep the lifting area free from obstacle, grease, machine oil, garbage and other impurities.
- Position the swing arm of the lift, making it contact the lifting point as recommended by the manufacturer. Raise the carriage and confirm the lifting pad and vehicle are closely contacted. Raise the carriage to the appropriate working height.
- For some vehicles, the parts dismantling (or installation) will cause severe deviation of the center of gravity, leading to unstable vehicle. The safety stands are needed to keep the balance of the vehicle.
- Before moving the vehicle away from the lifting area, please position the swing arm and lifting pad back away to avoid blockage during the movement.
- Use appropriate equipment and tools as well as safety protection facilities, e.g. working uniform, safety boot, etc.
- Pay special attention to various safety marks attached to the machine body.
- Keep hair, loose clothing, fingers, and all parts of body away form moving parts
- Pay special attention not to dismantling the safety unit of the machine or making it not functioning.
- The hydraulic oil used for this lift is N32 or N46. Please refer the safety data of grease and oil shown in the manual.
- Let components cool down before storage, loosen component cables completely in storage
- Do not install lift in the open air or expose to rain ,special requirements should be offered to manufacturer if it can't be avoided.
- Carefully check equipment list before installation .Immediately connect distributor or Launch for any question.
- **Launch Shanghai Machinery Co., Ltd. is dedicated to continuously improving the product quality and upgrading the technical spec. They are subject to change without notice.**

## Caution Labeling Exemplification

（1） Read operating and safety manuals before using lift!

（2）Proper maintenance and inspection is necessary for safe operation!

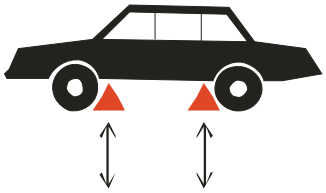


（3）Don not operate a damaged lift！

（4）Lift to be used by trained operator only!

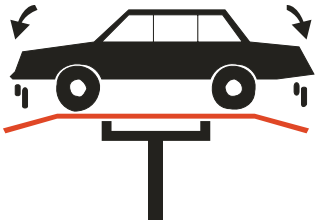
（5）Authorized personnel only in lift area!

（6）Use vehicle manufacture's lift points!



（7）Always use safety stands when removing or installing heavy components!

（8）Auxiliary adapters may reduce load capacity!



（9）Clear area if vehicle is in danger of falling!

（10）Position vehicle with center of gravity midway between adapters!

（11）Keep area clear when lifting and lowering vehicle!

（12）Avoid excessive rocking of vehicle while on lift !

（13）Avoid lifting on one side!

（14）Keep feet clear of lift while lowering!

（15）Do not stand below lift while raising or lowering!

# Table of Contents

# 1. Outline

## 1. 1 Model Description

| Model | Description |
|---|---|
| TP12-HD | 5.5Teconomical clear-floor 2-post lift |

## 1. 2 Purpose

TP12-HD is of safe and simple operation and applicable for the lifting of various small and medium-sized vehicles with total weight below 12,000lb in garage and workshop

## 1. 3 Functions and Features

- The cable and oil pipe are fully concealed, with decent and elegant appearance.
- Designed based on the international standard, meeting the demand of the garage and workshop.
- Top limit switch, effectively protecting the vehicle from overhead collision.
- Dual hydraulic cylinders drive, stable lifting and lowering.
- Automatic full-scope safety lock, safe and simple in operation.
- Detachable slider cover structure, and it is more convenient and efficient for maintenance.
- Adopt two steel cables for equalization, force two carriages to move synchronously, and effectively prevent the vehicle from tilting.
- Lowest height of lifting pad is 110mm, good for repairing low chassis or low profile car.

## 1. 4 Technical Specifications

**Basic parameters of the equipment:：**

| Model | Rated load | Lifting height | Rising time | Descending time | Net weight | Passing width | Machine width | Machine height |
|---|---|---|---|---|---|---|---|---|
| TP12-HD | 5500 kg<br>12000 lb | 1,676 mm<br>66 in | 65s | ≥20s<br>≤40s | 1160kg<br>2560 lb | 3040mm<br>120in | 4060mm<br>159.8in | 4200mm(165.4in) |

**Noise:**

Working noise: ≤ 75dB（A）

**Power unit**

Working pressure：24MPa

**Electrical parameters of the machine：**

Motor (optional)

Voltage：According to client's requirement

Single phase: 220V/50Hz; 220V/60Hz

Three phase: 380V/50Hz

Power：3 kW

## 1. 5 Environmental Requirement

Working temperature： -5℃～+40℃

Transport/storage temperature：-5℃～+40℃

Relative humidity: Temperature +30℃，relative humidity 80%

Height above sea level：No more than 2000m

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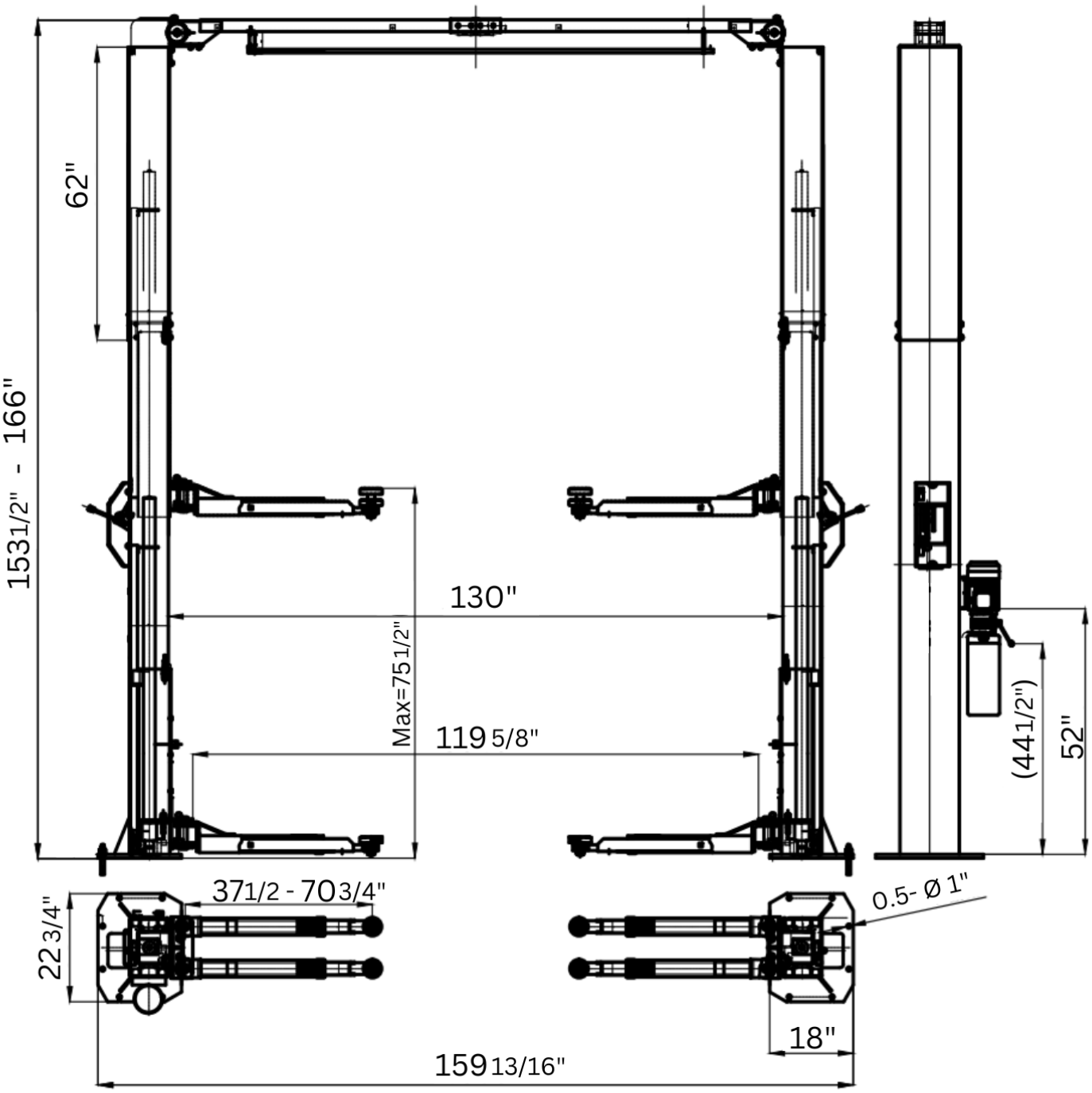
# TP12-HD



# 3. Operation Description

## 3.1 Precautions for vehicle repair work

- Different vehicles have different center of gravity positions. First understand the position of center of gravity, and when the vehicle enters into the lift, make its center of gravity close to the plane formed by two columns. Use vehicle manufacture's lifting points!
- Cautiously note the car roof position when lifting, to avoid its contacting with top beam and causing accident.
- Carefully read the warming symbol.
- The hydraulic valves have been adjusted before ex-factory, and the user can't make self-adjustment, otherwise it will be responsible for all the consequences generated.
- Based on the production needs, some specifications in the instruction manual are subjected to change without notice

## 3.2 Preparation before Operation

- Lubricate contact surface of the carriage with general-purpose lithium grease（GB7324-87）. All sliding surface should be coated evenly from the top to bottom.
- Fill hydraulic oil N32 or N46（approx.12L）to the oil reservoir of the power unit.

## 3.3 Inspection before operation

- Check to see if the motor power is installed properly.
- Check to see if all the connection bolts are fastened.

⚠ ***Note: Don't operate the lift with damaged cables or damaged and missing part, until it is inspected and repaired by the professionals.***

## 3.4 Lifting the Vehicle

- Keep work area clean, don't operate the lift in cluttered work area.
- Lower the carriage to the lowest position.
- Reduce the swing arm to the minimum length.
- Swing the arm along the route of the vehicle
- Move the vehicle to the location between the two columns
- Swing the arm and put the lifting pad below the recommended lifting point, and adjust the height of lifting pad to touch lifting point of vehicle
- Press the UP button on the electric control box(Fig.4), slowly lift the vehicle to ensure the load balance, and then raise the lift to the required height.
- Release the UP button and the carriage will stop.
- Press the DOWN button to engage the safety lock of carriage. At this time, the vehicle can be repaired.

⚠ ***Note:***

- ***Before operation, the safety locking devices must be Inspected.1) The gear blocks of the arm end must engage the gear block of the restraint shaft.2)No broken strand in the steel cable. 3)No deformation in the arm pad.***
- ***When lifting the vehicle, all the swing arms must be used.***
- ***Before lifting the vehicle, check all the hydraulic hose and fittings for oil leakage. In case of leakage, please don't use the lift. Remove the fitting with leakage and re-seal. Re-install the fitting and check if oil leakage still exists.***
- ***After the vehicle is lifted, when adding or removing any major heavy object, use jack stand to maintain the balance of the vehicle.***

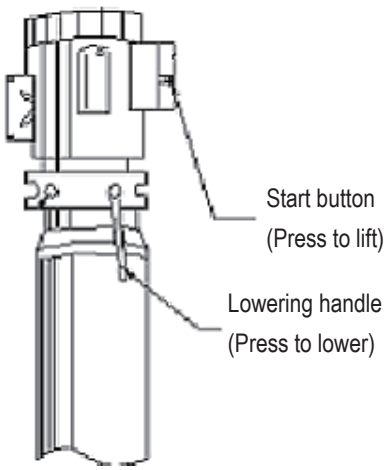



Fig.4

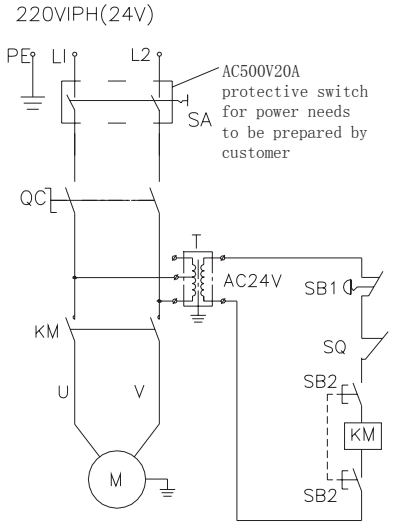
## 3.5 Lowering the Vehicle

- Clean the work area before lowering the vehicle.
- Lift vehicle of 5-10mm.
- Pull the safety lock handle, then press down the lowering handle(Fig.4),the carriage lowers
- Lower the vehicle till the swing arm down to the bottom and the lifting pads leave the vehicle chassis, and then release the handle.
- The swing arms under the vehicle must be fully shrunk。

⚠ ***Note: Don't operate lift if the safety latch doesn't work, which means the safety latch must fall into the safety groove when lifting. Don't operate lift when the load is tilting.***

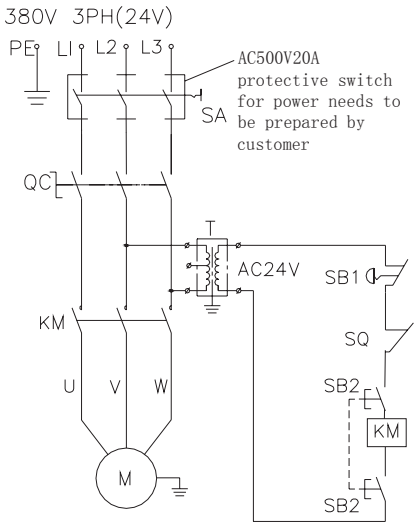
# 4 Hydraulic and Electrical System of the Equipment

## 4.1 Electrical System of the Lift




M–Motor KM–Contactor SB1–Emergency Stop Switch SB2–Button SQ–Limit switch T–Transformer

**Diagram of single-phase motor**




M–Motor KM–Contactor SB1–Emergency Stop Switch SB2–Button SQ–Limit switch T–Transformer

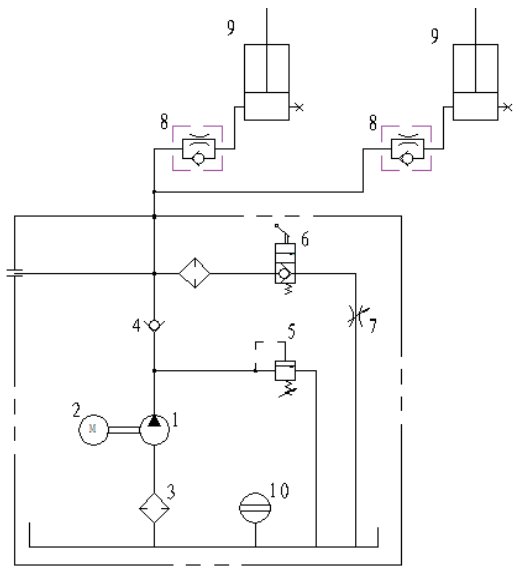
**Diagram of three phase motor**

**The electrical working principle is as follows:**

Press the start button (SB), motor (M) is energized to drive the gear pump supplying oil to push the carriage upward; release the start button SB, the motor (M) will lose the power and the carriage will stop rising. if the vehicle is lifted up to the top and contacts the limit switch (SQ) on the top beam, the motor (M) will lose the power, the carriage will stop lifting to protect the roof.

## 4.2 Electrical System of the Lift

**Diagram of hydraulic system:**




**Working principles of hydraulic system:**

When the button is pressed to start the motor on the power unit, the motor 2 will be actuated to put the oil pump 1 into motion; and oil will be sucked from the oil tank and sent to cylinder 9 forcing the piston move upward. At this time, the safety vale 5 is closed. (The pressure is well adjusted before leaving the factory to ensure the rated capacity. However, when the system pressure exceeds the limit, the oil will automatically overflow). When the start button is released, the oil supply will stop so as to stop the lifting. For lowering the carriage, first start up the motor to raise the carriage a little, pull the safety lock handle on the column to disengage the safety locking status; and then press the manual lowering handle valve 6 to lower the carriage.

# 5. Solutions to FAQ

| Symptom | Reason | Solution |
|---|---|---|
| Motor not operation | ♦ Start-up button is broken<br>♦ Limit switch burnt out<br>♦ Motor burnt out | ♦ Change UP button<br>♦ Change switch<br>♦ Change Motor |
| Motor is running, but the lift can't be raised. | ♦ Hydraulic pump sucks the air<br>♦ Suction tube is separate from the hydraulic pump<br>♦ Low oil level | ♦ Fasten all the suction pipe fittings<br>♦ Replace the suction tube<br>♦ Add the oil into the oil tank |
| Motor is running, the lift can be raised without load, but the vehicle can't be raised | ♦ Motor is running under low voltage<br>♦ Impurities inside the solenoid valve body<br>♦ Regulation pressure of safety valve is incorrect<br>♦ Lift is overloaded | ♦ Supply correct voltage to the motor<br>♦ Remove impurities from the solenoid valve body<br>♦ Adjust the safety valve<br>♦ Check the weight of the vehicle |
| The lift is lowering slowly | ♦ Leakage on the lowering valve or check valve body.<br>♦ External oil leakage | ♦ Clean the lowering valve or check valve body and keep the hydraulic oil clean<br>♦ Repair the external leakage |
| The lifting speed is slow or oil flows out of the oil fill cap | ♦ Air and oil are mixed<br>♦ Oil return pipe is loosened | ♦ Replace the hydraulic oil or start when air is out<br>♦ Re-install the oil return pipe |
| The lift can't rise horizontally | ♦ Balance cable is not adjusted properly<br>♦ The lift is installed on the slop floor | ♦ Adjust the balance cable to the proper tension<br>♦ Shimming the columns to level the lift(no more than 5mm), If exceeding 5mm, pour new concrete floor to make it level. Refer to installation description. |
| Anchor Bolt is not fastened | ♦ Hole is drilled too big<br>♦ Concrete floor thickness or fastening force is insufficient | ♦ Pour the fast curing concrete into the big hole and reinstall the anchor Bolt , or use new drill to drill the hole for re-positioning the lift<br>♦ Cut open the old concrete and make new concrete slab for the lift. Refer to installation description. |

# 6. Repair and Maintenance

## Keep clean

- This unit should be cleaned with dry cloth frequently to keep it clean. Before cleaning, first switch off the power to ensure the safety.
- The working environment of this unit should be clean. In case of dust in the working environment, it will speed up the parts wearing and shorten the service life of the lift.

## Every day:

- Check to see if the connection between hydraulic cylinder and carriage is proper.
- Check to see if the steel cable connection is proper, and if the tension is at the optimum status.

## Every month:

- Retighten the anchor Bolt s.
- Lubricate chains/cables with lithium based lubrication grease（GB7324-87）
- Check all the hydraulic lines for wearing
- Check to see if the carriage and the inner side of the column are properly lubricated. Use high-quality heavy lubrication grease (lithium based lubrication grease GB7324-87).

⚠ ***Note: All the anchor Bolt s should be tightened completely. If any Screw doesn't function for some reason, the lift can not be used until the Bolt is replaced***

## Every six months:

- Check all the movable parts for possible wearing, interference or damage.
- Check the lubrication of all the pulleys. If the pulley has dragging during the lifting and lowering, add appropriate lubricant to the wheel axle.
- When necessary, check and adjust the balancing tension to ensure the horizontal lifting and lowering.
- Check the verticality of the column.

⚠ ***Note: The inner corner of each column should be lubricated with lubricant, to minimize the roller friction and ensure the smooth and even lifting.***

## Maintenance of hydraulic system:

- Clean and oil change
  In the six months after initial use of this unit, clean the hydraulic oil tank and replace the oil, later clean the hydraulic system once a year, and replace the oil.
- Replace the seal
  After this unit is put into operation for certain period, if finding the oil leakage, carefully check it; if the leakage is due to the wearing of sealing materials, immediately replace the worn one based on the original spec. See Fig. 7

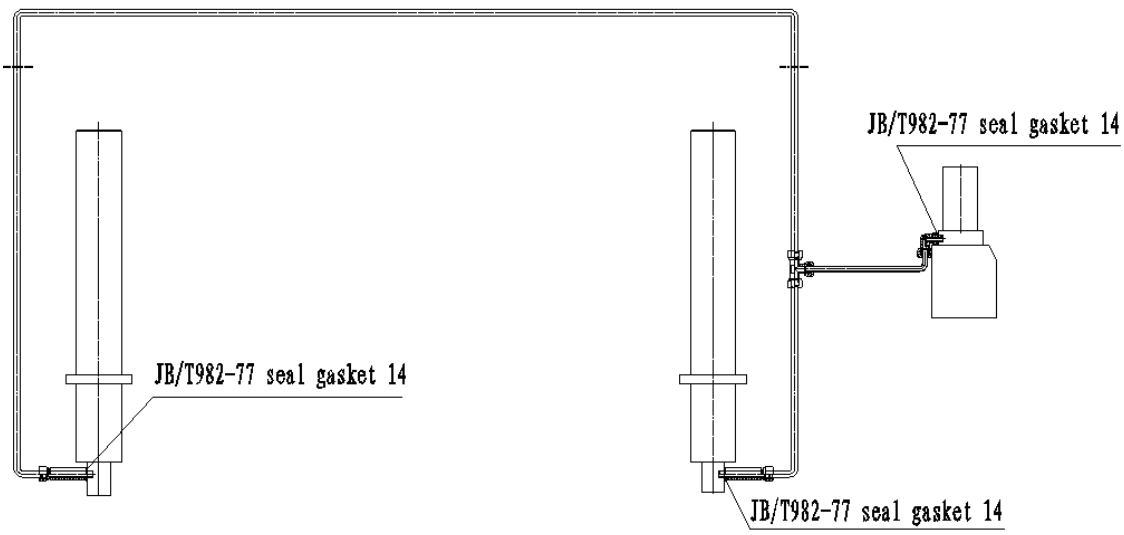



Fig.7

# 7.Storage and Scrap

## 7.1 Storage

When the equipment requires long-time storage:

- Disconnect the power supply
- Lubricate all the parts requiring lubrication: mobile contact surface of the carriage, etc.
- Empty all the oil/liquid storage units
- Put the plastic cover over the equipment for dust protection

## 7.2 Scarp

When the equipment service life is expired and can no longer be used, disconnect the power supply, and properly dispose of as per relevant local regulations.

# 8. Tools for installation and adjustment

To ensure proper installation and adjustment, please prepare the following tools:

| Tool | Model |
|---|---|
| Leveling instrument | Carpentry type |
| Chalk line | Min 4.5m |
| Taper Plunger Chip | |
| Hammer | 1.5kg |
| Tweezer | Small type |
| Crescent wrench | 40mm |
| Open-end wrench set | 11mm-23mm |
| Ratchet socket set | |
| Flat screwdriver | 150mm |
| Rotary hammer drill | 20mm |
| Concrete drill-bit | |
| 4 feet bubble level | |
| Socket wrench | 7mm |

# 9. Unpacking

- Open the packing box; remove the packing materials and inspect the lift for any sign of shipment damage. Check packing list to see if the main parts and accessories are complete.
- Keep the packing materials away from the children to avoid danger; if the packing materials cause the pollution, they shall be treated properly.

# 10. Installation

## **10.1** Important notice

- The wrong installation will cause the lift damage or personal injury. The manufacturer will not undertake any responsibilities for any damage caused due to incorrect installation and usage of this equipment, whether directly or indirectly.
- The correct installation location shall be “horizontal” floor to ensure the horizontal lifting. The slightly slope floor can be corrected by proper shimming. Any big slope will affect the height of the lifting pad when at the bottom or the horizontal lifting. If the floor is of questionable slope, consider a visual inspection, or pour a new horizontal concrete slab if possible. In short, under the optimum horizontal lifting status, the level of the lifting relies on the level of the floor where it is installed. Don’t expect to compensate for the serious slope.
- Don’t install this lift on any asphalt surface or any surface other than concrete. The lift must be

installed on concrete conforming to the minimum requirement showed in the manual. Don't install this lift on the concrete with seams or crack and defect. Please check together with the architect.

- Without the written approval of the architect, don't install this lift on a second floor with basement.
- Overhead obstruction: The lift installation area can't have any overhead obstruction, such as heater, building support, electrical pipe, etc.
- Concrete drilling test: The installation personnel can test the concrete thickness at each site by drilling test. If several lifts are installed at one place, it is preferred to make drilling test in each site
- Power supply: Get ready the power supply before the installation. All the electric wiring and connecting should be performed by a certified electrician. Check the possible obstruction, e.g. low ceiling, top pipeline, working area, passage, exit, etc.
- The front and back of the lift should be reserved with sufficient space to accommodate all the vehicles(Fig.8).

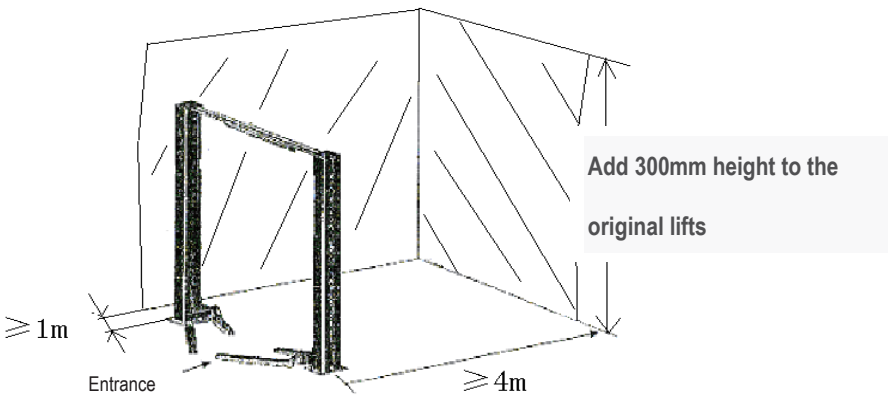



Fig 8

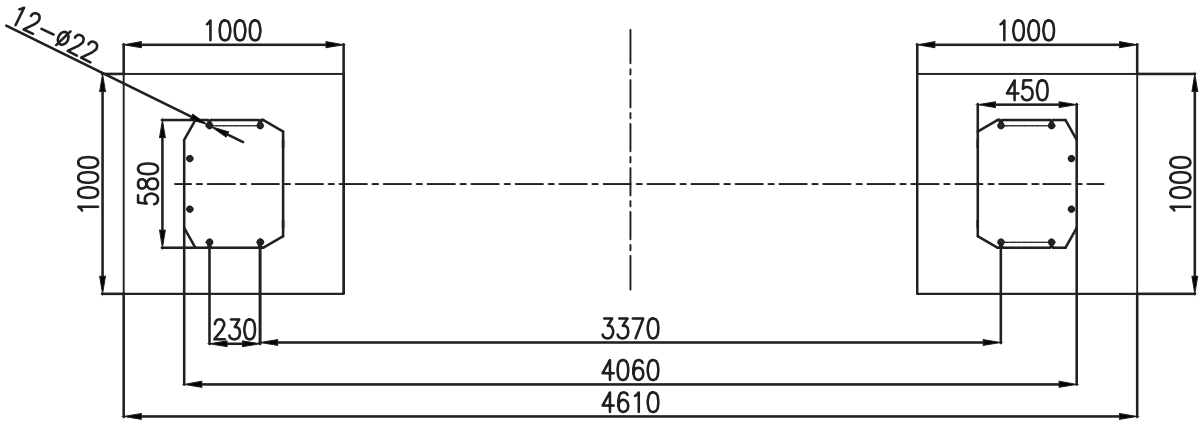
## 10.2 Installation procedure

### 10.2.1 Selecting installation site

Select installation site based on the following conditions:

- Lift can only be installed on concrete slab, which must have a minimum thickness of 250mm and should be aged 7days at least .
- The concrete slab shall have reinforcement by steel bar.
- The concrete slab must be leveled.
- If the thickness of the whole ground concrete is greater than 250mm, the lift can be installed directly

### 10.2.2 Base plate layout



***Note:***

- ***All the dimensions are based on the external border of the base plate.***
- ***Ensure the overall error is controlled within 6mm. In this way, the difficulties in the final assembly can be eliminated.***
- ***The marking and layout is very important. If it is inaccurate, there will be problems during the final assembly and operation.***

### 10.2.3 Install the power side column

First install extension column with column, then use lifting equipment to place power side column to the location as Fig.7 shows. Align the base plate of column with the chalk line layout. Guided by holes on the base plate of the column, use 5 concrete anchor bolts to fix it onto the ground. Drill and install anchor Bolt s at one time, during the drilling process, ensure no movement of the column.(Fig.11)

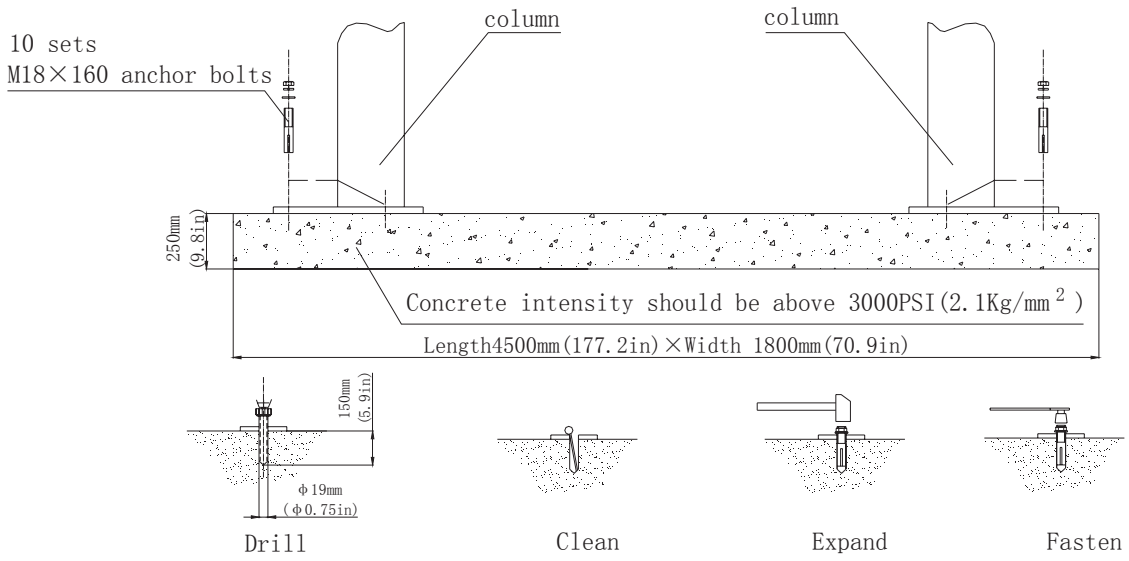



Fig.11

***Notes:***

- ***Use sharp Φ19mm concrete drill-bit to drill the holes so as not to drill the hole too large,. Use proper pneumatic tool to remove the dust from the hole. The depth of the hole is the same as that of the anchor Bolt . Insert the anchor Bolt and make the washers lean against the base of the column.***
- ***When fastening the anchor bolt, only use the (torque) wrench, and don't use impact tool for fastening.***
- ***Insert proper steel shim under the base seat of column to plumb the column. The thickness of shims shouldn't exceed 5mm.***

To get the correct and safety installation, please follow the following installation steps.

- Wear the safety goggles
- Use hard alloy drill-bit.
- Don't use the drill-bit with wearing exceeding the tolerance.
- The drill and concrete surface should be kept perpendicular.
- Let the drill work itself. Don't apply the extra force, and don't ream the hole or allow the drill to wobble.
- The drilling depth of hole is based on the length of anchor Bolt .The distance from the Bolt head to the concrete floor should be more than twice of the Bolt

diameter.

- Remove the dust from the hole.
- Gently tap the Bolt into the hole till the washer rests against the base plate of column.
- Fasten Bolt s

### 10.2.4 Install the top beam

Position the offside column at the designated chalk location. Lift the top beam to its high position, and use bracket and fasteners to fix it with the columns (as shown in Fig. 8). When installing the top beam, ensure the above micro switch support bracket adjacent to the power side column. In Fig 12:The symmetric top pulleys are to be installed at position 1、1",asymmetric top pulleys are to be installed at position1、1"、2、2"

***Note: Since the offside column is not fixed to the ground, you must operate carefully to avoid the falling of the column.***

Diagram of column, extension column and top beam

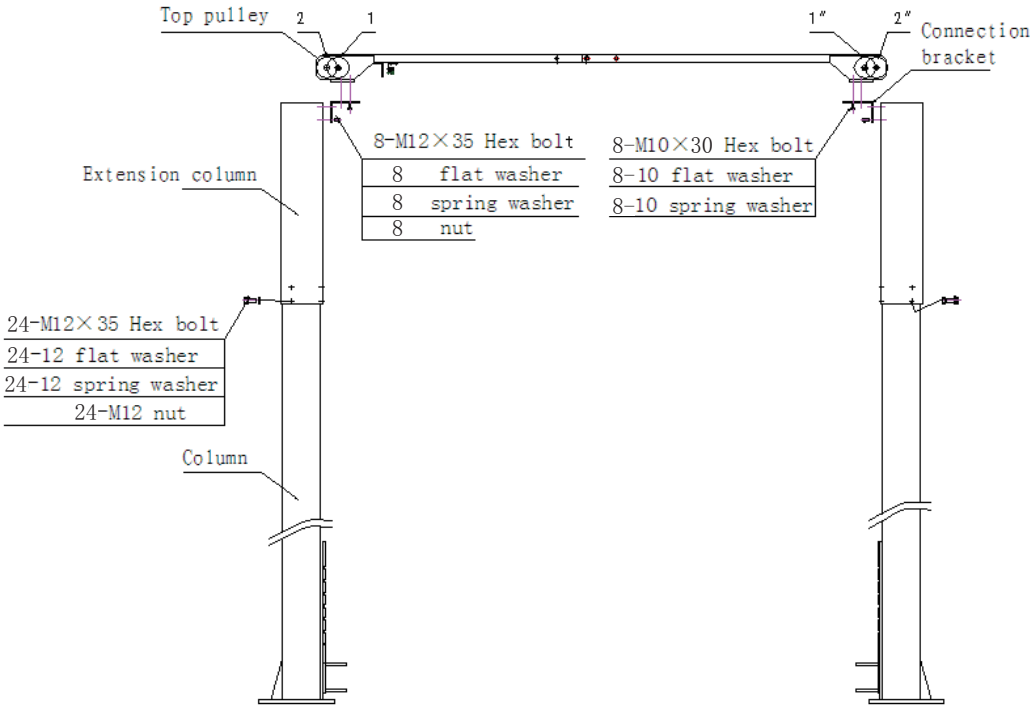



Fig 12

### 10.2.5 Install the offside column

Install the offside column as the procedures in10.2.3.

### 10.2.6 Install and adjust the balancing steel cables

Raise the two carriages to the safety locking position and two carriages are of the same height from the floor. Install the two steel cables as shown in Fig. 13.

Adjust the tension of cables through the adjustment nuts on each end of steel cable. The steel cables should be tight in equal tension. Each steel cable should be ensured in the pulley when adjusting tightly, otherwise the steel cable will be damaged.

***Note： Before operating the lift, recheck to balancing steel cables and ensure they are not intersected or wrongly installed. Ensure that the steel ropes are still on the pulley.***

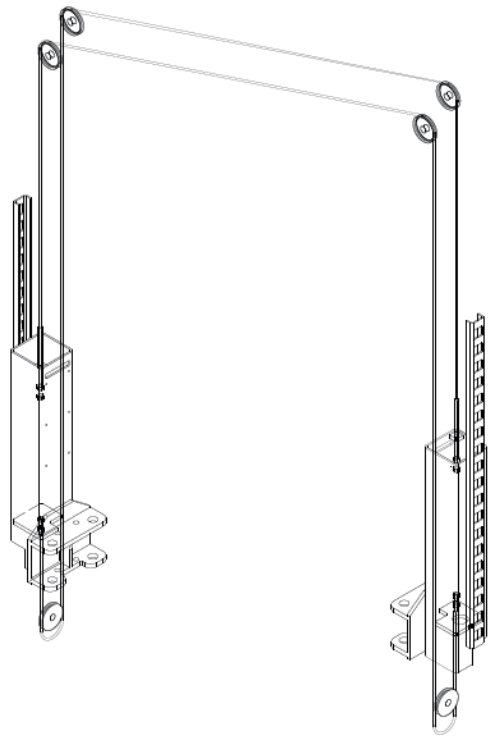


Fig 13

***Key points for assembly: the two steel cables shall be adjusted to equal tension in order to ensure the simultaneous movement of the two carriages.***

### 10.2.7 Install the power unit

Use two M10 bolts and washers to fixing the power unit. After fixing the power unit. Fill the reservoir with hydraulic oil .Operate carefully to avoid dust and other pollutants mixed with the hydraulic oil.

### 10.2.8 Connecting the power supply

Dismantle the sealing cover of the electrical box on the power unit and do the wiring according to the circuit diagram; the power supply switch is required to be installed near the lift for convenient disconnecting the power supply during maintenance or in case of emergency. The motor damage caused by wrong wiring is not warranted. Please contact the manufacturer for the electrical issues. Ensure that the oil tank is full; don't operate where there is no oil. After pressing the start button, if the motor doesn't run or the abnormal noise or heat occurs, the machine shall be immediately stopped to check the correctness of the electrical connections.

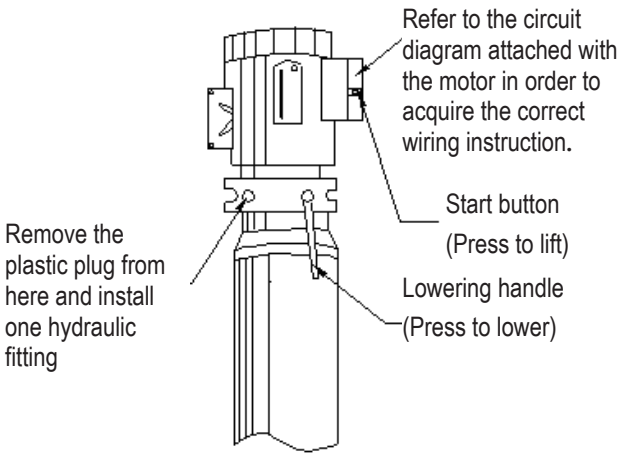



Fig 14

⚠ ***Note：***

***If the lift is used outdoors, it is recommended to set a cover on the power unit; such damages to the motors During the installation, rubber cushions must be added between the hydraulic station and the installation plate***

### 10.2.9 Lock release cable installation

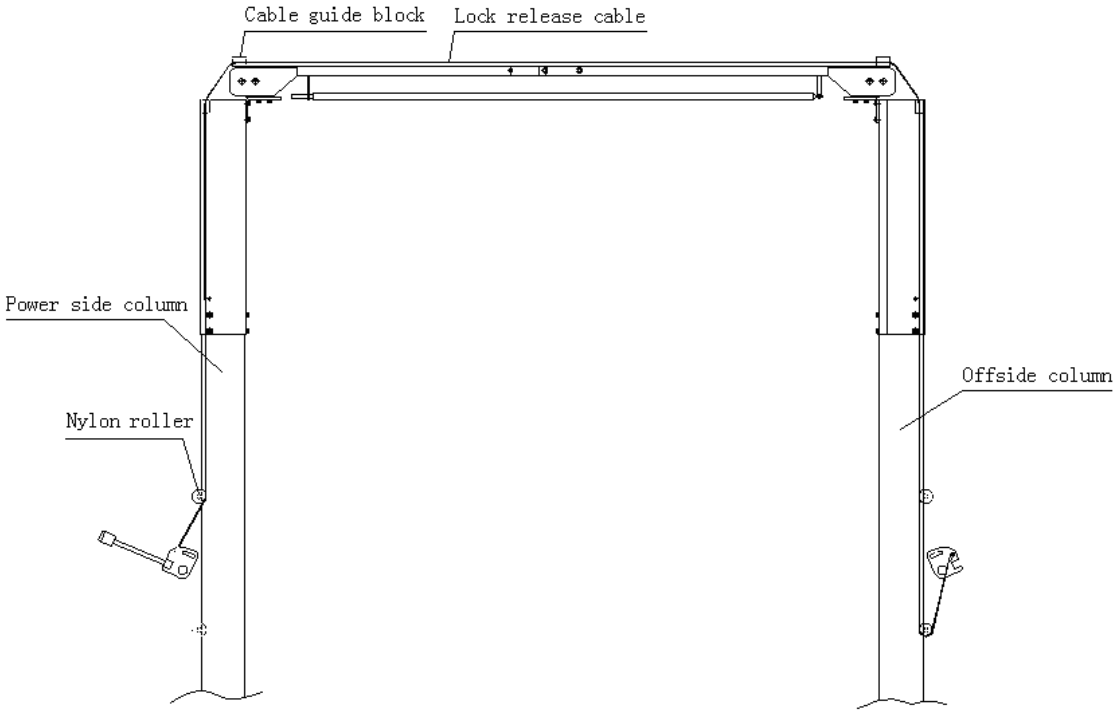



Fig.15

### 10.2.10 Connect the hydraulic lines

Hydraulic lines is shown in Figure 16; please perform the connection according to the diagram and all the fittings shall be tightened in order to prevent the oil leakage.

⚠ ***Note: When installing hoses, the carriage is at lowest position, to reduce the air in cylinder as much as possible .Air bleeding is being conducted when debugging.***

***If the hose shall be installed through the column, ensure that the hose passage will not interfere with any moving parts.***

***Rubber cushions must be added between the hydraulic station and the installation plate.***

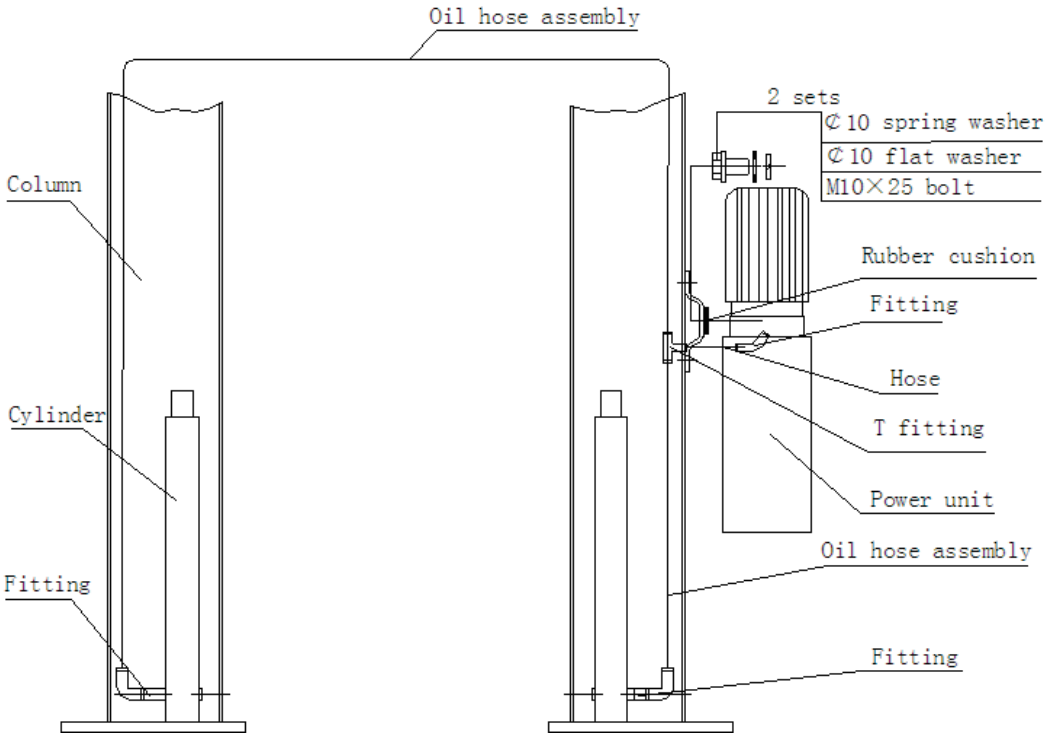



Fig 16a

When the finished product equipped with the pump station with base plate, loosen the 4 M6 screws on the column first, then install the pump station to the column through the anisotropic pore on the Motor mounting plate ,as the picture below:

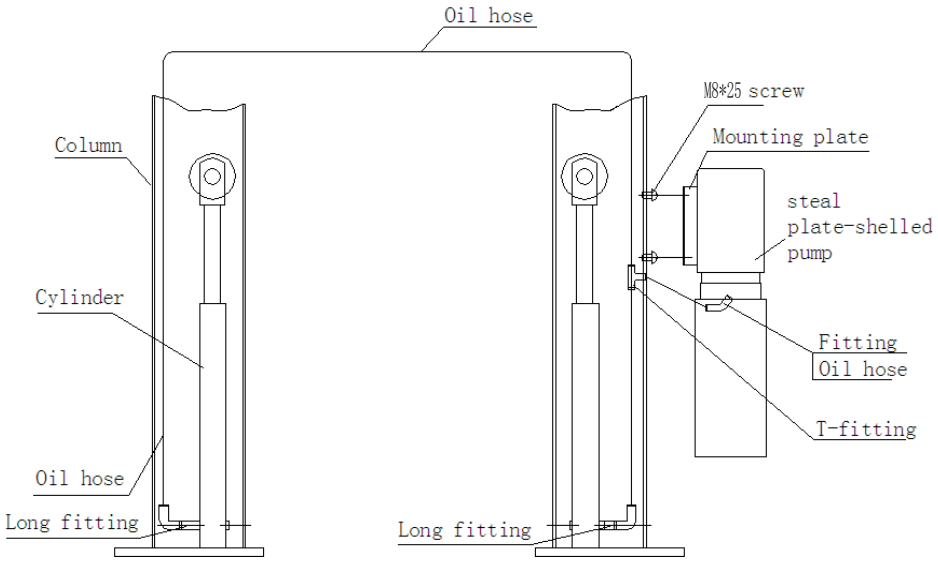



Fig 16b

### 10.2.11 Install the swing arm

- Check if the positioning gear mechanism at the end of arm fits, adjust the Screw s of fixed semi-gear for its fitness.

⚠ ***Note:***:

- *During the installation, lubricate the moving parts of swing arm and carriage ,so that the swing arm can move freely.*
- *Make sure the arm positioning gear is engaged!*

# 11. Lift Adjustment

## 11.1 Preparation before the adjustment

- Lubricate contact surface of the carriage and corners of column with general-purpose lithium grease. All sliding surface should be coated evenly from top to bottom.
- Fill hydraulic oil N32 or N46 to the oil reservoir of the power unit.

## 11.2 Adjustment procedure

- Check to see if the power supply is installed properly
- Check for the tightness of all the connecting bolts.
- Press the start button on the motor, and the carriage rises; stop pressing the button, then the carriage will stop. In order to lower down the carriage, first pull the safety lock handle on the column If it can't be pulled, raise a little and pull again .At the same time press the lowering handle on the power unit and the carriage will be lowered; stop pressing the handle, then the carriage will stop. When repairing, after the vehicle is lifted up to the required height, first press the lowering handle to actuate the mechanical safety lock in order to ensure the safety operation.
- The hydraulic system may contain air due to new installation, to bleed the air, repeat the lifting and lowering for several time
- The adjustment is completed

# Grease and hydraulic oil for lift

## 2# lithium based lubrication grease

| Item | Quality Index |
|---|---|
| Conical degree（1/10mm） | 278 |
| Dripping point℃ | 185 |
| Corrosion（T2 copper sheet，100 ℃，24h） | No change for copper sheet |
| Copper mesh oil split（100℃，22h）% | 4 |
| Evaporation（100℃，22h）% | 2 |
| Oxidation stability（99℃，100 h） | 0.2 |
| Anti-corrosion（52℃，48） | Class 1 |
| Impurity (microscope) /（pcs/cm³）<br>Above 10μm no more than<br>Above 25μm no more than<br>Above 75μm no more than<br>Above 125μm no more than | <br>5000<br>3000<br>500<br>0 |
| Similar viscosity（-15℃，$10s^{-1}$ ）,/(Pa·s)<br>no more than | 800 |
| Water spray loss（38℃，1h）(%)<br>no more than | 8 |

## N32 hydraulic oil (used for low ambient temperature)

| Item | Quality Index |
|---|---|
| Kinematic viscosity 40℃ | 28.8～35 |
| Pour point /℃ no higher than | -15 |
| Flash point /℃ no lower than | 175 |

## N46 hydraulic oil (used for high ambient temperature)

| Item | Quality Index |
|---|---|
| Kinematic viscosity 40℃ | 41.4～50.6 |
| Pour point /℃ no higher than | -9 |
| Flash point /℃ no lower than | 185 |