

# OPERATION & MAINTENANCE MANUAL

## Lifting System



## Manual

### Stanford Pipe

Year of Construction: 2012

Part Number: 192001552

Order Number: 109307

Carrying Capacity: 2x1000 lbs.

[www.duffnorton.com](http://www.duffnorton.com)

e-mail: [duffnorton@cmworks.com](mailto:duffnorton@cmworks.com)

9415 Pioneer Avenue

Charlotte, NC 28273

PO Box 7010

Charlotte, NC 28241-7010

Phone: +1 704-588-0510

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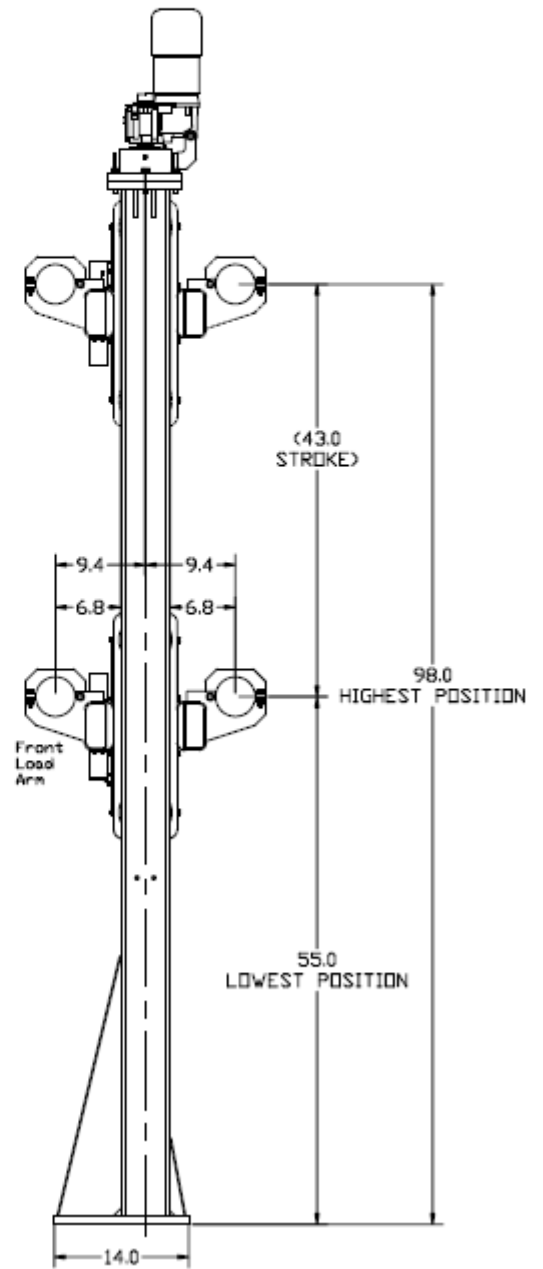
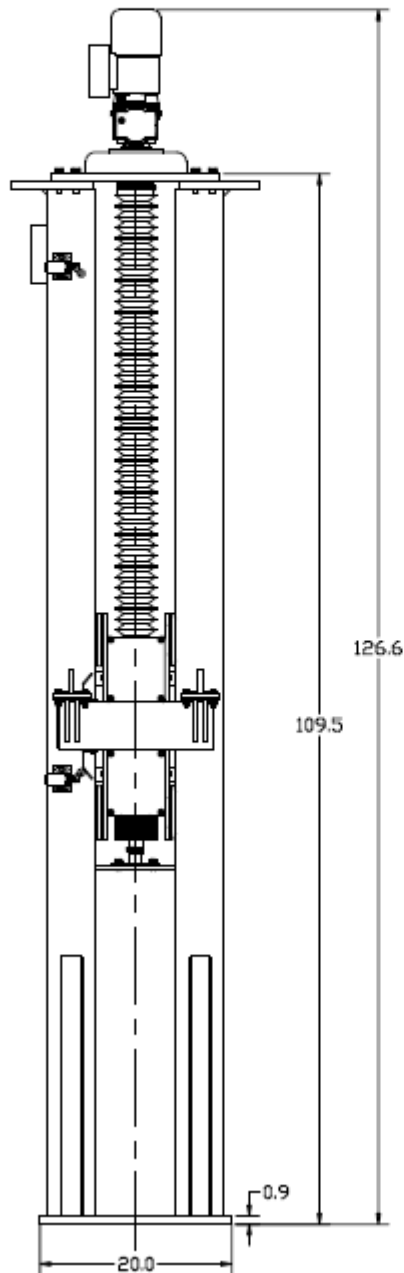
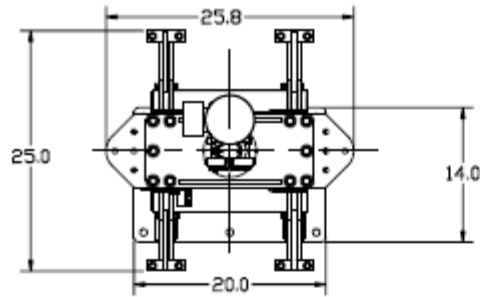
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## Part 1: OPERATION

### 1. General Dimensions



## 2. Introduction

Carefully read this operation manual prior to initial operation.

Pay attention to the warning- and remark symbols

File this document

Pipe lifting jacks are used for lifting 4inch OD pipes.

This set of 1400lbs capacity lifting jacks consists of 2 jacks. Each lifting jack is fixed on concrete floor with anchors. It has fixed pipe supports with an automatic stop mechanism after it reaches to highest / lowest position. The jacks are only displaceable by crane or fork lift truck.

## 3. Safety regulations

For the operation and maintenance the regulations of the respective country have to be observed.

## 4. Important Remarks and Safety Advice for Operation

The system may only be operated by authorized personnel. They must be trained and competent in the operation of the system.

The personnel must have carefully read this manual.

During operation, a responsible supervisor must always be present.

Lift only 4inch OD pipes, which are suitable for the pipe clamps on the load arms.

The jacks are only to be used indoors.

Ensure that the pipes to be lifted or supported do not exceed the carrying capacity stated on the name plate and in the technical data.

Prior to loading pipes, ensure that all lifting jacks are in the lowered and cleared position. Ascertain that there are no obstructions around the installation area and that no rubbish is lying on the lifting carriages.

Ensure that the door of the control cabinet on the wall and the junction boxes on the lifting jacks are fully closed and locked prior to operation of the system.

Ensure that the pipes are secured and in the pipe clamps of the lifting jacks before any operation.

It is best to use the front load arm when using only one side of the pipe lift

Ensure that the selector switch at the control panel is in the correct position and is selected for the correct mode of operation prior to operating.

During the lifting process, the entire system has to be observed and the synchronous movement has to be supervised. If any irregularity or dangerous inclination occurs, press the emergency stop button immediately.

When lowering the lifting jacks, the operator must ensure that there are no persons or obstructions under the pipes.

During pauses / work stoppages, the system should be switched off and secured against unauthorized operation (-> the main switch may be locked by a padlock, and any keys should be removed).

For maintenance or repair purposes, ensure that the system is switched off and secured against unauthorized restarting.

All electrical work shall only be executed by competent and trained experts.

Notify the relevant authorities of any unusual faults, failures, etc. Do not attempt to execute unauthorized repairs.

Before anchor mounting the jacks on a concrete floor, the load arms have to be in the lowered and cleared position.

The system must be checked by a test inspector prior to initial start-up.

### **The DON'Ts!**

Do not open the door of the control panel when operating the installation.

→ WARNING! HIGH VOLTAGE! ←

Do not manually operate the Variable Frequency Drives in the control panel.

→ WARNING! DANGER ←

Do not touch any moving parts.

Do not remove safety features of the lifting jack system or attempt to disengage them.

Operation of the system with controls other than those intended for this purpose is NOT allowed and will void any warranty/guarantee.

Frequent start/stop push-button operation should be avoided, as this may lead to unequal height levels between the lifting jacks and faults may occur.

Do not make any alterations or fit accessories into the installation.

## **5. Warning- and Remark Symbols**



Warning and caution remarks in this operation manual are identified by the following symbols: Important warnings which, if not observed, may lead to damage of the installation or could cause injuries.



Important warnings which indicate that work to be performed may only be done by qualified electricians.



This remark identifies helpful information and further instructions to be observed.

## 6. Technical Data

### 6.1 Lifting jacks

Carrying capacity of each lifting jack	700 lbs.
Carrying capacity of the entire lifting jack installation	1400 lbs.
Number of lifting jacks of the installation	2 pcs
Lowest position of load support	55 inches
Vertical stroke	43 inches
Upper position of load support	98 inches
Lifting speed / Lowering speed	19 inches/min
Load arm	fixed
Max. sound level	<70 dB(A)
Weight of each lifting jack	782 lbs
Base plate	fixed on concrete floor
Max. load cycles with nominal load	22000

### 6.2 Control system

Cable length of power supply with plug to control panel	5 ft
Cable length from Control panel to terminal box of lifting jack	J1: 50ft J2: 50ft
Power output of each lifting jack	0.16 hp
Connected load	0.32 hp
Voltage	120 V
Frequency	60 Hz
Control voltage	24 V
Type of protection	IP 55
Automatic synchronization control	available
Synchronization monitoring tolerance	± 0.125 inch
Control panel	fixed
electrical connection at control panel	Plug connection
electrical connection at lifting jack	Plug connection

## 7. Description of the installation

The Duff-Norton pipe lifting system consists of two lifting jacks mounted firmly anchored to the ground. These lifting jacks are used for lifting pipes. The lifting jack installation will be operated via a fixed control board.

A lifting jack consists of a jack frame, lifting carriage with two fixed load arms, self-locking ACME screw and a Clincher shaft mounting gear motor with brake and hand release.

Each lifting jack is equipped with a junction box for connecting to the control panel. Each load arm is equipped with two pipe clamps.

The lifting carriage which is guided in the upright by wheel flange and support rollers is moved vertically by a carrying nut with subsequent safety nut.

The tension loaded self-locking ACME screw is protected by protection boots.

The system is controlled by two variable frequency drives and a PLC that monitors, automatically corrects and keeps the system synchronized. In addition to the necessary synchronization, the system is provided with a safety circuit (Emergency Stop) and system stop (SYNC Error) to prevent damage.

## 8. Installation and First Operation

### 8.1 Requirements to the place of installation

Min. recommended concrete compressive strength 3000psi or other equivalent floor covering. The customer is responsible for ensuring that the installation is anchored to a concrete floor and approved by a civil engineer according the loading and concrete floor conditions.

The customer is responsible for ensuring that support braces are connected to the top end plates of the jacks to resist horizontal seismic forces.

The lifting jacks must be level. Slope and evenness in the installation area need to be within  $\leq 0.04$  inch.

All limit switches must be adjusted and properly working before operation.

**Danger:** The lifting jack may tip over if no heavy duty anchors are fitted.

When placing the installation, the following safety distances have to be absolutely adhered to:

These distances are mandatory:



for fingers:  $a = 1.2$  inches



for hands:  $a = 4$  inches



for arms and closed hands:  $a = 4.7$  inches



for feet:  $a = 4.7$  inches



for the body:  $a = 19.6$  inches



## 8.2 Requirements for the installation

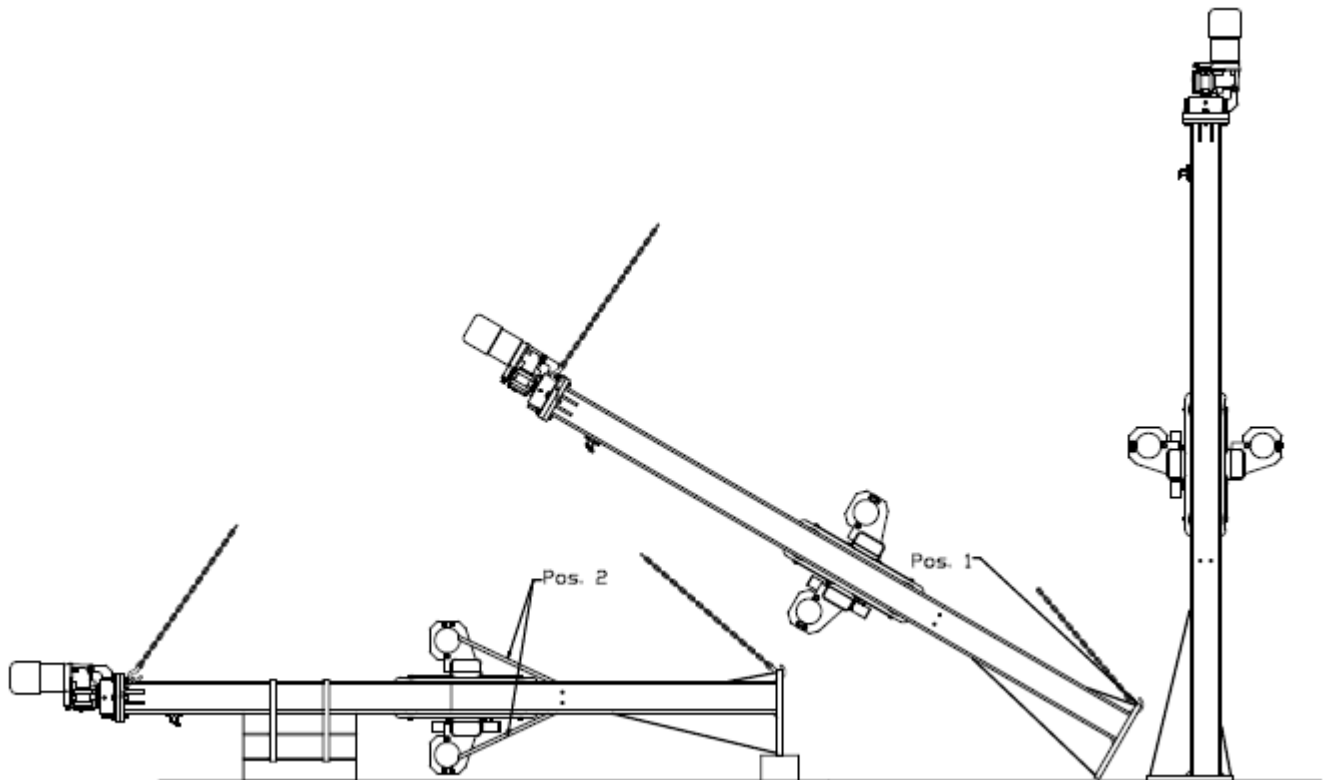
### 8.2.1 Lifting Jacks

Lifting and transportation of the lifting jacks are to be done only at the definite lifting points (Pos. 1). Pay close attention to the motor and encoder!

Remove the safety unit (Pos. 2) after jack is brought into vertical position

Remove vent plug of gear motor from vent screw if necessary - or – The locking screw needs to be replaced by an air-relief screw

This process can be monitored more effectively by additionally securing the base plate by means of a chain hoist, fork lift truck or similar.



Erecting the lifting jack (Fig. similar)



During set-up of the jacks the balance point shifts. When a specific angle is reached, the jack will tilt into its vertical position and beyond.

Therefore it is recommended as a secondary measure, that an additional sling or chain is used from a second crane or fork lift truck in order to support the base plate when erecting the jack. It is then easier to oversee the movement during the erection of the jack.

It is also possible to stack pallets underneath the "tilt area" of the jack's baseplate so the tilting movement can be more easily managed by removing pallet after pallet as the jack is being erected.

### 8.2.2 Control system / Electric-Connection

Working on the electric installation is only allowed if:

- the power supply is switched off
- the personnel are competent and well trained in electrical problems.

All safety regulations and standard electric regulations have to be observed.

Necessary power supply **120V + N + PE 60 Hz**

Overcurrent protection organs (fuses) have to be provided by the client.

Motor connected load	Recommended Protection for short circuit (fuse)	Recommended lead (Min. cross selection without consideration of the cable length)	Recommend using a Plug-in connector [A]
2x0.16 hp	20 A	4 x 25 mm <sup>2</sup> Cu	Rated for 20A

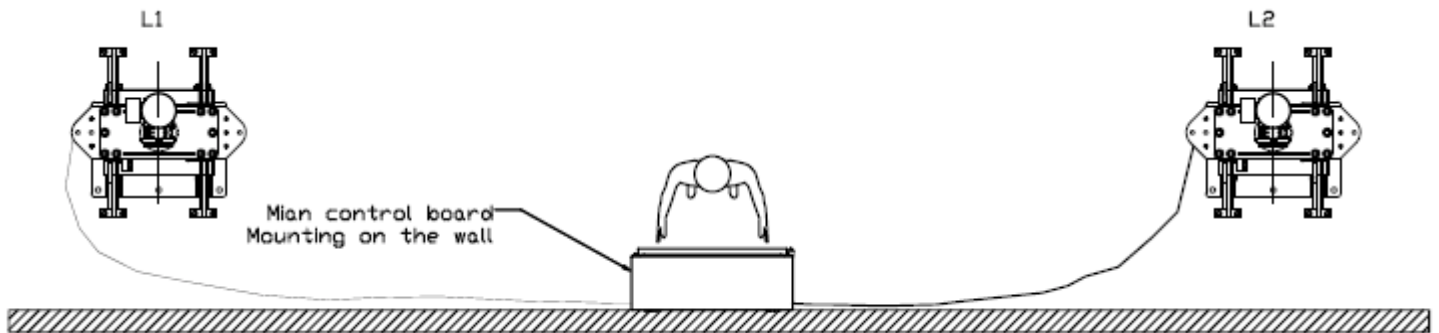
Wiring plan (see appendix)

### 8.2.3 Connection Lifting Jacks – Control Board / Plug places

Connection between the lifting jacks and control board is effected by separate plug connection cables.

The power connection at the control board will be effected via plug and socket (standard plug provided by Duff-Norton).

### 8.3 Installation scheme



The control board is fixed on the wall

The cable for power supply is Single Phase 102VAC + PE 60 Hz

Over current protection organs (fuses) and main-connector have to be provided by the customer.

Connect the correct plug from the lifting jack with the correct socket of the control board

If only one jack is not connected the system should not be switched on.

## 9. Commissioning

Must be done by an expert

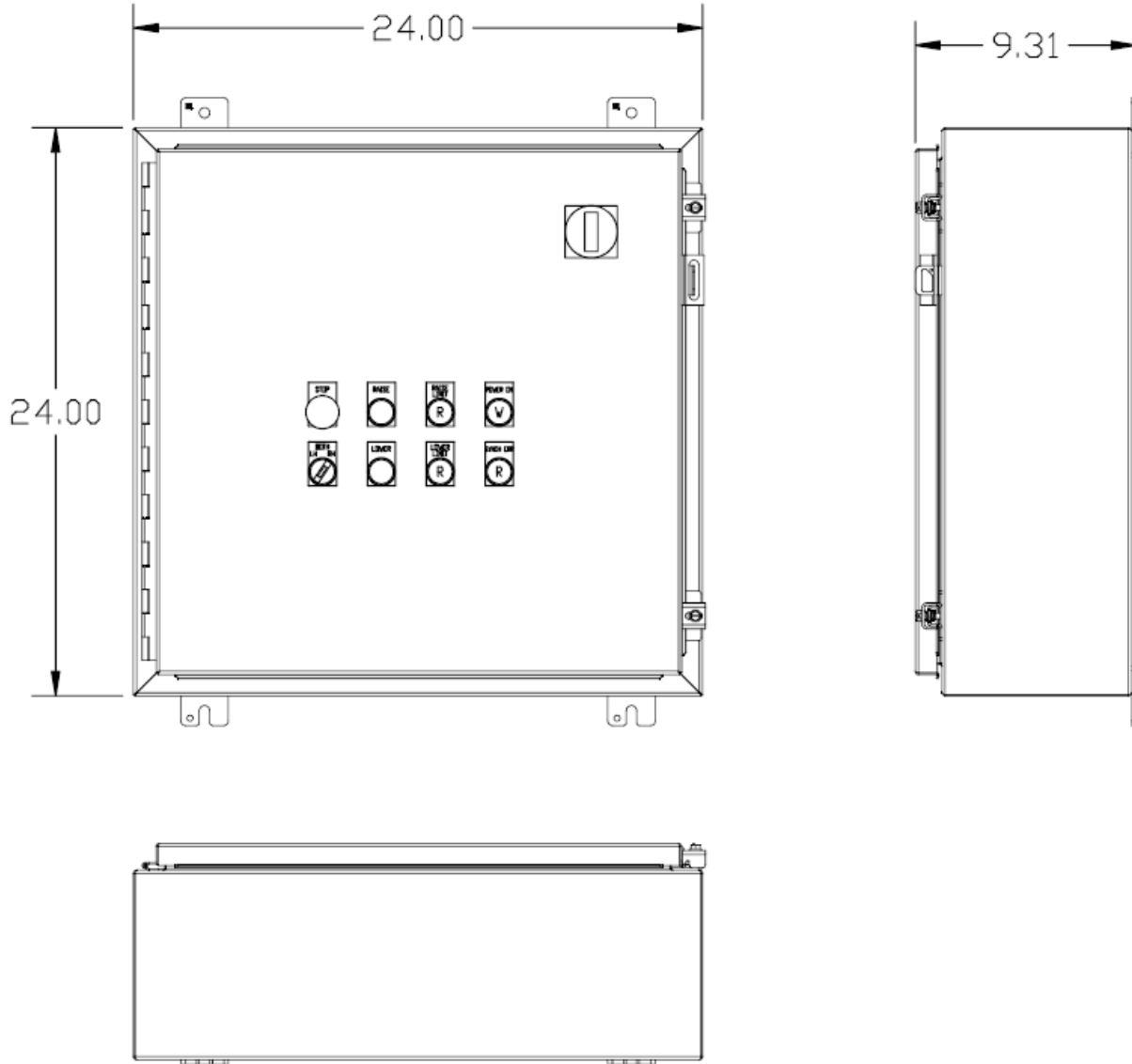
Tests without load

Important examinations:

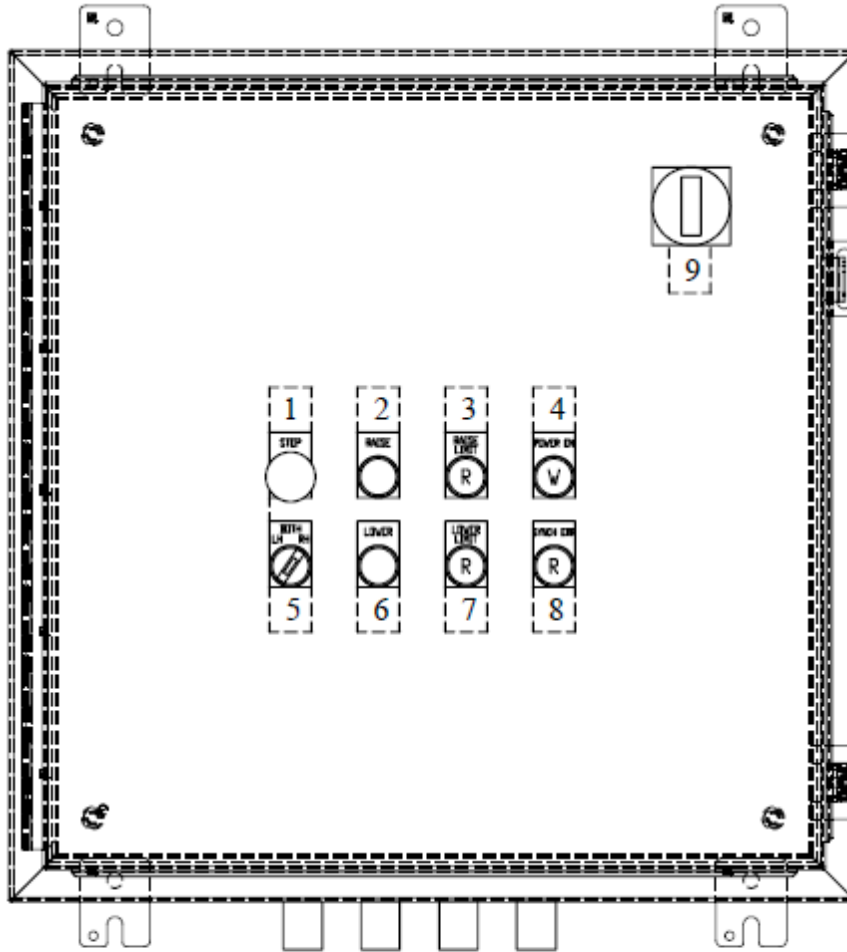
- Visually check all emergency push-buttons and operation lights.
- Visually check the protection boots.
- Functionally test all emergency push-buttons, operation and safety limit-switches and operation and lights.
- Test the movement directions up and down and check the functionality of the limit switches.
- Visually check the load arm and the lubrication condition of the ACME screw thread. Re-grease if necessary.
- Check the cable- and plug connections.
- Check the encoder mounting screw.
- Check the screws at the cross beam and the torque support for a firm seat.
- **All limit switches must be properly set and verified before operation!**

## 10. Operation- and Switching elements

### 10.1 Control board

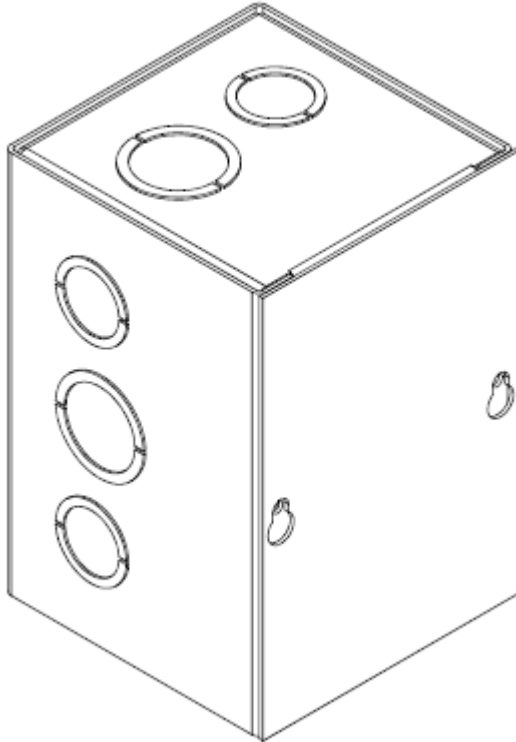


10.2 Control Panel of the Control board



Pos. No.	function / description	Type
1	Stop	Red Mushroom stop button
2	Raise	Black button
3	Raise limit	Red lamp
4	Power on	White lamp
5	LH / Both / RH	Key-switch
6	Lower	Black button
7	Lower limit	Red lamp
8	Synchronization Error	Red lamp
9	Main switch	Switch

### 10.3 Junction Box



Each lifting jack has one junction box, which is for connection to the main control panel.

The junction box is mounted on the upper portion of the lifting jack's upright beam.

### 10.4 Emergency stop buttons

**Functional description:**

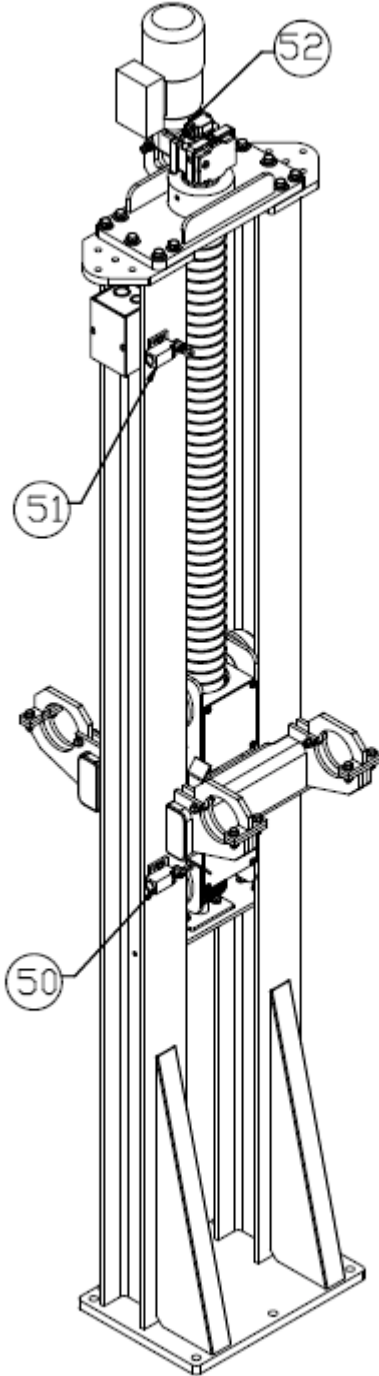
Pushing the Emergency Stop button (Pos. 1) at the control board will result in a total shutdown of the control voltage. The main supply voltage is still active.

Unlock the switch by pulling the button.



Check the Emergency stop function by pressing Emergency button at least once before operating the lifting jack.

10.5 Operation Elements of the lifting jack



No.	Designation	Kind /function
50	Lower limit stop	mechanical limit-switch
51	Upper limit stop	mechanical limit-switch
52	Rotation monitor	encoder
52	Lower safety limit stop	
52	Upper safety limit stop	

## 11. Operation

### 11.1 Switching on the control system

Ensure that the control board is connected to the power supply.  
The cables of Jack 1 – 2 have to be plugged into the sockets of the control board (chpt. 8.3).



The cables of Jack 1 – 2 have to be plugged into their sockets at the fixed control board. If not all plugs are connected, the system should not be operated.

Unlock the emergency-stop button (chpt. 10.2 / Pos. 1 )

Switch on the main switch (chpt. 10.2 / Pos. 9 ) on the right side of the control board.

The Power on indicator light should illuminate (chpt. 10.2 / Pos. 4) on the control panel. If not check to see that all plugs are connected and the emergency stop button is released.

### 11.2 Movement of lifting jacks

Turning the key-switch to LH, BOTH or RH will allow you to operate the left hand jack individually, both jack simultaneously or the right hand jack individually respectfully.

The RAISE button allows you to move each jack up until you reach the upper limit switch.

The LOWER button allows you to move each jack down until you reach the lower limit switch.

### 11.3 Single operation - Loading of the lifting jack load arms

Load the pipe on the pipe clamps and ensure all the screws on the pipe clamps are tight before operating the control panel.

After all lifting jacks are positioned, visually checked, and the pipes are loaded and securely fastened in the pipe clamps, the key-switch can be turned to BOTH and synchronous movement can be performed.



Operation in group mode is only possible if all jacks are synchronized.



#### 11.4 Short term switch off of the system / Operation under lifted load

Ensure that the load is fully supported.

Bring the key-switch in position "BOTH". Take the key out and store in at a designated place.

Switch off the control voltage.

#### 11.5 Switching the installation off

If possible, bring the lifting jacks to its normal position (all lifting jacks in lowered position).

Bring the key-switch in position "BOTH". Take the key out and store in at a designated place.

Switch off the control voltage (chpt. 10.2 / Pos. 9).

For additional safety, Lock can also be secured against unauthorized operation.

### 12. Information Messages

For control and monitoring of the installation, a PLC control system (programmable logic controller) is integrated into the control board. White or red indicator lamps tell the user what the current status of the lifting installation is, or inform the user what operations are available for operator to perform next.

#### 12.1 Control Voltage "On"

"POWER ON" (chpt. 10.2 / Pos. 4), white indicator light will illuminate. Approximately 20 seconds later the system is ready for operation.

#### 12.2 Indicator lamp " SYNCH ERR" "

The red lamp "SYNCH ERR" (chpt. 10.2 / Pos. 8) signals the operator that the lifting process has stopped, the jacks have reached an uneven height level position.

#### 12.3 Indicator lamp " LOWER LIMIT"

When all loading arms of the jacks reach their lowest position during group operation, the system will stop automatically and the red lamp "LOWER LIMIT" (chpt. 10.2 / Pos. 7) will illuminate.

#### 12.4 Switch key "BOTH" selected

To switch to "BOTH" (chpt. 10.2 / pos. 5) means the system is activated for operation in group mode.

#### 12.5 Indicator lamp "E-STOP"

The red indicator lamp "E-STOP" (chpt. 10.2 / Pos. 1) at the control board illuminates, when the "E-STOP" -button (chap. 10.2 / Pos. 1) at the control board is pressed. Simply pull the mushroom button to deactivate it (see chapter 10.4)

### 13. Fault Messages and Trouble Shooting

For control and monitoring of the installation, a PLC control system is integrated into the control board.

If a fault occurs several times, please contact Duff-Norton.

When in doubt, Duff-Norton should be contacted for direct supervision or assistance.



Duff-Norton  
9415 Pioneer Ave  
Charlotte, NC 28273 USA

PO Box 7010

Charlotte, NC 28241-7010

Telephone: +1 704-588-0510

[www.duffnorton.com](http://www.duffnorton.com)

E-Mail: [duffnorton@cmworks.com](mailto:duffnorton@cmworks.com)



It is important to point out that if a fault occurs, manual manipulation of the variable frequency drives to continue operating the system is strictly forbidden! If this shall happen, any guarantee on the drives will no longer be valid.

If it is absolutely essential to operate the motor drives (e.g. to pinpoint a failure) it should be done so through an electrical hook up, not manually, only by a qualified electrician who is completely familiar with this operation.



Extreme Caution must be exercised while investigating or repairing faults in order to avoid serious injuries or to prevent causing any damage to the system. In all cases, the personnel responsible for operating this installation should be informed prior to troubleshooting and repairing any fault. In cases where the control of the system is not absolutely necessary for troubleshooting a particular fault, the entire system must be turned off to avoid accidental operation which would pose a hazard.

### 13.1 Motor Protection

If a Motor overload is tripped during operation this means one of the actuating motors has been overloaded.

The causes could be

- a voltage drop of the power supply
- stiff actuators (no screw lubrication)
- too heavy load or
- a motor is defect
- a brake defect or fault



Reset the overload fault by pushing the O.L. reset button (this button is located inside of control panel) on the overload protector. If the fault occurs again, the above mentioned causes must be checked and eliminated.

If motor protection is not the problem, an additional cause could be a motor brake failure.

The system will shut down immediately and will be frozen until the fault is rectified.

Cause of this failure can be an interruption or a disconnection of the power supply to the brake motor. So long as there is no power, the brake is activated. When the power is reinstated, the brake will be released if safe conditions permit.



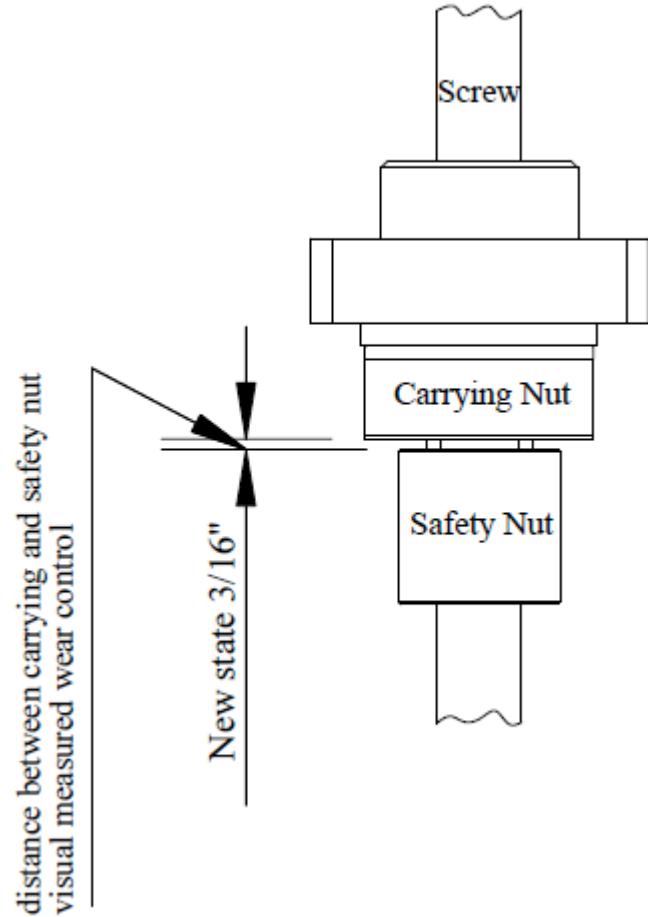
A qualified electrician has to check the affected circuit breaker in the control cabinet and then the wiring. If nothing appears to be wrong, he should next check the motor brakes of the lifting jacks.

### 13.2 Safety nut

For fault finding, control the wear of the carrying nut visually on the screw jack. The nut failure can be checked quickly and easily. Control whether there is still space between the carrying nut and the safety nut situated below it (please refer to the sketch; new state= 3/16 inch). If the space reduced to 1/8", the carrying nut has failed (also refer to the maintenance manual).

Carefully check the above; if necessary, replace the carrying nut.

This operation need be done every 12 months.



### 13.3 Synchronisation fault

The red indicator lamp "SYNCH ERR" (chpt. 10.2 / Pos. 8) illuminates.

The fault message indicates that the height difference of the selected lifting jacks is outside the allowable range of  $\pm 0.125$  inch.

The lifting installation stops immediately. Further movement is only possible after having reset the fault by adjusting the RH jack from the control panel.



Resetting a synchronization fault may only be done by responsible personnel who are in charge of deciding whether a fault really exists or whether the fault is a result of a certain operational condition.

#### Special Note: Correcting a synchronization fault

If the SYNCH ERR indicator lamp is flashing **slowly** (RH jack is behind LH jack)

- Switch the selector switch to RH and Jog the RH jack up until the flashing stops
- Measure the height of both actuators to verify the correction
- Switch the selector switch to BOTH and return to normal operation

If the SYNC ERR indicator lamp is flashing **rapidly** (RH jack is ahead of LH jack)

- Switch the selector switch to RH and Jog the RH jack down until the flashing stops
- Measure the height of both actuators to verify the correction
- Switch the selector switch to BOTH and return to normal operation

#### 13.3.1 Emergency lowering procedure in case the PLC is damaged and a synchronization fault occurs:



A qualified electrician needs to check the system. Once the system is checked and the area safely secured the jacks can be manually lowered using the hand levers on each brake motor.



Afterwards, the installation must be shut down completely and Duff-Norton must be contacted immediately for fault analysis and repairs.

## PART 2: MAINTENANCE

### 1. General

To guarantee permanent readiness for operation and trouble free functioning of Duff-Norton Lifting Installations, the following instructions have to be observed.

Carefully executed maintenance and inspection provide for a longer working life and security of the installation.



All inspection, maintenance and repair work must be done with care by trained and qualified personnel only.

For maintenance and inspection which do not require activated control or operation of the installation, the main switch on the control board has to be switched off and secured against unauthorized operation.



Maintenance and inspection works which require activated control or operation of the installation may only be executed by competent personnel.

Observe the safety regulations of the Employers Liability Insurance Association and work carefully.

Before using the installation always visually check the operating elements.

### 2. Screws

Visually check the lubrication on the screw of the lifting jacks **every 3 months**. Open the boot clamp of the upper protection boot in order to get direct access to the screw. The screws must always be well greased. If there is too little lubrication on the screw or there are dry metal shiny areas noticed, re-grease immediately.

Note: Through our experience, the interval to re-grease the screw is usually based on how often the system is used. Our estimation is that re-greasing is usually required after 50 complete cycles (up and down).

If splinter particles or dirt has accumulated in the grease, clean the screw from old grease and re-grease it in its entire length. A general cleaning of the screw from old grease and subsequent re-greasing has to be done **every 2 years**.

#### **Procedure for re-greasing the screw:**

Remove the cover of the lifting carriage.

Each safety nut is equipped with a grease fitting.

For the lubrication of the screw, press grease into the grease fitting using a grease pump.

Fix the cover at the lifting carriage after lubrication.

#### **Procedure for cleaning and greasing the screw:**

The following procedure for re-greasing the screw should only be done on an unloaded jack.

Bring all lifting jacks to their lower or upper position and switch the control voltage off (chpt. 11.7).

Open lower boot clamp of the lower or upper boot clamp of upper protection boot in order to get direct access to the screw. Fasten the loose end of the protection boot on to the fixed end.

Clean the old grease from the screw and re-grease them with a new lubricant. After the greasing fasten the protection boot correctly. For the distribution of the grease, we recommend to move the lifting unit once to its upper and lower limit position.

After positioning of the lifting carriages for the maintenance, the installation has to be switched off and secured against unauthorized re-starting.



When doing this maintenance work, ensure that no dust or dirt particles come in contact with the grease while it is being applied to the screw. A totally clean environment is essential when doing this work. Correct and regular greasing provides for a longer working life.

Ensure quantities of lubricant for each screw for re-greasing after general cleaning of the screw is approx. 300 ccm.

Recommended types of grease for the screw:

Grease identification according to ASTM.

The following brands correspond to this classification:

<b>Mobil</b>	Mobilgrease XHP 461 / Mobilith SHC 220
--------------	--

### 3. Protection Boots

Check the condition of the protection boots visually **every week**. In case of damages, a protection of the screws is no longer guaranteed.

Check the top boot and lower boot. If there are any cracks in the boot, the damaged protection boots have to be replaced.

Check the boot clamp. If there is any the boot's clamp is loosened, tight the boot's clamp.

To replace the lower protection boot, raise the lifting jack into its upper position and loosen the boot's upper and lower sleeve. The protection boot can then be easily removed and replaced with a new one.

To replace the upper protection boot, please contact Duff-Norton, because the procedure is complicated and requires the disassembly of many vital components.



The protection boots must not come into contact with acid, suds and strong cleaning substances. This could reduce the working life or immediate damage is possible.

#### 4. Wear Monitoring

Check the wear on the load nuts **every 12 month**. The wear may be checked via the distance between the carrying nut and the safety nut situated below.

In new state a defined gap between the carrying nut and safety nut on every lifting jack is approx. 3/16 inch (see the record sheet). With increasing wear of the carrying nut this distance decreases. If the gap has reduced to 1/8 inch, the carrying nut has to be replaced.

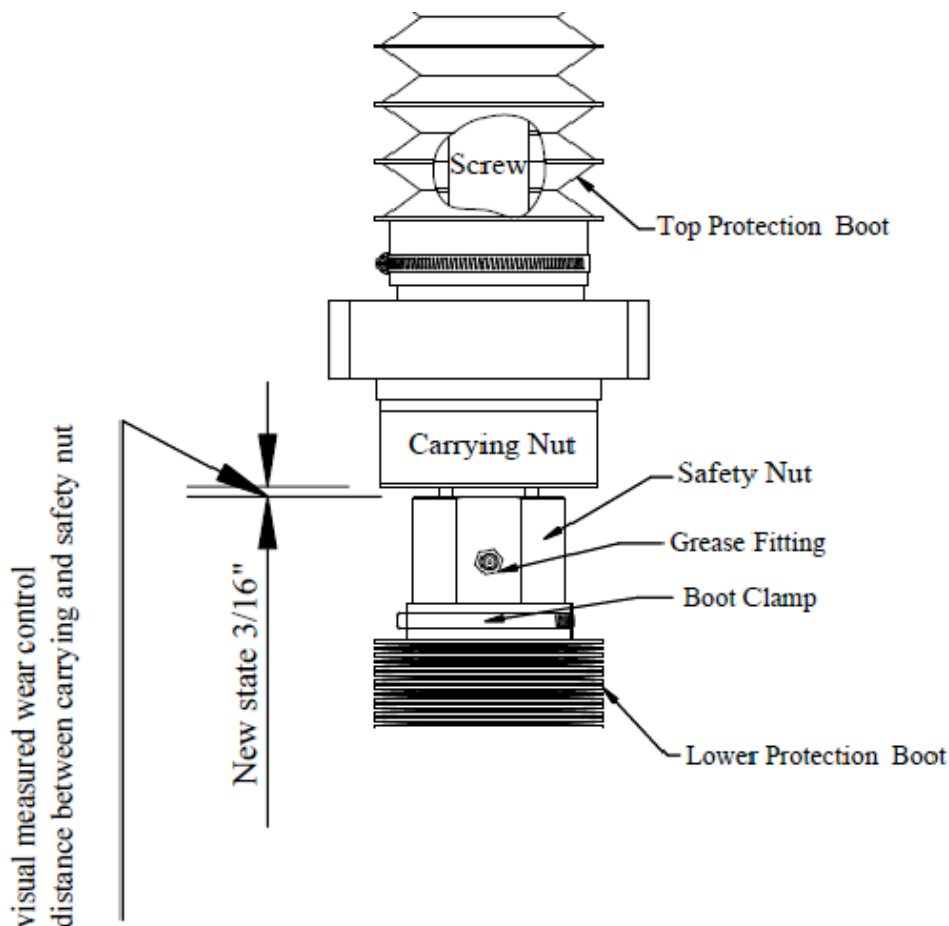
Dimension of gap between carrying nut and safety nut in new state = 0.188 inch (3/16 inch)

##### Criteria for Replacement of the Carrying Nut:

**Dimension of gap between carrying nut and safety nut: 0.188 inch (3/16 inch)**

We recommend recording the results of the **yearly examination** on the enclosed record sheet.

Thus, the course of wear can be observed easily and an early reaction is possible (ordering of new carrying-/safety nuts)



If there is an unusual harsh steel friction noise during operation, please check:



The lubrication condition of the screw (see chapter 2)

The lubrication condition of the spherical thrust roller bearing on the cross beam (see chapter 6)

The gap space between the carrying nut and safety nut. (see chapter 4)



## 5. Limit Switches

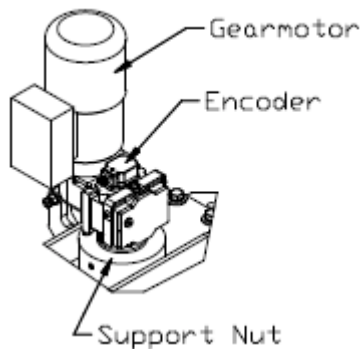
Together with the **yearly** wear monitoring, explained under chapter 10.5 (Operation manual), control the highest and lowest position of load arms for firm seat and proper function should be manually tested.

## 6. Self-aligning spherical roller thrust bearing

The bearings of the lifting jack screws (at the top) must be well greased. For the lubrication of the axial bearings, a grease fitting on the steel support nut is provided.

**Once per year** the bearings have to be re-greased manually via a lubrication pump with suitable grease fitting. Apply about 5 strokes of new standard bearing grease inside the bearing housing. Old grease which escapes out of the gaps has to be removed.

## 7. Encoder



A digital encoder is being used to provide an extremely precise position signal to control board. **Every year**, check the encoder for rotation and synchronization monitoring. Check for firm seat, correct position and no damage.

## 8. Function Test Synchronization Control

The systems synchronization should be tested yearly, and should be performed only when the jacks **unloaded**.

### Procedure for Testing the synchronization control/synchronization monitoring:

1. Bring all of the jack load anvils to their lowest positions and ensure both lower limit switches are actuated.
2. Switch from "LH" or "RH" to "BOTH" drive on the control console and acknowledge the Zero level.  
(Attention: The Zero level must be acknowledged)
3. Measure the height of each anvil and note the distances as a reference; be sure that the lower limit switches are set to the proper height and there is minimal variance.
4. Move both jacks together to multiple positions.
5. Measure all the height distances of the load anvils and verify synchronization. Minor deviations are possible.

## 9. Gear unit and brake motors

The lifting jacks are driven by clincher shaft mounted gear motors with motor brake.



Devices as ventilation caps, protective gratings, maintenance flaps, rain shielding coverings etc. which serve for preventing contacts with rotating or hot machine parts and penetration of foreign substances or water have to remain mounted during operation.



During operation the current consumption must not exceed the nominal current (name plate). When executing maintenance and repair work pay special attention that the winding coils of the motors are not damaged.

To guarantee perfect cooling, clean every **6 months** the cooling air channels if dirt has accumulated. Clean **yearly** the terminal box if dirt or moisture has accumulated. Afterwards, seal against leakages. Check **monthly** the gear unit for leaks.

The first oil change occurs at the latest after **2 years** after the motors start-up. Subsequent oil changes every **2 years**.

For more detailed information and maintenance remarks concerning gear unit and brake motor please refer to the manufacturer manual in the appendix.

Data list of the gear motors and brake type used:

Clincher shaft mounted gear unit with three phase	SK0182NB AZG-63 S/4 CUS BRE5 HL
Power output	0.16 hp
Voltage / Frequency	230/460V / 60 Hz
Output Speed	76 rpm
Type of protection	IP 55
control voltage of brake	115V / 60 Hz
Brake torque	5 Nm



In case of problems, please contact Duff-Norton

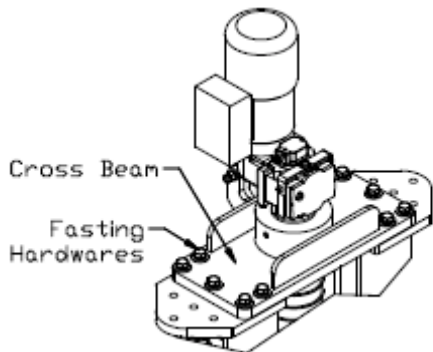
Do not disassemble the gears of the gear motors yourself! The correct meshing can only be adjusted by an expert!

9415 Pioneer Avenue  
Charlotte, NC 28273  
PO Box 7010  
Charlotte, NC 28241-7010  
Phone +1 704-588-0510

Internet: [www.duffnorton.com](http://www.duffnorton.com)  
E-Mail: [duffnorton@cmworks.com](mailto:duffnorton@cmworks.com)

## 10. Cross Beam

Check the fastening hardware of the cross-beam for firm seat every year



## 11. Steel Construction

**Every year**, check all load carrying parts of the steel construction for cracking and fixing screws for tightness. At the same time, clean and re-grease all moving parts.

Mechanically remove rust deposits and apply new paint to the affected parts.

## 12. Electric Installation

All connecting cables of the jack system and the wiring of each individual jack should be subject to a visual check every **3 month**.

Replace damaged cables.

## 13. Summary for Maintenance and Inspection Intervals

The below-stated table is only a summary of the items which are described in detail in this manual and which have to be strictly observed.

Time interval	Description	Refer to chapter
Daily / before using the installation	Visual check of the operation elements.	general
weekly	Visual check of the protection boots.	3
monthly	Check gear motor for leaks.	9
every 3 month	Control of the screw grease.	2
	Visual check of cables.	12
semi-annually	Clean the motor cooling area.	9
yearly	Check the wear of the carrying nut.	4
	Check the encoder.	7
	Check motor terminal box.	9
	Re-grease the self-aligning spherical roller thrust bearing.	6
	Check the fastening hardware of the cross-beam for firm seat.	10
every 2 years	Check of the steel construction	11
	Clean the ACME screws and re-grease.	2
	Change gear motor oil.	9

## 14. Spare Parts



Correct executed maintenance and examination guarantees early detection of problems.

Thus, spare parts may be ordered in time so that in case of occurring faults or wear long delivery times and a long down-time of the installation is avoided.

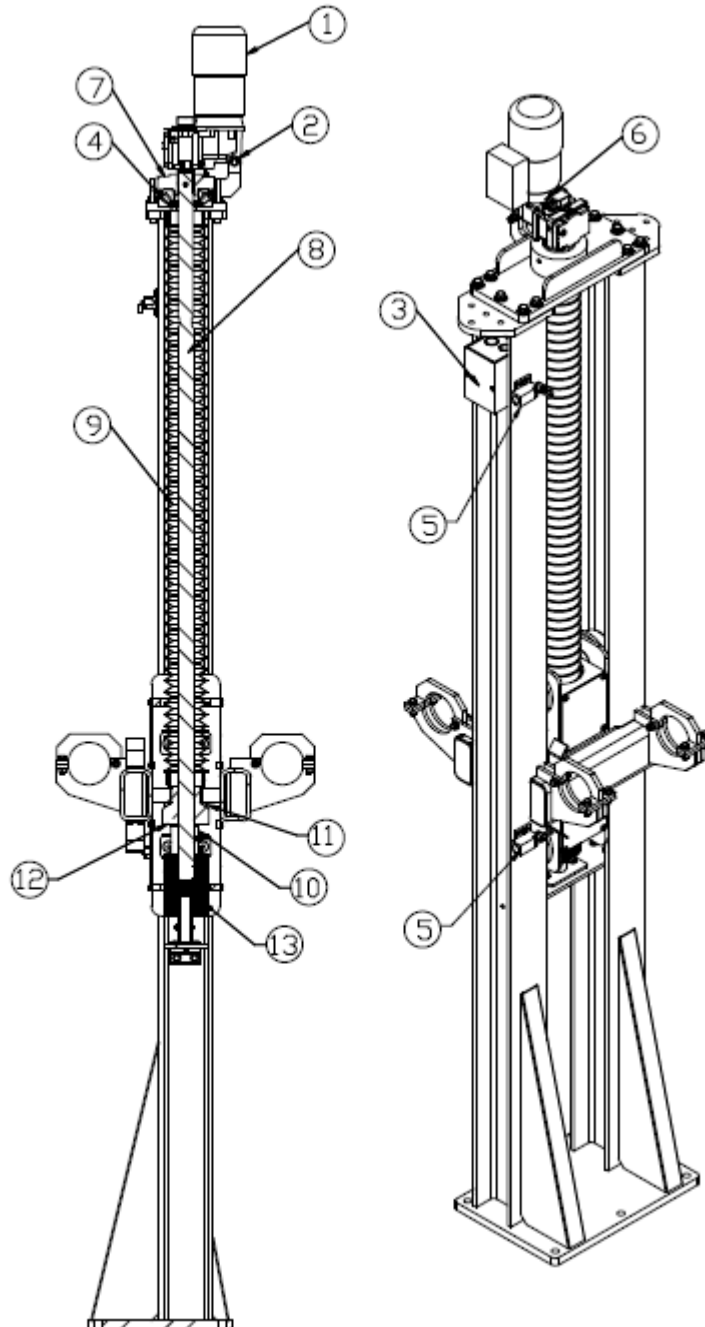
When ordering spare parts, please indicate:

Part-No / Characteristics

Name of item

Jack number (see name plates on the jacks)

To guarantee a safe function of the installation, only use original accessories and spare parts.



**Spare parts list**

Pos	Nomenclature	Characteristics/Part Number
001	Clincher shaft mounted gear motor	SK0182NB AZG-63 S/4 CUS BRE5 HL /192001520
002	Torque buffer of gear motor	
003	Screw cover pull box	6x4x4/192001522
004	Self-aligning spherical roller thrust bearing	29412-E/192001514
005	limit switch with roller lever	XCKP2118P16/192000346
006	Encoder	60 PPR flex arm mount / EN260C60
007	Support nut	192001501
008	Screw	Acme screw 192001502
009	Upper protection boot	192001515
010	Safety nut	Acme nut 192001505
011	Bearing washer	192001503
012	Carrying nut	Acme nut 192001504
013	Lower protection boot	192001516
All electrical components are listed in the parts list of the electrical wiring diagrams		

**15. Record Sheets for Wear Monitoring**

<b>dimension of gap between C&amp;S nut</b>	<b>original dimension (inch)</b> X	<b>inspector name</b> date/by	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by
J 1	3/16	10.2012 / Duff-Norton	J 1		
J 2	3/16	10.2012 / Duff-Norton	J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> X	<b>inspector name</b> date/by
J 1			J 1		
J 2			J 2		

<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		

<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		
<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>	<b>dimension of gap between C&amp;S nut</b>	<b>dimension (inch)</b> <b>X</b>	<b>inspector name</b> <b>date/by</b>
J 1			J 1		
J 2			J 2		



**16. Revision Data**

Rev. No.	Rev. Date	Changed Items
AA	10.2012	-----

**Appendix**

Wiring diagram

Operation and maintenance manual for gear motors



For information please contact Milton Peters at:

Phone: +1 704-916-5516

Email: [milton.peters@cmworks.com](mailto:milton.peters@cmworks.com)

 **Duff-Norton®**

9415 Pioneer Ave. • Charlotte, NC 28273  
Phone: (704) 588-4610 • (800) 477-5002  
Fax: (704) 588-1994  
Email: [Duffnorton@cmworks.com](mailto:Duffnorton@cmworks.com)

[www.duffnorton.com](http://www.duffnorton.com)

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