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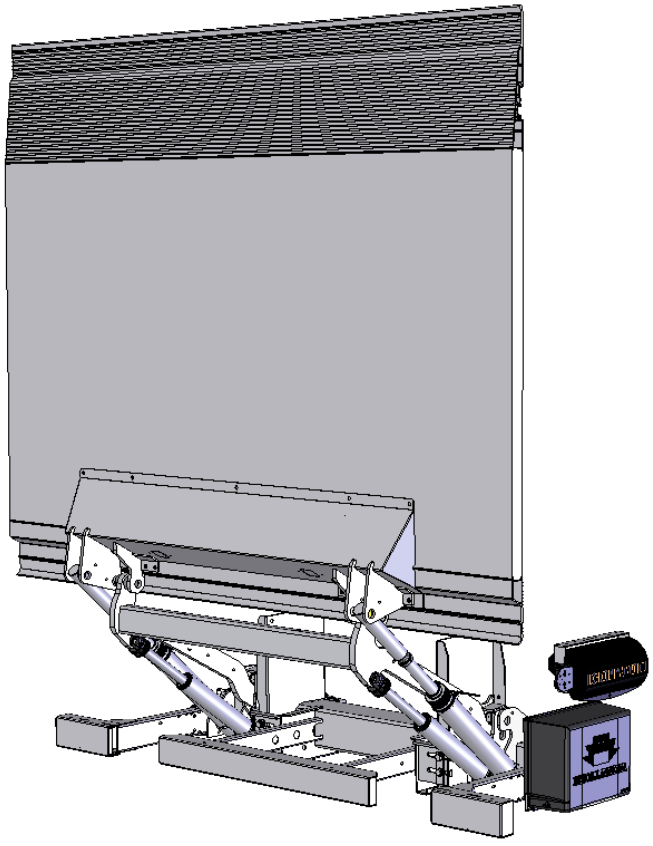
edition

DHOLLANDIA

DH-L* cantilever tail lifts

MAINTENANCE & REPAIR MANUAL



Manufacturer:

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website : www.dhollandia.com

Read the manual in its entirety before servicing or repairing the tail lift

Keep this manual in the vehicle cabin, as reference for the tail lift operator and technical personnel

Doc : **serv-DHL-EUR EN-2019-01** Rev: **0** Date: JUNE 04, 2019

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1. UNDERSTANDING SAFETY AND WARNING SIGNS

- Many safety signs and symbols used in this manual are based on international standards, others refer to specific situations or actions.
- Consult section 14 for an overview of signs and symbols used in DHOLLANDIA manuals, and their meaning.
- Please take special notice of the following signs used in the manual. They indicate the likelihood and severity of a potential injury if a person fails to follow the instructions presented on the safety sign.

DANGER

DANGER : indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. [white letters on red background]

WARNING

WARNING : indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. [black letters on orange background]

CAUTION

CAUTION : indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. [black letters on yellow background]

NOTICE

NOTICE : is used to address practices not related to physical injury. [white letters on blue background]

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS : indicate general instructions relative to safe work practices, reminders of proper safety procedures, or the location of safety equipment. [white letters on green background]

SAFETY ALERT SYMBOL (freestanding, or on background colors red, orange, yellow or black) : is used to alert the user to potential hazards. All safety messages that accompany this sign shall be obeyed to avoid possible harm.

WARNING

- Failure to understand and to follow the instructions in this manual can put the technician working on the tail lift, the operator and any bystanders at great risk of serious bodily injury and death.
- Prior to operating the tail lift, make sure you understand the safety and warning signs used, and read them in conjunction with the instructions in this manual.
- If in doubt, DO NOT operate the tail lift. Contact your national DHOLLANDIA distributor. See page 3 for contact info.

2. CONTACT INFORMATION AND DISCLAIMERS

- DHOLLANDIA tail lifts are regularly being adapted to new vehicle and chassis developments, and specialized customer requirements. Therefore DHOLLANDIA reserves the right to alter product specifications without prior notice; and potentially modifications or new developments might not have been taken into account at the time of printing.

NOTICE

Please confirm you have reviewed the most up-to-date version of this manual prior to carrying out maintenance or repair work. See below for instructions to download the latest version of the manual.

- Contact your national DHOLLANDIA distributor if you have any questions regarding the installation, operation, repair and maintenance of DHOLLANDIA tail lifts, to obtain replacement copies of manuals or decals, or to learn about available equipment options for DHOLLANDIA tail lifts.

If in doubt where to find your national DHOLLANDIA distributor, visit the official DHOLLANDIA website

www.dhollandia.com → Country selection / language selection → Distributors & service

The latest version of all manuals can also be downloaded from the DHOLLANDIA website

www.dhollandia.com → Downloads → User's manuals → … select required manual

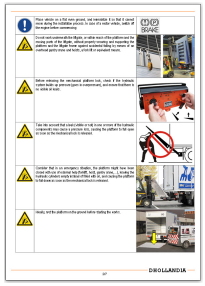
- Take notice of the following important disclaimers:

DISCLAIMERS

- DHOLLANDIA disclaims liability for any personal injury, death, or property damage that results from **operating a tail lift that has been modified from the original design**, without explicit written approval from the manufacturer.
- DHOLLANDIA disclaims liability for any personal injury, death, or property damage that results from **operating a tail lift that has not been serviced or repaired according to the instructions in the MAINTENANCE & REPAIR MANUAL**.
- DHOLLANDIA disclaims liability for any personal injury, death, or property damage that results from **use of aftermarket or non-OEM replacement parts for service or repair of the tail lift**.
- DHOLLANDIA disclaims liability for any personal injury, death, or property damage that results from **improper use of the tail lift**.
- DHOLLANDIA disclaims liability for any personal injury, death, or property damage that results from **overloading or improperly loading the platform**, disregard of the maximum rated lift capacity and the applicable load charts.
- There are no warranties, express or implied, including the warranty of merchantability or a warranty of fitness for a particular purpose extending beyond that set forth in the OPERATION MANUAL.

3. SAFETY INSTRUCTIONS FOR MAINTENANCE AND REPAIR

- The health & safety instructions for installation, repair and maintenance are regularly updated and enhanced, and therefore managed and presented in a separate manual.



- Contact the national DHOLLANDIA distributor for the most recent edition, or download it from the website:

  www.dhollandia.com ➔ your language ➔ Downloads ➔ User's manuals ➔ General information

⚠WARNING

- In order to ensure the safety of the technicians performing installation, repair or maintenance work on tail lifts, it is essential that they follow the instructions and precautions of the GENERAL SAFETY INSTRUCTIONS FOR REPAIR AND MAINTENANCE at all times.
- Make sure you wear safe work clothes, and take safety precautions as described in these instructions at all times.
- Additionally, when dismounting parts of the hydraulic circuit, make sure you take maximum precautions to avoid oil spillage and protect the environment, as described in these instructions.

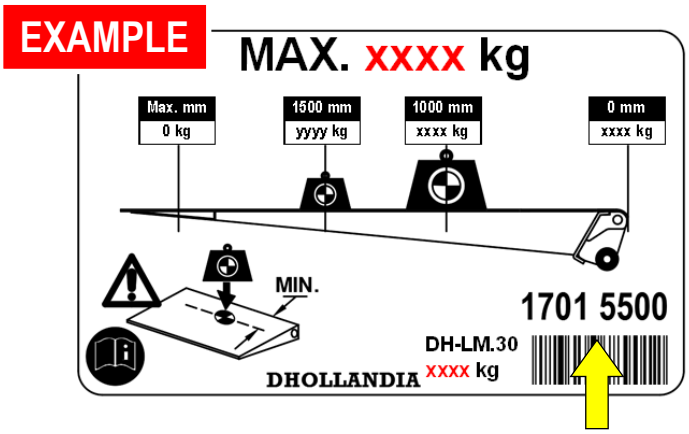
⚠WARNING

- In order to ensure the safety of the technical personnel, of the tail lift operators, and of any bystanders, installation, maintenance and repair work should only be performed by skilled and authorised technicians. These technicians must have been duly and professionally trained; must know and understand the content of the operation manual and the relevant installation, repair and maintenance manuals; and must master the safety aspects involved in their job.
- Negligence can put the technical personnel, the operator and third parties at great risk, and could result in severe personal injury or death. Negligence can also cause premature wear or damage to the tail lift.

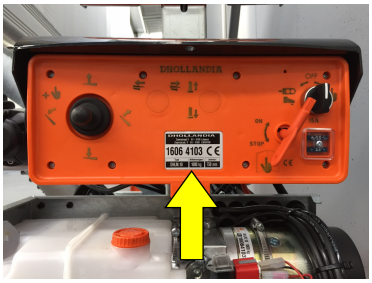
- In case of doubt, contact the national DHOLLANDIA distributor for further help and instructions.

4. IDENTIFICATION & ORDERING REPLACEMENT PARTS

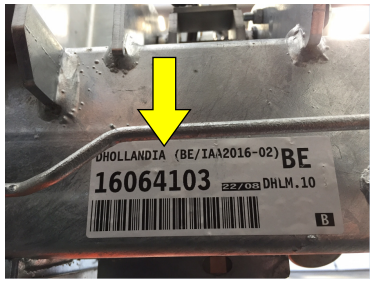
- Every DHOLLANDIA tail lift is identified by and labelled with a **unique 8-digit serial number** (with or without a space between the first and last 4 digits). Use this number for any inquiry on a particular tail lift, or when ordering replacement parts.
- In addition to the tail lift type and serial number, the various serial number labels provide additional information, such as: the maximum rated lift capacity and load chart, the bumper certification number, the date of manufacture, etc...
- These labels are usually affixed to the vehicle body and various tail lift components, and can be found in following locations (the yellow arrows point to the serial numbers):



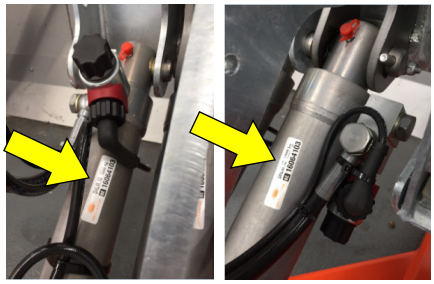
Affixed to the side of the vehicle body, or on the platform



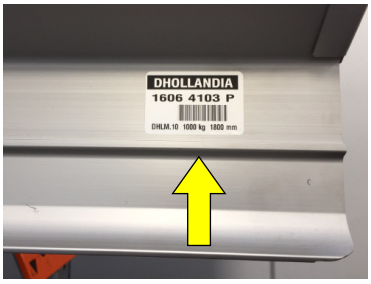
On the main external control box



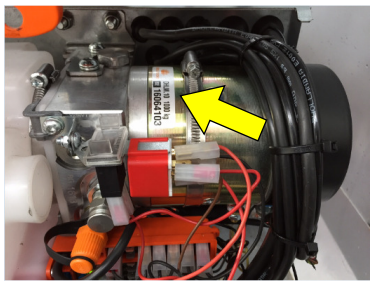
On the lift frame



On the hydraulic cylinders



On the platform



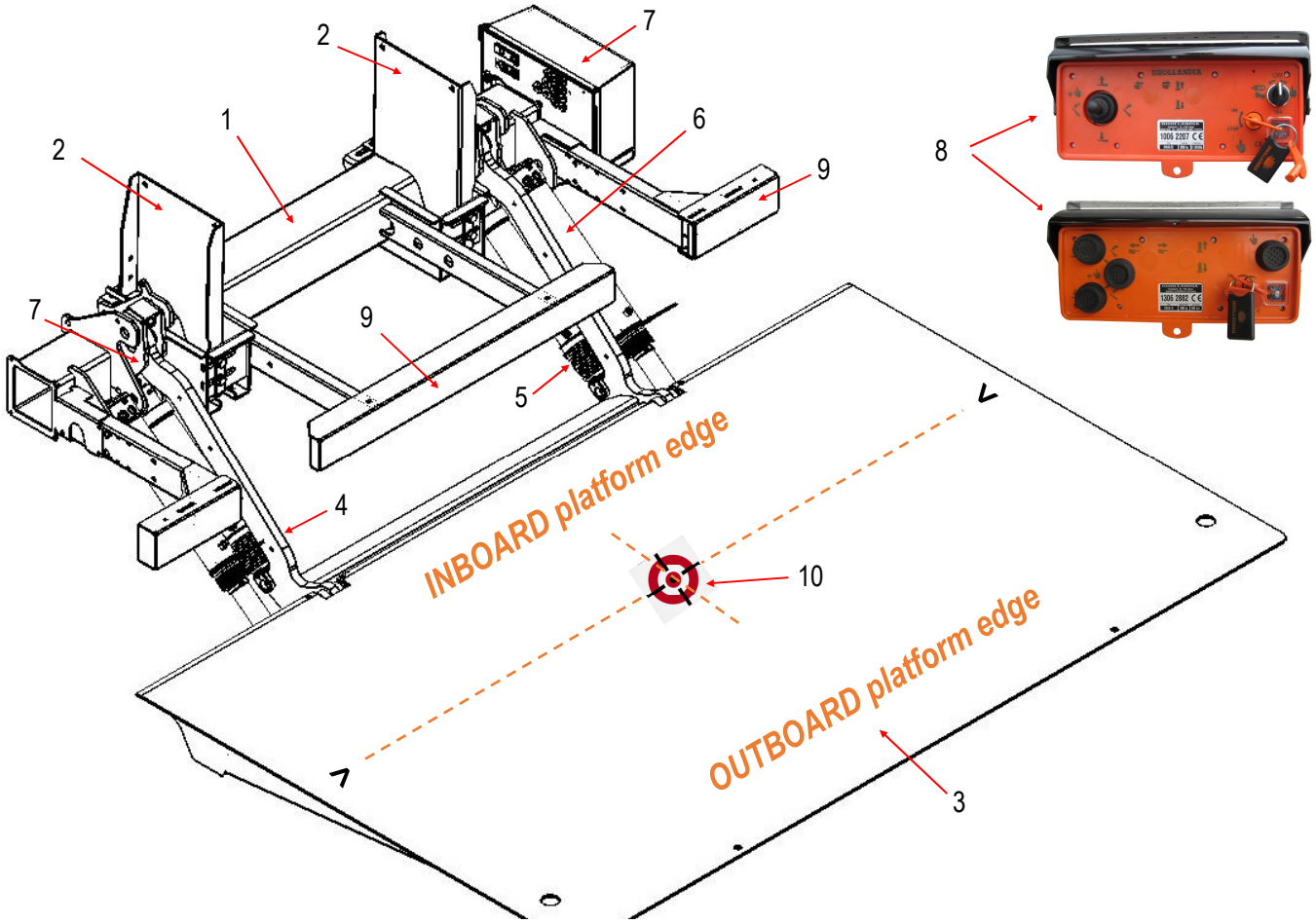
In the pump unit

- Use this serial number to order replacement parts, or to obtain technical advice from DHOLLANDIA or your local DHOLLANDIA distributor regarding maintenance, troubleshooting and repair.
- The following information must be confirmed when ordering replacement parts:
  - → Type, year of construction & serial number of the tail lift
  - → Replacement part number [consult the replacement parts lists]
  - → The desired quantity of each item
  - → Your administrative data: company name, invoice address + resale number, purchase order number, delivery address, to whose attention and expected delivery time.
- Replacement parts lists can be obtained from your local DHOLLANDIA distributor, or can be downloaded from:.

www.dhollandia.com ➔ your language ➔ Downloads ➔ Replacement parts lists (2005-…) ➔ ...

5. TAIL LIFT TERMINOLOGY

TAIL LIFT TERMINOLOGY	
See figure below for parts corresponding to numbers in this table	
#	**Description**
1	**Lift frame**: mounted in a fixed position under the vehicle chassis. It bears the platform and its load via connection to the lift arms and hydraulic cylinders.
2	**Mounting plates**: used to mount the lift frame to the vehicle chassis.
3	**Platform**: carries the load during loading / unloading, lifting / lowering. Manufactured from steel or lightweight aluminum with a non-slip working surface. Equipped with synthetic rollers to protect it from scraping the ground.
4	**Lift arms L+R**: actuated by the hydraulic lift cylinders, used to LIFT / LOWER the platform and its load.
5	**Lift cylinders L+R**: 1 or 2 hydraulic cylinders used to LIFT / LOWER the lift arms, the platform and its load.
6	**Tilt cylinders L+R**: 1 or 2 hydraulic cylinders used to OPEN / CLOSE the platform, or to change its angle when opened in work position.
7	**Hydraulic pump unit**: contains the electric motor driving the hydraulic pump, the oil tank, and the control valves.
8	**Main external control box**: mounted in a fixed position at the side of the vehicle, under the body. Contains the electrical switches allowing the operator to execute all tail lift functions OPEN - LOWER - LIFT - CLOSE.
9	**Bumper bar**: under run protection device.
10	**Center point of maximum load**: point up to which the maximum rated capacity of the tail lift is valid. Beyond that point, the maximum safe working load diminishes according to the applicable load charts found near the external control station on the side of the vehicle body. See also section 8 in the OPERATION MANUAL.



6. MAINTENANCE

- Regular maintenance performed by competent technicians, is extremely important, not only to maximize the life expectancy of the tail lift, but also to help ensure the operational reliability of the tail lift and safety of the operator (and potential bystanders).

⚠ WARNING	NOTICE
• All maintenance and repair work must be performed by skilled and authorized DHOLLANDIA service agents, and using original DHOLLANDIA replacement parts only. • The warranty and product liability are only valid for tail lifts which are maintained in good working condition according to the instructions in this manual.	

- The tail lift should work smoothly and quietly through its range of motion. During OPEN and LOWER cycles (*), the tail lift should operate almost silently. During LIFT and CLOSE cycles, only the sound of the running DC motor in the pump unit should be audible. Any other (creaking, grinding or shrieking) noise should be carefully investigated to avoid damage.

  (*) Valid for standard tail lifts equipped with single acting tilt cylinders with internal springs. For tail lifts equipped with the optional double acting tilt cylinders and POWER OPEN function, the DC motor is also audible while opening the platform.

- The maintenance frequency depends on the frequency and conditions of use. The checklist hereafter uses following letters to indicate the required maintenance frequency:

  90 days = every 90 days or 1750 cycles, whichever occurs first.

  Yearly = yearly, preferably just before winter

  W = after each pressure wash

- Use the checklist hereafter to execute the maintenance or inspection in a systematic way. Make sure you follow the indicated intervals.
- When checking the correct fastening of bolts and nuts, use a calibrated torque wrench to do so. The prescribed values are mentioned in the annex of this manual.

⚠ WARNING
• Besides the regular maintenance performed by skilled technicians, DHOLLANDIA strongly recommends that operators **perform daily pre-trip inspections** as detailed in the operation manual. • Some steps in the maintenance check list require special skills and specific knowledge, that can be acquired through the DHOLLANDIA training programs for maintenance and repair. In case of doubt, DON'T go any further, but ask your local DHOLLANDIA distributor for professional advice.

DHOLLANDIA	**Checklist for preventative maintenance and inspection of DH-LM**	Work order # Client PO #

Client: …………………..…………………..…………………. Plate: ……………….…..………..... Mileage: ………..………......

Address: ………………………………...………………… Model + S/N:……………………….........................…..…..

…………………………………………......…….….………….. Date:………………………………………………………..…..

City:………………………. ST:……... Zip:...……..……. Contact phone:…………………………………………………

When "not OK", liftgate must be serviced or repaired prior to further use !

Before getting started...	Frequency	OK ?	Corrected
Pressure wash *Clean liftgate thoroughly to make it ready for inspection*	90 days 1750 cycles		

Documentation check, safety markings and decals	Frequency	OK ?	Corrected
Operation manual *Present in vehicle cab; complete*	90 days 1750 cycles		
Model ID decal, serial number decal, MAXIMUM RATED CAPACITY decal *Present, legible, conspicuous, in good condition*	90 days 1750 cycles		
Marking of CENTER POINT OF MAXIMUM LOAD on platform *Present, legible, conspicuous, in good condition*	90 days 1750 cycles		
Marking of SAFE OPERATOR POSITION on platform (if no foot controls) *Present, in good condition, applied per installation manual*	90 days 1750 cycles		
Safety and operation decals *Present, complete, legible, in good condition*	90 days 1750 cycles		

Controls and electrical wiring	Frequency	OK ?	Corrected
Main external control box, cover, installation to vehicle body *Condition and integrity, undamaged*	90 days 1750 cycles		
Main battery disconnect switch in control box, dashboard switch in truck cabin *Condition, operation*	90 days 1750 cycles		
Switches and buttons, protective rubber covers *Condition, operation, automatic return to neutral position*	90 days 1750 cycles		
Wiring harnesses *Condition, secured with clamps and/or cable ties, undamaged*	90 days 1750 cycles		
Inside of main external control box, 15A fuse, plus spare, electrical switches *Condition, dry, corrosion free, all wires secured*	90 days 1750 cycles		
Mandatory 2-hand operation when using main external control box (if applicable), safety switch *Operation, not tampered with or altered in any way*	90 days 1750 cycles		
Safety switch (if applicable), connection of auxiliary controls *Operation, correct switching between main external controls and auxiliary controls*	90 days 1750 cycles		
Foot controls and their rubber buttons *Condition, operation, routing, securement and condition of the wiring harness*	90 days 1750 cycles		
Handheld remote control *Condition, operation, condition of holder or magnetic catch, spiral cable and plug(s)*	90 days 1750 cycles		

Electrical installation	Frequency	OK ?	Corrected
Batteries and battery connections *Condition, maintenance of battery, charging system output is sufficient, connections are secure. Apply silicone dielectric grease to all exposed connections.*	Yearly		
Main fuse or circuit breaker in battery box *Terminals tight, corrosion free, no signs of overheating, verify operation if manual trip present.*	90 days 1750 cycles		
(+) Battery and cables, plugs, terminal connections, protective looms *Condition, undamaged, secured with clamps and/or cable ties, inspect full length and connection at both ends of the cable*	90 days 1750 cycles		
(-) Ground cables, plugs, terminal connections, protective looms *Condition, undamaged, secured with clamps and/or cable ties, inspect full length and connection at both ends of the cable*	90 days 1750 cycles		
Wiring harness between control box and pump unit *Condition, secured with clamps and/or cable ties, undamaged*	90 days 1750 cycles		
Cylinder lock valve harnesses *Condition, secured with cable ties, undamaged*	90 days 1750 cycles		
Harness(es) from platform to control box or pump unit (foot controls, platform lights, etc.) *Condition, routing, secured with cable ties, undamaged*	90 days 1750 cycles		
Harnesses for other auxiliary controls *Condition, routing, secured with cable ties, undamaged*	90 days 1750 cycles		
Connections at main external control box *Condition, all connections secured, dry and corrosion free*	Yearly		
Connections in pump unit, electric connection board *Condition, all connections tight, dry and corrosion free*	90 days 1750 cycles		
Limit switches, pressure switches, tilt sensors (optional) *Condition, operation, automatic return to the neutral position; tilt sensor works correctly*	90 days 1750 cycles		

Hydraulic pipes and connections	Frequency	OK ?	Corrected
Hydraulic pipes, flexible and rigid *Condition, routing, no damage, leaks or chafing. Replace flexible pipes every 5 years.*	90 days 1750 cycles		
Hydraulic fittings, O-ring seals *Condition, no leaks*	90 days 1750 cycles		
Hydraulic circuit general *No visible oil leaks during operation and at rest*	90 days 1750 cycles		

Hydraulic pump unit	Frequency	OK ?	Corrected
Pump unit box + cover, outside + inside *Condition, undamaged, sealed, dry and corrosion free.*	90 days 1750 cycles		
Mounting of pump unit to lift frame or vehicle chassis *Condition and integrity*	90 days 1750 cycles		
Oil reservoir, oil filter *Check oil level, clean filter yearly, replace hydraulic oil every 3 years*	Yearly		
Bleed hydraulic circuits *After replacing oil, or after opening hydraulic circuit for any reason*	As needed		
Motor, starter solenoid, connection between both *Condition inside pump unit, operation, all connections are tight, no signs of overheating*	90 days 1750 cycles		
Hydraulic circuit general external appearance, valve block and solenoid valves *No visible oil leaks during operation and at rest*	90 days 1750 cycles		

Hydraulic cylinders	Frequency	OK ?	Corrected
All hydraulic cylinders *Condition, operation, fastening of pivot points and locking bolts*	90 days 1750 cycles		
Piston rods, rubber protection boots *Condition; rod surface free of paint, dirt, scratches and pitting*	90 days 1750 cycles		
Cylinder lock valves *Condition, undamaged, clearance from mounting plates, bumper, other fixed parts*	90 days 1750 cycles		
Tilt cylinders *Correct adjustment of extension rods, fastening of lock nut of extension rod*	Yearly		
Hydraulic circuits of cylinders, valves and couplings *No visible oil leaks in operation and at rest*	90 days 1750 cycles		

Lift frame	Frequency	OK ?	Corrected
Lift frame, lift arms *Condition, undamaged (deformation, cracks in material or welds), no corrosion*	90 days 1750 cycles		
Pivot points, pivot pins and bearings *Condition, no damage or wear, fastening of locking pins / bolts / nuts* *Presence and condition of lubrication fittings*	90 days 1750 cycles		
Pivot points, pivot pins and bearings *Pump grease in all lube fittings* (*) 90 days, 1750 cycles or after each pressure wash, whichever comes first	90 days 1750 cycles W (*)		
Auto-tilt brackets between lift arms and lift frame (DH-LM type) *Condition, undamaged (deformation, cracks in material or welds), lubricated*	90 days 1750 cycles		
Mounting plates to chassis *Condition, undamaged (deformation, cracks in material or welds), sufficient bolts per installation instructions, torqued to specifications (if bolted).*	90 days 1750 cycles		

Platform	Frequency	OK ?	Corrected
Platform construction *Condition, undamaged (deformation, cracks in material or welds), no corrosion*	90 days 1750 cycles		
Pivot points, pivot pins and bearings *Condition, no damage or wear, fastening of locking pins / bolts / nuts* *Presence and functional condition of lubrication fittings*	90 days 1750 cycles		
Pivot points, pivot pins and bearings *Pump grease in all lubrication fittings* (*) 90 days, 1750 cycles or after each pressure wash, whichever comes first	90 days 1750 cycles W (*)		
Platform at loading floor *Presence and functional condition of stop blocks for lifting movement. Alignment of the platform flush with the loading floor*	Yearly		
Platform rollers *Condition, undamaged. Replace when worn or damaged*	90 days 1750 cycles		
Cart-stops (optional) *Condition, operation, no debris underneath*	90 days 1750 cycles		
Flashing platform lights, foot controls, other electric platform options (optional) *Condition, operation of the device. Condition, routing of the harness(es) to the control box or pump unit, undamaged*	90 days 1750 cycles		
Platform flags (optional) *Presence, condition, visibility*	90 days 1750 cycles		
Mechanical platform lock (optional) *Condition, operation, lubricate mechanism*	90 days 1750 cycles		

Practical tests	Frequency	OK ?	Corrected
Functional test with empty platform *Perform all movements minimum 3 times with all control units.* *Liftgate should operate smoothly and quietly through its full range of motion.* *Check condition of pivot points (no excessive play).* *Verify correct auto-tilt function at ground level.*	90 days 1750 cycles		
Regular weight test at 100% of MAXIMUM RATED CAPACITY *Rest platform on ground.* *Position MAX. LOAD on CENTER POINT FOR MAX. LOAD.* *Lift platform. Check if lift capacity is sufficient. Check general operation and stability.* *Check safe working speeds:* • *Lift and lower: max. 6" / sec* • *Open and close: min. 9 sec to open or close platform*	Yearly		
Overload test, adjustment of pressure relief valve *Rest platform on ground.* *Position a load = 1.1 x MAXIMUM LOAD on the CENTER POINT OF MAXIMUM LOAD* *Press lift function. Platform should not lift off the ground. Pressure relief valve should open.* *If required, use procedure I-SERV-G-003 to adjust the pressure until platform will NOT lift 1.1 x MAXIMUM LOAD* *(Note: pressure should never exceed 220 bar / 3190 psi)*	Yearly		
Hydraulic circuit general *No visible oil leaks during operation and at rest*	90 days 1750 cycles		

Notes:	

Maintenance or inspection performed by:

Name of technician:

Date of next maintenance / inspection (*):

Service Center

(*) erase what is not applicable

Make sure you follow the all instructions and safety precautions at all times. Refer to:
⇒ **the OPERATION MANUAL**
⇒ **the GENERAL SAFETY INSTRUCTIONS FOR REPAIR AND MAINTENANCE**
(*available via www.dhollandia.com or contact the local distributor)*

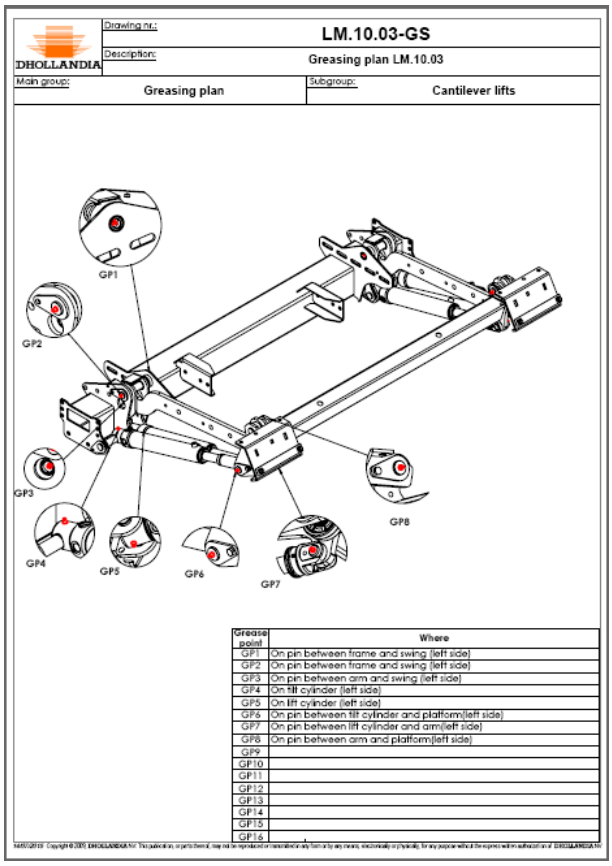
7. LUBRICATION AND GREASE PLANS

NOTICE

- **To maximize the durability and operational reliability of the tail lift, it is important to lubricate it regularly, taking into account the intensity of use.**
- All DHOLLANDIA tail lifts are equipped with low maintenance bearings. In normal conditions of use during a single shift, tail lifts should be lubricated **every 90 days, or 1750 cycles, whichever occurs first**.
- In case of very severe duty (multiple shift, 24h operation,…) or if frequently pressure washed with strong detergents, the frequency of lubrication should be increased to the specific conditions proportionally. In case of doubt, contact your national DHOLLANDIA agent.

- Pressure wash the tail lift, before pumping grease in the lube fittings.
- Ensure that all pivot points get a grease collar on both sides of the bearing or articulation, protecting it against ingress of water, salt, sand or dirt.
- Ensure all lube fittings function correctly, and replace any defective fittings.
- If articulations cannot be lubricated, even after replacing the lube fitting, dismount the pivot pin, polish its surface and clean the lube channel. (As ultimate solution, renew the pivot pin).
- Always use acid-free grease. The use of graphite grease is not allowed.
- If so equipped, verify if the platform lock operates smoothly, and lubricate with oil if necessary.
- Most grease plans are filed in the annex of this manual. Grease plans can also be downloaded from our website, or obtained from your national DHOLLANDIA distributor on request.

www.dhollandia.com ➔ your language ➔ Downloads ➔ Maintenance & Repair Manuals ➔ Grease plans



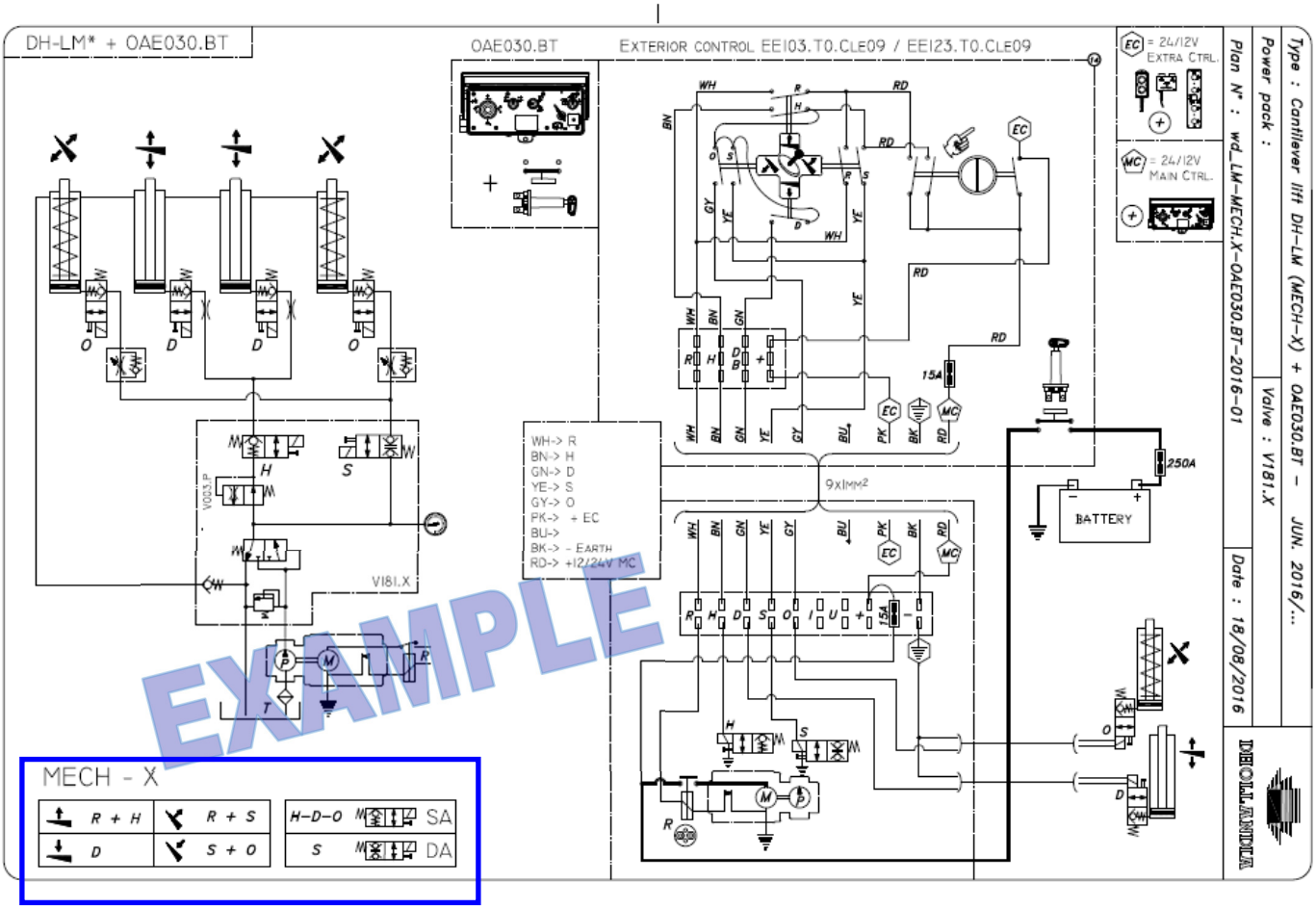
8. ELECTRIC AND HYDRAULIC DIAGRAMS

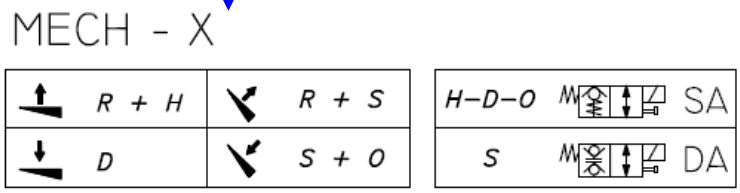
§8.1 - General

- DHOLLANDIA tail lifts are regularly being adapted to new vehicle and chassis developments, and specialised customer requirements. Therefore the electric and hydraulic diagrams applicable to your tail lift might deviate from the generic diagrams contained in this manual.
- The specific diagrams can usually be found inside the main external control box, or inside the pump unit. They can also be obtained from your national DHOLLANDIA distributor, or can be downloaded from:.

www.dhollandia.com ➔ your language ➔ Downloads ➔ Electric & hydraulic diagrams (2014-…) ➔ …

- Besides regular electric and hydraulic schematics, all diagrams also explain which solenoids and valves are operated for each function.





SA = Single Acting valve

DA = Double Acting valve

R = Starter solenoid of DC motor in pump unit

H = Control valve LIFT in pump unit

D = Electric lock valve on LIFT cylinders

S = Control valve TILT (OPEN + CLOSE) in pump unit

O = Electric lock valve on TILT cylinders

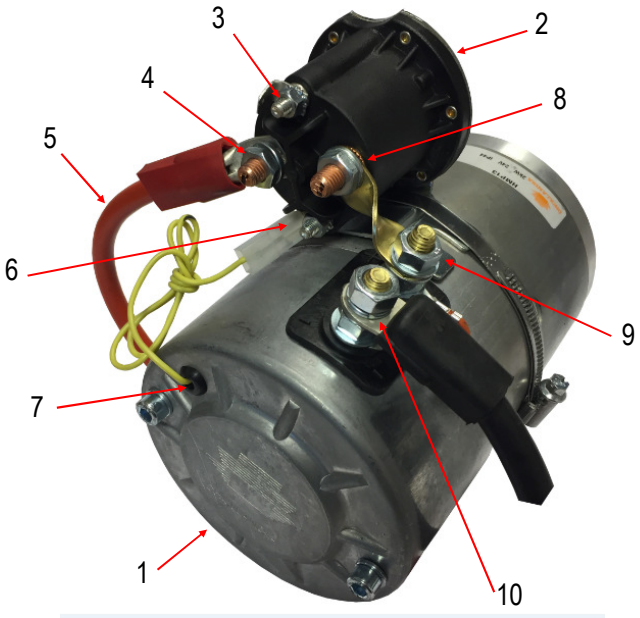
US = Control valve LEGS OUT on stabilising legs (*)

IS = Control vavle LEGS IN on stabilising legs (*)

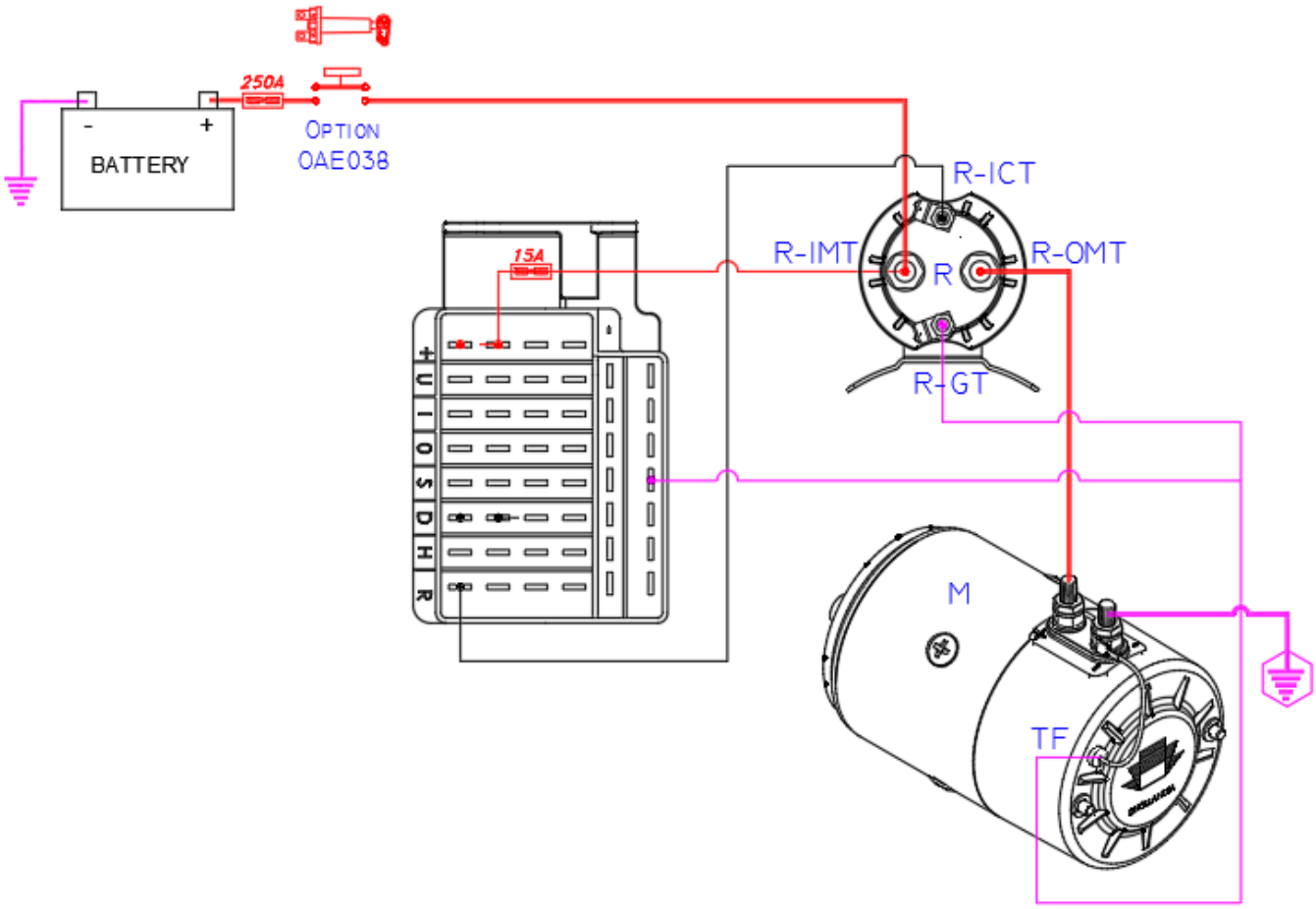
(*) if so equipped

Consult the replacement parts lists for a detailed overview of all tail lift components.

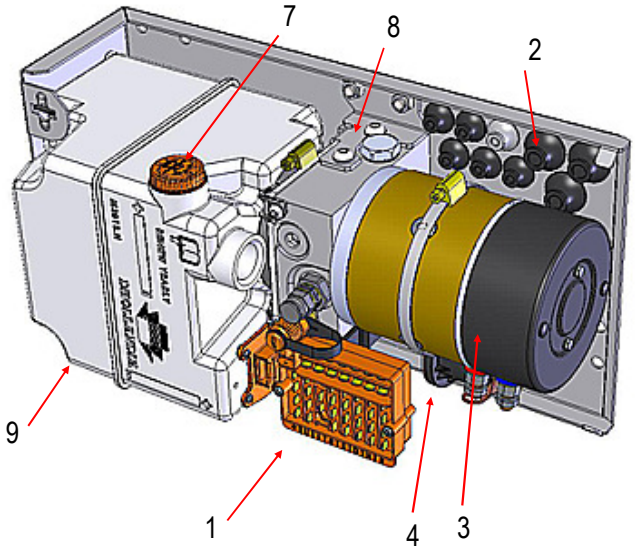
§8.2 - Tail lift terminology: electric DC motor and starter solenoid

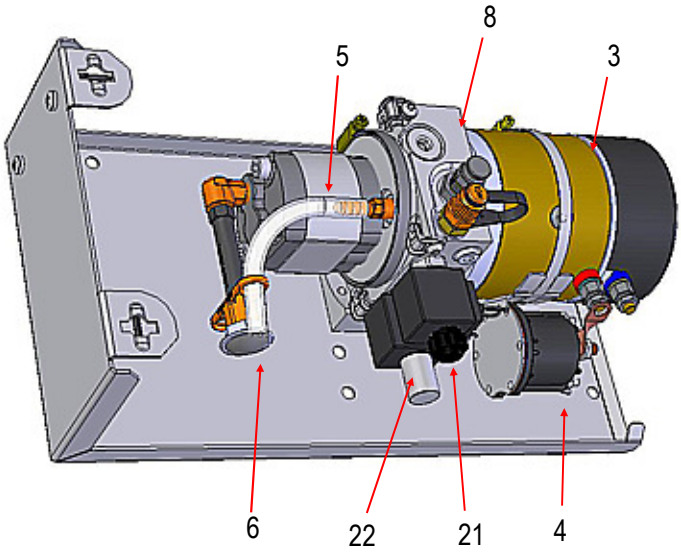


N°	Description
1	Electric DC motor
2	Starter solenoid R
3	Incoming control terminal R-ICT
4	Incoming main terminal R-IMT
5	(+) Battery cable from vehicle batteries
6	(-) Ground terminal R-GT to thermal fuse
7	Thermal fuse TF for starter solenoid inside DC motor
8	Outgoing main terminal R-OMT
9	(+) Terminal of DC motor. (+) Busbar from starter solenoid to (+) terminal of DC motor.
10	(-) Terminal of DC motor. (-) Ground cable of DC motor and solenoids



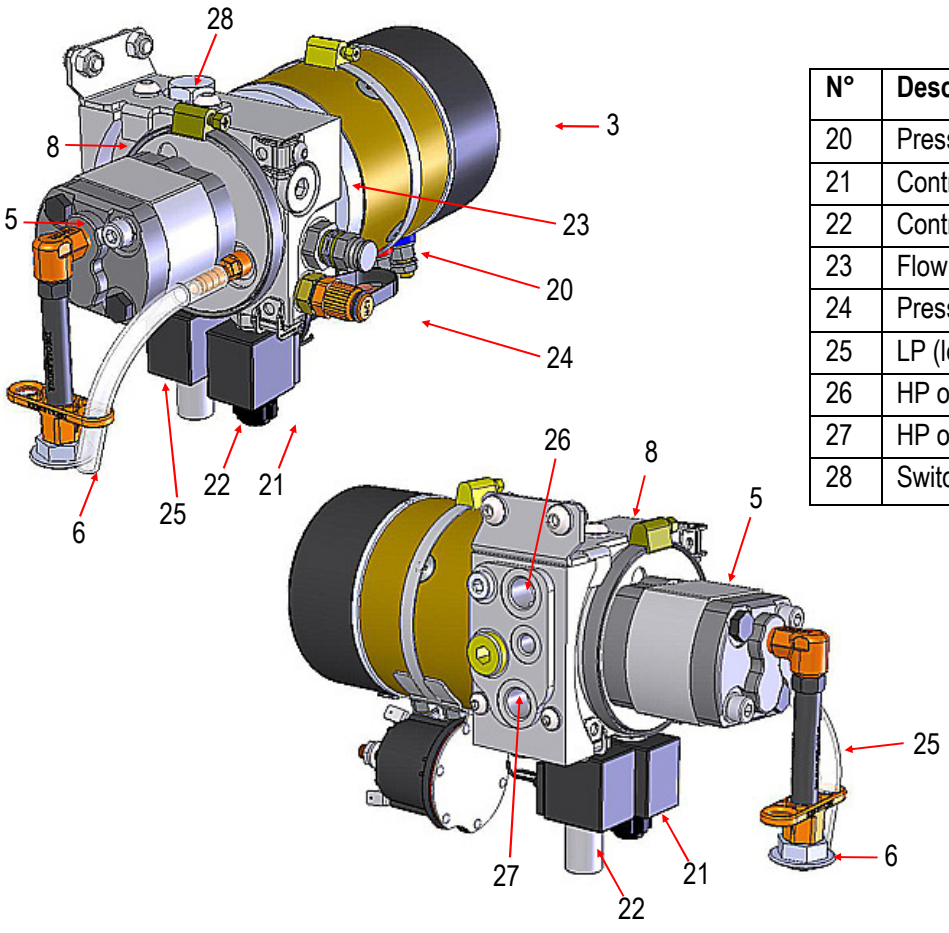
§8.3 - Tail lift terminology: pump unit of DH-LM.10, DH-LM.15, DH-LM.20





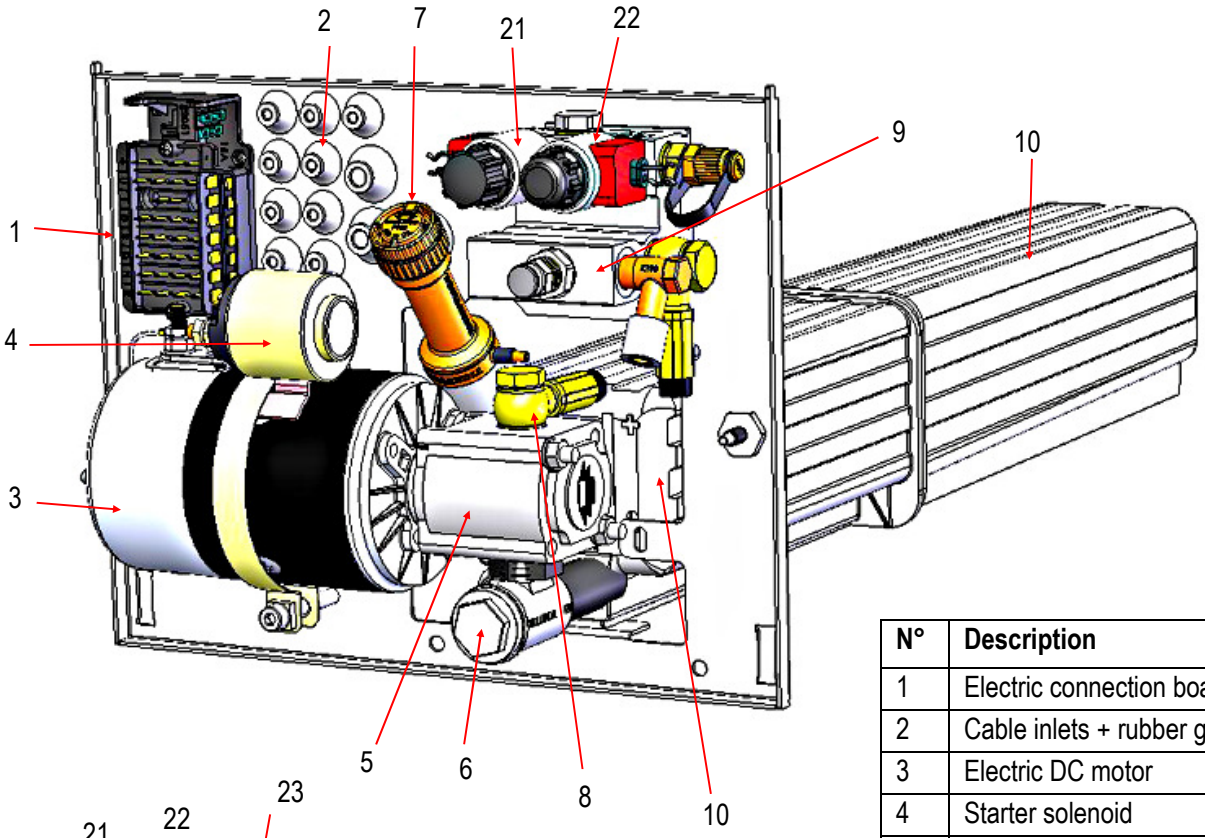
N°	Description
1	Electric connection board + 15A fuse
2	Cable inlets + rubber grommets
3	Electric DC motor
4	Starter solenoid
5	Hydraulic pump

N°	Description
6	Filter
7	Oil tank vent cap
8	Main valve block in pump
9	Oil tank

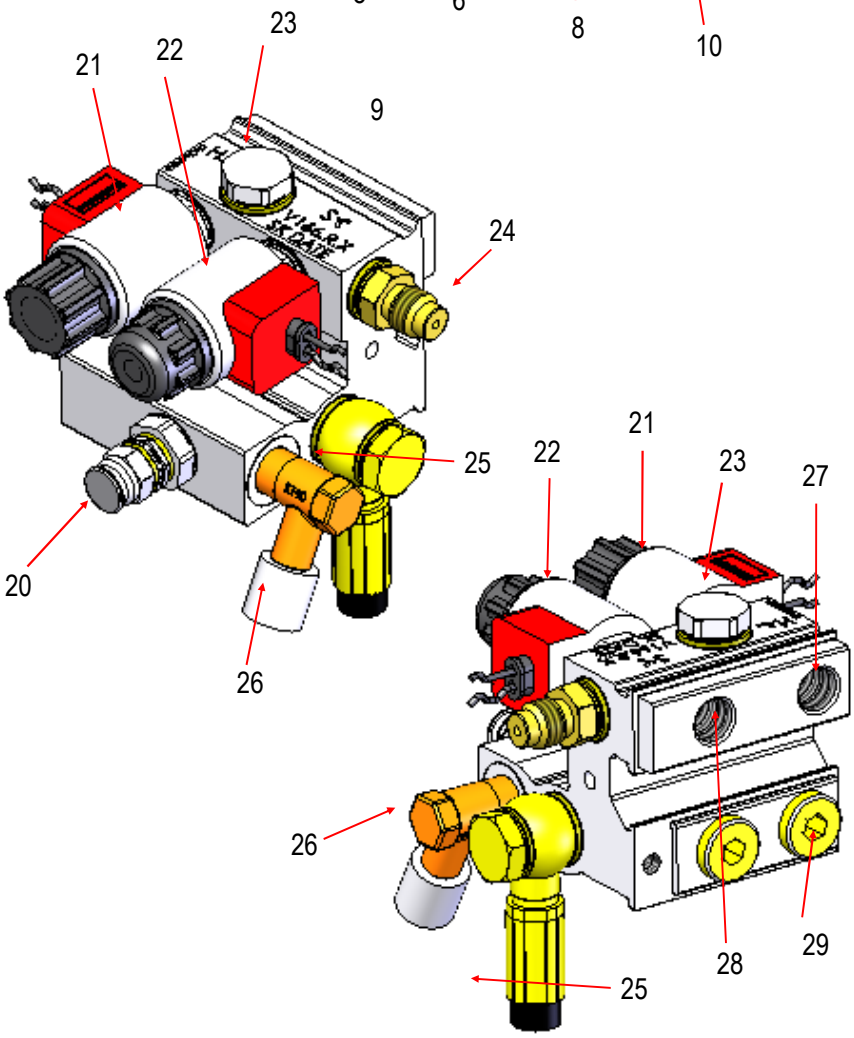


N°	Description
20	Pressure relief valve
21	Control valve H for LIFT
22	Control valve S for CLOSE / OPEN
23	Flow valve
24	Pressure gauge coupling
25	LP (low pressure) return line to oil tank
26	HP outlet to LIFT cylinders
27	HP outlet to TILT cylinders
28	Switch plunger of logical 3-way valve

§8.4 - Tail lift terminology: pump unit of DH-LM.20 , DH-LM.30

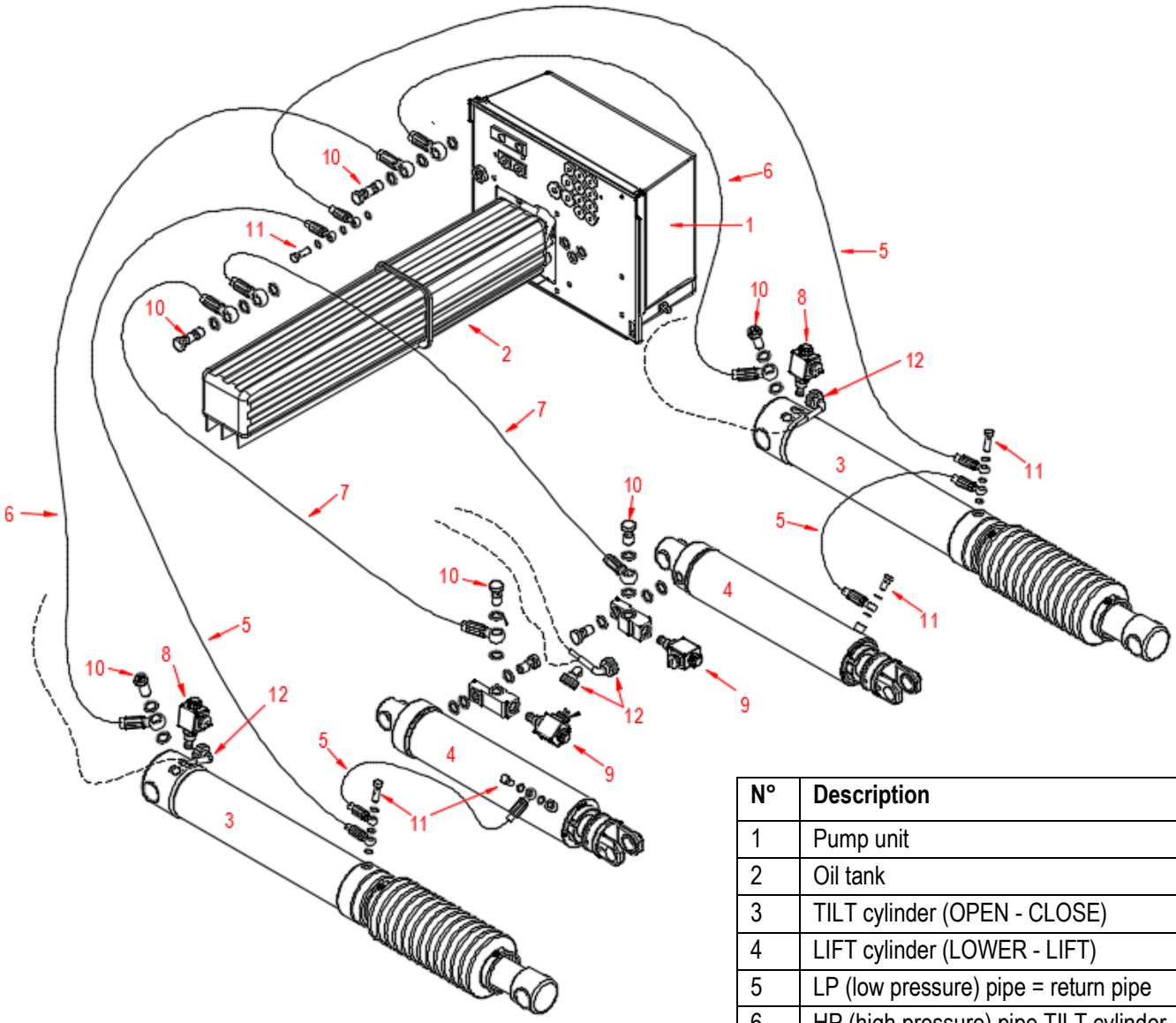


N°	Description
1	Electric connection board + 15A fuse
2	Cable inlets + rubber grommets
3	Electric DC motor
4	Starter solenoid
5	Hydraulic pump
6	Filter housing + filter
7	Oil tank vent cap
8	HP (high pressure) outlet of pump
9	Main valve block in pump unit
10	Oil tank

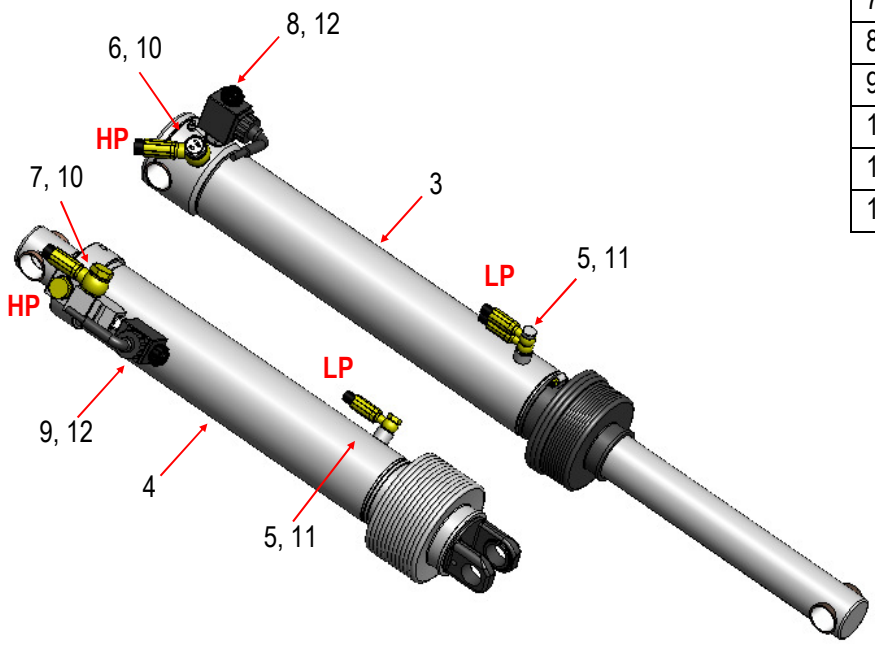


N°	Description
20	Pressure relief valve
21	Control valve H for LIFT
22	Control valve S for CLOSE / OPEN
23	Flow valve
24	Pressure gauge coupling
25	HP (high pressure) inlet from pump
26	LP (low pressure) return line to oil tank
27	HP outlet to LIFT cylinders
28	HP outlet to TILT cylinders
29	Non-return valve of logical 3-way valve

§8.5 - Tail lift terminology: pump unit, hydraulic pipes and cylinders



N°	Description
1	Pump unit
2	Oil tank
3	TILT cylinder (OPEN - CLOSE)
4	LIFT cylinder (LOWER - LIFT)
5	LP (low pressure) pipe = return pipe
6	HP (high pressure) pipe TILT cylinder
7	HP (high pressure) pipe LIFT cylinder
8	Electric lock valve O to OPEN / TILT
9	Electric lock valve D to LOWER
10	HP (high pressure) banjo coupling
11	LP (low pressure) banjo coupling
12	Lock valve harness + plug



9. TROUBLESHOOTING AND REPAIR

§9.1 - Introduction

- In case of a malfunction, the operator can verify a number of simple points before calling an approved DHOLLANDIA service agent:

  → Is the battery disconnect switch in the main external control box, switched on? And / or is the cabin switch in the vehicle cabin switched on? Is the dual-pole charge line between the tractor unit and trailer properly connected?

  → Is the main fuse or circuit breaker at the battery still passing current? Is the power connection between the battery and tail lift clean, tight and corrosion free?

  → Is the battery sufficiently charged? Does the tail lift work better when running the vehicle engine?

  → If so equipped, has the mechanical platform lock been released? (NOTE Make sure platform is tight against vehicle first!)

- If this has been verified with no success, and an approved service agent intervenes to repair the tail lift, it is very important that the troubleshooting is performed in a logical and systematic way. Too often components are replaced at random until the malfunction disappears. However, such methods can be very expensive for labor hours and replacement parts cost.

- Therefore, it is very important to **identify quickly and precisely if a malfunction has an electric, a hydraulic or a mechanical cause**.

- For instance, when the tail lift doesn't LOWER, possible causes are that:

  → the solenoid of one of the electric lock valves D on the lift cylinders receive insufficient or no current (= electrical fault);

  → one or both of the cartridges of the lock valves D on the lift cylinders has been hit and bent, or that the flow valve in the main valve block in the pump unit is blocked (= hydraulic fault);

  → one or both the piston rods of the lift cylinders is bent by overload or accident (= mechanical fault);

  → …

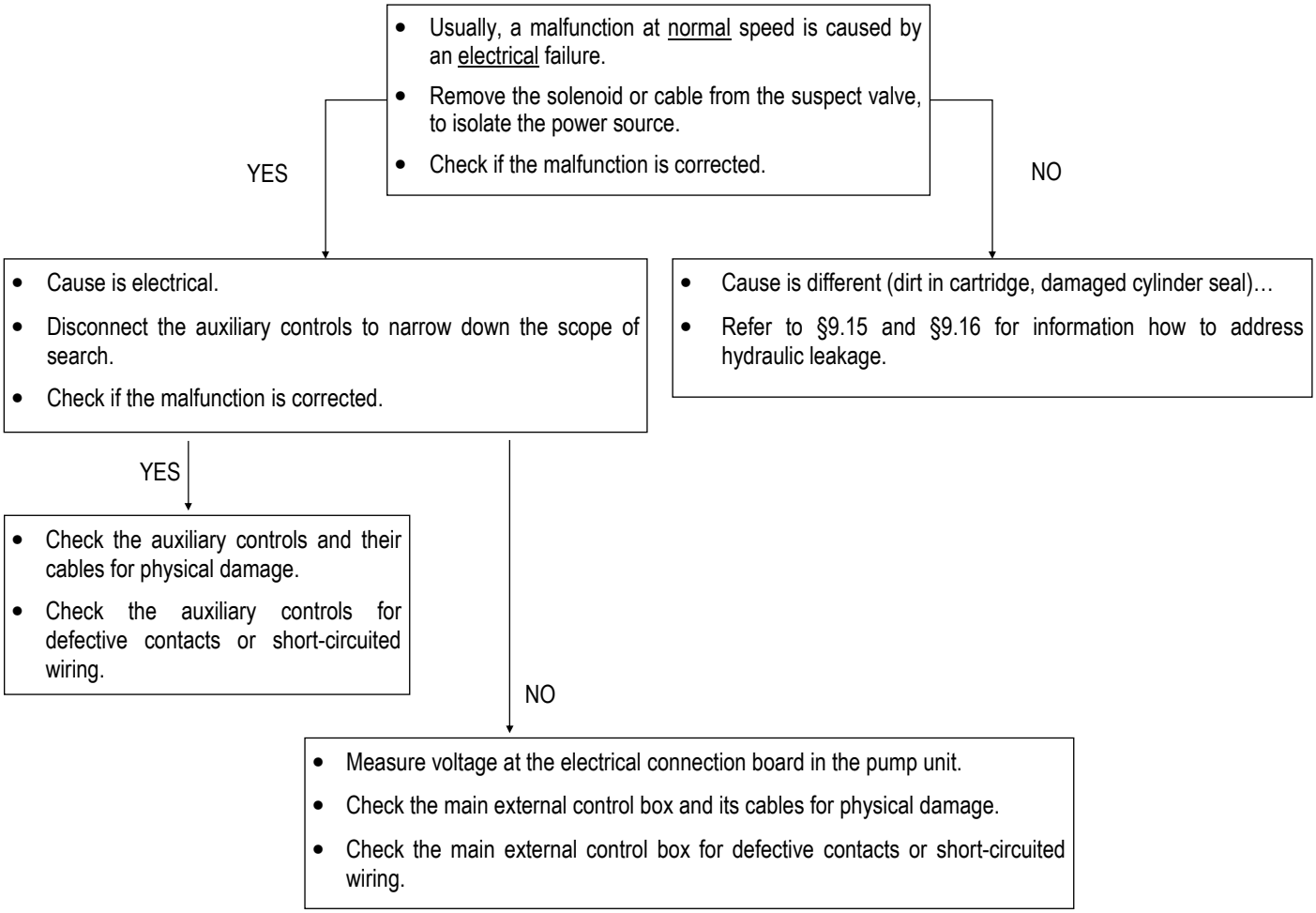
- The tables below can be used to guide you through the troubleshooting. Contact your national DHOLLANDIA distributor if further advice is needed.

⚠WARNING

Some steps in the troubleshooting instructions require special skills and specific knowledge, that can be acquired through the DHOLLANDIA training programs for maintenance and repair. In case of doubt, DON'T go any further, but ask your local DHOLLANDIA distributor for professional advice.

§9.2- Tail lift moves at normal speed, whilst operator doesn't operate any switch or button

- Button or switch of the main external control or auxiliary control doesn't return to the neutral 0-position.
- Button or switch does return to the 0-position, but one of the electrical contacts behind the switch is stuck or burnt.
- Short circuit between the various wires in one of the electrical cables.



§9.3 - Tail lift doesn't move at all, whilst operator tries to operate external control box or auxiliary control.

- Cabin switch in the vehicle cabin is not switched on (if so equipped).
- Dual-pole charge line between the tractor unit and the (semi-) trailer is defective or not plugged in (if applicable).
- Main fuse or circuit breaker in the battery compartment is out of order (fuse burnt or blown; circuit breaker tripped, etc.).
- Main battery disconnect switch in the external control box (if so equipped) is not switched on, or is defective.
- 15A fuse in the main external control box or pump unit is defective.
- 5A fuse or mini-relay for the cabin switch wiring inside the main control box or pump unit is defective.
- The electric connection board, starter solenoid R and DC motor in the pump unit are not correctly grounded.

- Make sure the cabin switch in the vehicle cabin is switched on (if so equipped).
- Make sure the main battery disconnect switch in the main external control box is switched on (if so equipped).

For all

For trailers, semi-trailers, and battery systems with plug connections

- Switch the circuit breaker back on (if so equipped).
- Replace the main fuse in the battery box (if so equipped).
- Analyse and repair the cause of defect.

- Make sure the plugs on (+) battery circuit and (-) ground circuit are plugged in correctly.
- Verify if charging system (tractor alternator or other) is working OK. Measure the voltage V, both when tail lift is idle and when pressing LIFT (tail lift under strain), voltage drop should be <2.0 vdc.
- Refer to §9.4 on weak batteries or damaged power supply.

- (If so equipped) check if nominal 12V / 24V is present at the incoming and outgoing terminal of the main battery disconnect switch in the external control box.
- (If no battery disconnect switch) check if nominal 12V / 24V is present at the incoming main terminal R-IMT of the starter solenoid R.

NO

YES

- Check the (+) battery cable, plugs and terminals from the battery to the incoming terminal of the main battery disconnect switch (if so equipped), or the incoming main terminal R-IMT of the starter solenoid R.
- Replace the main battery disconnect switch if no current passes through it, or if excessive voltage drop is noted.
- Refer to §9.4 on weak batteries or damaged power supply.

- Verify the 15A fuse in the main external control box or in the pump unit.
- (If so equipped) verify the 5A fuse and mini-relay for the cabin switch wiring in the main external control box or in the pump unit.
- Replace the fuse (and mini-relay) if damaged. Analyse and repair the cause of defect.

OK

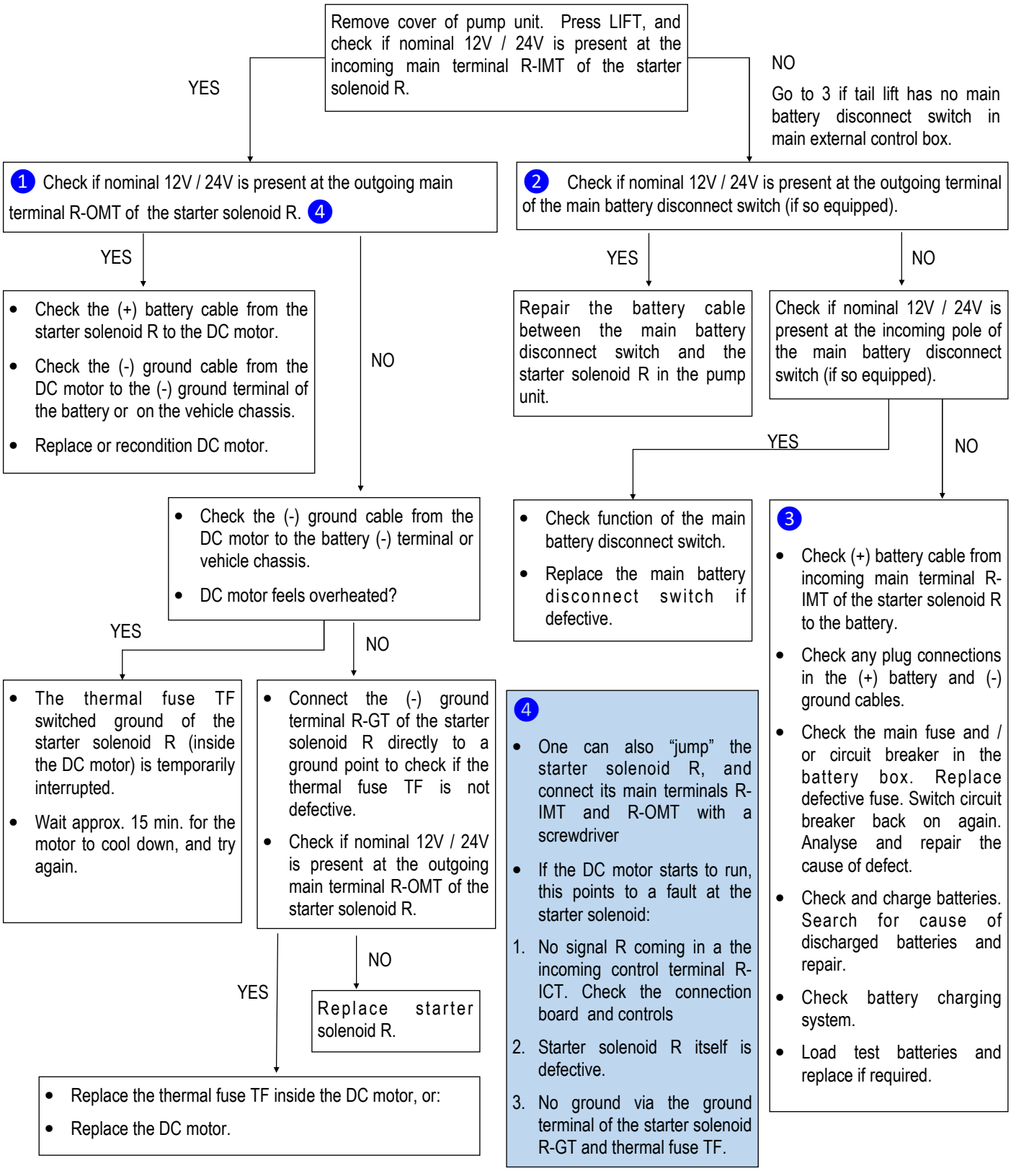
NOT OK

Problem solved.

- Mount a temporary direct (-) ground cable from the (-) negative terminal of the DC motor to the (-) terminal of the batteries.
- Verify if the electrical connection board and DC motor in the pump unit are adequately grounded.
- Most electrical components, such as the electrically operated valves, and the starter solenoid, mini-relay, DC motor in the pump unit will not function without proper (-) ground link.

§9.4 - Symptoms of weak batteries or damaged current supply.

- The downward functions (OPEN & LOWER) are working, but the upward movements (LIFT & CLOSE) are not.
- The DC motor still runs, but sounds slower and is struggling.
- The starter solenoid R switches on, but the DC motor doesn't react.
- The starter solenoid R quickly switches on and off (chattering or "doorbelling").
- Nothing at all happens.



- Remark: where reference is made to (+) battery cables and (-) ground cables, the following minimum cable sections are recommended:

Recommended MINIMUM cable sections for (+) battery cables and (-) ground cables	
Size electric motor	**Cable section**
500 W	16 mm² - 5 AWG
1200 - 2200 W up to max. 1500 kg capacity (length ≤ 7 m)	25 mm² - 3 AWG
1200 - 2200 W up to max. 1500 kg capacity (length > 7 m)	35 mm² - 1 AWG
1200 - 2200 W above 1500 kg capacity (length ≤ 13 m)	35 mm² - 1 AWG
1200 - 2200 W above 1500 kg capacity (length > 13 m)	50 mm² - 0 (1/0) AWG
3000 W (only 24V)	35 mm² - 1 AWG
Long motor duty cycle (double deck, power down)	50 mm² - 0 (1/0) AWG

- Batteries and their charging system should be chosen to comply with following minimum requirements:

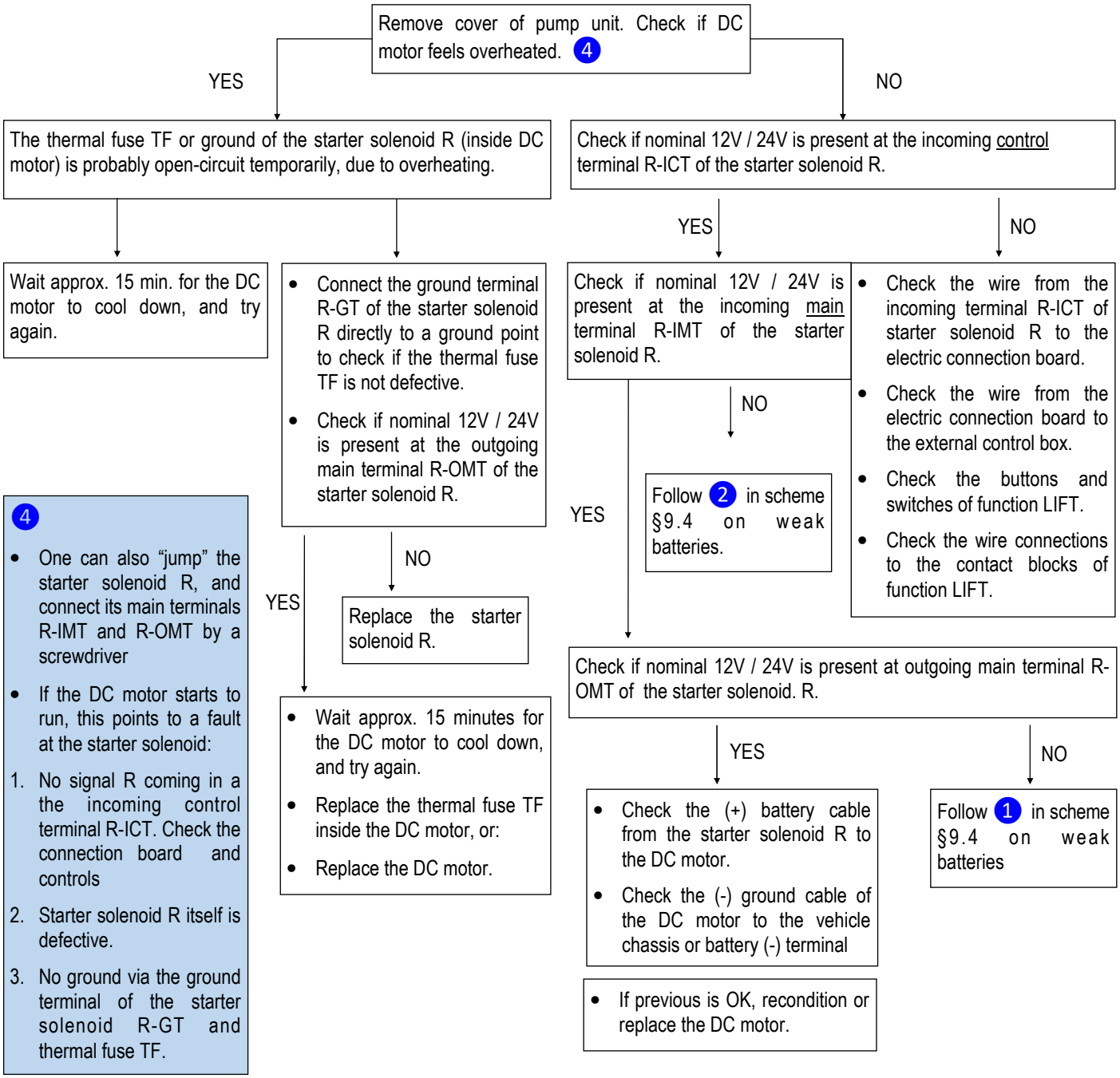
	Voltage System					
	12V			24V		
Capacity Tail Lift [kg]	Electrical Power [AMP]	Battery Capacity [Ah]	Generator Output [A]	Electrical Power [AMP]	Battery Capacity [Ah]	Generator Output [A]
≤ 750 kg	200	143	70	150	105 (2x)	70
≤ 1000 kg	250	143	70	200	105 (2x)	70
≤ 1500 kg	250	180	90	200	180 (2x)	90
> 1500 kg	250	180	110	250	180 (2x)	110
> 1500 kg Freq. Usage	300	220	110	300	220 (2x)	110

NOTICE

- To ensure the reliability of the tail lift over many years, it is essential that the batteries, their charging system, the (+) battery and (-) ground cables, and fuses are dimensioned sufficiently strong, and fitted with care following DHOLLANDIA installation instructions.
- Insufficient cable section on the (+) battery and (-) ground cables can cause low voltage problems, overheating, poor performance of the electrical system, and premature wear of the electrical components.
- Low voltage will cause damage to the electric components of the tail lift (starter solenoid, electric DC motor, electric switches, etc...). In extreme cases, low voltage / high amperage abuse can weld the contact plates of the starter solenoid shut, disable the thermal fuse, and lead to burning of the DC motor, the pump unit, and any flammable components nearby.
- (-) Ground circuits are as important as (+) battery circuits for the good operation of the tail lift, but often overlooked in troubleshooting. Make sure you take these into consideration when performing repairs or maintenance checks.

§9.5- The DC motor doesn't run, but the downward functions OPEN / LOWER work OK.

- The button / switch or electric contacts for LIFT or CLOSE in the main external control box or auxiliary controls are defective, or the connection to one of the contact blocks is loose.
- An electric wire is cut or damaged, or there is a bad contact.
- The incoming or outgoing connection to the electric connection board in the pump unit is loose or defective.
- The starter solenoid R in the pump unit is defective.
- The thermal fuse TF inside the DC motor (= ground of the starter solenoid) is open-circuit due to overheating (caused by overload or too low voltage / too high amperage).
- Insufficient battery voltage
- The carbon brushes of the DC motor are worn out, or the DC motor is defective.
- The (+) battery or (-) ground cable is damaged, or loose at the connection to the battery terminal.
- Insufficient battery voltage.



§9.6 - The DC motor doesn't switch off.

- The button or switch for function LIFT in the external control box or auxiliary controls doesn't return to the neutral 0-position.
- The button or switch returns to 0-position, but one of the electric contact blocks behind the switch is stuck or burnt.
- Short circuit between the various wires in one of the electrical harnesses.
- The contact plates of the starter solenoid R are stuck in closed-circuit condition. The starter solenoid R doesn't switch off power to the DC motor.

- Remove the connector of the control power for LIFT from the incoming control terminal R-ICT of the starter solenoid R.
- Check if the DC motor switches off.

YES

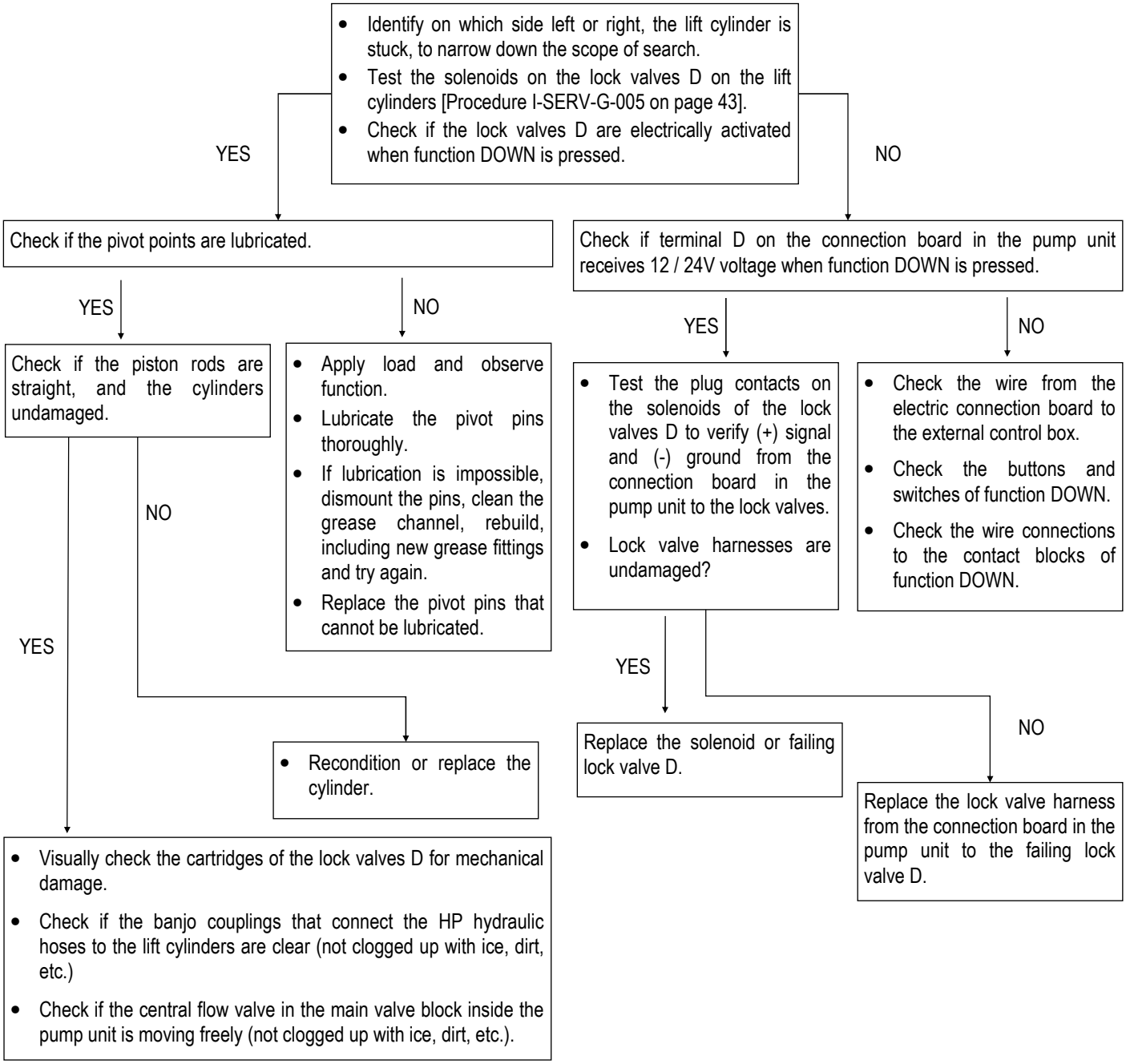
- Disconnect the auxiliary controls to narrow down the scope of search.
- Check the wire from incoming control terminal R-ICT of the starter solenoid R to the electric connection board. Verify if un-commanded 12 volt signal is present.
- Check the wire from the electric connection board to the external control box. Verify if un-commanded 12 volt signal is present.
- Check the buttons and switches of function LIFT.
- Check the wire connections to contact blocks of function LIFT. Verify if un-commanded 12 volt signal is present.

NO

- Replace the starter solenoid R.
- Check the battery voltage and amperage draw when pressing LIFT (put tail lift under strain). Verify the function of the batteries and charging system.
- Low voltage / high amperage abuse can weld the contact plates of the starter solenoid R shut, disable the thermal fuse, and lead to a burn-down of the DC motor, the pump unit, and any flammable components nearby.

§9.7 - The platform doesn't LOWER, the other functions work ok (for DH-LM + MECH.X wiring system).

- The button / switch or electric contact blocks for function DOWN are defective, or the connection to one of the contact blocks is loose.
- The incoming or outgoing connection to or from the electric connection board in the pump unit is defective.
- The lock valve harness to one of the electric lock valves D is damaged, or has a bad contact.
- One of the solenoids D (lift cylinders) is defective, or the cartridge of one of the valves is mechanically defective.
- One of the flow valves on the cylinders or in the power pack is mechanically blocked (by ice, dirt or by mechanical malfunction).
- One of the lift cylinders is blocked (piston rod bent by accident, pivot pins poorly greased,…).



§9.8 - The platform doesn't OPEN, the other functions work ok (for DH-LM + MECH.X wiring system)

- The mechanical platform lock has not been released (if so equipped). *CAUTION* If an OPEN attempt has been made, press CLOSE again before attempting to release the mechanical platform lock!
- The button / switch or electric contact blocks for function OPEN are defective, or the connection to one of the contact blocks is loose.
- The incoming or outgoing connection to or from the electric connection board in the pump unit is defective.
- The electric harness to one of the electric lock valves O is damaged, or suffers from a bad contact.
- One of the solenoids O (tilt cylinders) or S (pump unit) is defective, or the cartridge of one of the valves is mechanically defective.
- One of the flow valves on the cylinders or in the power pack is mechanically blocked (by ice, dirt or by mechanical malfunction).
- One of the tilt cylinders is blocked (piston rod bent by accident, pivot pins poorly greased,…).

- Make sure the mechanical platform lock is open.
- Identify on which side left or right, the tilt cylinder is stuck, to narrow down the scope of search.
- Test the solenoids on the lock valves O on the tilt cylinders and the control valve S in pump unit [Procedure I-SERV-G-005 on page 43].
- Check if the lock valves O and the control valve S are electrically activated when function OPEN is pressed.

YES

NO

Check if the pivot points are lubricated.

YES

NO

Check if the piston rods are straight, and the cylinders undamaged.

- Apply load and observe function.
- Lubricate the pivot pins thoroughly.
- If lubrication is impossible, dismount the pins, clean the grease channel, rebuild, including new grease fittings and try again.
- Replace the pivot pins that cannot be lubricated.

NO

YES

- Recondition or replace the cylinder.

- Visually check the cartridges of the lock valves O for mechanical damage.
- Check if the banjo couplings that connect the HP hydraulic hoses to the lift cylinders are clear (not clogged up with ice, dirt, etc.)
- Check if the central flow valve in pump unit moves freely (not clogged up with ice, dirt, etc.).

Check if terminal O and S on the connection board in the pump unit receive nominal 12 / 24V voltage when function OPEN is pressed.

YES

NO

- Measure out the plugs on the solenoids of the lock valves O to check (+) feed and (-) ground from the connection board in the pump unit to the lock valves
- Check the (+) feed and (-) ground to control valve S in the pump unit.
- Wires to the lock valves O and control valve S are OK?

- Check the wire from the electric connection board to the external control box.
- Check the buttons and switches of function OPEN.
- Check the wire connections to the contact blocks of function OPEN.

YES

NO

- Replace the solenoid or failing lock valve O, or:
- Replace the solenoid or failing control valve S.

Replace the harness from the connection board in the pump unit to the failing lock valve O or control valve S.

§9.9 – The tail lift doesn't reach its max. rated lift capacity (for DH-LM + MECH.X wiring system)

- The load is too heavy, or moved too far outboard beyond the center point of max. load.
- The pressure relief valve is set too low.
- The pressure relief valve is contaminated or mechanically blocked in open position.
- The pump draws insufficient oil: the oil or oil filter are contaminated, clogged up with ice or dirt, or the oil is too viscous (after refilling with oil of incorrect specifications). Or the oil level is too low.
- The hydraulic pump is worn out, or the drive shaft between pump and DC motor is broken.
- The seal of one of the lift cylinders is leaking.
- One of the lift cylinders is blocked (piston rod bent by accident, pivot points poorly greased,…).

- Make sure that the load on the platform doesn't exceed the max. rated lift capacity, and its position complies with the load charts.
- Fit a pressure gauge to the main valve block in pump unit. The max. pressure normally ranges from 2175 psi / 150 bar to max. 2900 psi / 200 bar
- Try and increase oil pressure [Procedure I-SERV-G-003 on page 40]. Press LIFT and check if pressure gauge shows significant increase in oil pressure?

YES

Check again if the tail lift reaches its max. rated lift capacity now.

YES

Problem solved. Secure the jam nut of the pressure relief valve adjustment screw, and put seal cap back in place.

NO

- Make sure that tail lift is adequately lubricated.
- Verify the 2 lift cylinders for internal leaks of the seals on the piston [Procedure I-SERV-G-007 on page 45].
- Verify if the lift cylinders are not bent or damaged by accident.
- Recondition or replace the lift cylinder(s).

NO

- Visually check the oil tank, or on the return pipe from the main valve block to the oil tank, if the oil pressure generated by the pump is not going straight back to the return line.
- Try and purge pressure relief valve [Procedure I-SERV-G-004 on page 41].
- Press LIFT and check if the pressure gauge shows significant increase in oil pressure now.

YES

Problem solved. Secure the jam nut of the pressure relief valve adjustment screw, and put seal cap back in place.

NO

- Clean or replace the oil filter (remove dirt or ice)
- Remount oil filter. Top up oil level if required [Procedure I-SERV-G-008 on page 46].
- Press LIFT and check if the pressure gauge shows significant increase in oil pressure now?

YES

Problem solved. Secure the jam nut of the pressure relief valve adjustment screw, and put seal cap back in place.

NO

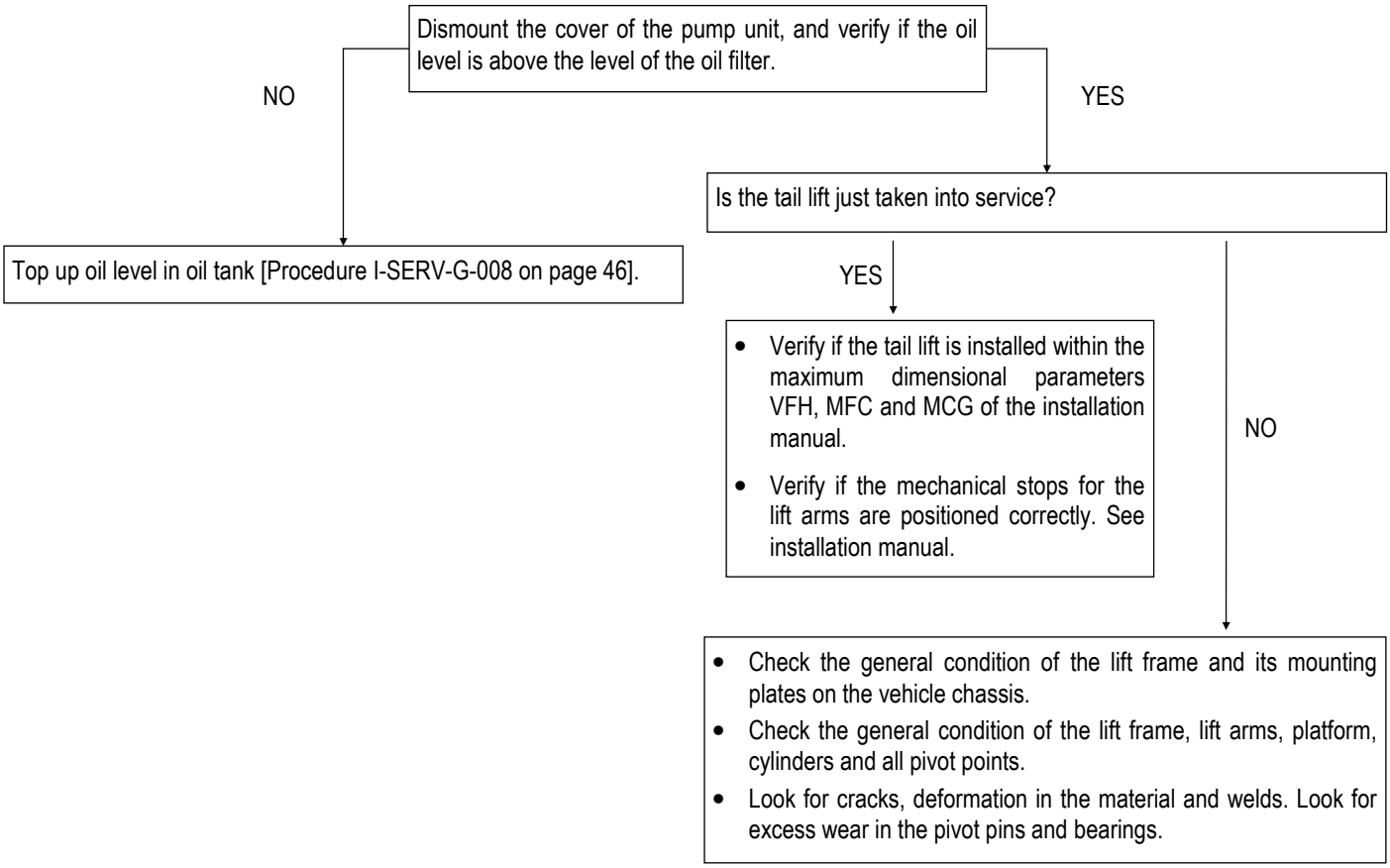
- The hydraulic pump is worn out (pump body warms up quickly).
- The drive shaft between pump and DC motor is broken
- Replace pump (and DC motor if required).

⚠WARNING **NOTICE**

- Never raise the hydraulic pressure above 3190 psi / 220 bar, without asking advice from your national DHOLLANDIA distributor.
- Too high pressure adjustment can cause damage to the tail lift, and serious bodily injury in case of a pressure induced burst in the hydraulic circuit.

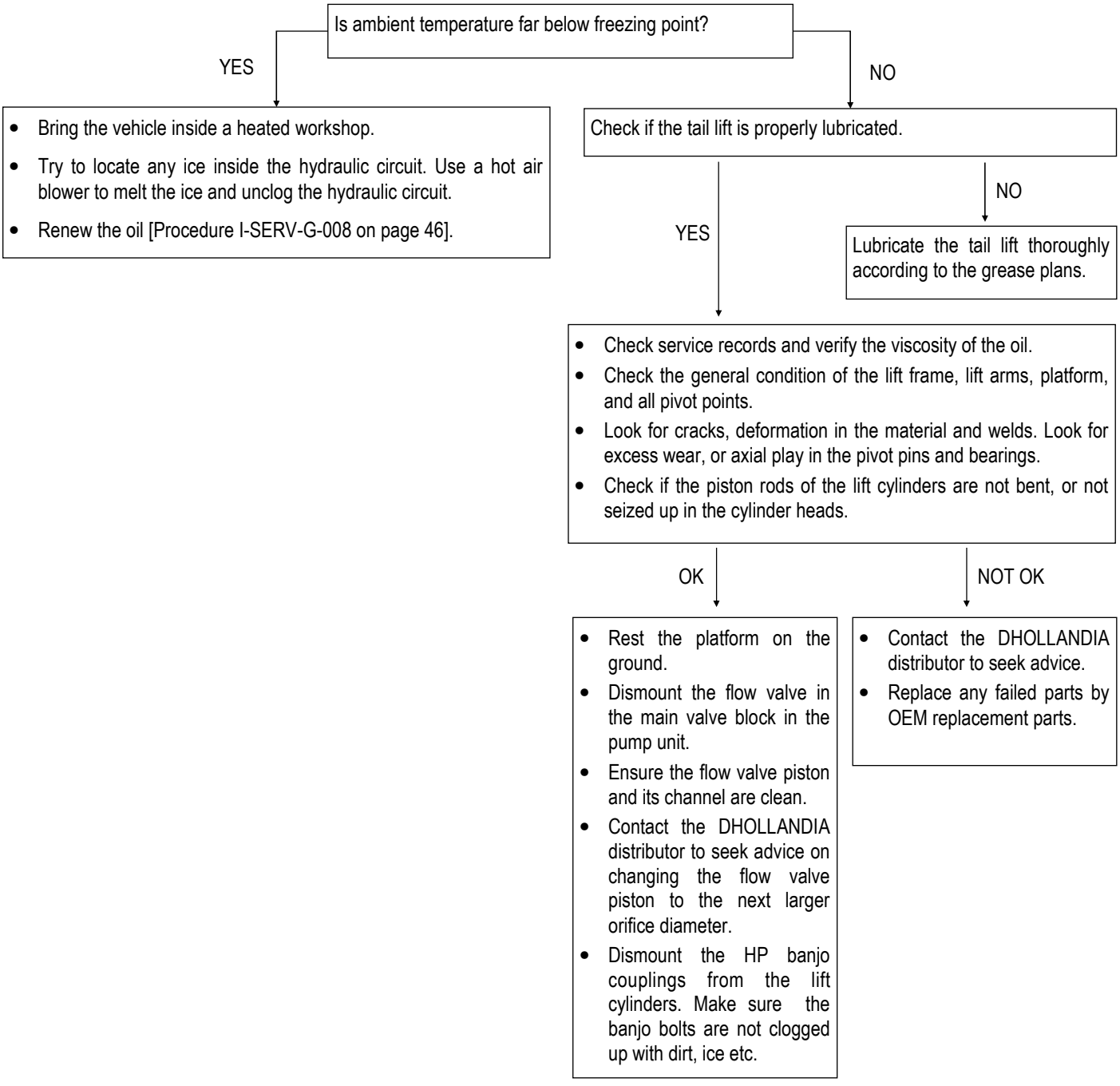
§9.10 – The tail lift doesn't reach vehicle floor level

- Insufficient volume of oil in the oil tank
- The tail lift is mounted too low or otherwise has too steep of a lift frame angle, relative to the vehicle chassis. Or the end stops for the lift arms have not been fitted correctly.
- Vehicle body has been moved backwards.
- The lift frame is twisted by overload or accident.
- The lift arm, or one of the articulation points is deformed by overload or accident.



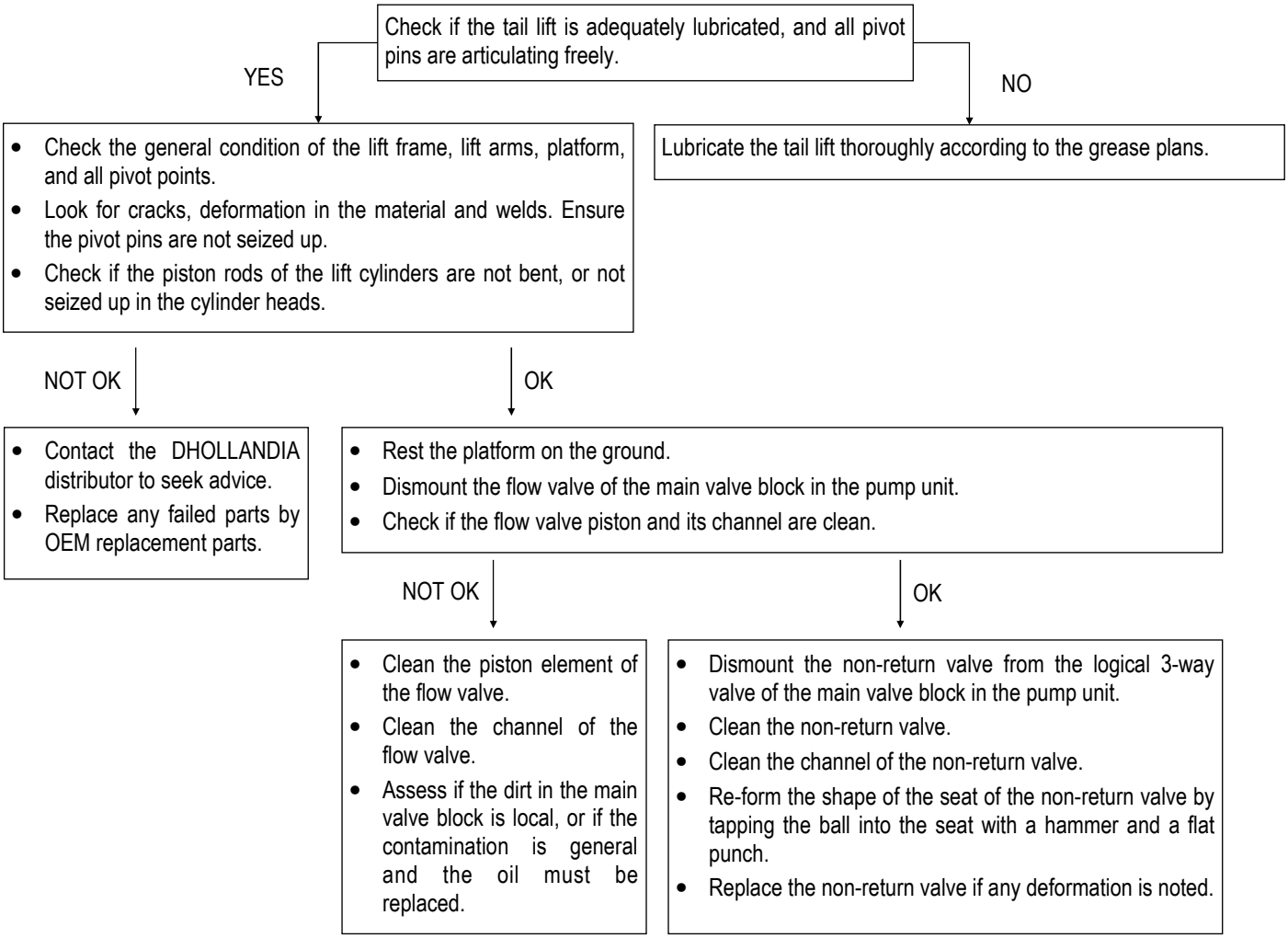
§9.11 – The platform LOWERS only very slowly, when function LOWER is activated

- The tail lift is poorly greased, the pivot pins seized up in their bearings.
- The tail lift is deformed in one of the pivot points (pins or bearings).
- One of the piston rods of the lift cylinders is bent by overload or accident.
- The flow valve orifice in the main valve block in the pump unit is dimensioned too small.
- The flow valve in main valve block in pump unit is blocked (mechanical defective, or blocked by dirt or ice,…).
- The banjo couplings that connect the HP hydraulic hoses to the lift cylinders are clogged with ice, dirt, etc.
- By very cold weather when oil is contaminated with moisture: ice formation in the hydraulic pipes, valves.



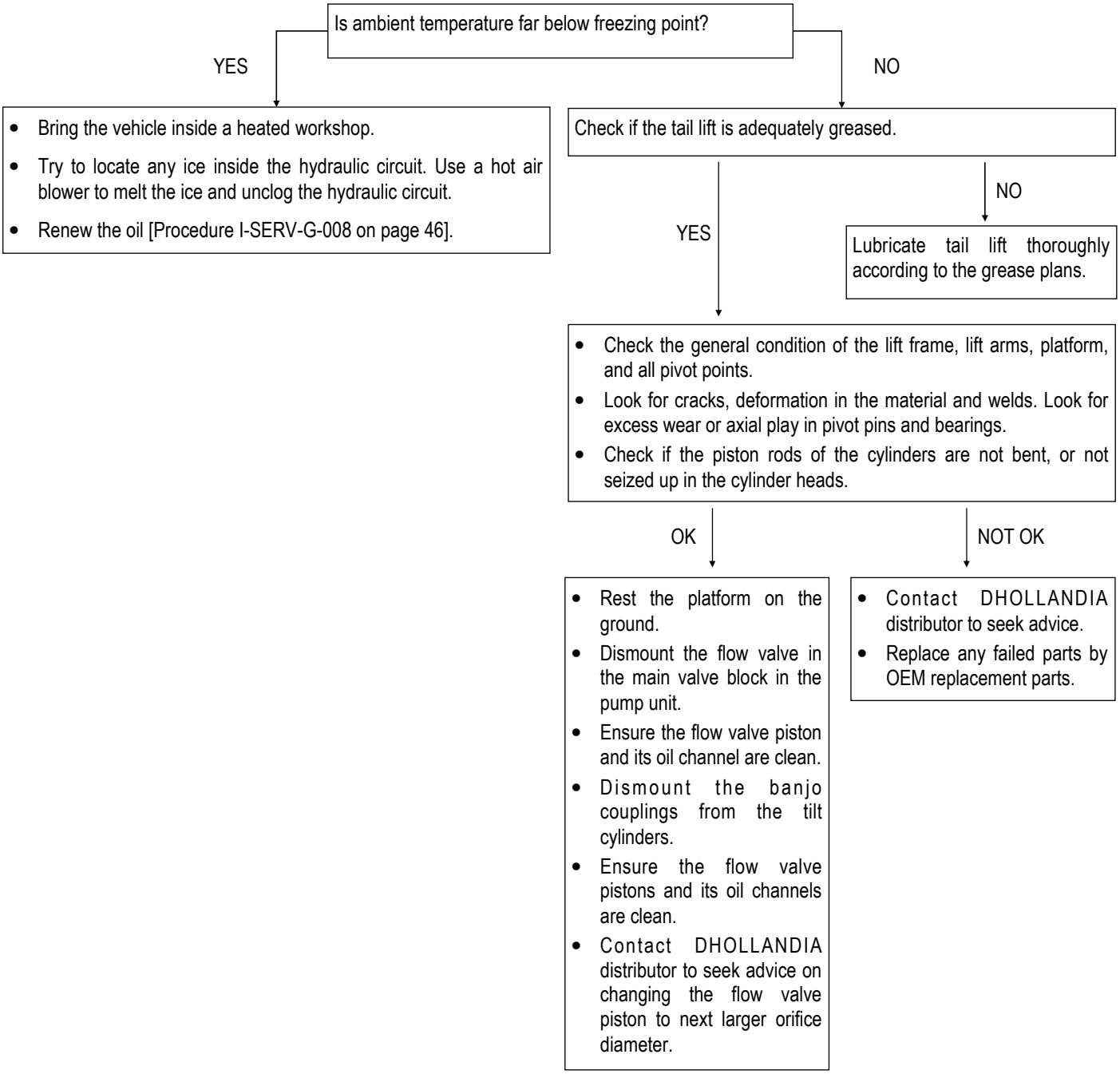
§9.12 – The platform LOWERS shock-wise, when function LOWER is activated.

- The tail lift is poorly greased, the pivot pins are seized up in their bearings.
- The tail lift is deformed in one of the pivot points (pins or bearings).
- One of the piston rods of the lift cylinders is bent by overload or accident.
- The logical 3-way valve of the main valve block in the pump unit is leaking, the return of oil to the oil tank is opened and closed alternatingly.
- The flow valve orifice in the main valve block in the pump unit is being blocked partially (mechanical defect, or blocked by dirt or ice,…).



§9.13 – Platform OPENS very slowly, when function OPEN is activated.

- The tail lift is poorly greased, pivot pins seize up in their bearings.
- The tail lift is deformed in one of pivot points (pins or bearings).
- One of the piston rods of the tilt cylinders is bent by overload or accident.
- The flow valve orifice in the main valve block in the pump unit, or the flow valves in the banjo couplings on the tilt cylinders are dimensioned too small.
- The flow valve in the main valve block in the pump unit, or the flow valves in the banjo couplings on the tilt cylinders are blocked (mechanical defect, or blocked by dirt or ice,…).
- The banjo couplings that connect the HP hydraulic hoses to the lift cylinders are clogged up with ice, dirt, etc.
- By very cold weather, when oil is contaminated with moisture: ice formation in the hydraulic pipes, valves.



§9.14 – The platform LIFTS and CLOSES simultaneously, when function LIFT is activated.

- If new lift: error in the order preparation; platform and lift frame are mis-matched. The Q1 dimension on the frame and the platform are unequal. (Q1 = distance between the center point of the lift arm and center point of the tilt cylinder).
- The solenoid of the control valve S CLOSE is electrically activated, while it should not be.
- The cartridge of the control valve S CLOSE is contaminated or stuck in open position, or defective in another way.

Is tail lift just placed into first service after installation?

YES

- Measure and compare the Q1 dimension on the lift frame with the Q1 dimension on the platform. These dimensions should be identical.

NOT OK

- Error in order preparation, or picking of the equipment from stock.
- Contact DHOLLANDIA distributor to seek advice. The platform must be exchanged or a new lift frame installed.

OK

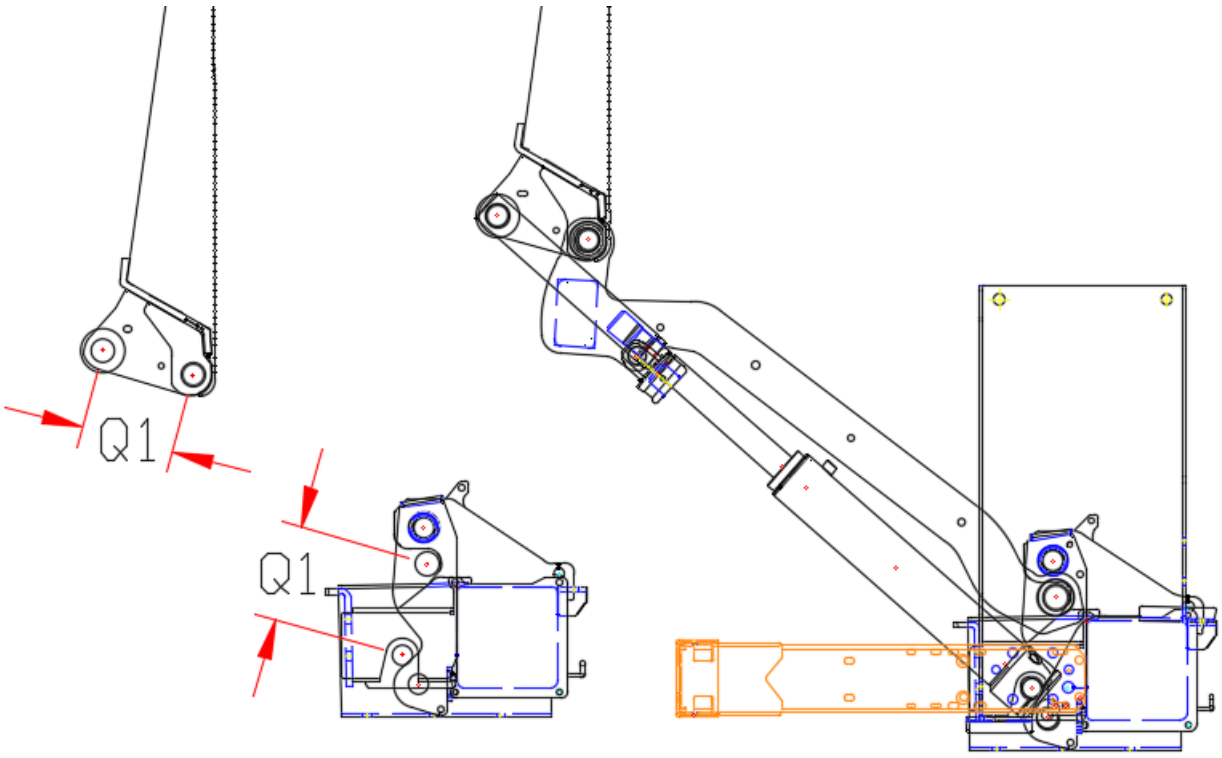
- Remove the solenoid from valve S in the pump unit.
- Check if the platform is still CLOSING when LIFT is activated.

YES

- The cartridge of control valve S in the pump unit is leaking.
- Try and purge valve S [Procedure I-SERV-G-006 on page 44].
- Or replace the failing cartridge of valve S.

NO

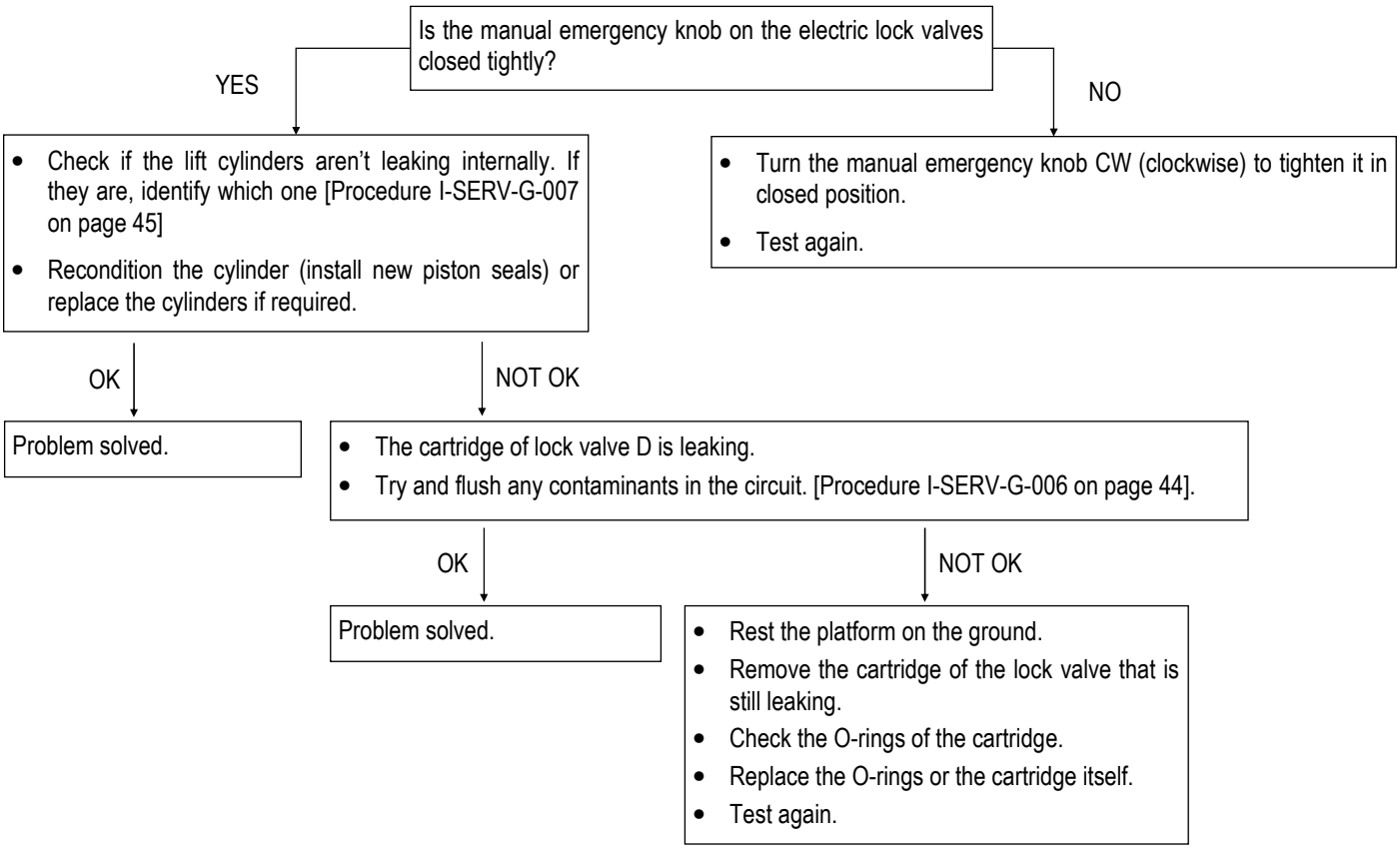
- A button or switch of function CLOSE doesn't return to the neutral 0-position, or:
- Short-circuit in wiring between LIFT and CLOSE circuit.
- Check the button and switches of function CLOSE, and the associated wiring.
- Replace the failed button, or contacts, or wiring.



§9.15 – The platform drifts down slowly, although the operator doesn't push any button (for DH-LM + MECH.X wiring system)

- The electric lock valves D on the lift cylinders are leaking. The O-ring of the cartridge is damaged, or the valve is stuck in open position by contamination or ice.
- The piston seals in the lift cylinders are leaking.
- Combination of both.

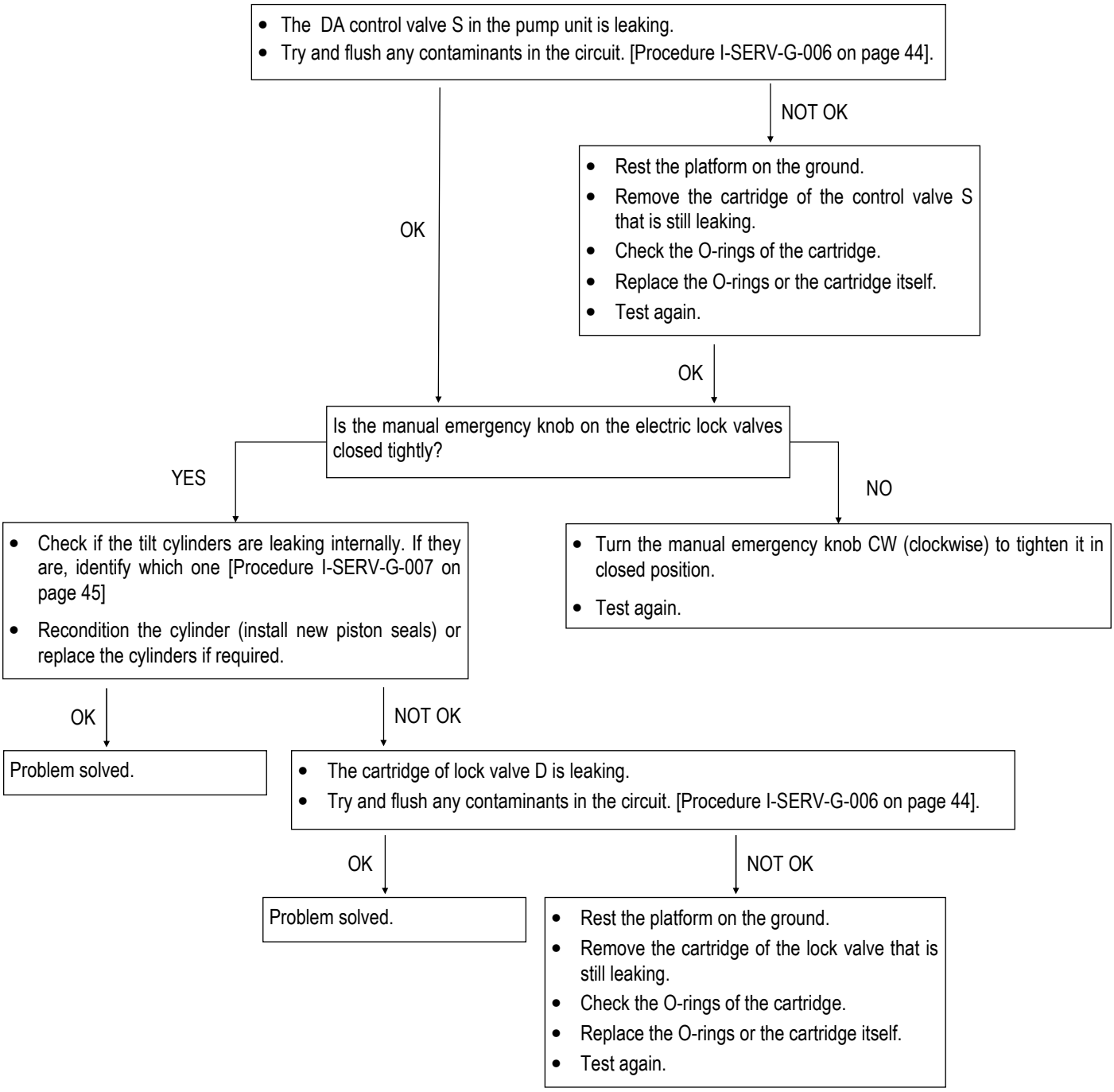
Note: the platform of DH-LM is supported by 2 lift cylinders. The platform can only drift down if a malfunction exists on the left and right side cylinder simultaneously. This means the lock valves D leaking on both left and right lift cylinders; or the internal piston seals leaking on both left and right lift cylinders; or a combination of both.



§9.16 – The platform drifts open slowly, although the operator doesn't push any button (for DH-LM + MECH.X wiring system)

- The electric lock valves O on the tilt cylinders are leaking. The O-ring of the cartridge is damaged, or the valve is stuck in open position by contamination or ice.
- The piston seals in the tilt cylinders are leaking.
- Combination of both.
- The control valve S on the main valve block in the pump unit is leaking. The O-ring of the cartridge is damaged, or the valve is stuck in open position by contaminants or ice.

Note: in its travel position, the platform of DH-LM is supported by 2 tilt cylinders and a double-acting (DA) control valve in the pump unit. The platform can only drift open if a malfunction exists in 3 areas simultaneously: on the left and right side tilt cylinder and in the DA control valve S in the pump unit. This means the DA control valve S in the pump unit is leaking, plus the lock valves O are leaking on both left and right tilt cylinders; or the internal piston seals leaking on both left and right tilt cylinders; or a combination of both.



10. EMERGENCY OPERATION

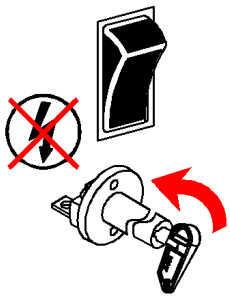
§10.1 - Introduction and safety instructions

- DH-LM tail lifts are equipped with a manual emergency operation feature on the electric lock valves of the cylinders, and the electric control valves in the pump unit.
- This emergency operation feature:
  → enables the operator OPEN or LOWER the platform should the regular electrical controls fail;
  → helps the service technician in troubleshooting, to distinguish between electrical and hydraulic malfunctions.

⚠WARNING

- To reduce the risk of injury, emergency operation of the valves must be restricted to skilled operators, who have been properly trained to do so, and who know and understand the safety instructions for use, repair and maintenance, and the additional precautions described below.
- If operated from a position behind or below the platform, the operator will be exposed to great risk of serious bodily harm and death.
- Always stay out of the range of motion of the platform and moving parts of the tail lift.
- Always keep hands and limbs free from the pinch points created by the moving parts of the tail lift.

- Depending on configuration, switch off the cabin switch and / or the main battery disconnect switch in the external control box.
- Always work from a position on the side or over the front of the lift frame, never from the area behind or under the platform.

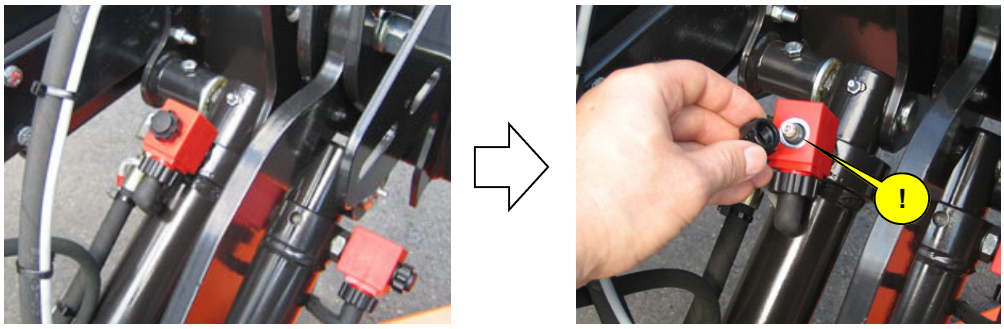


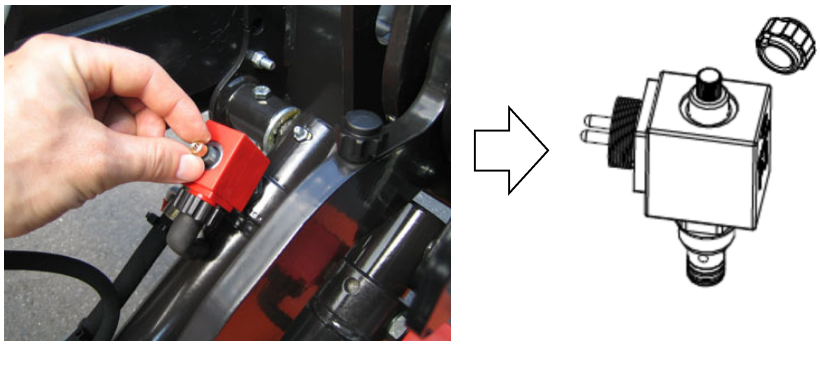
- Use the wiring diagram supplied with the tail lift to determine which electric lock valves on the cylinders, and which control valves in the pump unit must be opened manually to achieve function OPEN or LOWER. Then proceed accordingly.
- Always open the lock valves on the cylinders first, and then the control valve in the pump unit.

- When finished, don't forget to close the emergency manual operation valves by turning the knobs clockwise until tight; then reinstall the protective cap back on top of the valve cartridge.

§10.2 - Procedure I-SERV-G-001: manual operation of the SINGLE ACTING valves

Manual operation of SINGLE ACTING valves V036 / V037 / V133.24 / V133.12 and their .H variants	
Step	**Opening the valve manually**
1	Remove the plastic cap from the top of the cartridge.
2	Turn emergency knob CCW (counter-clockwise) to OPEN the valve manually.
3	The flow of oil through the valve and the speed of the down movement can be regulated by opening the valve more (= faster) or less (= slower).
Step	**Closing the valve manually**
4	Turn emergency knob CW (clockwise) to CLOSE the valve manually. Fasten it hand-tight in the closed position.
5	Mount the plastic cap back on top of the cartridge.

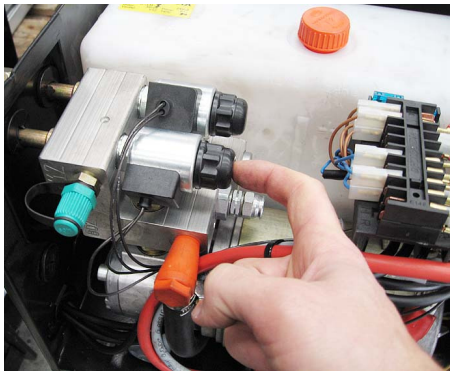


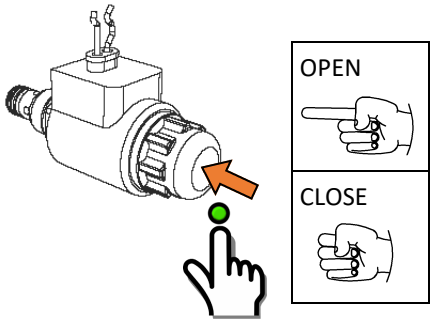


§10.3 - Procedure I-SERV-G-002 : manual operation of the DOUBLE ACTING valves (2 types)

Manual operation of DOUBLE ACTING valves V177.12.H / V177.24.H	
Step	**Opening the valve manually**
1	The plastic cap has an elastic skin, covering an emergency button that can be pushed in by a finger. These valves can be operated manually without removing anything.
2	Push the button IN to OPEN the valve manually.
Step	**Closing the valve manually**
3	Release the button to CLOSE the valve manually.

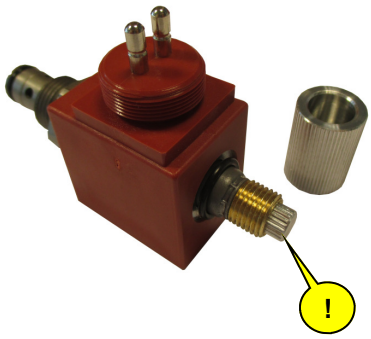
V071.H / V072.H

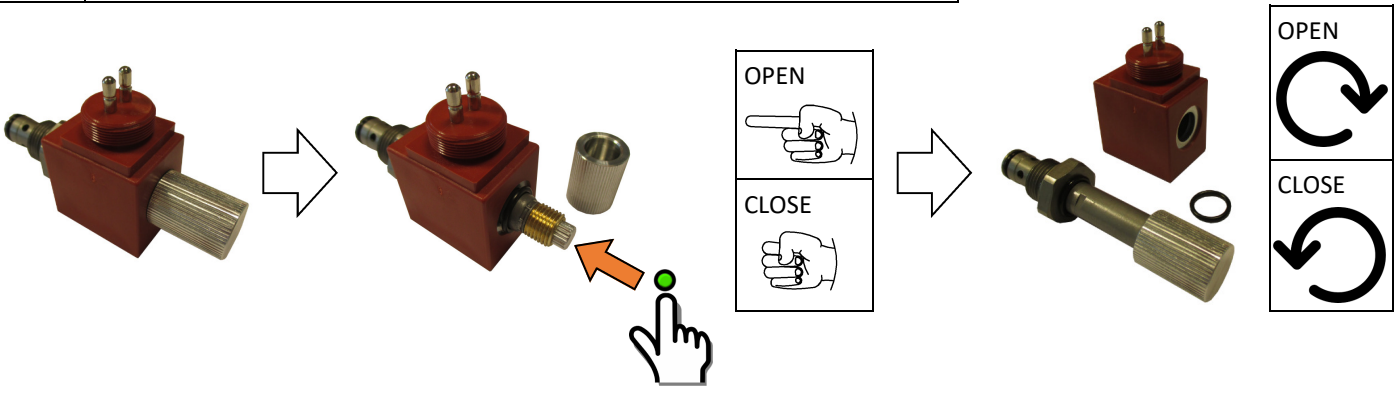




Manual operation of DOUBLE ACTING valves V177.12 / V177.24	
Step	**Opening the valve manually**
1	Remove the metal cap from the top of the cartridge (turn CCW). The push button below the nut must be pushed IN to OPEN the valve manually.
2	Push the button IN to OPEN the valve manually.
3	If the button is difficult to push, remove the solenoid. Put the metal nut back on the cartridge without solenoid, and turn the metal cap CW (clockwise) as far as possible to OPEN the valve manually.
Step	**Closing the valve manually**
4	Release the button, or turn the nut CCW (= counter-clockwise) to CLOSE the valve manually.
5	Reinstall the solenoid back in its original position on the cartridge.
6	Reinstall the metal cap back in its original position and fasten it hand-tight.

V177.12 / V177.24



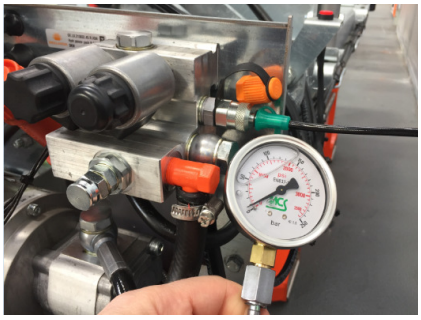


11. OTHER IMPORTANT TECHNIQUES

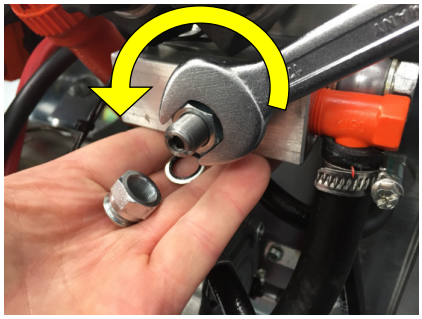
§11.1 - Procedure I-SERV-G-003: hydraulic pressure reading and adjustment

- The lift capacity of the tail lift is determined by the maximum pressure generated by the pump, before the pressure relief valve (on the main valve block in the pump unit) opens, returning the oil back to the oil tank.
- The correct pressure is set via an overload test:

Place a load corresponding with the max. rated capacity at the correct center point of max. load on the platform.

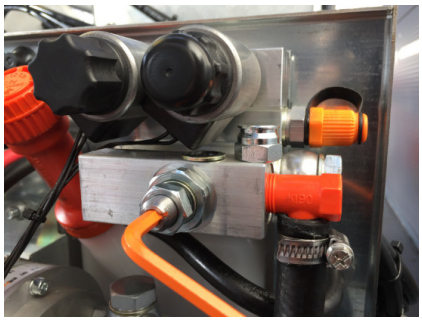


Attach a pressure gauge K0106 (or equivalent) on the pressure gauge coupling



Remove the cap of the pressure relief valve, loosen the jam nut (CCW).

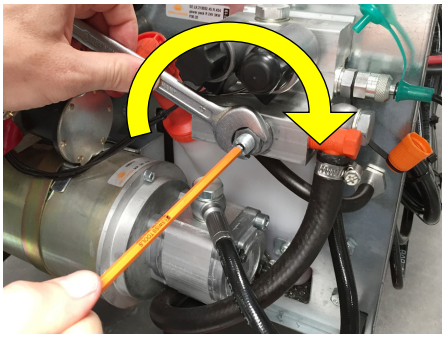
Use an Allen key or screwdriver to adjust the center pressure screw. Press LIFT. Adjust the pressure screw so the platform just lifts the max. rated capacity.



Turn CCW = lower pressure and lift capacity

Turn CW = raise pressure and lift capacity

Increase the load on the platform by 10%. Adjust the pressure so that the tail lift can NOT lift the max. rated capacity + 10%.



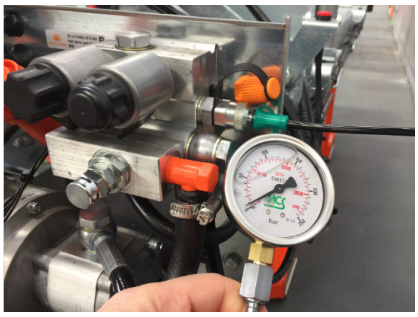
Counter-hold the center pressure bolt and tighten the jam nut (CW). Reinstall the sealing ring and cap back in original place.

⚠WARNING **NOTICE**

- Never adjust the pressure relief valve without using a pressure gauge to verify the changes.
- Never raise the hydraulic pressure above 3190 psi / 220 bar, without asking advice from your national DHOLLANDIA distributor.
- Too high pressure adjustment can cause damage to the tail lift, and serious bodily injury in case of a pressure induced burst in the hydraulic circuit.

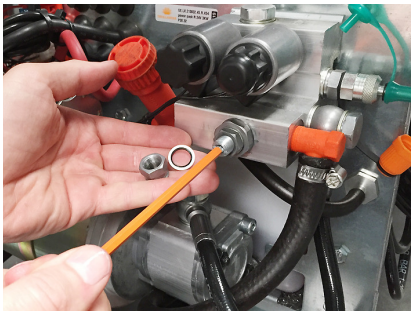
§11.2 - Procedure I-SERV-G-004: flushing of pressure relief valve

- If the tail lift doesn't reach its max. rated lift capacity, one reason might be that the pressure relief valve is stuck open by debris, and the pump cannot build up pressure.
- To flush and clean the pressure relief valve:



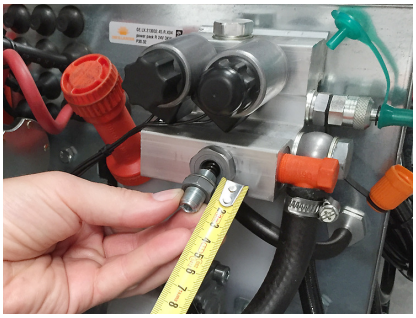
Attach a pressure gauge K0106 (or equivalent) on the pressure gauge coupling

Remove the cap of the pressure relief valve, loosen the jam nut (CCW).



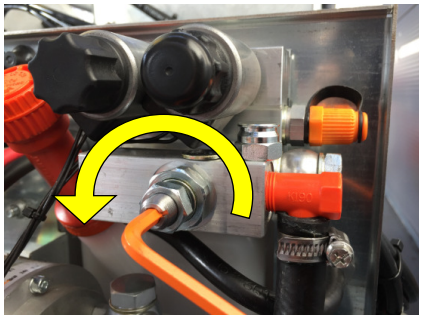
This procedure will require that you unscrew the center pressure screw while the pump is running and building up pressure.

Hence you must be sure of the bolt's length to keep it inside the base of the cartridge with sufficient safety margin, before proceeding to the next step.



Rest the platform at the ground to dump all hydraulic pressure in the system.

Use an Allen key or screwdriver to unscrew the center pressure screw and measure its length. Then assemble the center pressure bolt back in its original position.



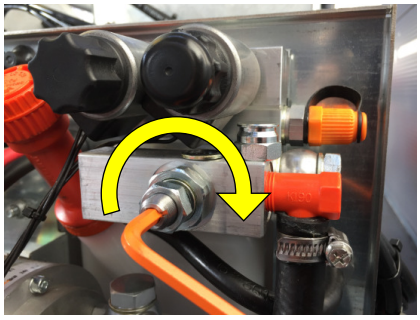
Press LIFT to make the pump run.

Use Allen key or screwdriver to turn the center pressure bolt CCW. Make sure you stand on the side of the valve block, not directly behind (see warning box on next page).

Turn CCW = lower pressure and lift capacity

Turn CW = raise pressure and lift capacity

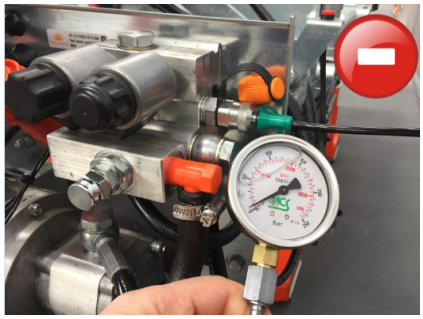
While unscrewing the center pressure screw, measure and make sure you always keep the bottom end min. 4 mm or 5/32" inside the base of the cartridge. Press LIFT for 30 sec.



Press LIFT to make the pump run.

Turn the center pressure screw CW to try and raise the pressure again, beyond the original pressure screw position.

If pressure is rising, follow procedure I-SERV-G-003 to set the correct pressure.



If pressure is NOT rising:

- Rest platform on the ground, and try replacing the pressure relief valve assembly.
- Clean or replace the oil filter (remove debris or ice).
- Replace worn-out pump (if pump body heats up fast).

⚠ WARNING

- Make sure you stand on side of the main valve block and the pump unit, not directly behind the pressure relief valve.
- Wear appropriate work clothes, including a wrap-around face shield, protective gloves and fire resistant overalls.
- Follow the safety instructions for repair and maintenance carefully. Pay attention to your personal safety and environmental protection
- Turning the center pressure screw too far loose (CCW) while the pump is trying to build up pressure, can expel the bolt forcefully, and disperse oil at high pressure. Failure to follow instructions can cause serious bodily injury.

§11.3 - Procedure I-SERV-G-005: check on valve and solenoid function

- The solenoids on the electric lock valves of the hydraulic cylinders, and on the control valves on the main valve block in the pump unit can be checked in various ways. 2 popular ways are as follows.
- Test with magnet tester E0247: the light bulb at the back of the tester shines when a magnetic field is detected.

Test of solenoid on cylinder lock valve

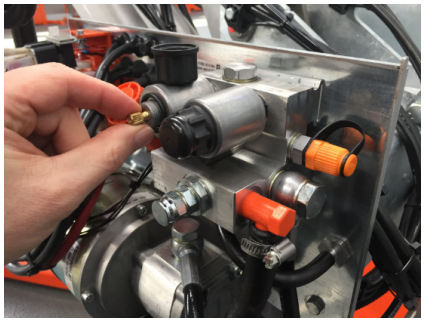
Test of solenoid on control valve in pump unit

Electric function of valve is OK. (+) and (-) wire and solenoid are functional.

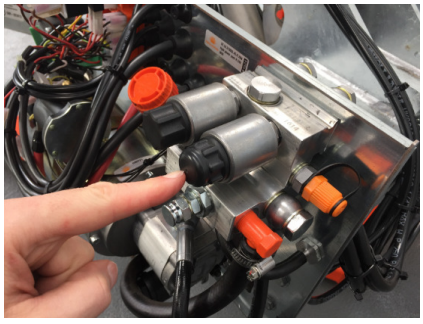
Electric function of valve is NOT OK. Defect in (+) or (-) wire, or solenoid itself.

- Test by means of the manual emergency operation of the cartridge: electric function of valve can be replaced by manual actuation. See Section 10, Procedures I-SERV-G-001 and –002 on emergency operation. If a non-working movement can be brought alive by manually opening the valve(s), the related solenoid is not functional: defect in (+) or (-) wire, or solenoid itself.

Manual operation of single acting cylinder lock valve O (OPEN) or D (DOWN)



Manual operation of single acting control valve H (LIFT) in pump unit



Manual operation of double acting control valve S (OPEN - CLOSE) in pump unit

- Valve is not working.
- Open valve manually.
- Check if intended movement is working OK now?

YES

- Check for voltage at the electric connection board in the pump unit if the external control box works OK.
- If yes: electric defect of the solenoid
  - → Lock valve harness damaged: (+) power wire or (-) ground wire
  - → Bad connection of the lock valve harness on the electric connection board in the pump unit
  - → Defective solenoid; replace.

NO

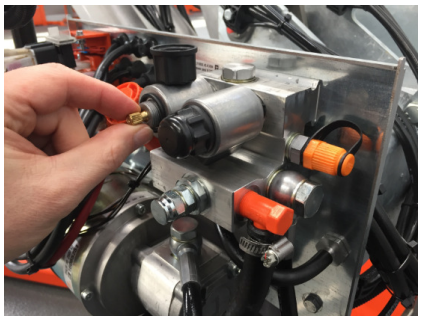
- Cartridge is clogged up with debris or ice. Clean and flush.
- Cartridge is physically damaged; replace.
- Piston rod of the cylinder is bent. Or piston rod is seized up in the cylinder head.
- Other mechanical defect ...

- To end, close the valve manually hand-tight, orient the solenoid in a position that will not damage the valve harness and plug during any of the tail lift functions, replace the nut back on the solenoid and tighten firmly.

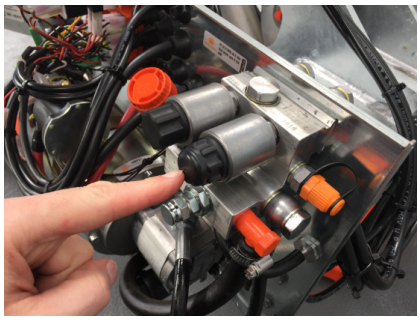
§11.4 - Procedure I-SERV-G-006: Flushing and cleaning of valve cartridge

- If a valve cartridge is leaking, is held partially open by debris in the oil, you can try to flush the debris and clean the valve as follows.
- Open the valve manually by means of the manual emergency operation of the cartridge. Press LIFT for 30 sec. to flush a valve on the LIFT / LOWER circuit. Press CLOSE for 30 sec. to flush a valve on the CLOSE / OPEN circuit.

Manual operation of single acting cylinder lock valve O (OPEN) or D (DOWN)



Manual operation of single acting control valve H (LIFT) in pump unit



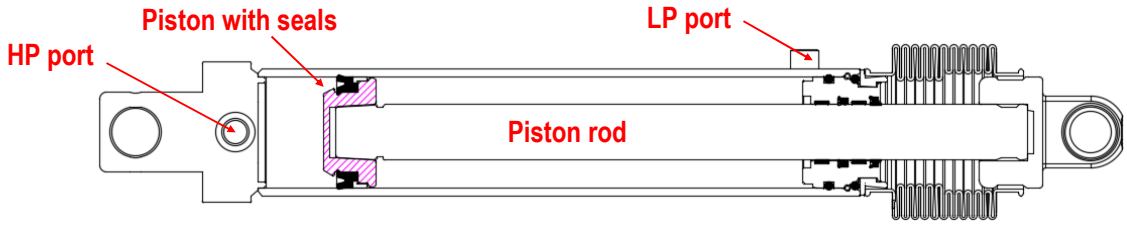
Manual operation of double acting control valve S (OPEN - CLOSE) in pump unit

- If not successful, rest the platform on the ground. Dismount the leaking valve, and try to clean dismounted valve with air gun.
- If not successful, replace the leaking valve.
- To end, close the valve manually hand-tight, orient the solenoid in a position that will not damage the valve harness and plug during any of the tail lift functions, replace the nut back on the solenoid and tighten firmly.

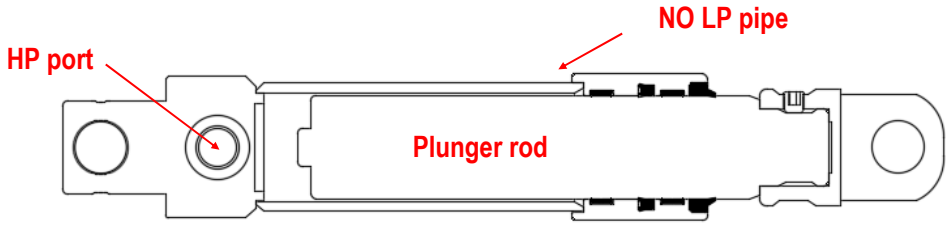
§11.5 - Procedure I-SERV-G-007: Testing internal cylinder leaks

- DHOLLANDIA uses 2 types of hydraulic cylinders

  → Type 1: “Piston” cylinders with a piston rod that is substantially narrower than the barrel, plus a piston with seals.

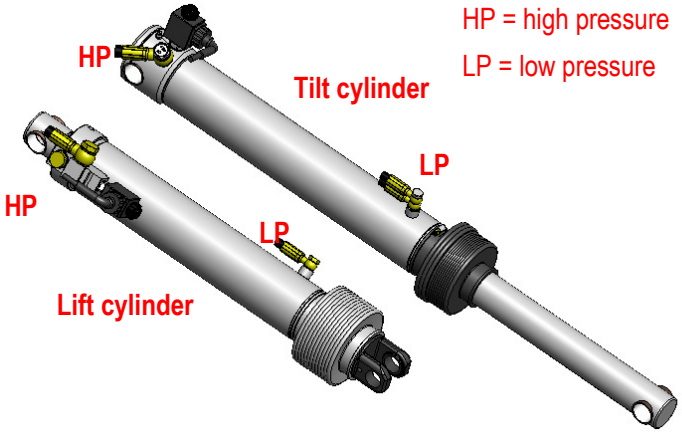


  → Type 2: ”Plunger” cylinders with a piston rod that is same diameter than inside diameter of the barrel, without a piston.



- Type 2 “plunger” cylinders cannot have invisible internal leaks, causing a hydraulic malfunction. Type 1 “piston” cylinders can be tested for internal leakage past the pistons seals as follows.

- To test LIFT cylinder(s):
  1. Rest the platform on the ground
  2. Disconnect the LP (low pressure) pipes from the lift cylinder, and guide them into a clean oil pan to avoid oil spilling on the ground.
  3. Perform 2-3 complete LIFT cycles from ground to vehicle floor and back, to evacuate any remaining oil from the LP side of the lift cylinder. A small amount of oil is normal.
  4. After 4-5 complete cycles, the LP port of the lift cylinder should lose no more oil. If OK, the cylinder is good. If not OK, recondition or replace the lift cylinder.



- To test TILT cylinder(s):
  1. Start with the platform at vehicle floor level, opened up to its maximum downward pitch.
  2. Disconnect the LP (low pressure) pipes from the tilt cylinder, and guide them into a clean oil pan to avoid oil spilling on the ground.
  3. Perform 2-3 complete TILT cycles from the deepest tilt position to the closed travel position and back, to evacuate any remaining oil from the LP side of the tilt cylinder. A small amount of oil is normal.
  4. After 4-5 complete cycles, the LP port of the tilt cylinder should lose no more oil. If OK, the cylinder is good. If not OK, recondition or replace the tilt cylinder.

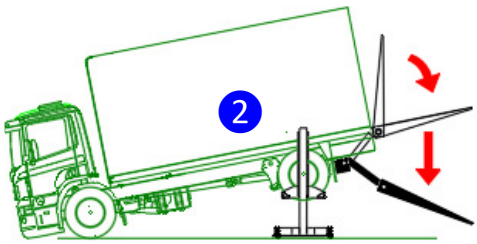
Contact the national DHOLLANDIA distributor, or consult the website to view the “GUIDELINES FOR THE REVISION OF HYDRAULIC CYLINDERS ” and the applicable safety precautions. Confirm that you have reviewed the most up-to-date version of this manual prior to working on hydraulic cylinders.

www.dhollandia.com → Downloads → Education Training → I-SERV-BE 2012-02-EN-cylinder revisions GEN 2

§11.6 - Procedure I-SERV-G-008: Oil replacement, filling and bleeding

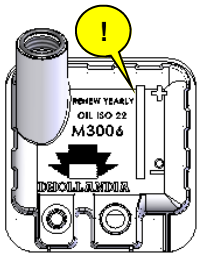
REPLACEMENT OF HYDRAULIC OIL

- Oil is usually drained from the pump unit of the tail lift by means of a vacuum extractor like [1].
- To remove a maximum possible quantity of oil, raise the rear end of the vehicle off the ground as shown in [2]. Then fully OPEN and LOWER the platform beyond the normal work range, to slide the cylinders in to their minimum stroke, and push a maximum volume of oil back to the tank.

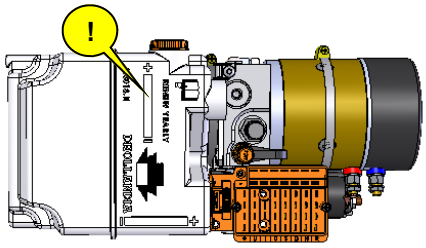


OIL LEVELS

- The oil tanks are marked with minimum and maximum oil levels.
- To fill up oil, rest the platform in open work position at the ground, and fill up to **1" below the (+) maximum mark**.
- LIFT and CLOSE the platform. Check if both movements can be performed fully without oil aspiration problems at filter. Check if the oil level is at or above the (-) minimum mark.
- If the platform cannot be CLOSED fully without oil aspiration problems, top up more oil but not above the (+) mark on the oil tank.



DH-LM.20, DH-LM.30

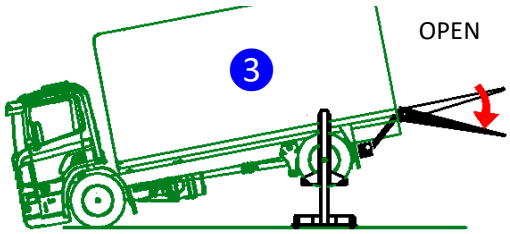


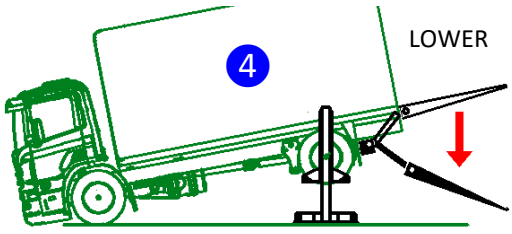
DH-LM.10, DH-LM.15, DH-LM.20

Mark	Meaning	How to measure?
-	Minimum level	Platform stowed vertically in its travel position
+	Maximum level	Platform rested at the ground in work position

BLEEDING OF HYDRAULIC CIRCUITS

- The hydraulic circuits must be bled after following work:
  - → Reconditioning or replacement of hydraulic cylinders
  - → Replacement of hydraulic pipes
  - → Full replacement of oil
- If possible, raise the rear end of the vehicle off the ground as shown in [3] and [4].
- OPEN the platform fully below horizontal level to slide the tilt cylinders to their minimum stroke, as shown in [3]. Continue to press OPEN for 30 seconds.
- TILT the platform UP to horizontal position, and LOWER the platform fully to slide the lift cylinders to their minimum stroke as shown in [4]. Continue to press LOWER for 30 seconds.
- Repeat these 2 actions, until you hear no further oil bubbling back to the oil tank.





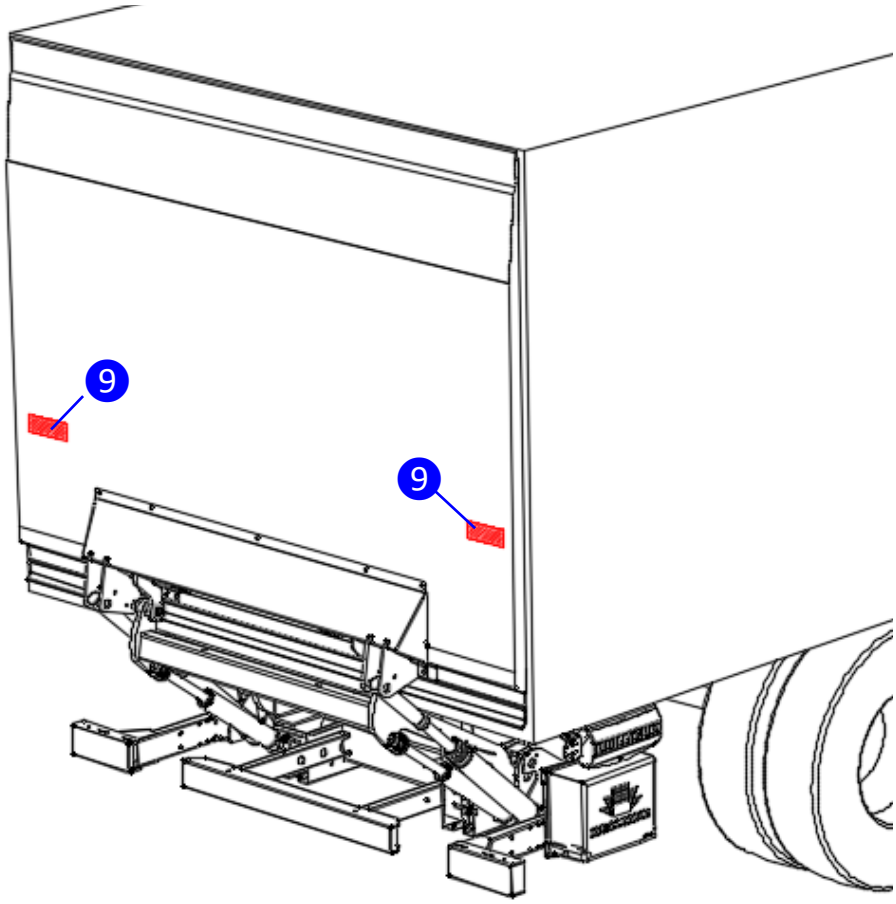
TYPES OF OIL

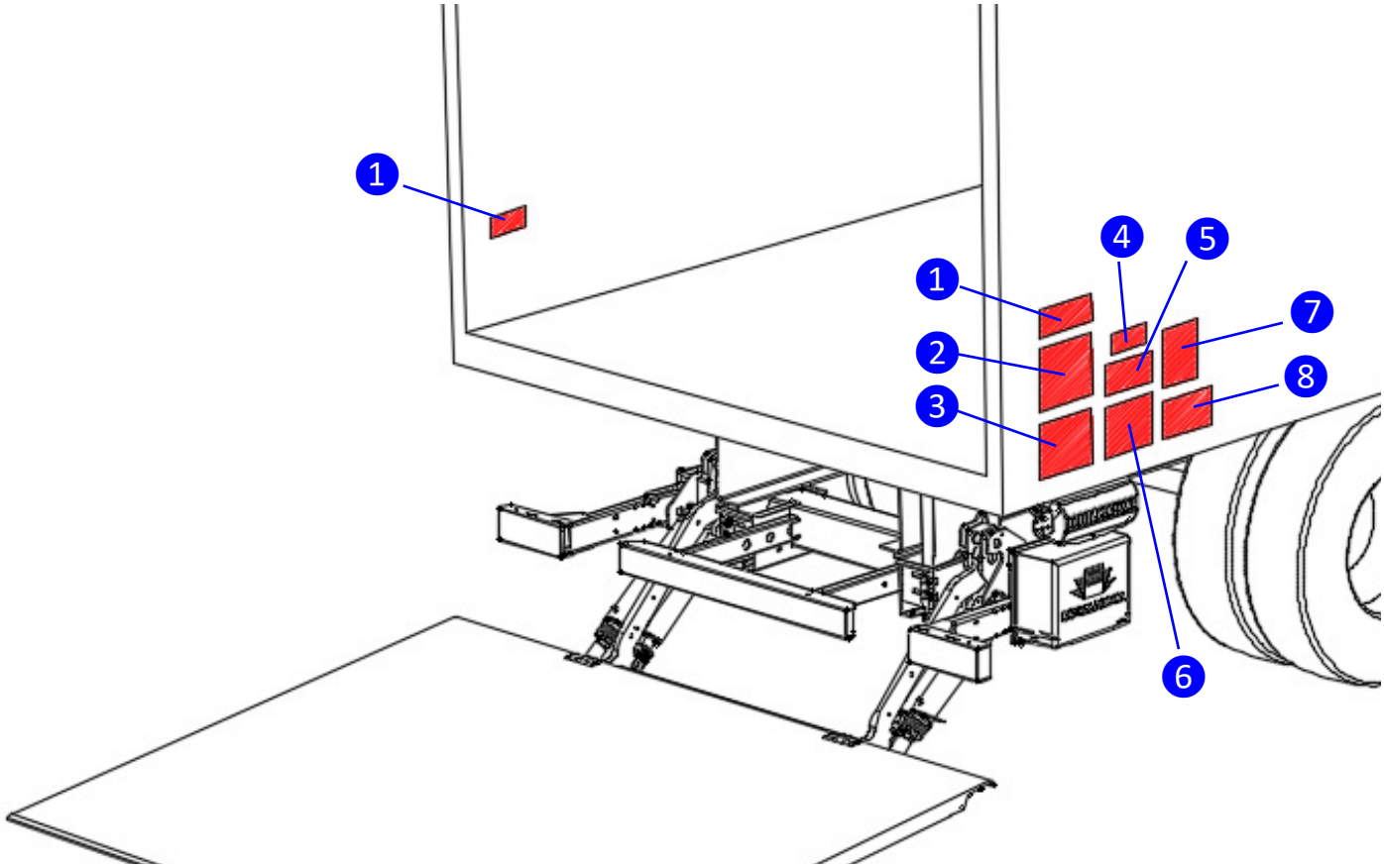
- For various climate conditions, DHOLLANDIA uses 3 types of oil. See table
- When filling up oil, make sure that you use the same, or a compatible type of oil.
- Detailed oil characteristics can be obtained from your national DHOLLANDIA distributor [doc. I-SERV-H-001 in latest version].

Option code	Temperature	Type of oil, examples
Standard	Mild to hot	ISO VG 22
OAH001 winter oil	Down to –30°C = -22°F	ISO VG15
OAH002 Arctic oil	Down to –52°C = -60°F	Hydr. fluid such as Castrol Aero HF 585 B

10. DECALS

- The following decals are supplied with each new tail lift, and should be affixed to the vehicle body during installation in the manner set forth in the adjacent drawings.
- NEVER remove or paint over any decal. Missing, worn or illegible warning decals must be immediately replaced. Get free replacement decals from DHOLLANDIA. Contact your regional DHOLLANDIA distributor. See page 4 for contact info.
- The operator should comply with all affixed safety and instructions decals. Be aware that the decals merely summarize the main points, and that the operator must know, understand, and comply with the full contents of the operation manual.
- Note: the decals marked as “EXAMPLE” can vary in function of the maximum rated capacity of the tail lift, or the chosen type of external control box.





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⚠ WARNING - SAFETY INSTRUCTIONS

Read and understand the user's manual, all instructions and warnings before use.

Carelessness or ignorance will put the operator and third parties at great risk of serious injury and death.

1. Do not use liftgate unless you have been properly trained and instructed, you have read and you understand the full operating instructions.
2. Wear appropriate working clothes, incl. footwear with steel toe caps and a good non-slip sole, and wear protective gloves.
3. Ensure the vehicle is safely parked and braked before using the liftgate.
4. Where applicable, refer to the site's specific risk assessment, and follow the local work & safety instructions.
5. Always inspect the tail lift before using it. DO NOT use tail lift if there are signs of bad maintenance, subnormal wear or damage, or if the platform surface is slippery. DO NOT attempt to repair tail lift yourself, unless you have been trained and authorized to do so.
6. Do not overload. Observe the maximum rated capacity and load charts.
7. Do not stand behind or within reach of the platform.
8. Make sure that platform area, including the area in which loads may fall from platform, is clear of obstacles and other people at all times.
9. Make sure you can see and keep visual control over the whole working area of the liftgate, the platform and its load at all times.
10. Beware of finger and toe traps at all times. When riding platform, stand at safe distance of minimum 10" from the inboard edge of the platform adjacent to the rear
11. It is prohibited for anyone other than the operator to travel on the platform.
12. Liftgate is intended for loading and unloading cargo only. Do not use liftgate for anything else but its intended use.
13. Make sure platform is clearly visible from all approach directions (by means of flashing platform lights, platform flags, traffic cones, etc...) and that the working zone is sufficiently illuminated.

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EXAMPLE

3

EF0582

4

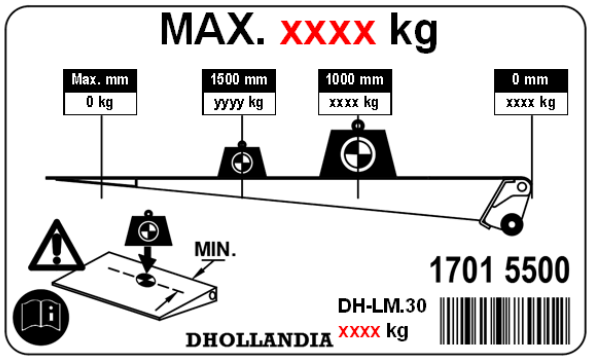
EF0570 +

EXAMPLE

5

EF0585 + serial nr

EXAMPLE



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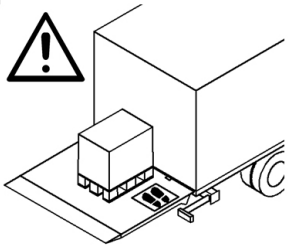
PLATFORM LOADING INSTRUCTIONS



Position load as close as possible to inboard platform edge.

Position load in middle line of platform. Avoid loading on 1 side only.

Operator should stand on side of load, well clear of inboard platform edge to avoid crushing feet.

Read and understand the user's manual, all instructions and warnings before use.

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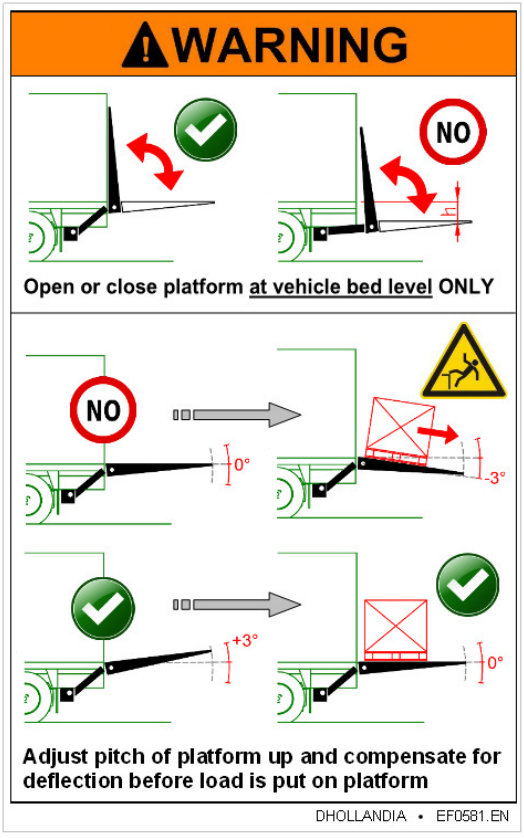

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- Tail lift decals used and affixed in areas, other than the rear of the vehicle:

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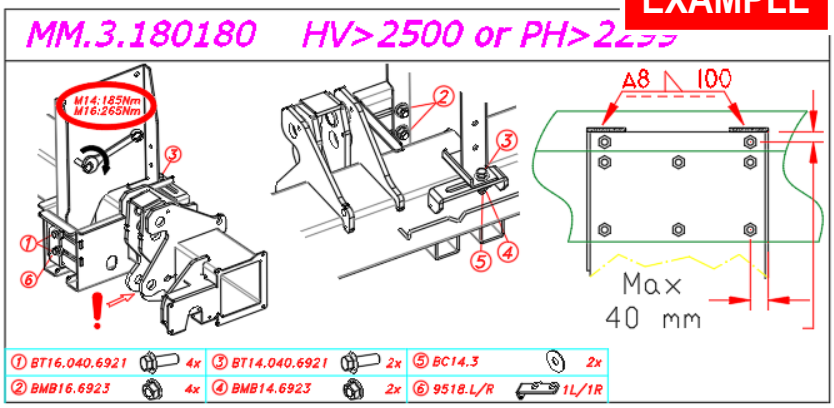
EF0814-EN-US

Cabin switch in driver's cabin to switch electrical power to tail lift on / off (if so equipped)

13. PRESCRIBED TORQUE VALUES FOR BOLTS SUPPLIED WITH LIFTGATE

- Installer must verify that all bolted connections are fastened to the required torque value in conformance with table in this appendix.
- Different torques apply for bolts in a shear stress versus pull stress mounting application. See table enclosed.
- After weight testing, installer must verify that all bolted connections between lift frame and mounting plates, and between mounting plates and vehicle chassis are still tightened to the required torque value. Retighten if necessary.
- Use a calibrated torque wrench to tighten bolt and nut connections to the prescribed torque value.

EXAMPLE



Nm	Bolt Class X= 8.8 Y=10.9			
	Type of stress			
	P		S	
	PX	PY	SX	SY
M08 x 1.25	8	11	24	33
M10 x 1.50	15	22	47	68
M12 x 1.75	26	44	82	115
M14F x 1.50	45	65	135	195
M14 x 2.00	45	65	129	185
M16F x 1.50	100	150	208	300
M16 x 2.00	100	150	195	285
M20 x 1.50	215	310	425	605
M24 x 2.00	360	490	715	975

M12.6.PX = 6x M12 P type of load class 8.8

Pull stress

Shear stress

⚠WARNING

NOTICE

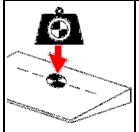
- Incorrect, too soft or too hard tightening of mounting bolts can lead to accidental fall of the liftgate off the vehicle chassis.
- A fall of the liftgate off the chassis can damage the liftgate and / or vehicle chassis, and can cause serious bodily injury or death to the operator and any bystanders.
- Therefore, it is essential that the mounting plates are installed following the instructions of in the installation manual, and bolt torques are maintained at the prescribed levels as part of the maintenance program.

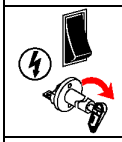
14. MEANING OF SAFETY AND WARNING SIGNS

WARNING signs	
	Overview and keep visual control over the working area of the liftgate at all times.
	General warning sign, used to alert the user to potential hazards. All messages that follow this sign shall be obeyed to avoid possible harm.
	Entrapment hazard. Keep hands, limbs, loose clothes and long hair away from moving parts.
	Crushing & shearing hazard. Keep hands away from moving parts.
	Crushing & shearing hazard. Keep feet away from moving parts.
	Slipping hazard.
	Tripping hazard.
	Hazard caused by tilting objects.
	Hazard of falling from heights.

MANDATORY ACTION signs	
	Contact your regional DHOLLANDIA distributor.
	Consult the DHOLLANDIA website. Download from DHOLLANDIA website.
	Read the manual or instructions.
	Hold on to safety rail. Protect yourself from falling off the platform, or vehicle floor.
	Wear safety gloves.
	Wear safety-toe shoes.
	Wear appropriate work clothes, avoid loose-fitting clothes that might be trapped in the moving parts of the lift.
	Wear ear protection, eye protection and a safety hard hat.
	Use a safety shield.

PROHIBITION signs	
	General prohibition. DO NOT do!
	General prohibition. DO NOT do!
	DO NOT use machine by more than 1 operator!
	DO NOT step or stand here!

Other frequently used signs	
	Yes do this way. Correct work procedure.
	Yes do this way. Correct work procedure.
	No, DO NOT do this way. Incorrect work procedure.
	Position the load at the applicable center of gravity or load center. Follow the load instructions.
	Emergency stop. Will cause an immediate stop of the liftgate.
	Emergency exit. Provision (lever, valve,…) creating an emergency
	Unlock. Disengage the mechanical locking system.
	Lock. Engage the mechanical locking system.

	Switch ON the electrical power.
	Switch ON the electrical power to the liftgate via the main battery disconnect switch and / or cabin switch.
	Switch OFF the electrical power.
	Switch OFF the electrical power to the liftgate via the main battery disconnect switch and / or cabin switch.
	This is an operation to be executed manually (as opposed to an electrical function controlled by means of one of the control units).