

MULCHER

TORNADO 450

10.1 -SERIES

TORNADO 470

10.1 -SERIES

TORNADO 560

10.1-10.2 -SERIES



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EC DECLARATION OF CONFORMITY

MANUFACTURER:
OY ELHO AB
INDUSTRIVÄGEN 6
68910 BENNÄS FINLAND

TECHNICAL FILE:
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PRODUCT DEVELOPMENT MANAGER, CTO
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WE DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE FOLLOWING PRODUCT

EQUIPMENT: MULCHER
BRAND NAME: TORNADO
MODELL/TYPE: 450, 470 OCH 560
OPTIONAL ATTACHED EQUIPMENT

- HYDRAULIC FRONTHATCH TORNADO 560
- HYDRAULIC FRONTHATCH TORNADO 450

IS IN CONFORMITY WITH THE
MACHINEDIRECTIVE 2006/42/EC
AND THE FOLLOWING HARMONIZED STANDARDS AND TECHNICAL SPECIFICATIONS HAVE BEEN APPLIED:

EN 292-1
EN 292-2
EN 294
EN 349
EN 811
EN 1152
ISO 5781
ISO 3767/91

BENNÄS 07.10.2019



MICHAEL JOHANSSON, CEO

LIMITED WARRANTY

THIS LIMITED WARRANTY IS A PRODUCT WARRANTY GIVEN BY OY EL-HO AB (“ELHO”) WARRANTING THE QUALITY OF ITS MANUFACTURED PRODUCTS TO THE ORIGINAL OWNER. ELHO’S LIABILITY FOR DEFECTS IN THE MANUFACTURED PRODUCTS IS LIMITED AS STATED IN THE CONDITIONS BELOW.

1. WARRANTY EXTENT AND PERIOD

ELHO WARRANTS THAT NEW MACHINERY AND EQUIPMENT MANUFACTURED BY ELHO WILL BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USE FOR A PERIOD OF TWELVE (12) MONTHS AFTER THE DATE OF SALE TO THE ORIGINAL OWNER (“THE CUSTOMER”) AND UNDER THE CONDITION THAT THE DISTRIBUTOR HAS REGISTERED THE WARRANTY AT ELHO BY RETURNING THE WARRANTY REGISTRATION FORM WITHIN 14 DAYS FROM THE DATE OF SALE TO THE CUSTOMER (“THE LIMITED WARRANTY”). A REPAIR UNDER THIS LIMITED WARRANTY DOES NOT EXTEND THE WARRANTY PERIOD.

2. WARRANTY CLAIM

ANY CLAIM UNDER THE LIMITED WARRANTY SHALL BE REPORTED BY RETURNING A COMPLETE WARRANTY APPLICATION TO ELHO WITHIN 14 DAYS FROM THE DATE WHEN THE CUSTOMER MADE THE DISTRIBUTOR AWARE OF THE DEFECT; OR ELSE THE WARRANTY CLAIM WILL NOT BE ACCEPTED. A COMPLETE WARRANTY APPLICATION SHALL IN ANY CASE BE SENT TO ELHO WITHIN 30 DAYS FROM THE DATE WHEN THE DAMAGE WAS DISCOVERED OR SHOULD REASONABLY HAVE BEEN DISCOVERED; OR ELSE THE WARRANTY CLAIM WILL NOT BE ACCEPTED. THE DISTRIBUTOR SHALL PROVE THAT THE WARRANTY APPLICATION WAS SENT WITHIN THE TIME LIMITS STATED ABOVE.

3. REPAIR OR REPLACEMENT PROCEDURE

UNDER THE CONDITIONS THAT THE WARRANTY HAS BEEN CORRECTLY REGISTERED ACCORDING TO CLAUSE 1 AND THE WARRANTY CLAIM HAS BEEN MADE IN COMPLIANCE WITH CLAUSE 2, ELHO ASSUMES RESPONSIBILITY UNDER THE LIMITED WARRANTY TO, AT ELHO’S OPTION, REPAIR OR REPLACE ALL PARTS THAT IN ELHO’S OPINION ARE DEFECTED IN MATERIAL OR WORKMANSHIP. THIS

RESPONSIBILITY CAN BE SATISFIED BY SHIPPING THE PARTS NEEDED FOR REPAIR OR REPLACEMENT TO THE DISTRIBUTOR. ELHO ASSUMES RESPONSIBILITY FOR THE COSTS OF SPARE PARTS NEEDED FOR REPAIR OR REPLACEMENT AND FOR THE FREIGHT OF THESE PARTS TO THE DISTRIBUTOR.

THE DISTRIBUTOR SHALL MAINTAIN THE DEFECTIVE PARTS FOR SIX (6) MONTHS AFTER THEIR REPLACEMENT. ON ELHO’S INITIATIVE AND AT ITS EXPENSE, THE DEFECTIVE PARTS SHALL BE SHIPPED TO ELHO FOR ANALYSIS.

4. LIMITATIONS ON WARRANTY COVERAGE

4.1 COMPONENTS NOT MANUFACTURED BY ELHO

COMPONENTS NOT MANUFACTURED BY ELHO, BUT INCORPORATED IN MACHINERY AND EQUIPMENT MANUFACTURED BY ELHO, E.G. HYDRAULIC COMPONENTS, POWER TRANSMISSION SHAFTS, GEARBOXES, TIRES ETC., ARE COVERED BY THE WARRANTY GRANTED BY THE ORIGINAL MANUFACTURER OF THE COMPONENTS.

4.2 NO WARRANTY FOR FITNESS OR PERFORMANCE

ELHO DOES NOT WARRANT THE FITNESS OF THE MACHINERY OR EQUIPMENT FOR A PARTICULAR PURPOSE OR THE PERFORMANCE OF THE MACHINERY OR EQUIPMENT.

4.3 DAMAGE CAUSED BY THE OWNER

THE LIMITED WARRANTY DOES NOT COVER DAMAGE OR LOSS THAT IN ELHO’S OPINION IS RESULTING FROM NORMAL WEAR AND TEAR OR DAMAGE OR LOSS RESULTING FROM MISUSE, OVERLOAD, ACCIDENT, NEGLIGENCE OR IMPROPER INSTALLATION, OPERATION OR MAINTENANCE, ALTERATION OF THE MACHINERY OR EQUIPMENT WITHOUT ELHO’S WRITTEN CONSENT OR USAGE OF NON-ORIGINAL PARTS. AGRICULTURAL MACHINERY IS SUBJECTED TO WEAR AND TEAR AND NEEDS REGULAR MAINTENANCE.

TORNADO 450, 470 & 560**4.4 DETERIORATING PARTS**

THE LIMITED WARRANTY DOES NOT COVER DAMAGE ON WEAR PARTS E.G. PROTECTIVE CANVASES, BLADES, FLAILS, CONDITIONER FINGERS AND SHAFTS, DISCS, GEAR SHAFT FOR DISCS, SKIDS, FRICTION CLUTCHES, TINES, TIRES, SHARPENING EQUIPMENT, MULCHER CHAINS, V-BELTS, ROLLER CHAINS, CHAIN TIGHTENER PARTS, SCRAPERS, RUBBER DAMPERS, FILTERS OR DAMAGE TO PAINT DUE TO NORMAL WEAR AND TEAR.

4.5 TRANSPORTATION

THE LIMITED WARRANTY DOES NOT COVER DAMAGE OR LOSS RESULTING FROM TRANSPORTATION FROM OR TO ELHO OR BETWEEN THE DISTRIBUTOR AND THE CUSTOMER.

4.6 VANDALISM ETC.

THE LIMITED WARRANTY DOES NOT COVER DAMAGE OR LOSS RESULTING FROM VANDALISM, THEFT OR OTHER COMPARABLE DAMAGE.

4.7 PRODUCT IMPROVEMENT

ELHO HAS A POLICY OF CONTINUOUS PRODUCT IMPROVEMENT. ELHO RESERVES THE RIGHT TO DEVELOP, IMPROVE AND ALTER THE DESIGN OF ANY ELHO PRODUCT WITHOUT ASSUMING ANY OBLIGATION TO MODIFY ANY ELHO PRODUCT PREVIOUSLY MANUFACTURED.

4.8 CONSEQUENTIAL DAMAGE

ELHO WILL NOT BE LIABLE FOR LOST PROFITS, LOSS OF BUSINESS, INCONVENIENCE, ADDITIONAL OPERATING EXPENSES, DAMAGE TO HARVEST, DAMAGE OR INJURY TO PROPERTIES OR PERSONS, OR OTHER LOSS OR DAMAGE RELATING IN ANY WAY TO THE MACHINERY, EQUIPMENT, PRODUCTS OR SERVICES, WHETHER DIRECT OR CONSEQUENTIAL, SPECIAL, INDIRECT OR PUNITIVE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH LOSSES OR DAMAGE, OR FOR ANY CLAIM BY ANY THIRD PARTY. THE FOREGOING LIMITATIONS APPLY REGARDLESS OF THE CAUSES OR CIRCUMSTANCES GIVING RISE TO SUCH LOSS, DAMAGE OR LIABILITY, EVEN IF SUCH LOSS, OR DAMAGE OR LIABILITY IS BASED ON NEGLIGENCE OR

OTHER TORTS OR BREACH OF CONTRACT INCLUDING, WITHOUT LIMITATION, FUNDAMENTAL BREACH OR BREACH OF A FUNDAMENTAL TERM.

5. NO ASSIGNMENT

THE RIGHTS OF THE DISTRIBUTOR UNDER THIS LIMITED WARRANTY ARE NOT TO BE ASSIGNED TO ANY THIRD PARTY.

6. ENTIRE WARRANTY

THE FOREGOING LIMITED WARRANTY CONSTITUTES THE ENTIRE WARRANTY GIVEN BY ELHO. THERE ARE NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, IN RESPECT OF THE MACHINERY, EQUIPMENT, SPARE PARTS OR SERVICES CONTEMPLATED BY THESE TERMS, INCLUDING WITHOUT LIMITATION, NO WARRANTIES OR CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

7. INDEMNITY

THE DISTRIBUTOR SHALL INDEMNIFY ELHO AGAINST ALL WARRANTY CLAIMS OR OTHER CLAIMS REGARDING ANY COST, LOSS OR LIABILITY FROM THE CUSTOMER OR ANY THIRD PARTY. THE DISTRIBUTOR SHALL HANDLE ALL WARRANTY CLAIMS CONCERNING ELHO PRODUCTS WITHIN ITS TERRITORY OF BUSINESS.

8. GOVERNING LAW

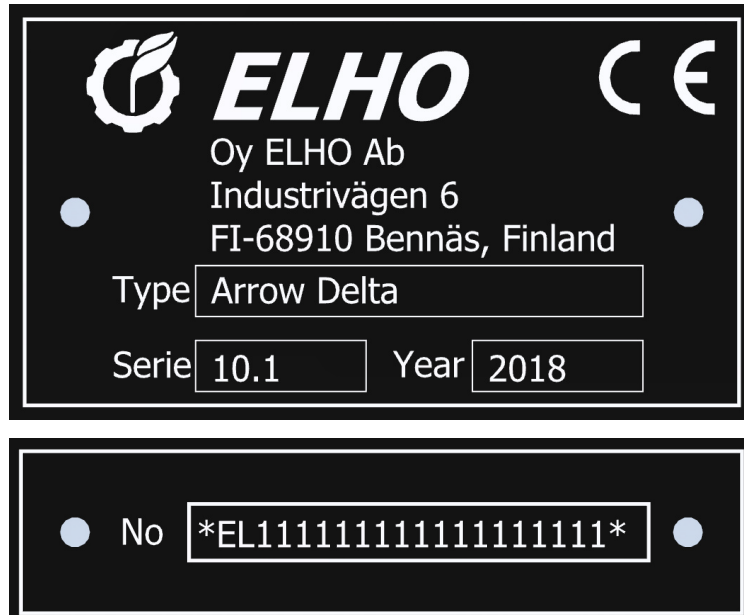
THIS LIMITED WARRANTY IS GOVERNED BY THE FINNISH LAW.

9. DISPUTES

ANY DISPUTE, CONTROVERSY OR CLAIM ARISING OUT OF OR IN CONNECTION WITH THIS LIMITED WARRANTY, OR THE BREACH, TERMINATION OR INVALIDITY THEREOF, SHALL BE FINALLY SETTLED BY ARBITRATION IN ACCORDANCE WITH THE ARBITRATION RULES OF THE FINLAND CHAMBER OF COMMERCE. THE NUMBER OF ARBITRATORS SHALL BE THREE (3). THE PLACE OF ARBITRATION SHALL BE HELSINKI, FINLAND AND THE LANGUAGE OF THE ARBITRATION SHALL BE ENGLISH.

MACHINE SERIAL NUMBER

YOU CAN FIND THE SERIAL NUMBER OF THE MACHINE FROM THE PLATE ON THE MACHINE FRAME. ALWAYS PRESENT THE MODEL IDENTIFICATION AND SERIAL NUMBER WHEN ORDERING SPARE PARTS, OR CLAIMING WARRANTY ETC.



WRITE DOWN THE INFORMATION FROM YOUR MACHINE IN THE FIELDS BELOW. THIS MAKES SPARE PART ORDERS EASIER FOR YOU IN THE FUTURE.

TYPE

SERIES

NO.

1. SAFETY INSTRUCTIONS

1.1 INTENDED USE

The Mulcher Tornado is designed for using with normal agricultural tractors. The machine is used for chopping and trimming of bushes and small trees which grow along the hedgerows and in ditches. It is not however designed for chopping and trimming very large trees.

Do not exceed 30km/h when transporting the machine.

Before usage of the machine, read thoroughly this instruction manual and follow the instructions given.

1.2 TRACTOR AND MACHINE NOISE.



EC directive 86-1888-EEG and UK; "Noise at Work Regulations 1989" places the responsibilities for employers and employees to assess and control noise levels in the workplace. If you operate at maximum speed in a confined space, the noise level of the machine may exceed 87dB (A). We recommend that you do not run the machine in a confined space. But if necessary correct ear protection should be worn. The noise level during normal use varies depending on the noise from the tractor and how it is used. In some cases, the tractor, in motion under load and normal PTO speeds, will emit the highest noise level. Approximate noise level at the driver's seat from the machine with the tractor cab window open, is in the range 80-96 dB (A) and takes place with the machine in the raised position and not in the mowed position. The noise level from the machine usually decreases during mowing. We recommend that you keep the cab windows of the tractor closed when using the machine. If the window must be open for ventilation, use the side window farthest from the mower bar. Keep in mind that radios and other sound sources inside the tractor cab can also be a source of noise. The comments on noise levels are only a guide and each combination of tractor and machine must be assessed individually.

1.3 MANUAL HANDLING - COMPONENTS

EC-directive 89/391/EEG and 90/269/EEC and UK Manual Operations Regulations 1992, lays the responsibility on the employer and employees to follow the required safety when heavy lifting is done manually. Depending on the work situation certain components can require to people to handle them.

1.4 WARNING SIGNS

This instruction manual contains clearly marked warning signs that are intended for your personal safety and contains important advices for using the machine.

 WARNING	
	Indicates the presence of a hazard which could result in personal injury

NOTICE	RISK OF DAMAGING THE MACHINE
	Is used to address risk of mechanical damage

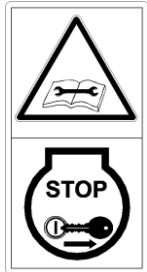
1.5 SAFE OPERATION

Before you operate or assemble the machine, read carefully this manual and the safety labels on the machine.

- Keep children and unauthorized persons at a safe distance from the machine when starting it up.
- Make sure that all the protection surfaces are correctly assembled and complete.
- Before the machine's drive shaft is attached to the tractor, double-check that there are no loose components on or under the machine. Also, check that nobody is standing in front of or behind the machine when it is started.
- All installations and servicing can only be carried out when the machine is stopped running.
- Never work under the machine, e.g. in the case of changing the chains without the lifting cylinder valve closed.
- Always check that there is no one in the danger area when turning the machine in the working or transport position.
- The machine chains can continue rotating for over one minute after the power has been turned off. It is therefore recommended that you wait inside the tractor's cabin until it has completely stopped rotating. Always activate the hand brake before leaving the tractor
- The noise level from the ELHO Tornado can reach over 87 dB(A), especially when the machine is in operational mode; so, it is, therefore, we recommend all the windows in the tractor remain closed whilst being operated.
- When the window is open on the passenger's side the noise level can reach anywhere from 80-96 dB(A) when the machine is in operational use.

1.6 SAFETY LABELS ON THE MACHINE

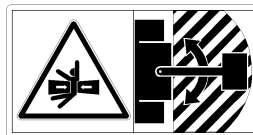
The ELHO Tornado is provided with adequate protection and safety devices. It is not possible to build a machine that has no danger areas in or around it and that is why we provide you the user these symbols to help protect you.



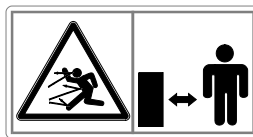
1. This symbol means that you need to turn off the engine, turn off the electrics and take out the starting key and read the instructions before removing any protection.



2. You need to wait until the chains have stopped rotating, this can take several minutes after the machine has stopped running.



3. This symbol is showing that you should not stand in the danger zone.



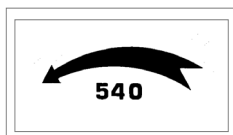
4. This symbol is telling you to stand at a safe distance from the machine due to risk of rocks/stones being thrown up from the ground.



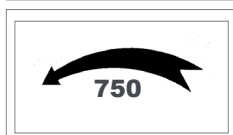
5. This symbol is trying to warn you to stop the machine before removing any guards.



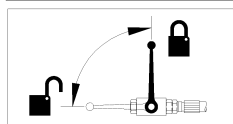
6. This symbol is telling you to stay within a safe distance from the machine when it is moving, ie. Being placed in the working position.



7. This symbol is reminding you to drive with a max rpm of 540



8. This symbol is reminding you to drive with a max rpm of 750



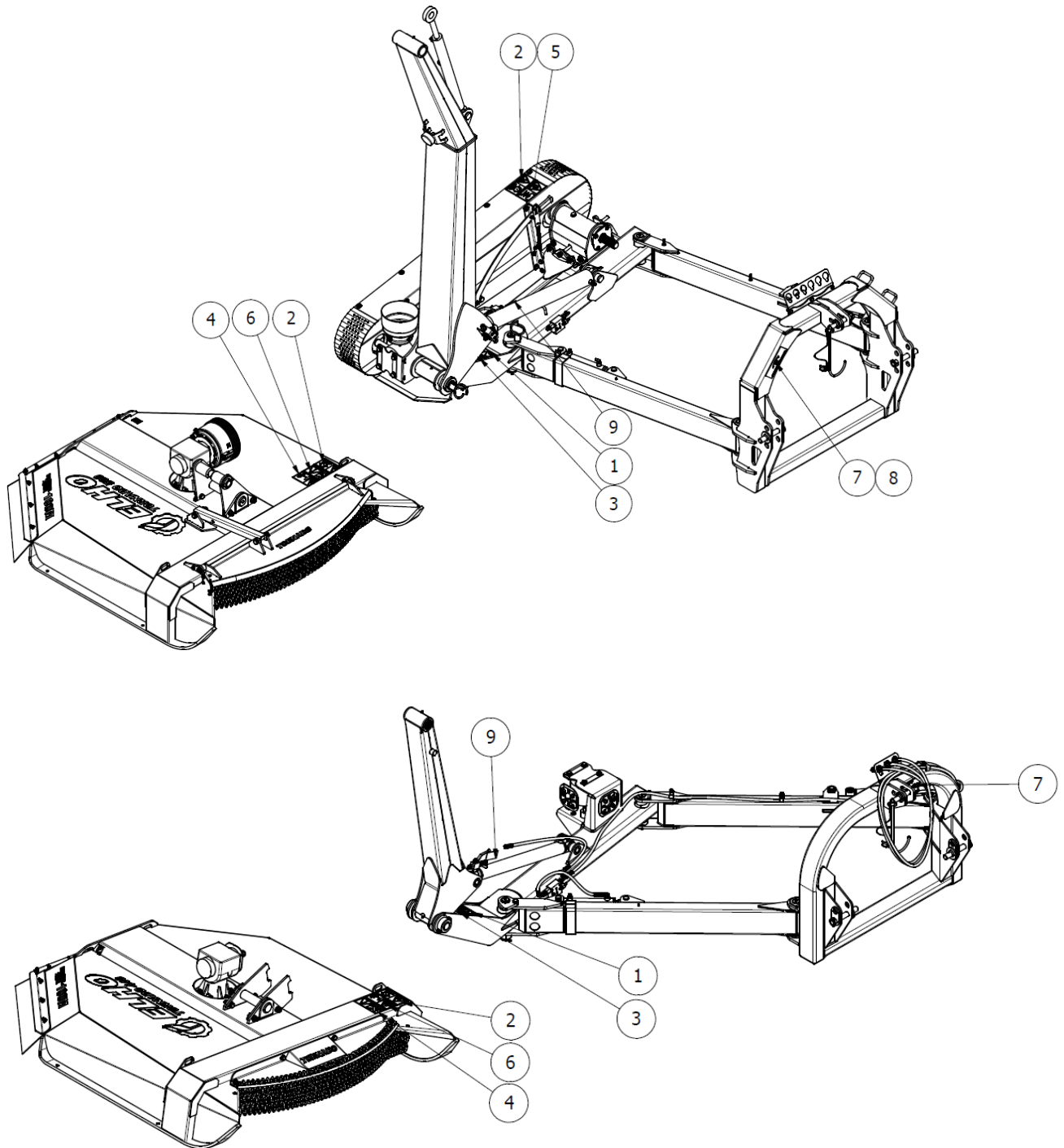
9. This symbol is reminding you to close the lifting cylinder hand valve before for transporting the machine.

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1.7 Replacing safety labels

Replace missing or damaged safety labels. The replacement safety labels are available from your dealer.

1.8 PLACEMENT OF SAFETY LABELS



2. TECHNICAL DATA

	Tornado 450	Tornado 470	Tornado 560
Working width	1,6 m	1,8 m	1,6m
Maximal reach*	4,4 m	4,7 m	5,5m
Hydraulic side shift	1,8 m	1,8 m	1,8m
Hydraulic lifting of the machine	+90 degrees	+90 degrees	+90 degrees
--Lowering of the machine	-30 degrees	-45 degrees	-45 degrees
Collision protection as standard	Hydraulic	Hydraulic	Hydraulic
Weight	800kg	1060 kg	1280 kg
Connection to the tractor	Cat II	Cat III	Cat III
PTO rotation speed	Max. 540 rpm	Max. 540 rpm	Max. 750 rpm
Connections to the tractor hydraulics			
Double acting	1 pcs, 2 pcs**	2 pcs, 3 pcs**	2 pcs, 3 pcs**
Single acting	1 pcs	1 pcs	1 pcs
Free return	1 pcs	1 pcs	1 pcs

*From tractor centerline

** with optional equipment

Optional equipment	Order number
Hydraulic front hatch, Tornado 560	115604
Hydraulic front hatch, Tornado 450	115605

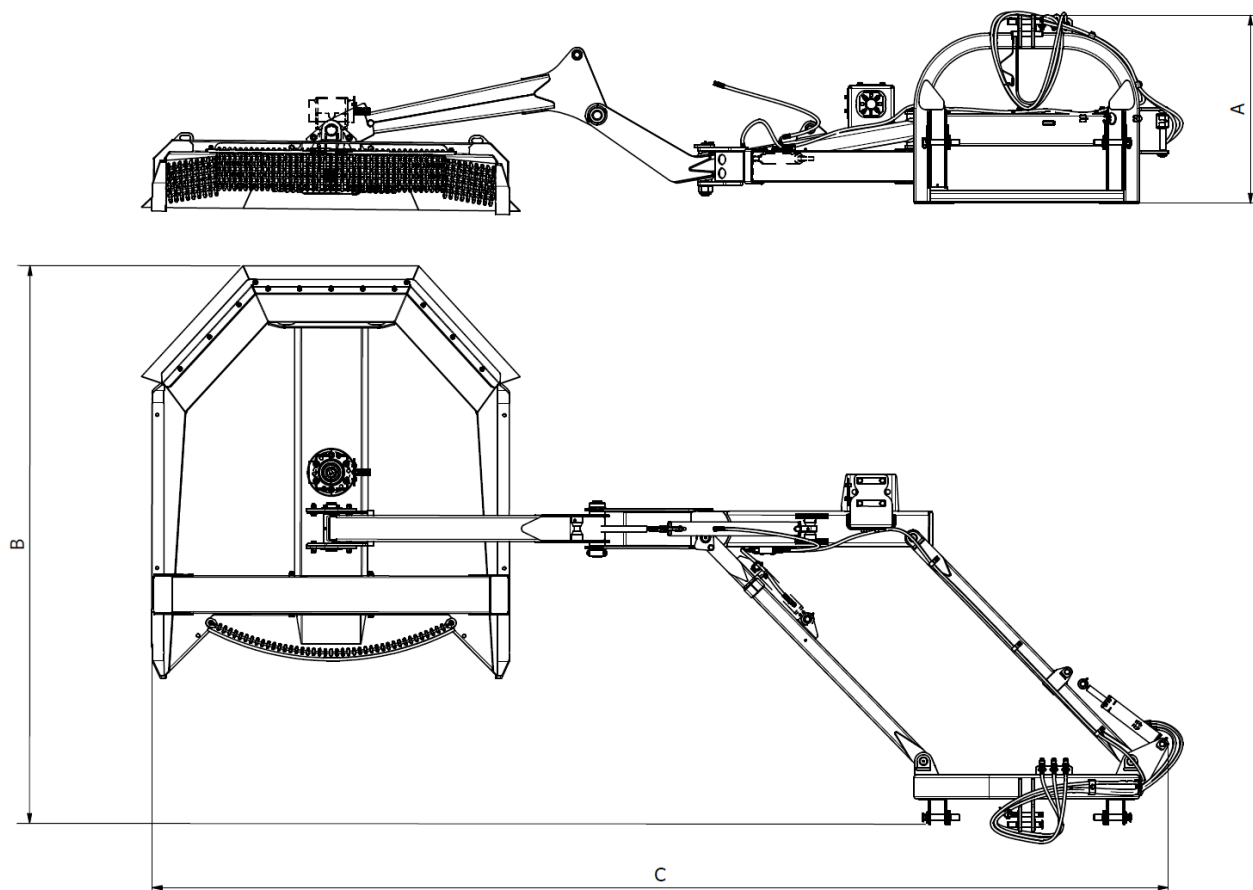
2.1 PAINT

The manufacturing of the paint complies with the strictest International painting standards for the paint and painting procedure. This ensures the long lifetime of the ELHO machines. But even a good paint surface can be damaged or scratched during transport and whilst in use. Paint in the correct color is usually most easily accessible at your local paint shop as post and parcel transport of paint is restricted by very strict safety rules. The following International color codes are used for the original painting of the ELHO machines. The international color codes help you to get the right shade. The original paint is polyurethane-based industrial truck paint, but an alkyd-based paint of good quality is also suitable for paint repair.

Yellow	RAL 1006
Gray	RAL 7024

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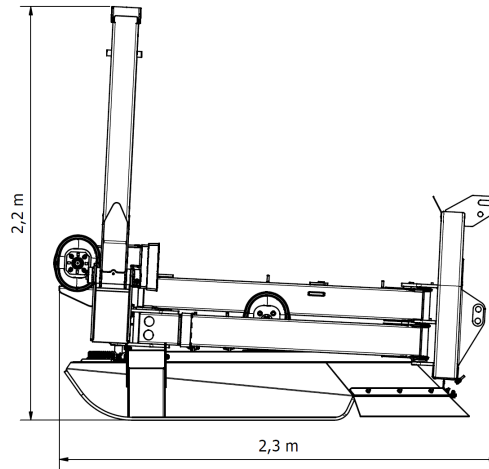
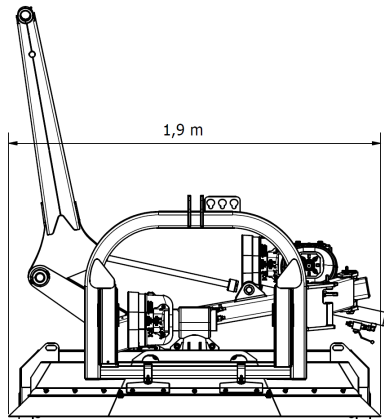
2.3 DIMENSIONS



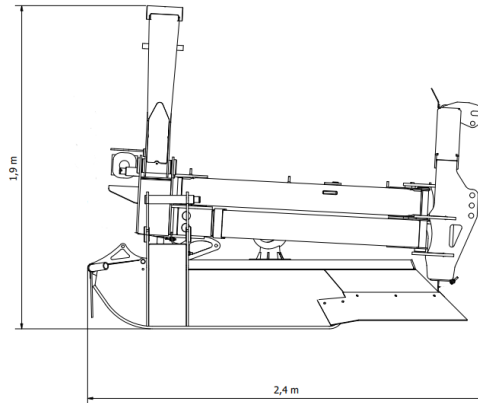
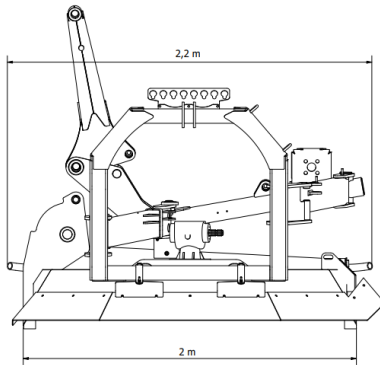
	Tornado 450	Tornado 470	Tornado 560
A	1 m	1,1 m	1,1 m
B	2,9 m	3,3 m	2,9 m
C	3,4 - 5,2 m	3,7 - 5,5 m	4,5 - 6,3 m

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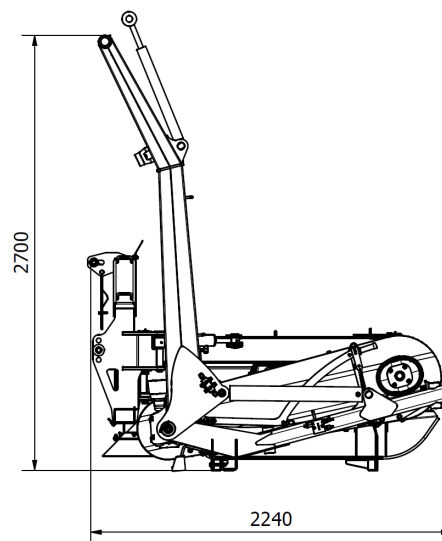
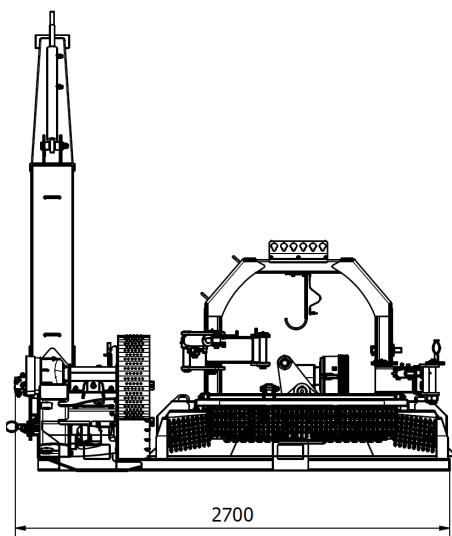
Dimensions when in shipping package.



Tornado 450

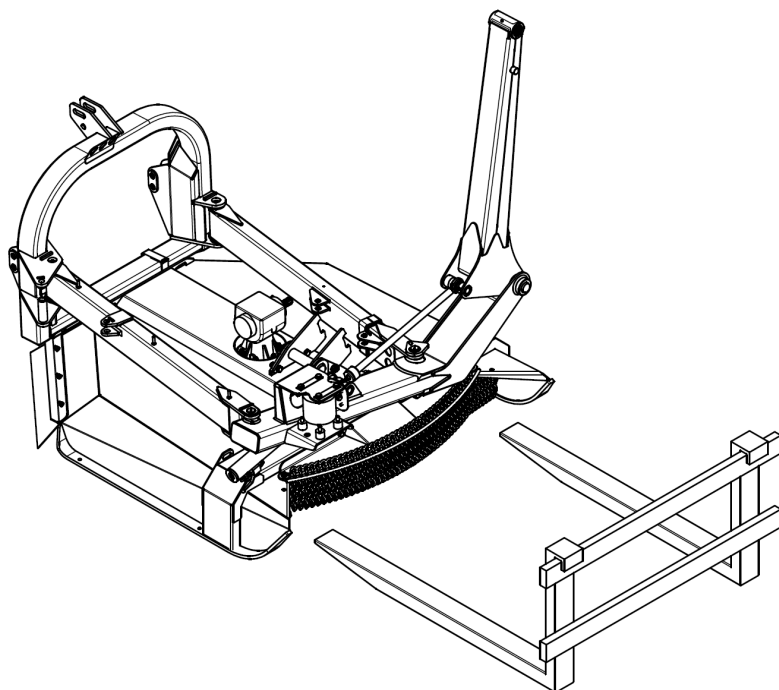


Tornado 470

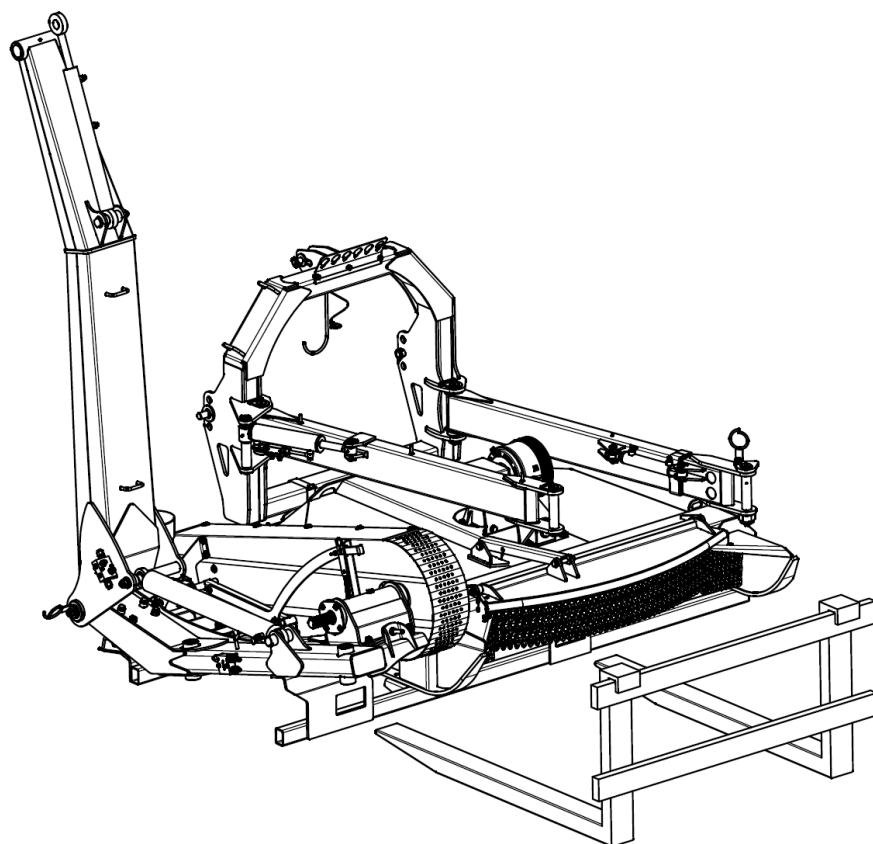


Tornado 560

2.4 LIFTING OF THE MACHINE



Tornado 450



Tornado 560

3. STARTING OF THE MACHINE

It is important to take caution when starting a new machine. Improper installation, operation or similar may cause damage that is not covered by the machine warranty.

ELHO **Tornado 450** is delivered as standard with the following drive shaft:

Primary drive shaft: Bondioli 810686CE007001 equipped with a ~1800Nm friction clutch, or similar from another manufacturer.

Secondary shaft: Bondioli 8G7T155FX014001 or similar from another manufacturer.

ELHO **Tornado 470** is delivered as standard with the following drive shaft:

Primary drive shaft: Bondioli 8G9T181CE007002 equipped with a ~2200Nm friction clutch, or similar from another manufacturer.

Secondary shaft: Bondioli DS9R151FXWR7W01 equipped with wide angle cross. or similar from another manufacturer

ELHO **Tornado 560** is delivered as standard with the following drive shaft:

Primary drive shaft: Bondioli DH8T181CE007002 equipped with a ~2100Nm friction clutch, or similar from another manufacturer.

Secondary shaft: Bondioli DH8T141FX015K01 equipped with wide angle cross. or similar from another manufacturer

Make sure that the telescopic shaft profile is kept well lubricated so that it does not seize.

NOTICE	RISK OF DAMAGING THE MACHINE
	Incorrect length can damage the machine and tractor. Make sure the PTO shaft is not too long or short.

Make sure that the drive shaft does not have the possibility to touch against the machines frame when the cutting assembly is moved to the outside position. Observe also where the tractors hydraulic pressure rod and the 3-point lifting arms are in their maximum position.

Check that the hydraulic hoses are correctly fitted and that they can move freely with the machine.

Before the machine is started, we highly recommend that you check that the correct amount of oil is in the gear box.

Before engaging the PTO, the machine must be placed into the working position at the side of the tractor. Make sure that PTO rotation speed is correct. No loose objects must be left under or on top of the machine. Also make sure that no persons are standing close in front of or behind the machine when it is started up.

If necessary, check and tighten all screws and nuts after a couple of hours of operation. This is particularly important for the knife bolts. This is particularly important for the lid of the chain rotor

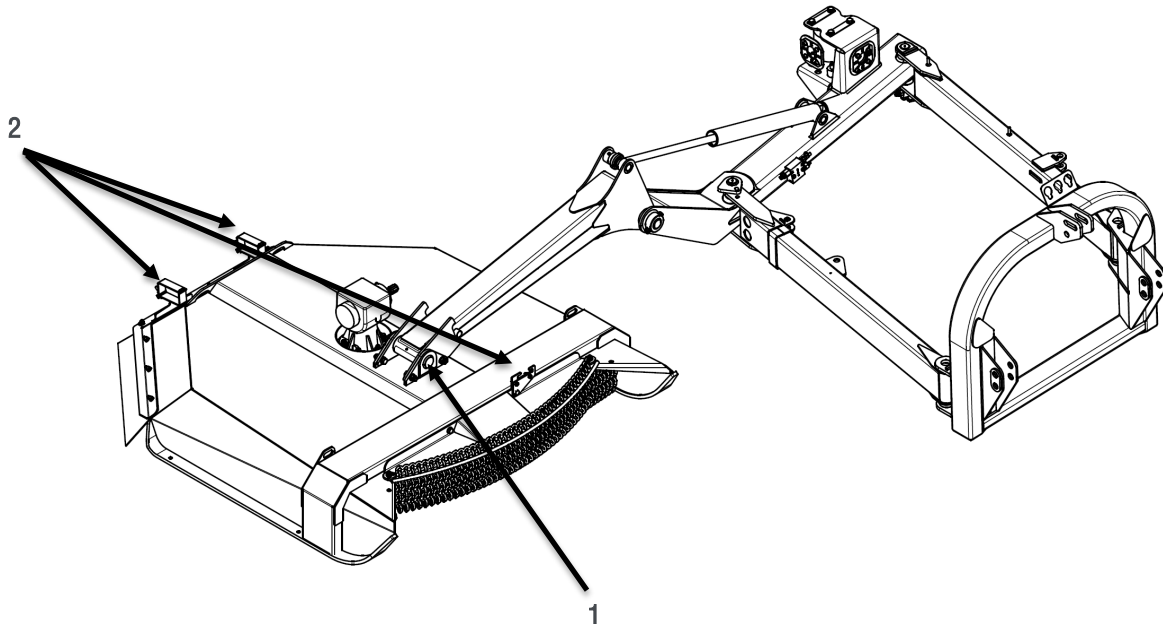
3.1 ASSEMBLING

The machine is delivered in a transport framework in which the front and back of the framework is separated.

- The supports and protection are made from wood and does not contain any chemical toxic antifouling agents and thus meaning that it can be burnt and used as fuel.
- Left over steel pieces from the transport packaging can be either returned to the factory or taken to a recycling station.

Assembly of the Tornado 450 is easily done as follows.

- Connect the tractor to the 3-point frame.
- Detach the frame from the cutting head

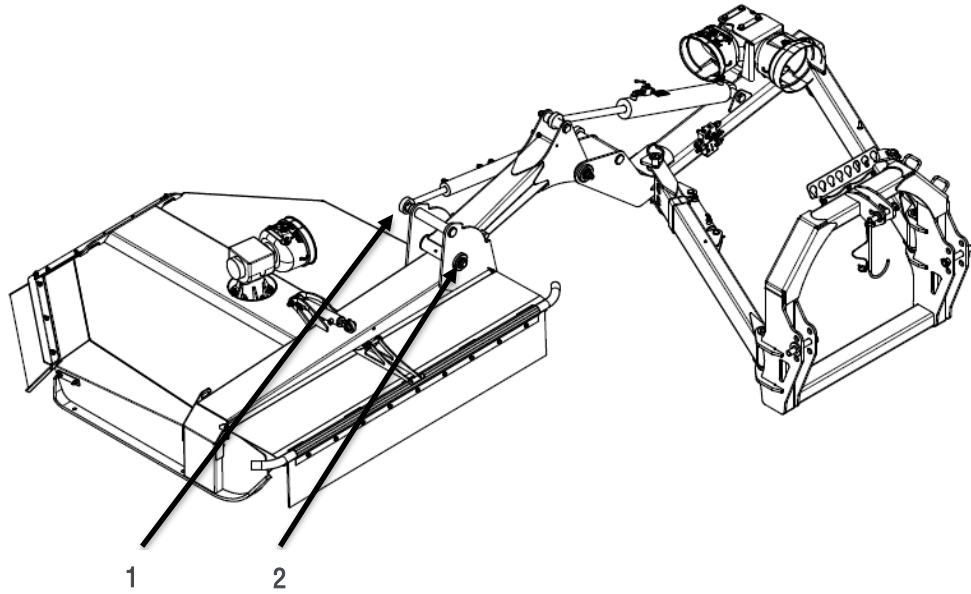


1. Assemble the pin and lock with a washer and spring pin.
2. Take away the transport packing.

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Assembly of the Tornado 470 is easily done as follows.

- Attach the 3-point frame to the tractor.
- Detach the frame from the cutting head

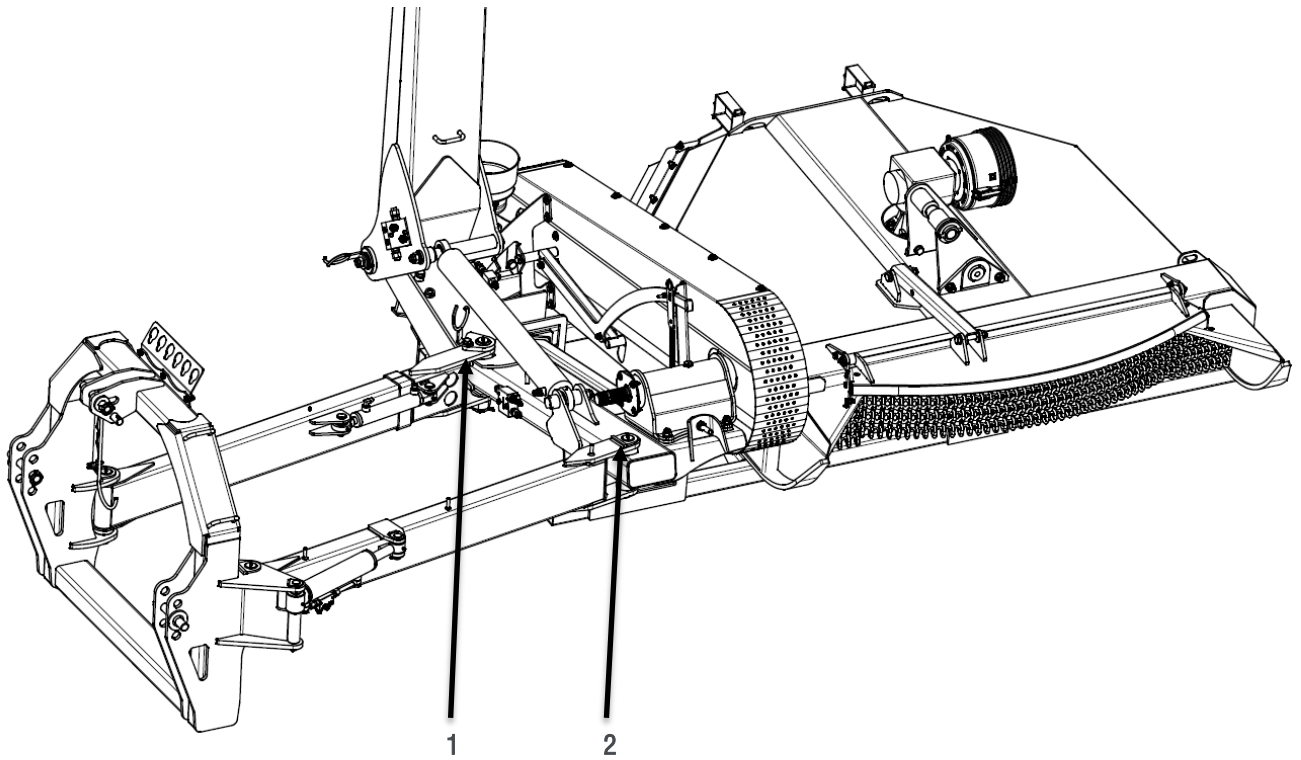


1. Fit the cylinder. Fit the washer and locking ring on the pin.
2. Fit the beam with a pin from each side. Tighten the pins with the bolt. Tightening torque 300 Nm

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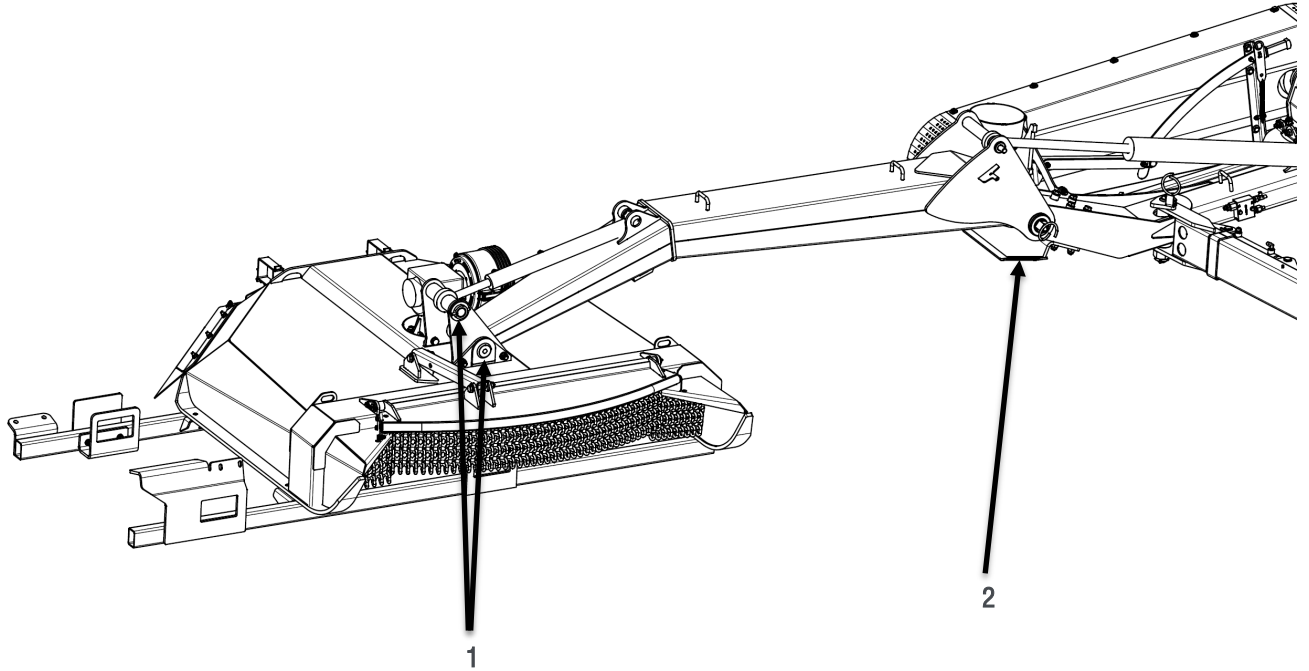
Assembly of the Tornado 560 is easily done as follows.

- Attach the 3-point frame to the tractor.
- Detach the frame from the cutting head
- Drive forward and position the 3-point frame and side beams to a reasonable distance from the machine.



- Fit the pins 1 and 2.
- Take the beams out of the transport packaging.

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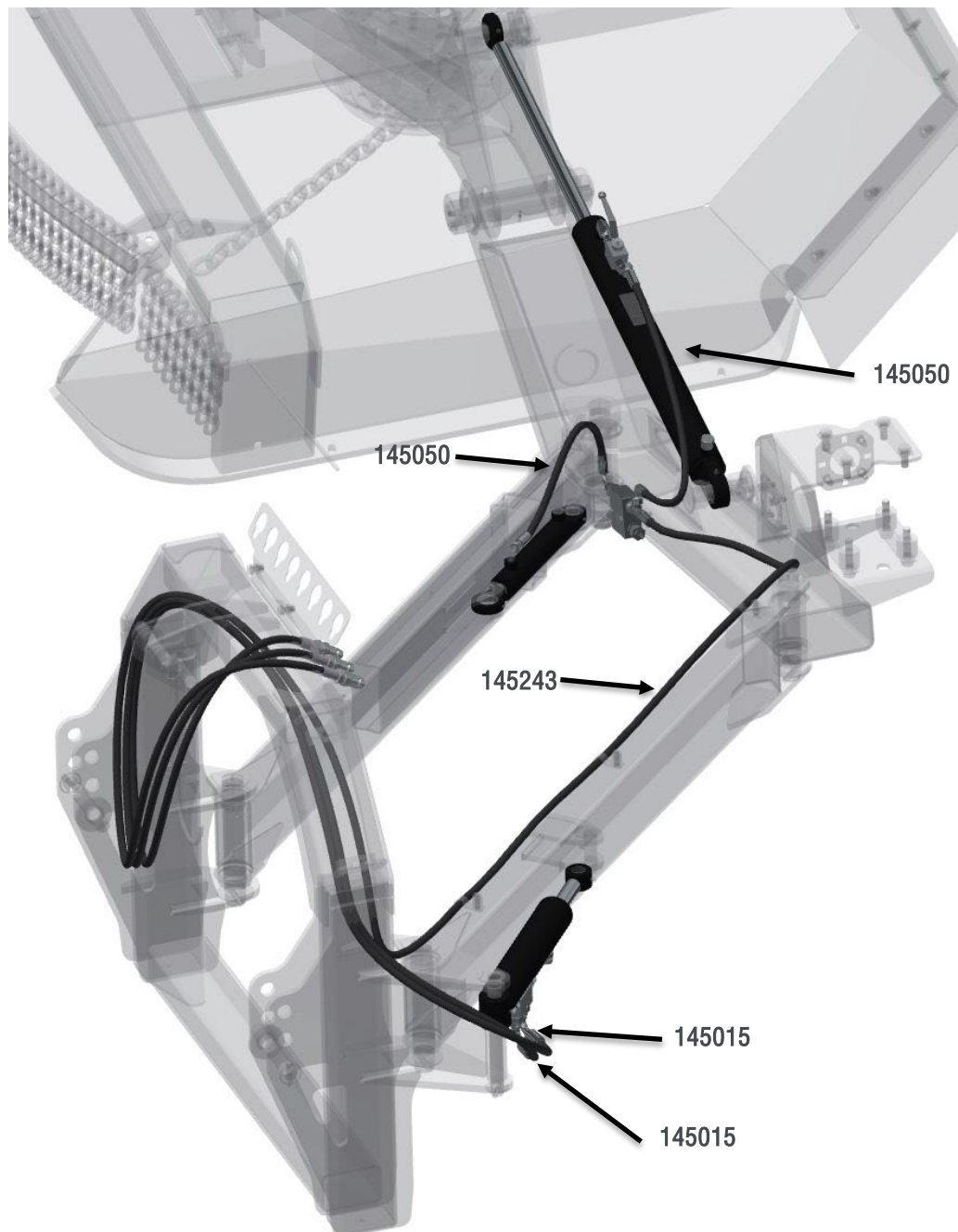
1. Fit the pins, lock them with springpins (1).
2. Fit the skid (2).
3. Fit the hydraulic hoses.

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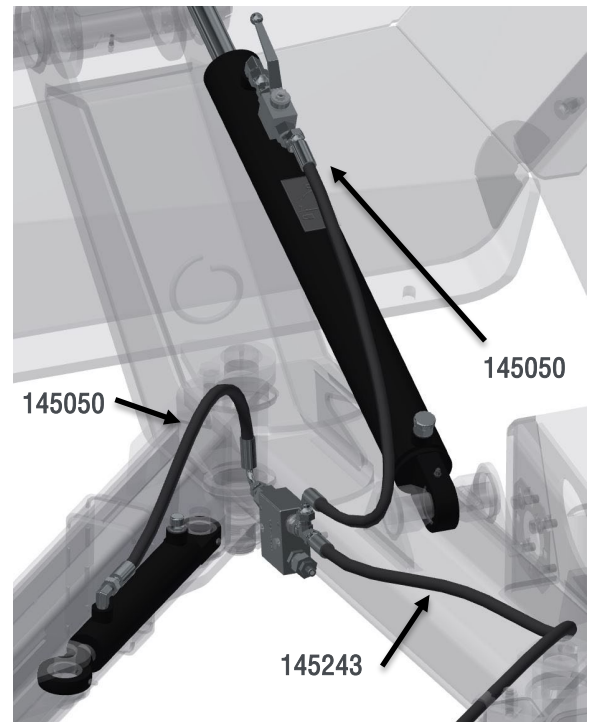
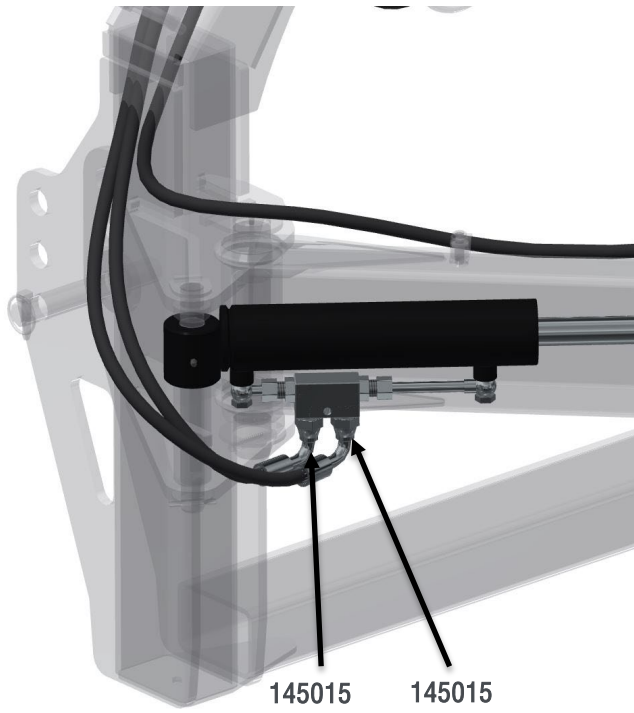
3.2 ASSEMBLING THE HYDRAULICS

The numbers of the hose can be found on the hose fittings.

Overview of the Tornado 450.

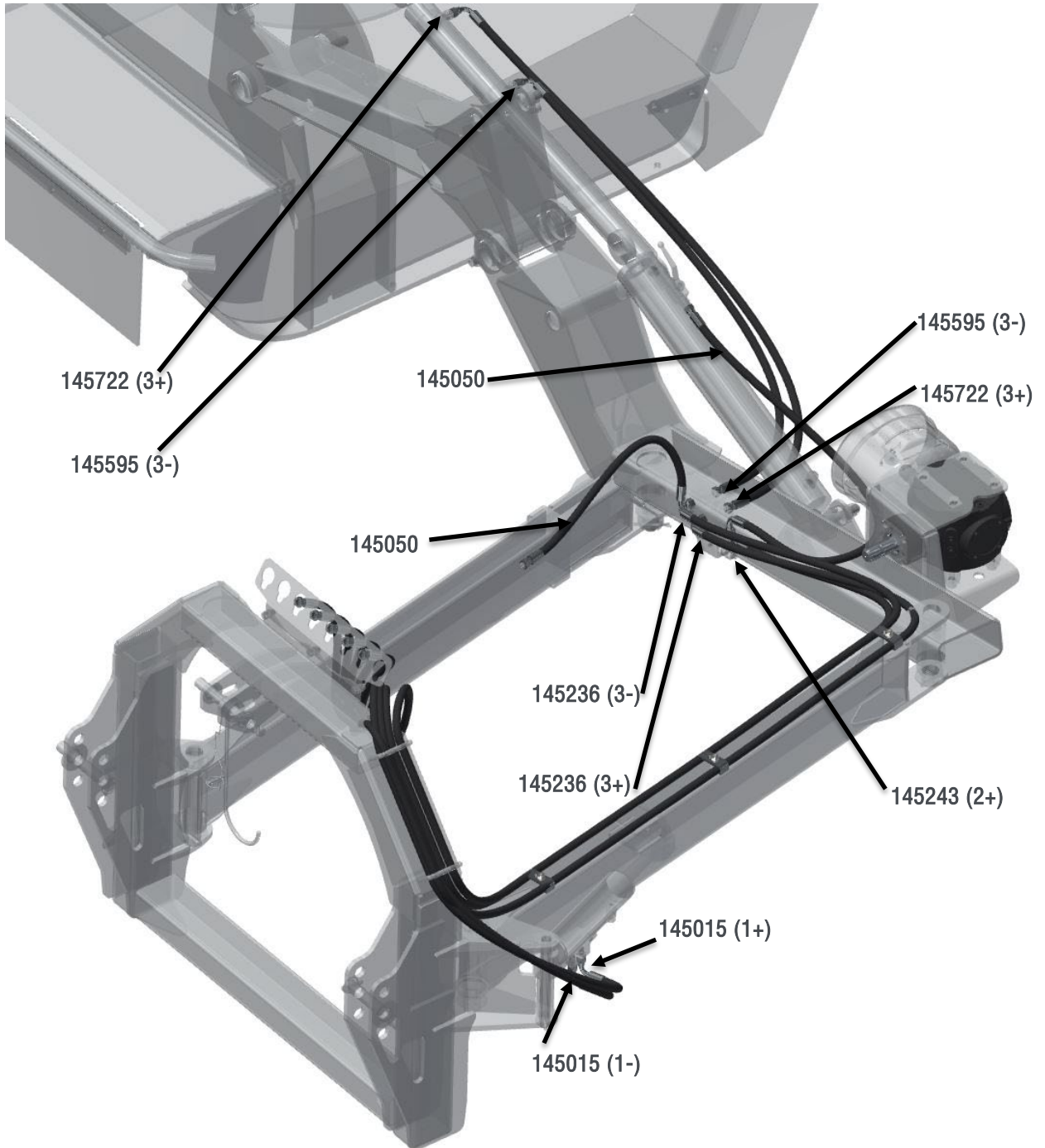


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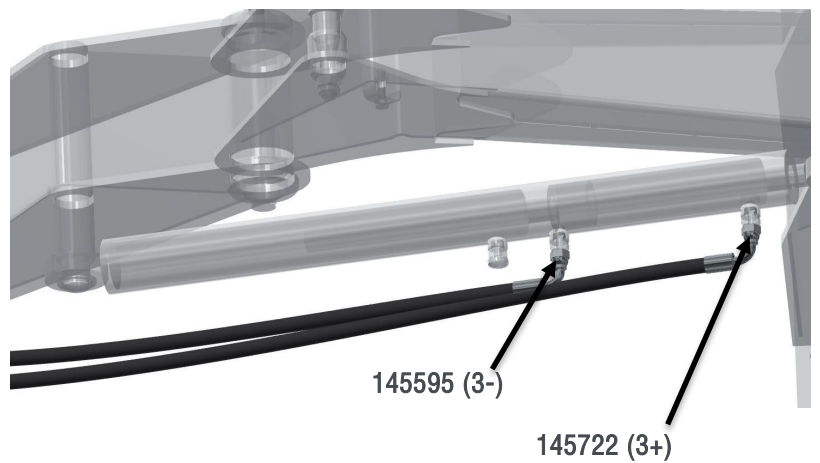
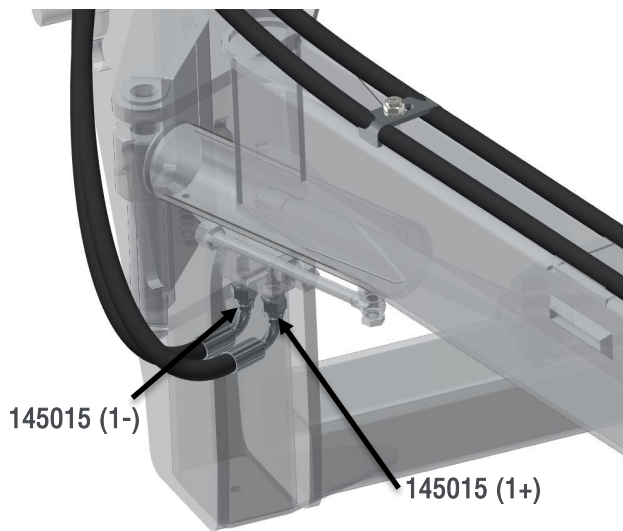
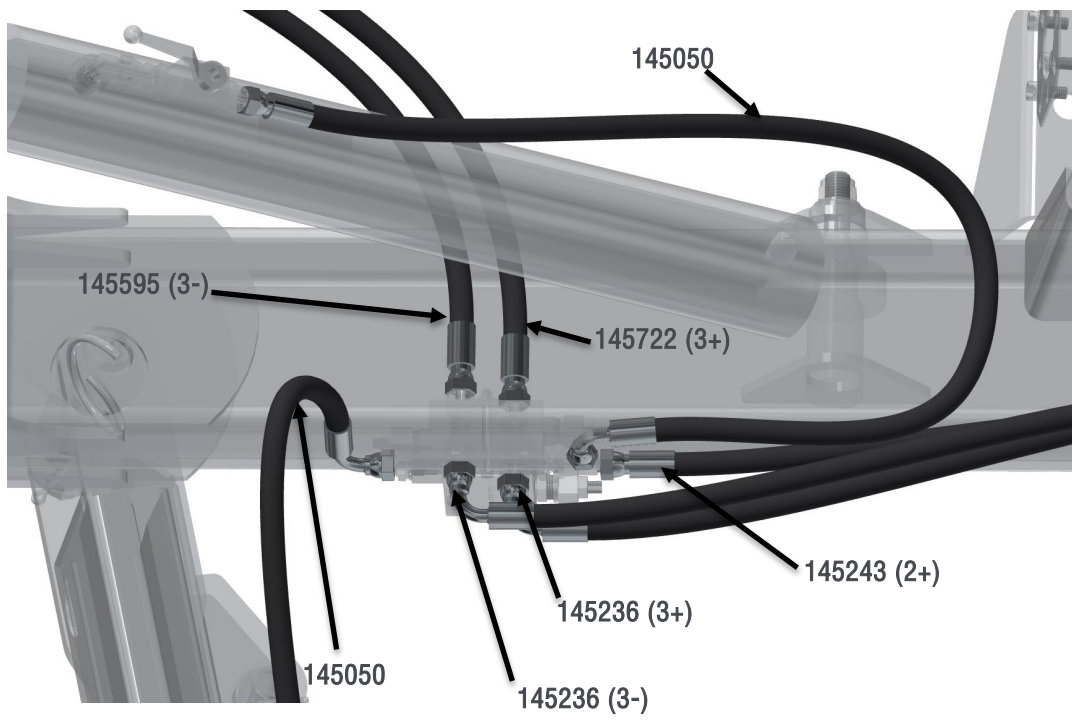


TORNADO 450, 470 & 560

OVERVIEW OF TORNADO 470

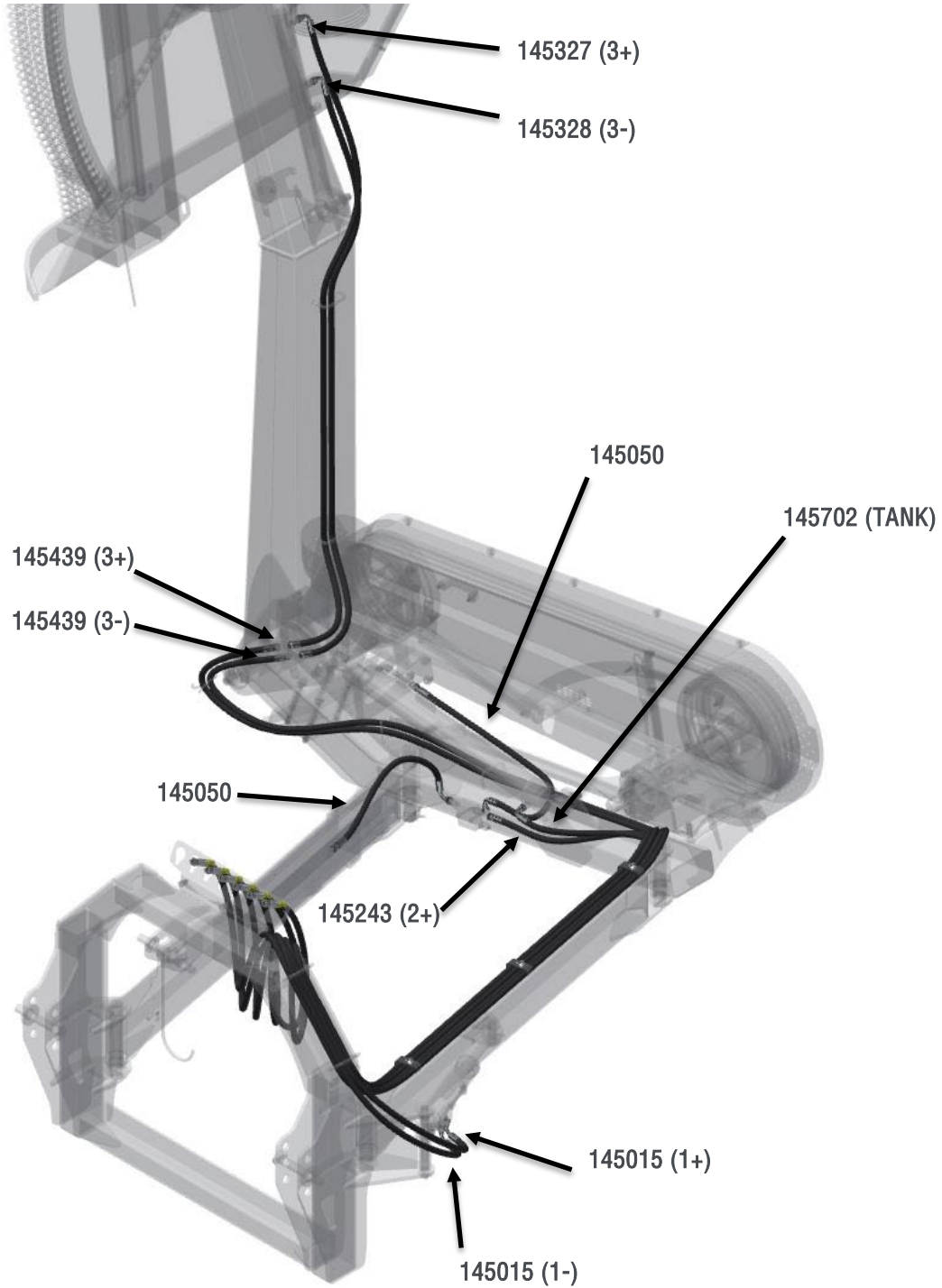


TORNADO 450, 470 & 560

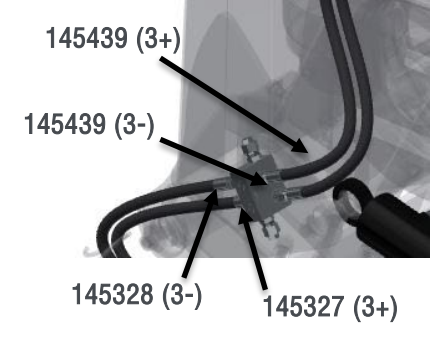
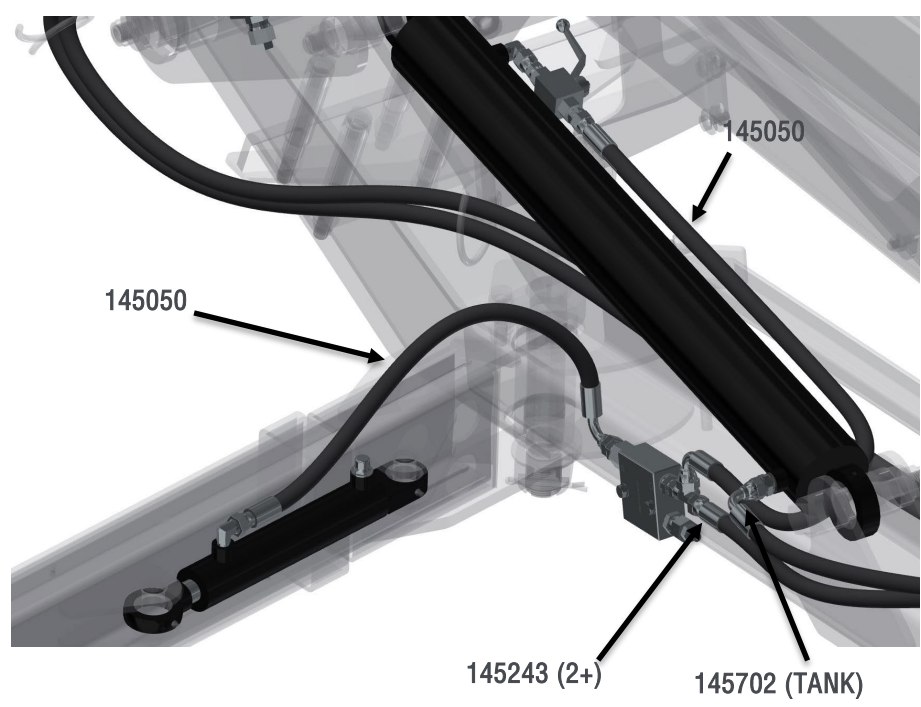
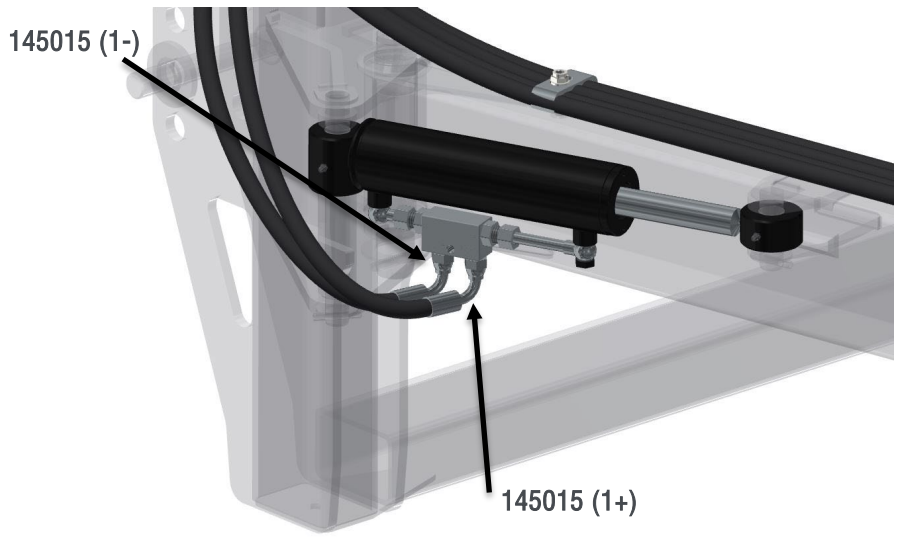


TORNADO 450, 470 & 560

Overview of the Tornado 560.

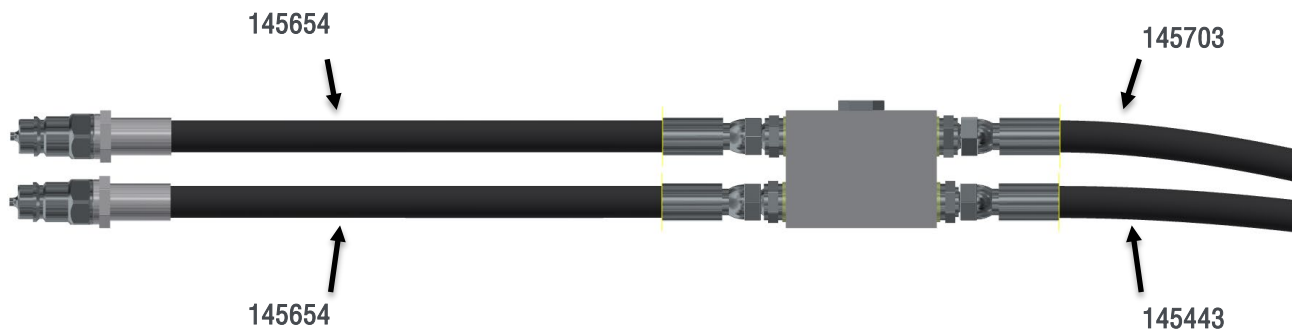
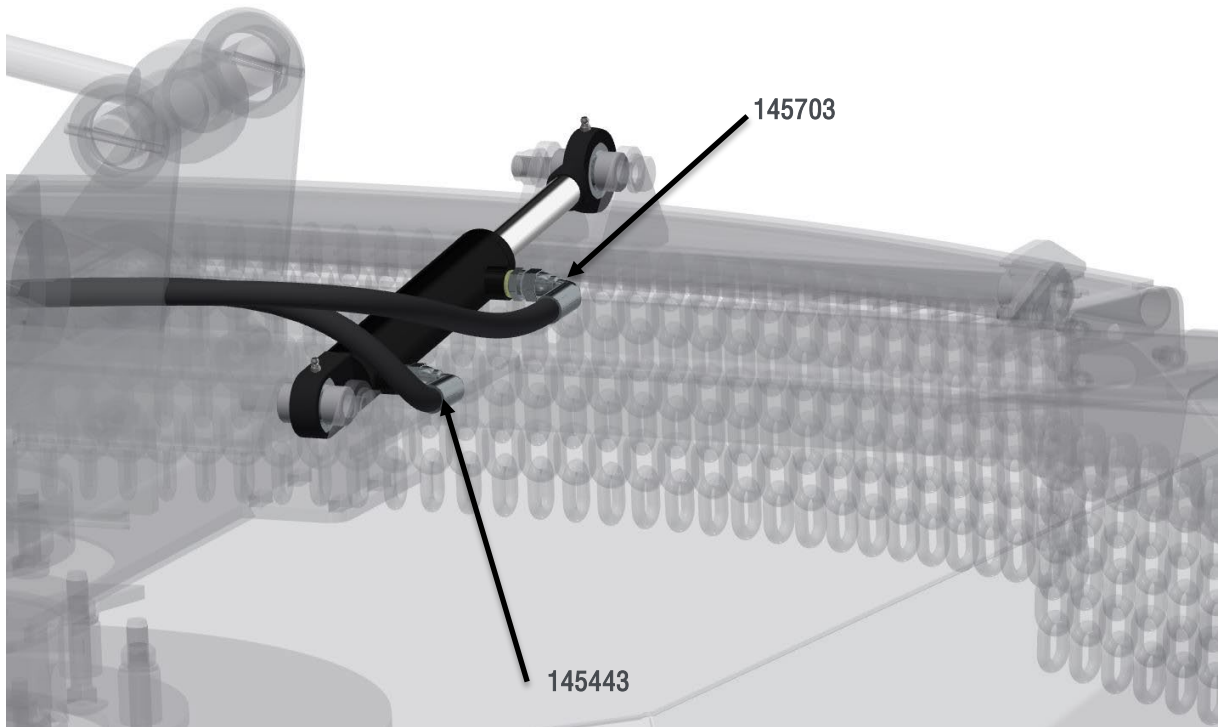


TORNADO 450, 470 & 560




TORNADO 450, 470 & 560

Hydraulic front hatch, 450 and 560.



Route the hoses along the beam and onto the hinge beam with the other hoses.

3.3 CONNECTING AND DISCONNECTING THE MACHINE FROM THE TRACTOR

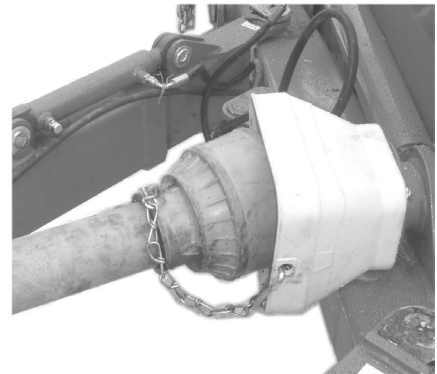
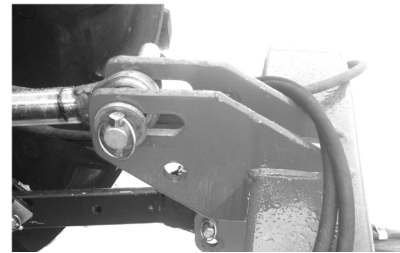
⚠ WARNING	
	When connecting or disconnecting the machine, turn off the tractor motor, put the parking brake on and take out the starting key. no hydraulic movement by the tractor is allowed. Always use protective glasses and gloves when working

Connecting and disconnecting to the tractor should only be carried out when the machine is placed in the working position for e.g. When the cutting assembly is against the ground.

Connection:

The machine should be connected as normal to the 3-point arm lift. Make sure that the top linkage is attached as normal to the oval hole.

The drive shaft/PTO is connected to the tractors as normal. Secure the drive shaft protection cover with the help of the chain supplied.



Attach the lift and turn cylinder hoses. The machine is fitted with ½” quick releasing hydraulic hoses according to ISO 5675. Check the tractors instruction manual that the quick releasing hydraulic hoses fit. It is possible however to change the fast release attachments on the hoses for it to fit to the tractor.



Tighten and lock the lift arms sway restrictor.

TORNADO 450, 470 & 560

3.4 DETACHING

The machines cutting head should be lowered to the ground so that it is laying firmly against the ground. Check also that the hydraulic hoses contain no pressure.

Disconnect the machine from the tractor.

Disconnect the drive shaft from the tractor and place it in the support arm provided in the frame

Disconnect the hydraulic hoses.



3.5 LIFTING THE MACHINE TO TRANSPORT POSITION


- Lift the machine so it clears the ground using the 3-point lifting arms.
- Lift the cutting head into a vertical position.
- Swing the cutting head into position behind the tractor.



NOTICE	RISK FOR DAMAGING THE MACHINE
	Close the ball valve (B) on the liftcylinder.



3.6 LOWERING THE MACHINE TO WORKING POSITION

⚠ WARNING	
	Keep unauthorized people outside the work area! Unauthorized people are not allowed in the work area.

Always make sure that nobody is standing near or around the danger zone when lowering the machine into the working position.

Open the lifting cylinders ball valve.

Lower the cutting head using the lift cylinder.

If the cutting head does not lower all the way, for e.g. if the tractor is leaning to the left, do a short sideways movement and at the end of the movement activate the lowering arm again. Then the cutting head will lower.



NOTE, when the Tornado 470 is to be lowered into working position, the cutting unit is lowered with both the lifting cylinder and the tilt cylinder.

4. SETTING

4.1 STUBBLE HEIGHT ADJUSTMENT

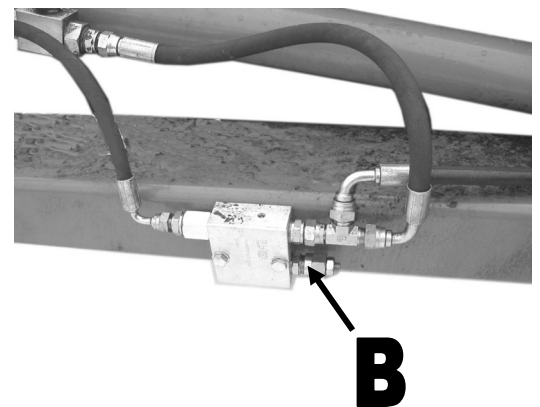
Due to fact that the machine is sometimes used outside of the field and on uneven ground it is important that the machine is supported by the lifting mechanism on the tractor. Unnecessary contact with the ground and the chain rotor will be minimize by the skids.



4.2 HYDRAULIC RELEASE DEVICE

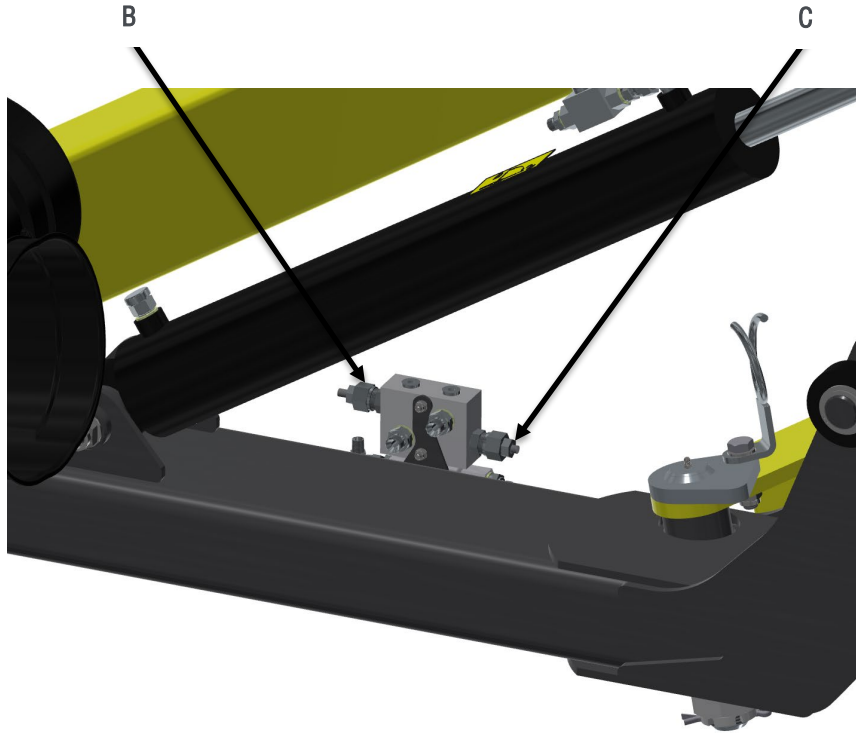
The release pressure is already pre-set at the factory and normally does not require re-setting.

If you are however uncertain about the setting you could have a hydraulic service company check the pressure settings at valve **B**. This should be set at about 95 bar.

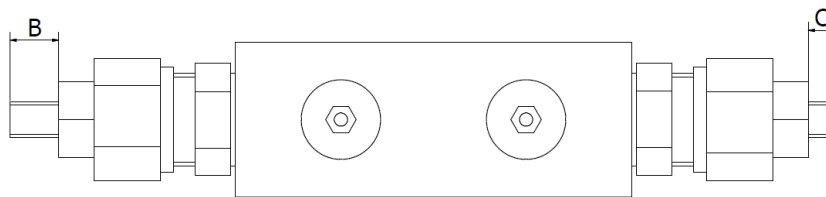


4.3 HYDRAULIC TILT


The Tornado 470 has a double pressure relief valve on the tilt function to limit the pressure in both directions of the function. Valve C limits the plus function and valve B the minus function.



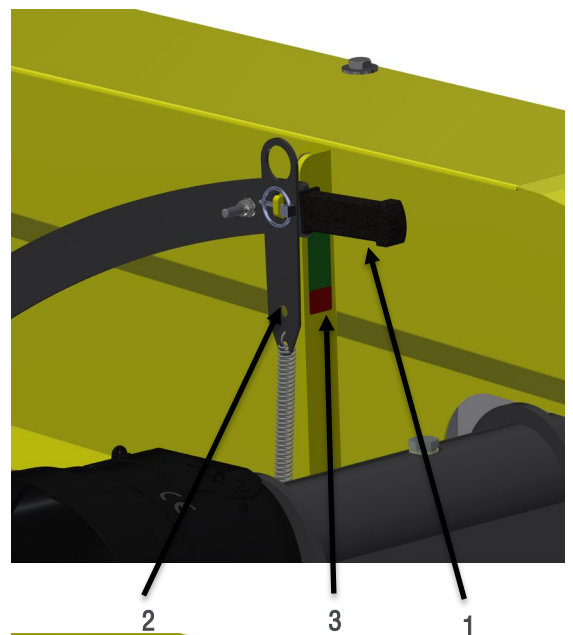
The dimension (B) on valve B should be 11 mm and the dimension (C) on the Valve C should be 5.6 mm



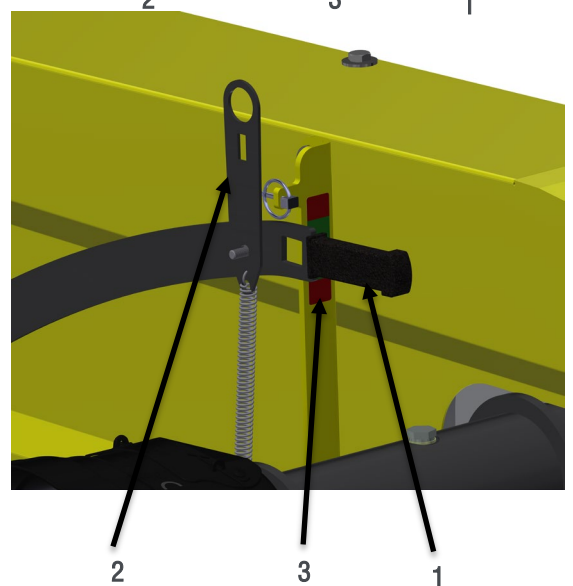
4.4 BELT TENSIONING

⚠ WARNING	
	<p>Before you leave the cab make sure that the PTO is disengaged and the engine turned off. Handbrake engaged and the rotor has stopped completely. Note the machine can continue for several minutes after it has been turned off.</p>

Tornado 560 is equipped with V-belts. On the machine, there is a device that you easily check the belt tension with. The device for the belt tension has an arm (1) and a spring-loaded link (2). The picture shows how it should be placed during the operation.

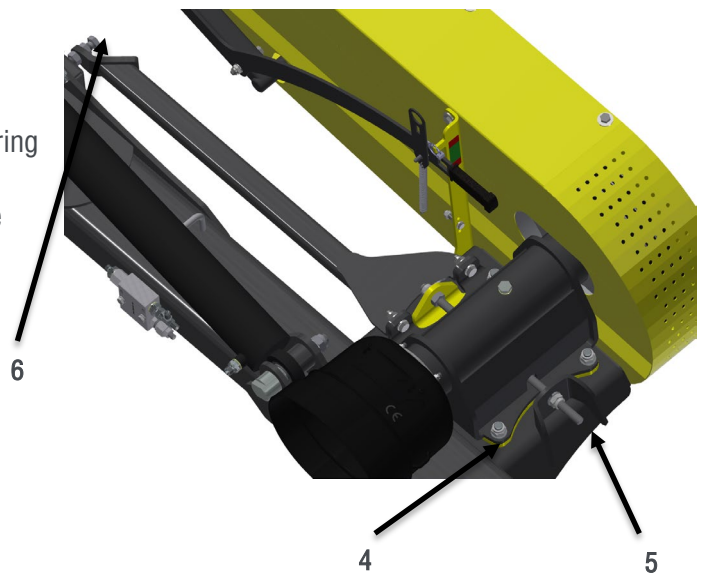


When belt tension is checked you first take the linkage pin away. The spring-loaded link and the arm are taken off the bracket so it can move freely. The arm should be at the green area on the scale (3) when the belt tension is right. If the arm is pointing at the red area the belt tension needs adjusting.




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The belt tension is adjusted by moving the whole bearing housing. Loosen the bolts (4) and adjust the bearing housing with the adjustment bolt (5). The angle of the pulley is adjusted with the adjustment bolt (6).



5 USAGE

5.1 CUTTER

⚠ WARNING	
	<p>Keep unauthorized people outside the work area! Unauthorized people are not allowed in the work area.</p>

Let the cutting head down to its working height before engaging the PTO. See § 3.6 Lowering to working position.

When cutting use the correct speed on the PTO,
Tornado 560 at 750 rpm
Tornado 450 and 470 at 540 rpm.

Use moderate driving speed.





Even though the machine is equipped with safety devices there is always a risk of damage to the machine, for example, if the machine hits something or foreign material gets into the machine.

Due to that, you should keep enough stubble height. The cutting machine is carried by a tractor during operation. The skids at the side of the machine are to be seen as an extra safety device that lessens the risk of the chain rotor hitting the ground

TORNADO 450, 470 & 560

Adjust your moving speed to current conditions. Extra special care needs to be taken when turning with the cutting head in the lifted position.

Utmost caution needs to be taken when clearing with the cutting machine in a vertical position. There is always a risk that branches and damaged chains will fly off the machine. The machine needs therefore to be shifted as far to the right as possible at least so it's away from the tractor cab.

 WARNING	
	<p>Before you leave the cab make sure that the PTO is disengaged and the engine turned off. Handbrake engaged and the rotor has stopped completely. Note the machine can continue for several minutes after it has been turned off.</p>

5.2 TRANSPORT

The machine is turned into a transport setting according to 3.5 Lifting into the transport position.

Close the lifting cylinder ball valve. B

Ensure the tractor is stable it has enough weight on the front axle to drive safely. Use front weights if necessary.




Use driving speed according to the current situation. Special care needs to be taken when driving on uneven roads. Too high speed might lead to too bigger shock loads that can lead to frame damage on the machine.

Traffic rules and other road laws must always be followed. There might be a need for a warning triangle, rear light, or reflex reflector on the cutting machine in some cases.



6 SERVICE

⚠ WARNING	
	<p>Before you leave the cab make sure that the PTO is disengaged and the engine turned off. Handbrake engaged and the rotor has stopped completely. Note the machine can continue for several minutes after it has been turned off.</p>

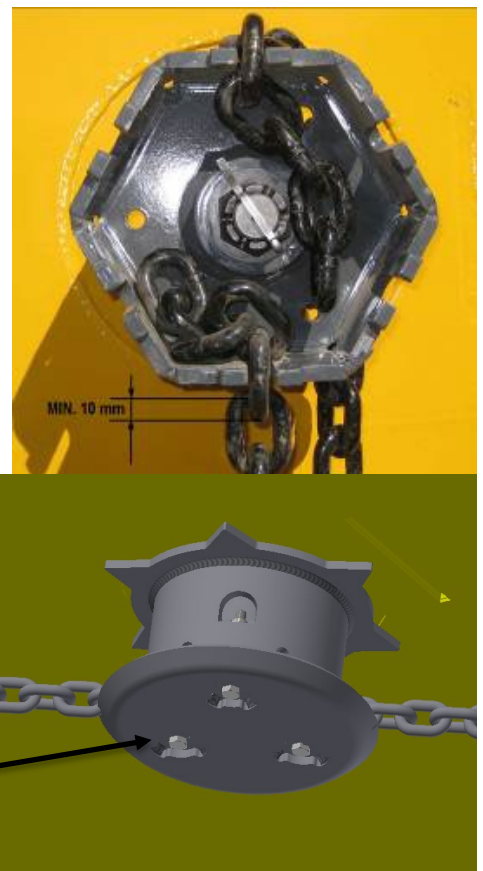
In order to ensure a long and reliable operation for you and your Tornado it is important that you keep the machine clean and service it according to instructions below.

The rotor.

Check the condition of the rotor head and the chains regularly. If you experience vibrations check that both chains are equally long.

Also check the chain-link conditions especially where they are attached to the rotor. The minimum thickness of the link is 10mm. See picture. When you are getting close to the described thickness there is more chain to feed out from inside the rotor. When you do that you also need to cut the end of the other chain away at the outer end. It is important that both chains are equally long and that they are changed at the same time in order to keep the rotor balanced.

Also check the torque of the rotor's lid. We recommend that you change locknuts at each chain shift. Tightening torque 95-105Nm.



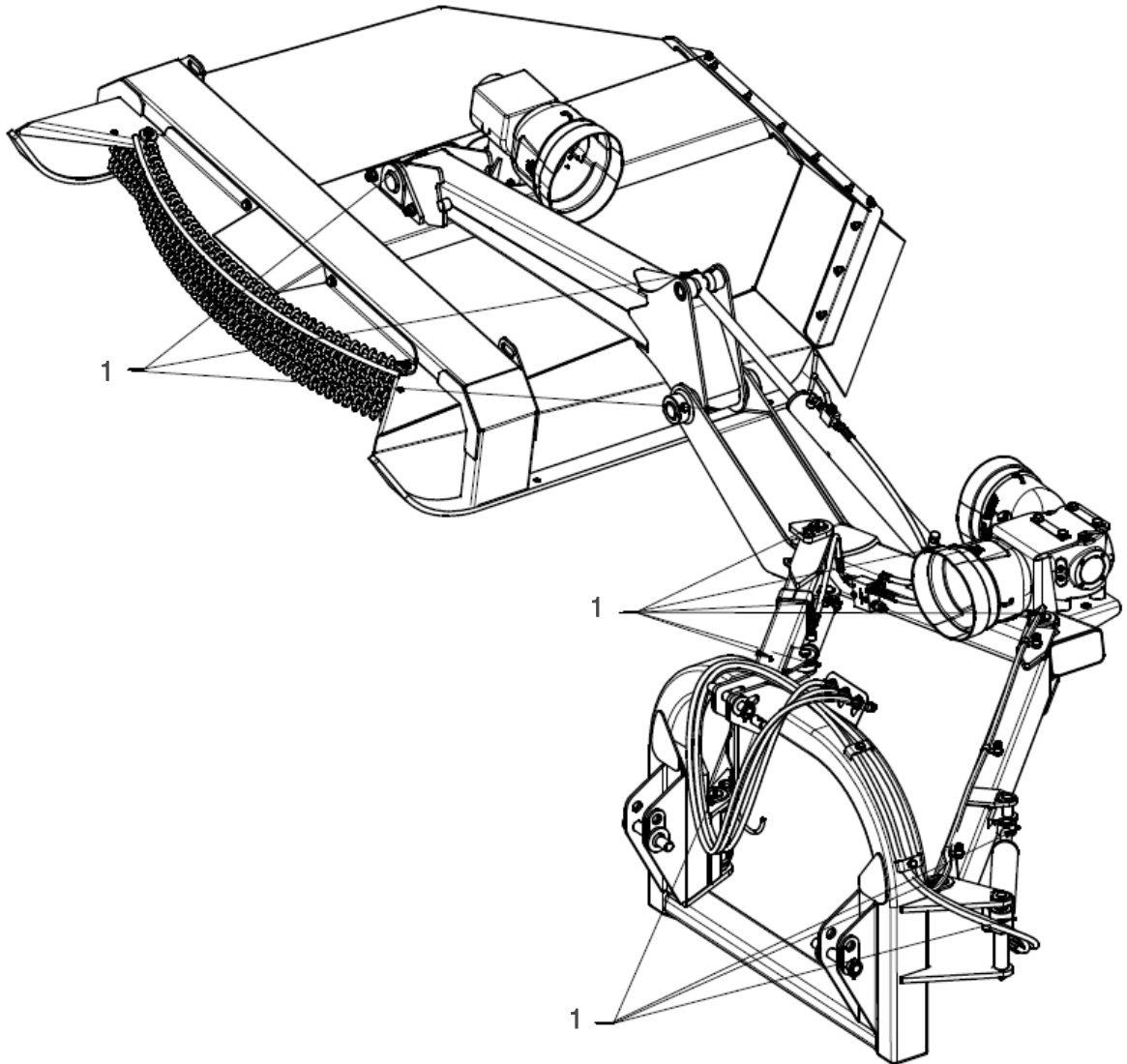
NOTICE	RISK FOR DAMAGING THE MACHINE
	Only use Elho original chains

Check the rotor for cracks. Damaged or a worn-down rotor cannot be repaired it has to be changed.

TORNADO 450, 470 & 560

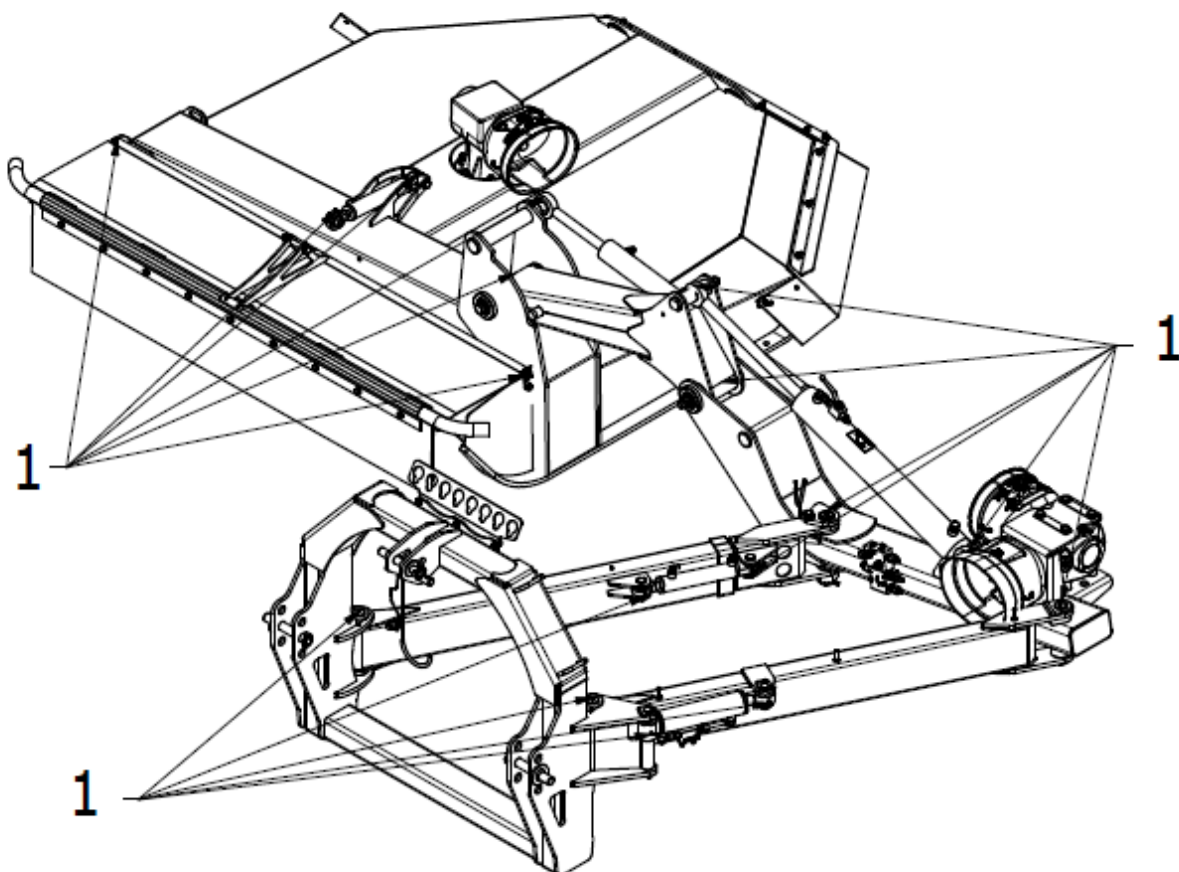
6.1 LUBRICATION

Tornado 450.



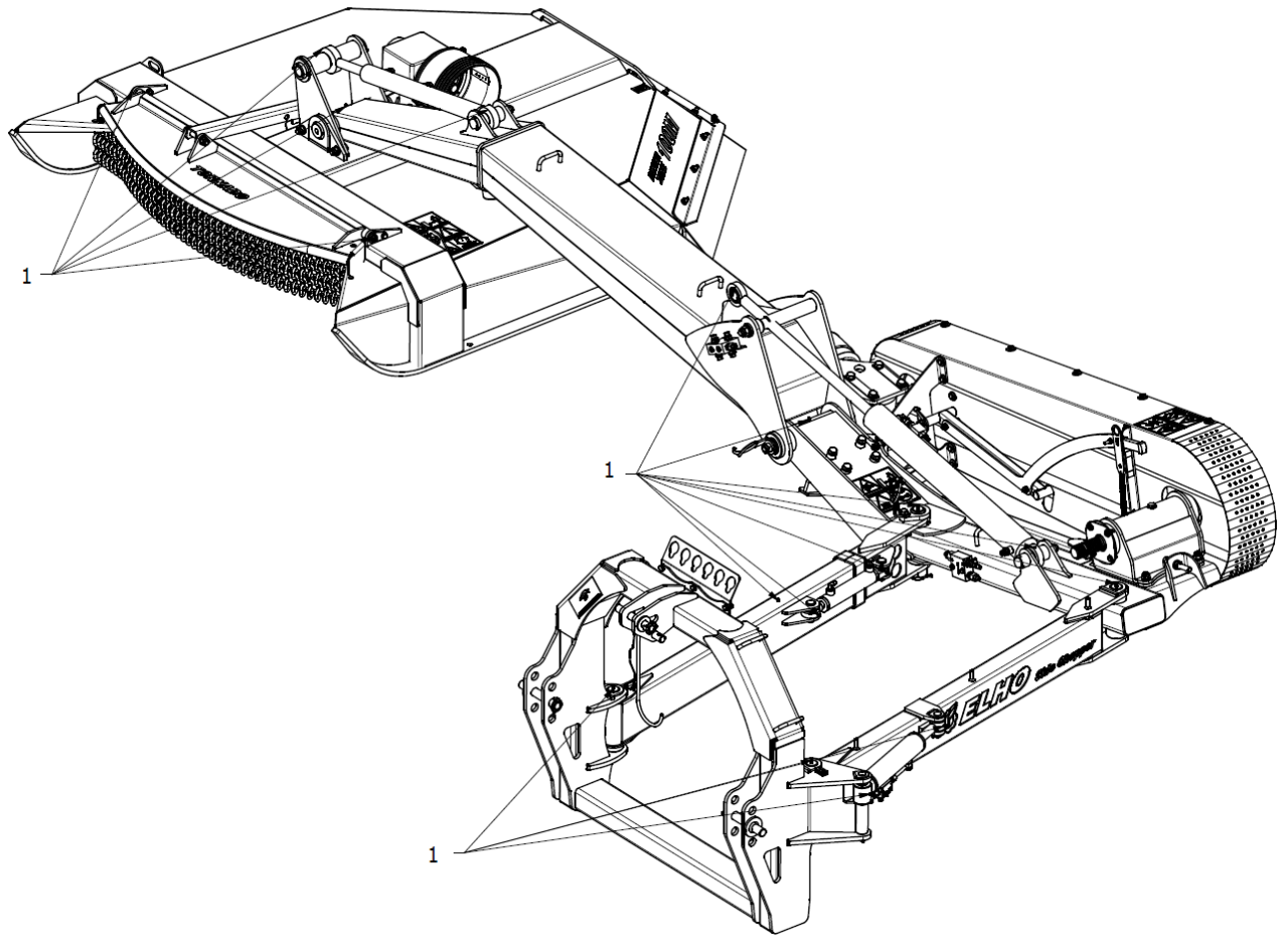
TORNADO 450, 470 & 560

Tornado 470



TORNADO 450, 470 & 560

Tornado 560



Use a good quality bearing grease

POINT	TYPE	560	450	INTERVALL
1	JOINT PINS AND CYLINDER PINS	17 PCS	13 PCS	10H
2	DRIVE SHAFT	2 PCS	2 PCS	10H

If the machine will be stationary for a longer time we recommend that the machine is washed and greased. Rust protection oil on the sheet metal panels will ensure a longer life.

6.2 CONTROLL AND CHANGE OF OIL

Before use of a new machine check the oil level in the gearbox. Oil levels needs to be level plug on the plug when the machine is horizontal.

Check for visible oil leakage regularly when having breaks during work

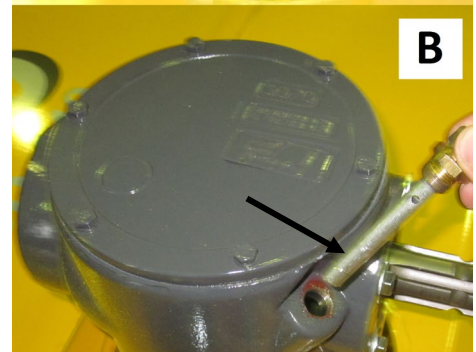
The machine can have a type A or type B gearbox

Oil capacity type A: at plug level about 0,9 litres

Oil capacity type B: at the dipstick marking about 2,0 litres

Change interval: First change at 10 h after that with 50h intervals.
Minimum once a season.

Attention! When changing the oil, emptying of type B is done smoothest through the air nipple and with the machine in transport position.



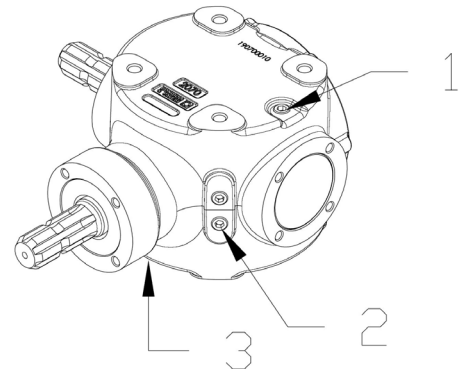
Before using a new machine first check the oil level in the angle gearbox.

During work brakes check for external oil leakage.

Oil type: SAE 90 EP

Oil capacity : at plug level 2 (about 1,2 litre)

Change interval: First change at 10 h after that with 50h intervals.
Minimum once a season.

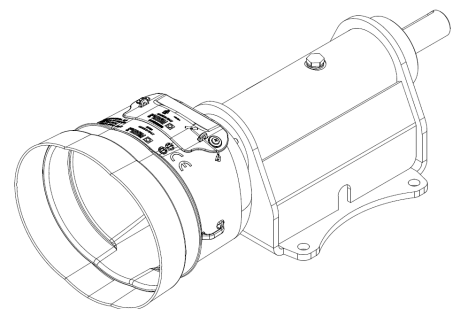


The bearing housing is oil filled. On top of the bearing housing there is a filling plug. On the underside there is also a plug to drain the oil.

Oil type: SAE 90 EP

Oil capacity: (about 0,1 litre)

Change interval: First change at 10 h after that with 50h intervals.
Minimum once a season.



TORNADO 450, 470 & 560

Check bolt and nuts regularly and tighten when needed. If nothing else is mentioned use the torques from the table below:

BOLT SIZE M (MM)	BOLT SIZE 4.6 (NM)	BOLT SIZE 8.8 (NM)	BOLT SIZE 10.9 (NM)	BOLT SIZE 12.9 (NM)
6	4,2	11	17	
8	10	28	40	
10	20	55	80	89
12	34	95	140	154
16	83	235	350	375
20	16	475	675	732
24	28	825	1170	1270
30	55	1630	2320	2500

7 STORAGE

The machine must be washed thoroughly at the end of the season.

Use lots of water but do not use pressured washer.

Do not aim the water against the rotor

Change oil in the gearbox.

Change damaged or worn chains.

Change the rotor if damaged.

Replace damaged protection chains.

Change damaged or worn rear protection

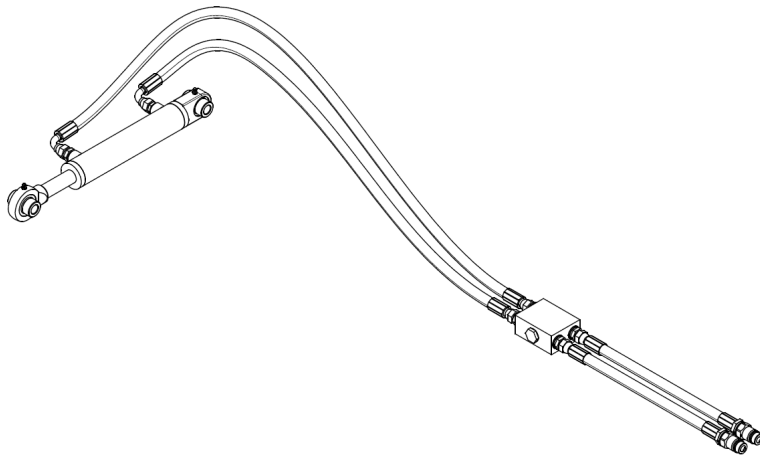
Repair any paint damage

Put rust proofing oil on sheet metal panels after the machine has dried from the washing.

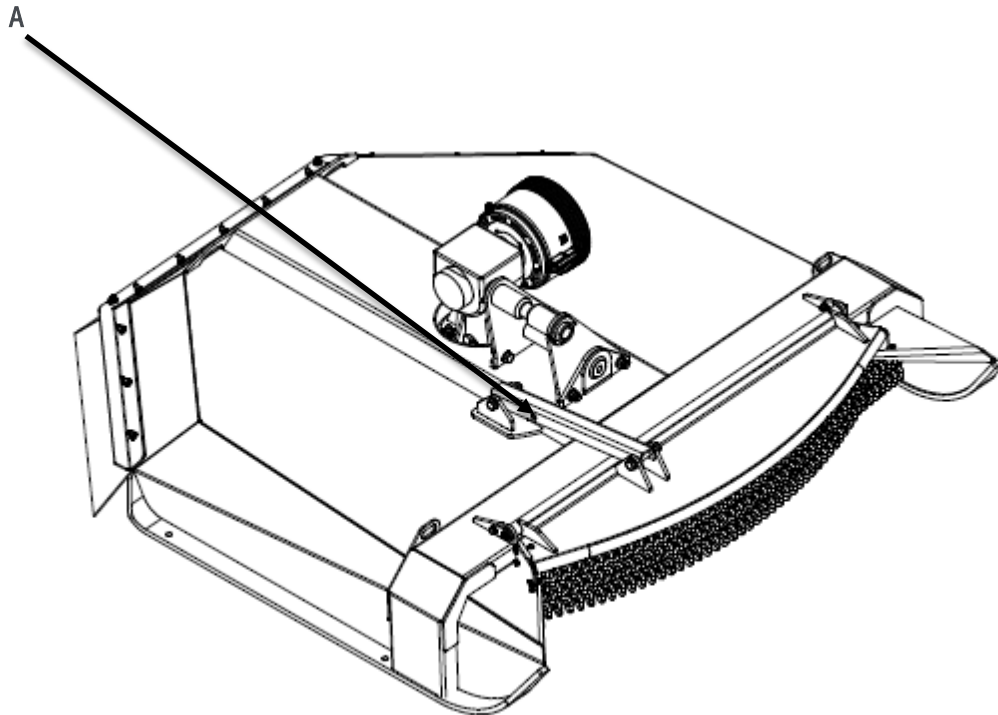
Store the machine in a dry place.

8 ADDITIONAL EQUIPMENT



Hydraulic front hatch Tornado 560, order number: 115604.
 Hydraulic front hatch Tornado 450, order number: 115605.



Hydraulic cylinder is mounted instead of bracket A. Hydraulic hoses are pulled along the frame together with hoses from the tilt cylinder. Make sure there is enough hose between the cylinder and the boom in order to avoid the hoses to be stretched when machine is tilted.



9 FINAL DEASSEMBLY

 WARNING	
	Keep unauthorized people outside of the working area. It's not allowed to stay under a suspended load. Always use work gloves.

- Use only suitable and approved lifting straps and chains for all lifting work.
- Unnecessary stay in the lifting area is not allowed.
- Be extra careful when lifting parts of the machine by hand.
- Before disassembly make sure the machine is detached from the tractor and make sure that it has stopped spinning.
- Before disassembling make sure that the hydraulic system is depressurized.

Oil

Collect the oil from the hydraulic system and return it to a recycling station.

Disassembly

We recommend that the machine is taken to scrap metal station after tires and oil has been removed.

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