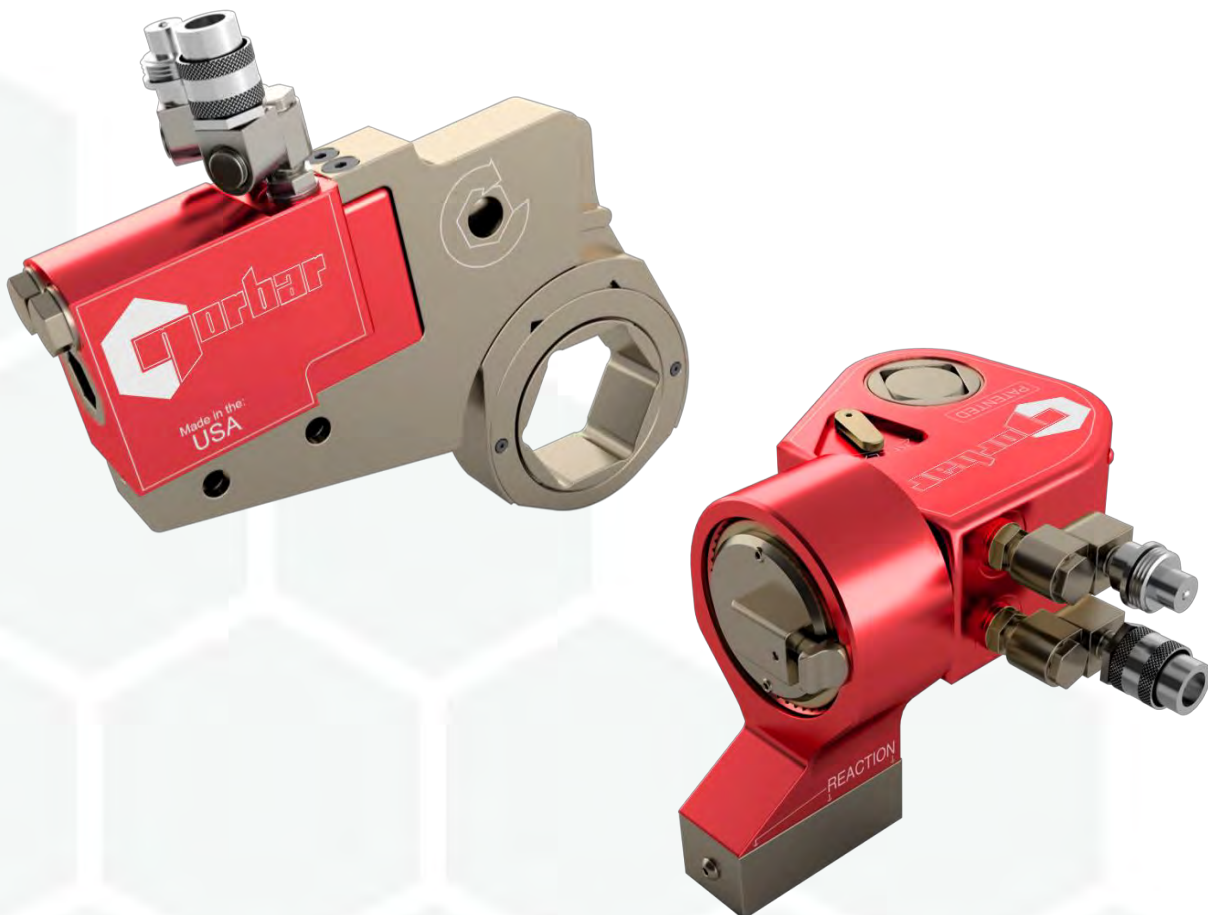


HYDRAULIC TORQUE WRENCH NSD & NHC SERIES



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PART NUMBERS COVERED BY THIS MANUAL

This manual covers all Norbar Square Drive (NSD) and Norbar Hex Cassette (NHC) Hydraulic Torque Wrenches, including the following:

Norbar Square Drive (NSD) Series

Model	Part Number	Square Drive	Maximum Torque Output (At 10,000 psi / 690 bar)	
			N·m	lbf·ft
NSD-1	73200	¾"	1,874	1,382
NSD-3	73201	1"	3,960	2,921
NSD-6	73202	1 ½"	6,928	5,110
NSD-8	73203	1 ½"	11,585	8,545
NSD-11	73204	1 ½"	14,633	10,793
NSD-20	73205	2 ½"	24,315	17,934
NSD-30	73206	2 ½"	34,986	25,804
NSD-45	73207	2 ½"	63,223	46,631
NSD-60	73208	2 ½"	74,441	54,905

Norbar Hex Cassette (NHC) Series

Model	Part Number	Norbar Hex Link Cassette (NHL) Range	Maximum Torque Output (At 10,000 psi / 690 bar)	
			N·m	lbf·ft
NHC-1	73220	19mm to 51mm	1,754	1,294
NHC-3	73221	32mm to 75mm	4,168	3,074
NHC-7	73222	51mm to 95mm	9,354	6,899
NHC-10	73223	60mm to 105mm	13,423	9,900
NHC-17	73224	70mm to 135mm	21,627	15,951
NHC-25	73225	86mm to 145mm	32,024	23,620
NHC-50	73226	115mm to 185mm	60,720	44,785

SAFETY

IMPORTANT: DO NOT OPERATE THE TOOL BEFORE READING AND UNDERSTANDING THESE INSTRUCTIONS. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DAMAGE TO THE TOOL. YOU MUST WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN USING THESE TOOLS.

This tool is intended for use with threaded fasteners. Any other use is not recommended.

Do not use tool in potentially explosive atmosphere as these tools contain grease, which may cause an explosion hazard in the presence of pure oxygen. These tools also contain aluminium alloy components which may cause a hazard in certain explosive environments.

These tools will come under reaction forces during operation. Ensure that the correct reaction set up has been used to contain these reaction forces. Be careful not to trap any objects in any reaction pinch points, including hands, hydraulic hoses, loose objects, etc. See section on Torque Reaction.

Be aware of unexpected tool movement due to reaction forces as this may cause injuries. Failure of the drive square/Hex Link Cassette may also cause unexpected tool movement.



There is a risk of crushing between the reaction arm/surface and work piece.

Keep hands away from reaction bar.

Keep hands away from tool output.

Keep loose clothing, hair, etc. from being caught in any rotating part of the tool.

Unexpected direction of inserted tool movement can cause a hazardous situation.

Use only sockets and adaptors which are in good condition and are intended for use with power tools. Before using any accessory with the tool, make sure they are inspected for wear/damage. If the accessory is in a good condition for use, make sure the tool and hydraulic pump are disconnected and switched off before installing, removing or adjusting any accessory.

Ensure all components in your hydraulic system have matching capacity/pressure ratings and make sure hoses are in good condition with no kinks or worn areas. Do not operate above the rated capacity of any components in the hydraulic system. The manufacturers recommended safe operating pressure for hoses, fittings, pumps, etc. must not be exceeded. Check that all fittings, couplers, and hoses are tight and clear of any obstructions before, during and after use. Ensure all hydraulic hoses are correctly fitted before switching on the hydraulic oil supply.

Use safety clips or safety lanyards on all pressure hoses. Never carry a tool by the hose or pull on the hose to disconnect. Keep cords or hoses away from heat, ice, oil and sharp edges. Damaged tools, fittings, hoses, etc. should be removed from use and tagged "DO NOT USE".

Proper apparel and personal protective equipment (i.e. hard hat, gloves, safety glasses, steel toe boots and ear plugs) should be worn as applicable. Loose clothing or jewellery should be avoided.

When operating the tool, be sure to keep good footing, secure body positioning, and maintain good balance. Keep your body a safe distance from operating tools and make sure all observers are kept a safe distance away from the work area. Never work over or under anyone.

Use good common sense and be alert to your surroundings. Do not use tools while you are tired or under the influence of drugs, alcohol or medication.

These tools are not insulated against electric shock.

Norbar recommends the following general safety precautions in the use of power tools:

1. Keep all tools in good condition with regular maintenance.
2. Use the right tool for the job.
3. Examine each tool for damage before use.
4. Operate according to the manufacturer's instructions.
5. Provide and use the proper protective equipment.

INTRODUCTION

The Norbar Square Drive (NSD) and Norbar Hex Cassette (NHC) series are hydraulic driven power tools designed for applying torque to threaded fasteners. The models outlined in this manual are capable of applying a torque from 159 N·m through to 74,441 N·m.

A Hydraulic oil pump is required to adjust the hydraulic oil pressure relevant to the required tool output. A pressure chart unique to your tool is supplied in the case with the tool.

Parts Included

- Hydraulic Wrench
- Carry case
- Operators Manual
- Quick Reference Guide
- Calibration Certificate with pressure chart specific to tool
- Container of Lubricant

NOTE: **Norbar Hex Link Cassettes do not come included with a NHC Torque Wrench and need to be purchased separately. More details on available Hex Link Cassettes are in the following accessories table.**

Accessories for NSD Series (available on request)

- Straight reaction arm
- Reaction clip
- Extended reaction member
- Hex driver socket
- Direct socket drive
- Direct Hex drive adaptor
- Impact sockets
- Hydraulic hoses
- Hydraulic pump

Accessories for NHC Series (available on request)

- Hex Link Cassettes (NHL)
- Hydraulic hoses
- Hydraulic pump
- Hex reducer
- Stack socket
- Inline reaction arm

Hex Link Cassettes for NHC-1 (73220)

Part Number	Description	Part Number	Description
73240.M19	NHL-1 19mm Hex Link Cassette	73240.M41	NHL-1 41mm Hex Link Cassette
73240.M27	NHL-1 27mm Hex Link Cassette	73240.M46	NHL-1 46mm Hex Link Cassette
73240.M32	NHL-1 32mm Hex Link Cassette	73240.M51	NHL-1 51mm Hex Link Cassette
73240.M37	NHL-1 37mm Hex Link Cassette		

Hex Link Cassettes for NHC-3 (73221)

Part Number	Description	Part Number	Description
73241.M32	NHL-3 32mm Hex Link Cassette	73241.M56	NHL-3 56mm Hex Link Cassette
73241.M37	NHL-3 37mm Hex Link Cassette	73241.M60	NHL-3 60mm Hex Link Cassette
73241.M41	NHL-3 41mm Hex Link Cassette	73241.M65	NHL-3 65mm HexLink Cassette
73241.M46	NHL-3 46mm Hex Link Cassette	73241.M70	NHL-3 70mm Hex Link Cassette
73241.M48	NHL-3 48mm Hex Link Cassette	73241.M75	NHL-3 75mm Hex Link Cassette
73241.M51	NHL-3 51mm Hex Link Cassette		

Hex Link Cassettes for NHC-7 (73222)

Part Number	Description
73242.M51	NHL-7 51mm Hex Link Cassette
73242.M56	NHL-7 56mm Hex Link Cassette
73242.M60	NHL-7 60mm Hex Link Cassette
73242.M65	NHL-7 65mm Hex Link Cassette
73242.M70	NHL-7 70mm Hex Link Cassette

Part Number	Description
73242.M75	NHL-7 75mm Hex Link Cassette
73242.M76	NHL-7 76mm Hex Link Cassette
73242.M86	NHL-7 86mm Hex Link Cassette
73242.M95	NHL-7 95mm Hex Link Cassette

Hex Link Cassette for NHC-10 (73223)

Part Number	Description
73243.M60	NHL-10 60mm Hex Link Cassette
73243.M65	NHL-10 65mm Hex Link Cassette
73243.M70	NHL-10 70mm Hex Link Cassette
73243.M75	NHL-10 75mm Hex Link Cassette

Part Number	Description
73243.M76	NHL-10 76mm Hex Link Cassette
73243.M86	NHL-10 86mm Hex Link Cassette
73243.M95	NHL-10 95mm Hex Link Cassette
73243.M105	NHL-10 105mm Hex Link Cassette

Hex Link Cassettes for NHC-17 (73224)

Part Number	Description
73244.M70	NHL-17 70mm Hex Link Cassette
73244.M75	NHL-17 75mm Hex Link Cassette
73244.M76	NHL-17 76mm Hex Link Cassette
73244.M86	NHL-17 86mm Hex Link Cassette
73244.M95	NHL-17 95mm Hex Link Cassette

Part Number	Description
73244.M105	NHL-17 105mm Hex Link Cassette
73244.M115	NHL-17 115mm Hex Link Cassette
73244.M125	NHL-17 125mm Hex Link Cassette
73244.M135	NHL-17 135mm Hex Link Cassette

Hex Link Cassettes for NHC-25 (73225)

Part Number	Description
73245.M86	NHL-25 86mm Hex Link Cassette
73245.M95	NHL-25 95mm Hex Link Cassette
73245.M105	NHL-25 105mm Hex Link Cassette
73245.M115	NHL-25 115mm Hex Link Cassette

Part Number	Description
73245.M125	NHL-25 125mm Hex Link Cassette
73245.M135	NHL-25 135mm Hex Link Cassette
73245.M145	NHL-25 145mm Hex Link Cassette

Hex Link Cassettes for NHC-50 (73226)

Part Number	Description
73246.M115	NHL-50 115mm Hex Link Cassette
73246.M125	NHL-50 125mm Hex Link Cassette
73246.M135	NHL-50 135mm Hex Link Cassette
73246.M145	NHL-50 145mm Hex Link Cassette

Part Number	Description
73246.M155	NHL-50 155mm Hex Link Cassette
73246.M165	NHL-50 165mm Hex Link Cassette
73246.M175	NHL-50 175mm Hex Link Cassette
73246.M185	NHL-50 185mm Hex Link Cassette

NOTE: Imperial Hex Link Cassettes are available and non-standard sizes can be manufactured to order.

FEATURES AND FUNCTIONS

Norbar Square Drive (NSD) Series

Square Drive

For use with all standard size square drive impact sockets. The square drive is easily reversible for the tightening and loosening of threaded fasteners.

High Strength, Lightweight Body

Tool body is made from a durable, high strength and lightweight aircraft alloy.

Unibody

Eliminates 'Pinch Points' and reduces side loading. The drive train assembly is completely encased within the tool body, limiting the risk of foreign objects obstructing any internal components.

Reaction System

This system allows for a 360° reaction rotation that is able to index in increments of 7.5 degrees creating 48 different reaction points in both directions. This reaction system is reversible which provides the user with an additional 48 different reaction points, making 96 reaction points in total. The reaction member is made from a lightweight aircraft alloy.

Anti-Reverse Pawl

Holds rotational wind-up forces to maintain required torque.

Pawl Release

Anti-Reverse pawl release mechanism allows manual release of the tool if "binding" occurs.

Slotted Piston Rod

Maintains a 90° relationship between piston rod and nut to increase accuracy and reduce number of moving parts.

Dual Plane Swivel Fittings

Allows for hose movement without hose binding. Made from a stainless steel and robustly designed with fewer moving parts.

Coated

All parts of the tool that are exposed have been coated to resist corrosion.

Light/Ergonomic

The tools light and ergonomic design helps to reduce operator fatigue.

Calibrated

Every tool has been calibrated to +/- 3% accuracy and comes with its own Calibration Certificate with unique pressure settings for better accuracy.



Norbar Hexagon Cassette (NHC) Series

Inline Ratchet Drive

Standard Hex Link Cassette sizes from 19mm across the flats. Imperial and special sizes are also available. A spring retaining clip allows for quick and easy changing of the Hex Link Cassettes.

Precision Machined

Tools are precision machined to increase accuracy, durability and repeatability with reduced surface damage to the nut.

Unibody

Eliminates 'Pinch Points'.

Reaction Pad

A reaction pad built into the tool body allows the tool to react against an adjacent nut. An extension can also be available as an accessory.

Multi-Axis Porting System

Allows the swivel fittings to be manually relocated from the top of the tool to the back of the tool (or vice versa) using only simple hand tools.

Drive Pin Design

The design of the drive pin helps to reduce the overall dimensions of the Hex Link Cassette head including a thinner 'nose' radius, allowing the tool to fit more applications.

High Strength, Lightweight Body

Tool body is made from a durable, high strength and lightweight aircraft alloy.

Slotted Piston Rod

Maintains a 90° relationship between piston rod and nut to increase accuracy and reduce number of moving parts.

Dual Plane Swivel Fittings

Allows for hose movement without hose binding. Made from a stainless steel and robustly designed with fewer moving parts.

Coated

All parts of the tool that are exposed have been coated to resist corrosion.

Light/Ergonomic

The tools light and ergonomic design helps to reduce operator fatigue.

Calibrated

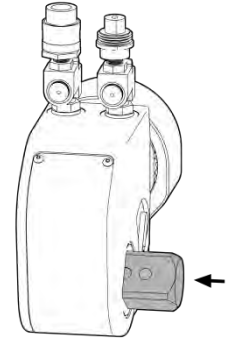
Every tool has been calibrated to +/- 3% accuracy and comes with its own Calibration Certificate with unique pressure settings for better accuracy.



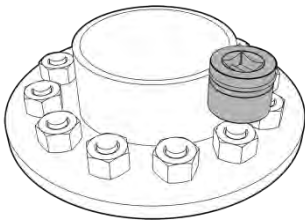
SET UP INSTRUCTIONS

Setting the Square Drive for NSD

The square drives on the NSD series tools are designed to be pushed through the body housing for both tightening and loosening threaded fasteners. If the square drive is protruding out the right side of the tool when looking toward the dust cover, the tool is set to tighten the fastener. If the square drive is protruding out the left side of the tool, then the tool is set to loosen the fastener. To change the operating direction of the tool, simply push the square drive through the housing until it projects out the other side of the tool. To connect a socket to the square drive follow the below steps:



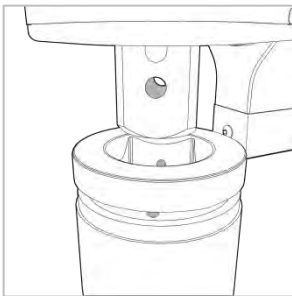
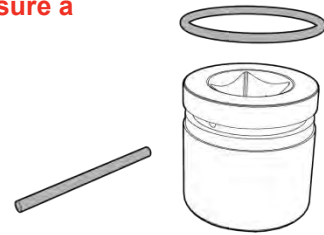
1. Locate the correct size socket for the application and check for wear or cracks.



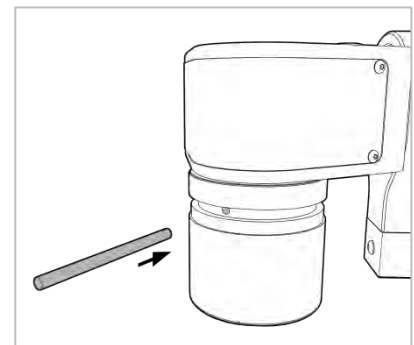
IMPORTANT: ENSURE THAT THE SOCKET CLOSELY FITS THE NUT/BOLT. IF NOT, THERE WILL BE SEVERE CORNER LOADING, WHICH WILL ROUND THE CORNERS OF THE NUT/BOLT AND WILL PLACE UNDUE BURSTING LOAD ON THE SOCKET. THE DAMAGE TO THE NUT/BOLT WILL BE OBVIOUS, BUT THE DAMAGE TO THE WRENCH/SOCKET MAY BE A HIDDEN HAIRLINE CRACK THAT MAY LEAD TO FAILURE LATER.

TIP: Before connecting the socket, test it on the fastener to ensure a secure fit.

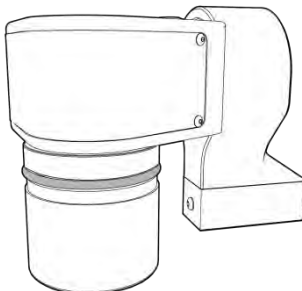
2. Remove the retaining circlip and holding pin from the socket.



3. Turn the square drive to ensure the holding pin hole is facing out from the tool.



4. Insert the socket onto the square drive ensuring that the socket pin hole is correctly lined up with the square drive pin hole and slide the holding pin through the hole.



5. Once the holding pin has been pushed through the socket and square drive, place the retaining circlip over the holding pin to secure.

TIP: Damaged or worn sockets should be removed from use and tagged "DO NOT USE".

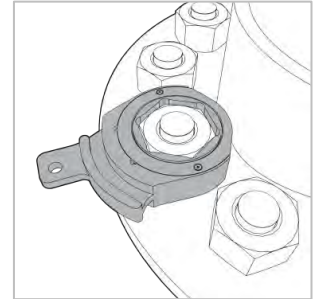
Connecting the Hex Link Cassette for NHC

The NHC Series tools do not come equipped with a Hex Link Cassette, before applying torque to a nut/bolt you will need to fit the correct size Hex Link Cassette.

To attach a Hex Link Cassette to your NHC tool follow the below instructions:

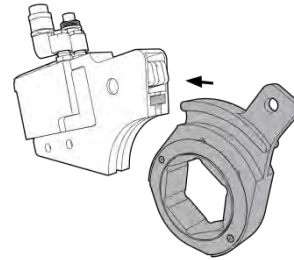
1. Locate the correct size Hex Link Cassette for the application and check for wear or cracks.

IMPORTANT: ENSURE THAT THE HEX LINK CASSETTE CLOSELY FITS THE NUT/BOLT. IF NOT, THERE WILL BE SEVERE CORNER LOADING, WHICH WILL ROUND THE CORNERS OF THE NUT/BOLT AND WILL PLACE UNDUE BURSTING LOAD ON THE HEX LINK CASSETTE. THE DAMAGE TO THE NUT/BOLT WILL BE OBVIOUS, BUT THE DAMAGE TO THE TOOL MAY BE A HIDDEN HAIRLINE CRACK THAT MAY LEAD TO FAILURE LATER.



TIP: Before connecting the Hex Link Cassette, test it on the fastener to ensure a secure fit.

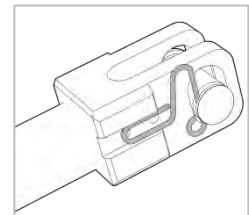
2. Ensure the body railings of the tool and Hex Link Cassette has been adequately cleaned and lubricated. If not follow the relevant steps highlighted in the maintenance section before proceeding with the below steps.
3. Ensure the cylinder drive pin is removed from the tool body (See Figure 1).
 - a. Locate the cylinder drive pin hole on the tool body.
 - b. Inside the cylinder drive pin hole pull the quick-clip back and away from the cylinder drive pin.
 - c. When free from the quick-clip, push the cylinder drive pin out through the other side of the tool body.



4. Slide the Hex Link Cassette into the NHC tool body.

5. Ensure the cylinder pin hole on the Hex Link Cassette is in line with the cylinder pin hole on the tool body and reinsert the cylinder drive pin through the hole.
6. In the cylinder drive pin hole, pull the quick-clip away from the cylinder drive pin and push the cylinder drive pin fully into the hole.

7. Release the quick-clip and ensure the cylinder drive pin is secured under the quick-clip.



TIP: Damaged or worn Hex Link Cassettes should be removed from use and tagged “DO NOT USE”.

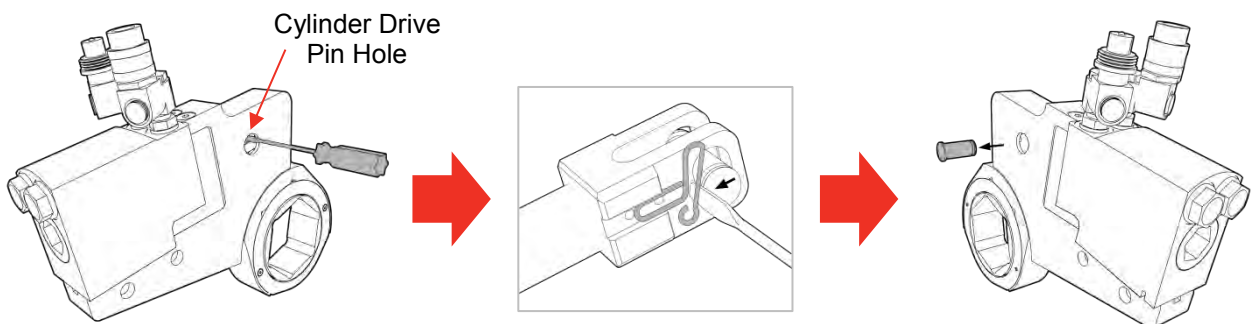


FIGURE 1 – Removing the Cylinder Drive Pin

Hose Connections



WARNING: BEFORE CONNECTING ANY HOSES, ENSURE ALL EQUIPMENT IN THE HYDRAULIC SYSTEM HAVE MATCHING CAPACITY/PRESSURE RATINGS. DO NOT EXCEED 10,000 PSI WITH THESE TOOLS.

IMPORTANT: TO ENSURE THE TOOL WORKS ACCURATELY, ONLY USE GAUGES THAT HAVE BEEN CALIBRATED.

Before connecting the hydraulic system to the tool, you will need to ensure that the system has been bled of any excess air. This will help to ensure that the hydraulic pump works at optimum performance. To bleed the system, follow the below steps:

1. Check the components to be used in the hydraulic system for any damaged parts. Ensure that the hoses do not contain any cracks, splits or leaks.
2. Connect the hoses male and female quick connects to the quick connects on the hydraulic pump, see FIGURE 2.
3. Connect the free ends of both hoses to each other using the quick connects. This should create a loop in the hydraulic system, see FIGURE 3.
4. Make sure all connections are fully connected to form a tight seal.
5. Turn the hydraulic pump on and allow the hydraulic oil to circulate through both hoses at a low pressure for 1-2 minutes.
6. Turn the hydraulic pump off and disconnect the two hydraulic hoses that are connected to each other, but leave the two hoses connected to the hydraulic pump.

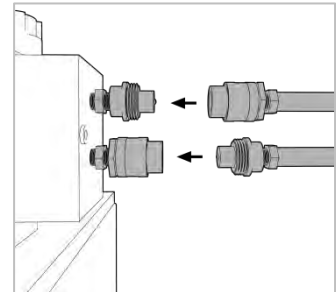


FIGURE 2 – Connecting Hoses to Pump

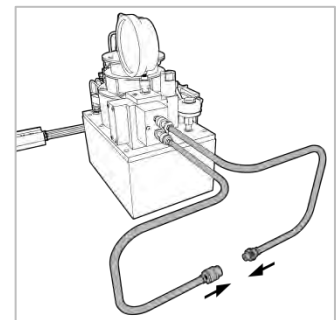


FIGURE 3 – Connecting Hoses to Each Other

After any residual air has been bled from the system, connect hoses to the tool. If the hoses have not been preloaded with hydraulic oil, ensure that the hydraulic pump reservoir is not drained of hydraulic oil during start up. Follow the below steps to connect the hydraulic system to the tool.

1. Use the tool and hoses quick connects to connect the hoses to the tool.
2. Ensure the hoses are fully connected to both the tool and the pump. The connections should form a tight seal, see FIGURE 4.
3. Ensure there are no sharp bends or kinks in the hydraulic hoses, as this will cause a severe backup pressure in the hoses.

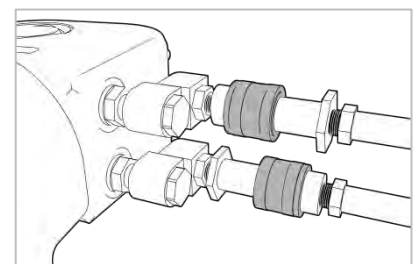


FIGURE 4 – Tight Hose Seal



WARNING: DO NOT HANDLE THE HOSES WHEN THEY ARE PRESSURISED. OIL ESCAPING UNDER PRESSURE CAN PENETRATE THE SKIN CAUSING SERIOUS INJURY. IF OIL IS INJECTED UNDER THE SKIN, CONTACT A DOCTOR IMMEDIATELY.

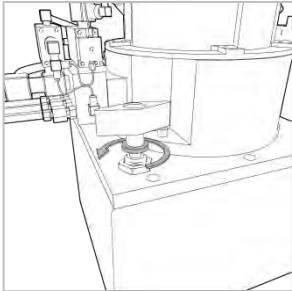
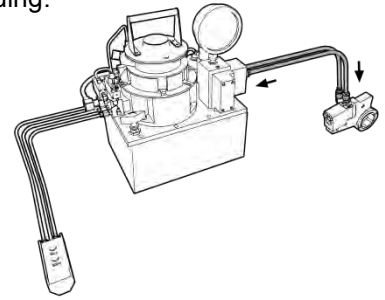


WARNING: DO NOT REVERSE THE MALE AND FEMALE QUICK CONNECTS ON THE TOOL, HYDRAULIC PUMP OR ONE END OF THE HYDRAULIC HOSES. DOING SO WILL REVERSE THE POWER STROKE CYCLE AND MAY DAMAGE THE TOOL.

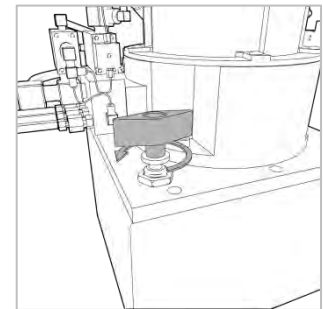
Setting Torque

To ensure that the correct pressure level is set, please refer to the pump manufacturer's specifications and the Calibration Certificate supplied with the tool, the below steps are only a guide and may vary depending on the hydraulic pump used. Please read the pumps instructions before continuing:

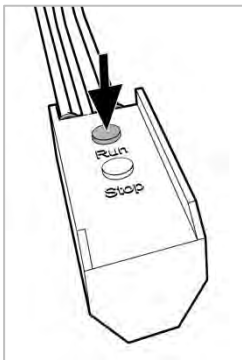
1. Ensure the tool is securely connected to the pump, outlined in the above section. The tool should NOT be placed on the nut/bolt at this time.



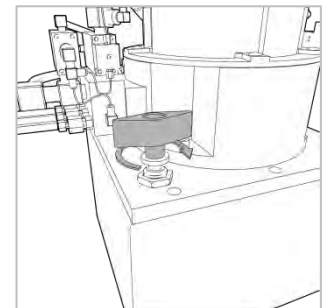
2. Loosen the locknut beneath the relief valve knob.



3. Turn the pressure setting knob counter clockwise, loosening it all the way.

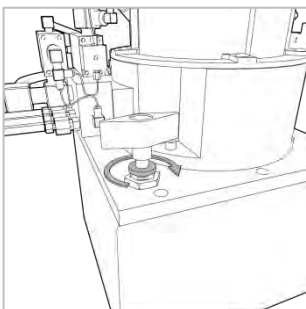


4. Connect the pump to the power supply, turn on and then press the remote control advance button, holding down until the tool cylinder strokes out completely.



5. Turn the pressure setting knob clockwise until the desired pressure is reached. Refer to the tools calibration certificate for pressures.

NOTE: Do not exceed 10,000 psi.



6. Tighten the locknut to prevent a change in psi.

7. Press the remote control advance button again until the tool cylinder stalls out completely to ensure that the desired pressure is still being achieved and has not been altered in tightening the locknut.

Torque Reaction



WARNING: NEVER USE REACTION BARS UNLESS SPECIFICALLY DESIGNED BY NORBAR FOR YOUR TOOL APPLICATION.



WARNING: ENSURE HANDS, LOOSE CLOTHING AND LONG HAIR ARE KEPT AWAY FROM THE WORKING AREA. BE AWARE OF PINCH POINTS THAT CAN TRAP HANDS, SEE FIGURE 5.

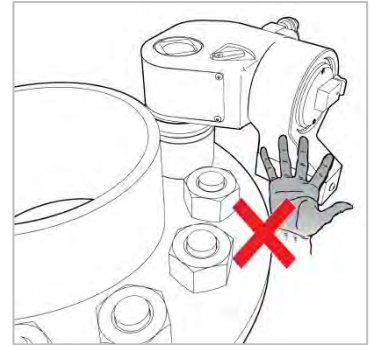


FIGURE 5 – Reaction Pinch Points

Both the NSD and NHC hydraulic torque wrenches will come under reaction forces during operation. The NSD series models come equipped with a rotatable reaction arm and the NHC series tools can take reaction on the reaction pad built into the tool body.

IMPORTANT: REACTION FORCES ARE THE MOST DESTRUCTIVE FORCES ASSOCIATED WITH THE USE OF HYDRAULIC TORQUE TOOLS. CARE MUST BE TAKEN TO ENSURE THAT THE INSTRUCTIONS DETAILED IN THIS SECTION ARE ADHERED TO.

Ensure reaction is taken against a positive stop with either the reaction arm or reaction pad. Taking reaction forces elsewhere on the tool body may lead to application failure and damage the tool.

With the NHC Series tools always react with the reaction point spanning over half the width of the body and as centred on the reaction pad as possible.

Reaction should always be taken on a flat surface and as close to the middle of the reaction arm/pad as possible, see FIGURE 6. Do not take reaction on a sloped or rounded surface, as this may cause the tool to deflect or slip off.

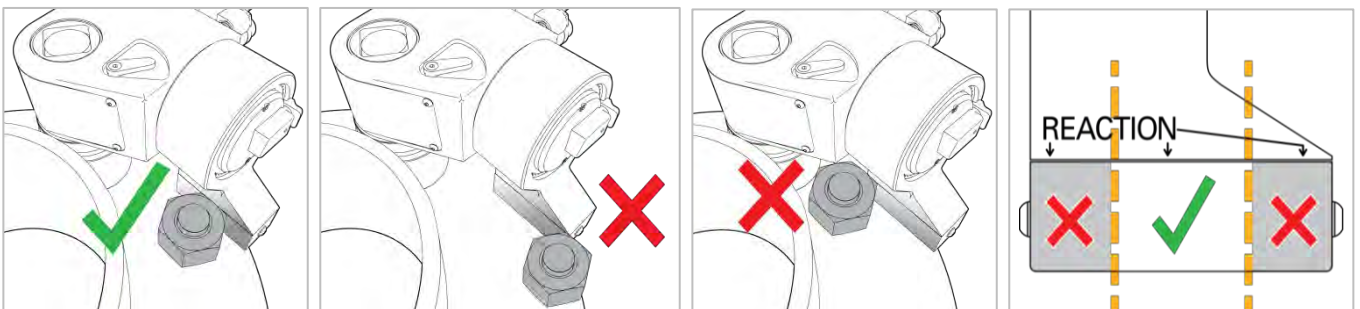


FIGURE 6 – Safe Reaction Areas on the NSD Reaction Arm

Setting the Reaction Arm for NSD Series Tools

1. Find a reaction surface that is flat. Do not react against sloped or rounded surfaces.
2. Connect the reaction arm to the tool and place it so the reaction is as close to 90 degrees as possible. If required reverse the reaction arm for a better reaction. Ensure the reaction arm is completely connected to the tool before proceeding. See FIGURE 7
3. Ensure the bolt is reacting flat against the reaction arm and is placed in the middle of the reaction arm. Do not take reaction at either end of the reaction arm, see FIGURE 6 and 8.



WARNING: ENSURE CORRECT MECHANICAL SUPPORT AND REACTION ARM POSITION HAVE BEEN USED TO CONTROL THE REACTION FORCES. IF THE REACTION ARM IS NOT POSITIONED AGAINST A FLAT SURFACE AT THE 90 DEGREE ANGLE AND AGAINST A POSITIVE STOP, THIS COULD CAUSE THE TOOL TO TILT OFF THE AXIS OF THE NUT/BOLT.

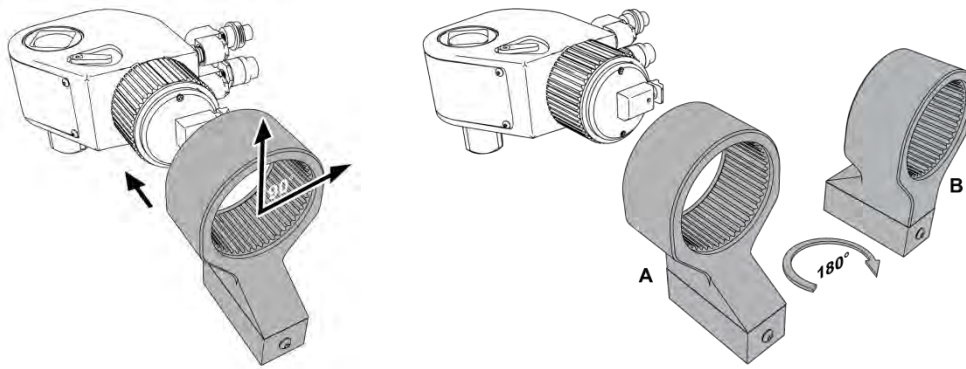


FIGURE 7 – Attaching the Reaction Arm for NSD

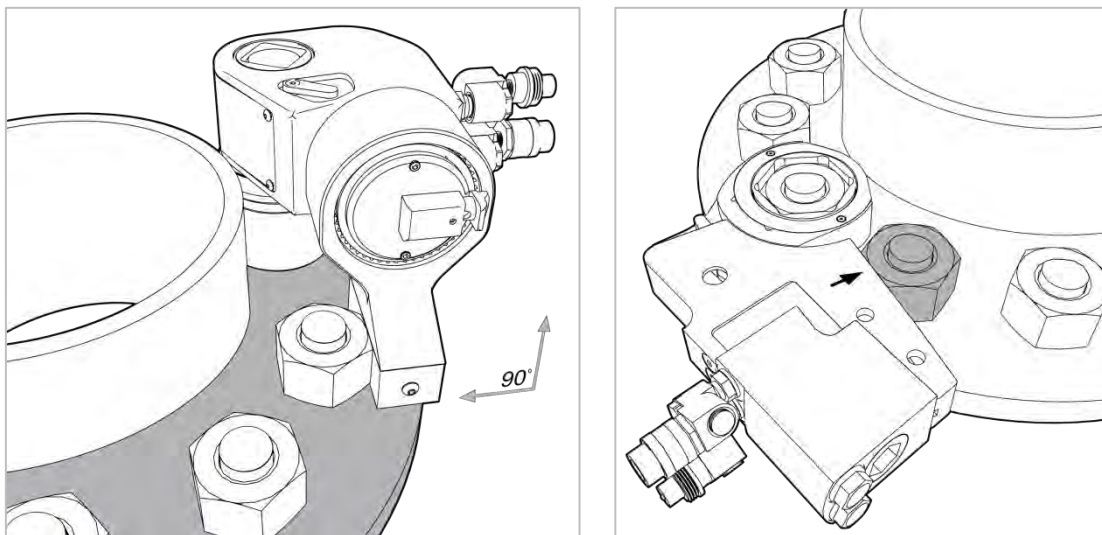


FIGURE 8 – Example of a Correct Reaction Set-Up for the NSD and NHC Tools

OPERATING INSTRUCTIONS



WARNING: KEEP HANDS CLEAR OF THE REACTION ARM.



WARNING: WHEN USING THIS TOOL IT MUST BE SUPPORTED AT ALL TIMES IN ORDER TO PREVENT UNEXPECTED RELEASE IN THE EVENT OF FASTENER OR COMPONENT FAILURE.



WARNING: CHANGING THE HYDRAULIC OIL PRESSURE DURING OPERATION WILL CHANGE THE STALL TORQUE VALUE.

Before operating, ensure that the tool has been adequately lubricated; see Maintenance section for further guidance.

Tightening

1. Ensure that the correct socket or Hex Link Cassette has been fitted to the tool. Refer to Set up Instructions for further guidance.
2. Place the tool onto the nut/bolt and set the reaction arm/pad to ensure that the tool is reacting correctly. Please follow instructions outlined within the section on Torque Reaction.

NOTE: The wrench/socket should be engaged to the full depth of the nut/bolt to transmit maximum torque and to prevent damage from overloading the wrench and damaging the corners of the nut/bolt.

IMPORTANT: BE AWARE OF HAND AND FINGER PLACEMENT, AVOID ALL POINTS OF OPERATION HAZARDS WHEN POSITIONING OR USING EQUIPMENT.

3. Connect the tool to the hydraulic system and ensure that all hose connections are complete to form a tight seal. See section on Hose Connections for further details.

IMPORTANT: ENSURE ALL HOSES, QUICK CONNECTS AND END PLUG ARE CLEAR OF THE TOOL AND THE REACTION POINT.

4. Turn the pump on.
5. Set the oil pressure for the required torque. Refer to Calibration Certificate supplied with the tool for torque pressures or 'Setting Torque' section in this manual for further instructions on setting torque pressures.

NOTE: Do not apply more torque to a nut/bolt than the manufacturer's specification for that nut/bolt. Doing so can result in nut/bolt failure and perhaps socket damage.

Never exceed the maximum rated pressure/capacity of any of the equipment used in the hydraulic system.

6. Activate the remote control connected to the pump to advance the piston.
7. Once the piston is fully advanced, release the button on the remote control to enable the piston to retract. You will know the tool has fully advanced when:
 - a. NSD tools – The nut/bolt stops rotating, pressure builds to set pressure and the pump volume becomes louder.
 - b. NHC tools – The Hex Link Cassette is extended past the body and the set pressure has been reached. See FIGURE 9.

TIP: If the tool will not extend or retract, check the couplings to make sure they are tight.

8. Once the piston has fully retracted keep repeating steps 6 and 7 until the nut is no longer turning and the pump has reached the desired pressure. You will know the tool is fully retracted when:
 - a. NSD tools – You hear a ‘click’, pressure builds, then decreases, and pressure returns to approximately 1500 psi.
 - b. NHC tools – You are able to see the cylinder drive pin through the hole in the tool body and the pressure returns to approximately 1500 psi. See FIGURE 10.

NOTE: Starting another stroke before the piston has fully retracted may cause damage to the tool.

TIP: If the tool is erratic in its cycle, check the oil level in the pump.

9. Switch off the hydraulic system and prepare the tool for its next application.

NSD Series tools are equipped with an anti-reverse latching pawl release mechanism, located on the side of the tool. This allows release of the tool if ‘binding’ occurs. Press the pump control button to load up the tool, using your hand turn the latching pawl handle towards the back of the tool. If tool will not release from bolt, increase hydraulic pressure and repeat this process.

IMPORTANT: DO NOT FORCE WITH PLIERS, HAMMER, VICE GRIPS, CRESCENT WRENCH, ETC. THIS WILL CAUSE DAMAGE TO THE TOOL.

NEVER HAMMER ON A SOCKET THAT IS UNDER LOAD.

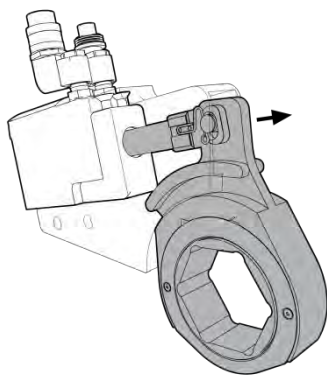


FIGURE 9 – Fully Advanced NHC Piston

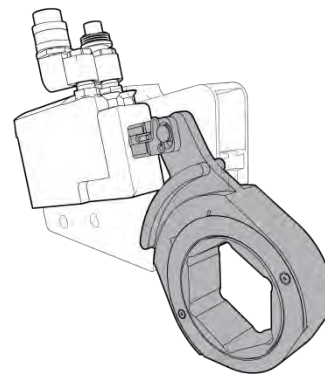


FIGURE 10 – Fully Retracted NHC Piston

Releasing

1. Adjust the pump pressure to the MINIMUM pressure required to loosen.

NOTE: Do not exceed 10,000 psi.

2. For the NSD series tools the socket will need to be removed from the square drive. If you are using a NHC Series tool simply remove the tool from nut/bolt and flip the tool to place the Hex Link Cassette onto the nut/bolt from the other side. If you are using a NHC series tool proceed to step 3. If you are using a NSD series tool follow the below steps to set the square drive:
 - a. Remove retaining circlip and holding pin on the socket.
 - b. Slide socket off from the square drive.
 - c. Push the square drive through the body housing until it projects out from the other side of the tool.
 - d. Slide the socket onto the square drive, ensuring that the pin hole on the socket lines up with the pin hole of the square drive.
 - e. Slide the holding pin through the pin hole and replace the retaining circlip over the pin hole.
3. Once both tools have been set up for releasing, follow steps 1 through to 9 outlined under Tightening.

MAINTENANCE

To maintain optimum performance and safety, regular maintenance needs to be carried out, to ensure the tools are kept clean and adequately lubricated.

Any other maintenance or repairs should be carried out by Norbar or a Norbar approved agent and should form part of a service. Service intervals will depend on the type of usage of the tools and the environment in which they are being used. The maximum recommended maintenance and recalibration interval is 12 months.



WARNING: BEFORE BEGINNING ANY MAINTENANCE WORK ON YOUR TOOL, ENSURE THAT THE POWER SUPPLY TO THE HYDRAULIC SYSTEM HAS BEEN SWITCHED OFF AND PRESSURE HAS BEEN RELIEVED FROM THE SYSTEM. ONLY CARRY OUT ANY REQUIRED MAINTENANCE ONCE THE TOOL HAS BEEN CORRECTLY DISCONNECTED FROM THE HYDRAULIC SYSTEM.

Disassembling the NSD Series

The below steps must be followed when disassembling the tool. Removing any parts outside of these instructions could cause damage to the tool.

NOTE: When disassembling this tool, be careful not to scratch or damage any surfaces that will contain pressurised hydraulic oil.

TIP: If you are holding the tool, threaded members or housings in a vice, ensure copper covered vice jaws are used.

1. Remove the dust cover, by unscrewing the 4 screws located in each corner.

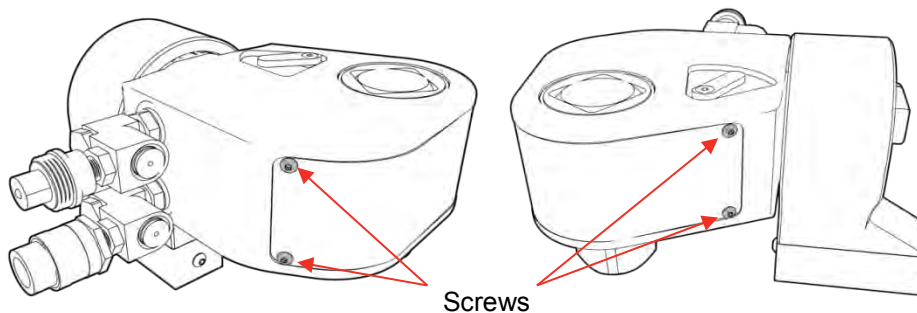
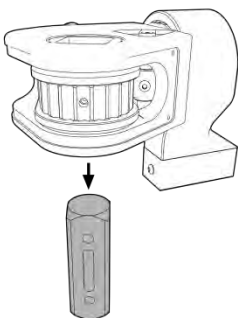
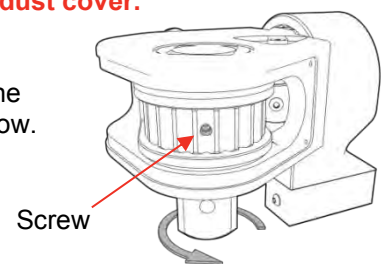


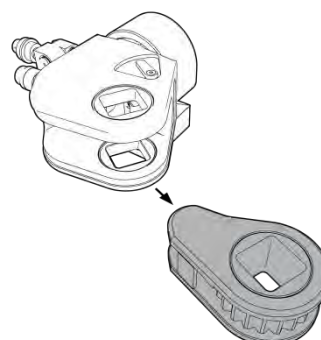
FIGURE 11 – Dust Cover Screw Location

NOTE: NSD-1 and NSD-3 models will only have 3 screws in the dust cover.

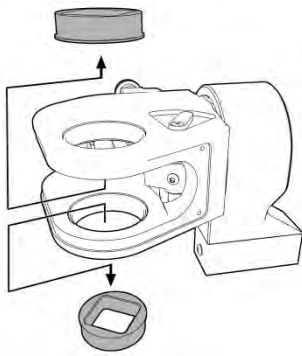
2. To remove the square drive, locate the gear set screw in the centre of the drive gear. The drive square may need to be rotated for the screw to show. Once visible remove this screw.



3. Remove the socket/square drive from the body unit.



4. Slide the drive train assembly out from the body unit.



5. Remove the two bushings from the tool body by pushing each bushing towards the inside of the tool.

6. Take apart all components of the drive train assembly for lubrication and inspection.
Drive train assembly consists of:

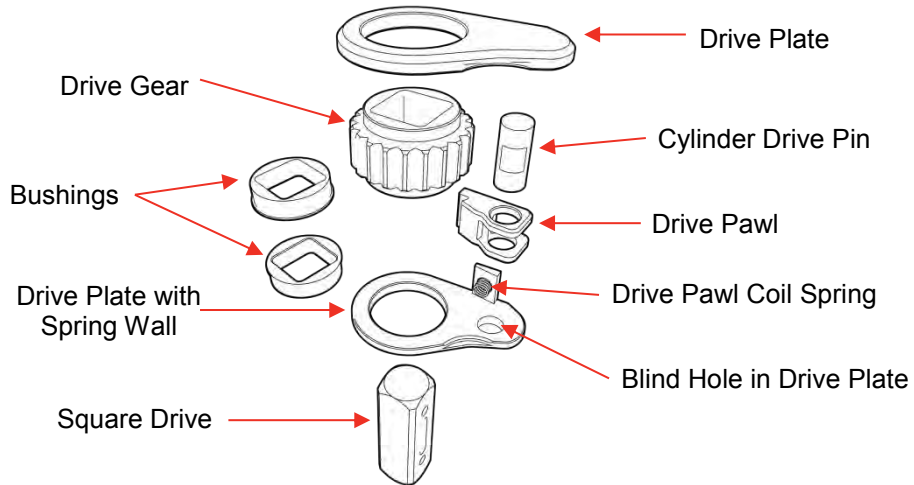


FIGURE 12 – Drive Train Assembly Components

When lubricating, ensure all components of the drive train assembly and the inside walls of the tool are well lubricated with the exception of the blind hole in the drive plates and the cylinder drive pin. Be careful not to lubricate the blind hole on the inside of the drive plate.

IMPORTANT: NEVER LUBRICATE THE INSIDE OF THE BLIND HOLE ON THE DRIVE PLATES. DOING SO COULD CAUSE PROBLEMS WITH OPERATION.

7. Check latching pawl assembly for damage.

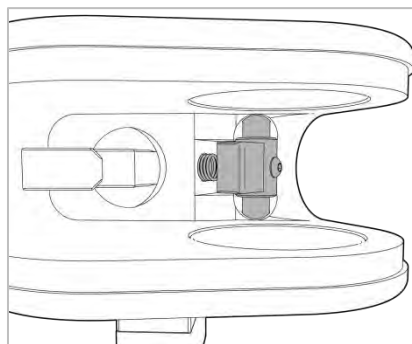


FIGURE 13 – Latching Pawl

The latching pawl coil spring should be intact and show no signs of damage. Tension of this spring should be tight when pressing the latching pawl handle. Replace any damaged parts.

NOTE: Latching pawl coil spring will be free to fall out when removing the drive train assembly.

8. Before reassembling the tool ensure all relevant parts are cleaned and well lubricated. See Maintenance section for further guidance.

Disassembling the NHC Series

The below steps must be followed when disassembling the tool. Removing any parts outside of these instructions could cause damage to the tool.

NOTE: When disassembling this tool, be careful not to scratch or damage any surfaces that will contain pressurised hydraulic oil.

1. Remove the Hex Link Cassette from the tool (see FIGURE 14).
 - a. Locate the cylinder drive pin hole on the tool body.
 - b. Inside the cylinder drive pin hole pull the quick-clip back and away from the cylinder drive pin.
 - c. When free from the quick-clip, push the cylinder drive pin out through the other side of the tool body.
 - d. Slide the Hex Link Cassette out of the tool body.

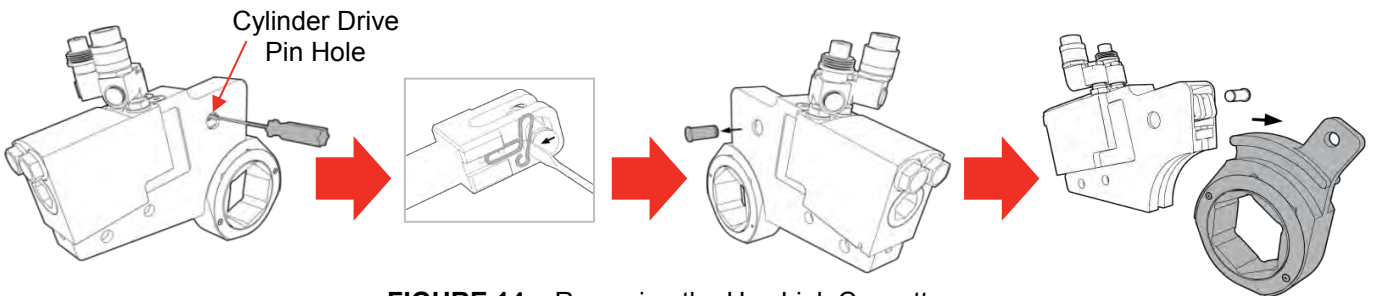


FIGURE 14 – Removing the Hex Link Cassette

2. Disassemble the Hex Link Cassette (see FIGURE 15).
 - a. Place on a flat surface and remove the set head shields and screws with an Allen key.

TIP: Sometimes an appropriately sized Torx Screwdriver will work just as well in these screws.
 - b. Push the drive gear out of the cassette head.
 - c. Remove the positive drives and springs from the cassette head found in the interior rim.

NOTE: Be careful of loose springs when removing the positive drives and springs

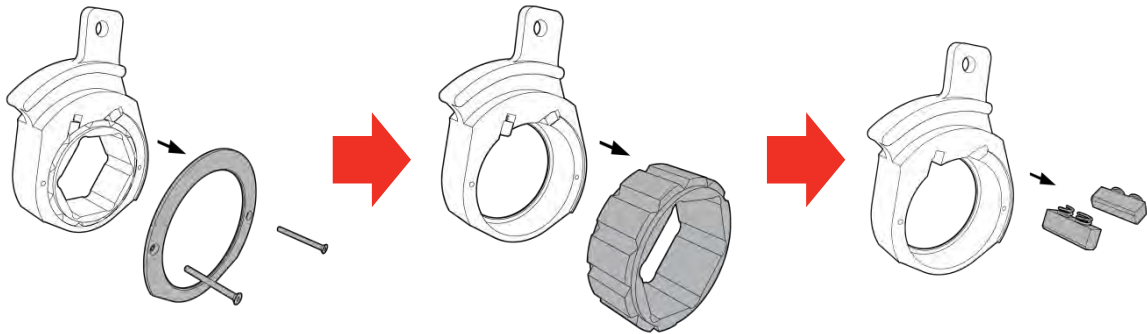


FIGURE 15 – Disassembling the Hex Link Cassette

3. Clean and lubricate all components of the Hex Link Cassette and inside walls of the tool. See below sections on cleaning and lubrication for further guidance. Components of the Hex Link Cassette are shown in FIGURE 16:

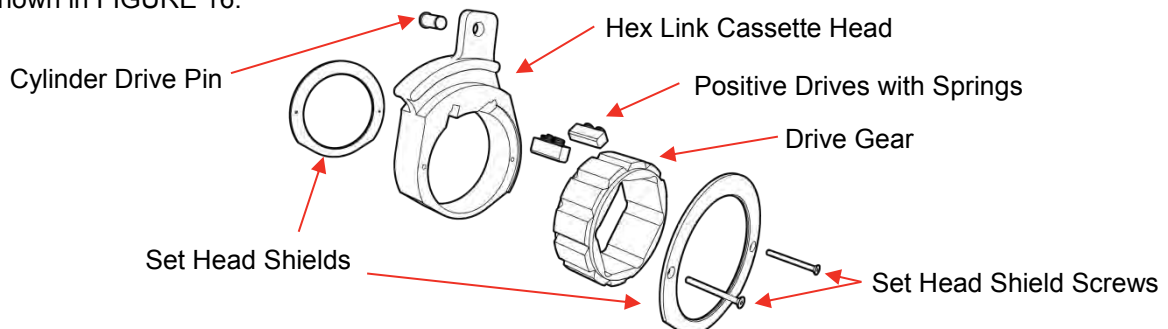


FIGURE 16 – Hex Link Cassette Components

Cleaning

Ensure all parts of the tool are kept in a clean and well maintained condition to aid safety. It is best to clean all parts of the tool once disassembled and before lubrication. When cleaning do not use abrasives or solvent based cleaners and ensure cleaning takes place in a well-ventilated area.

Lubrication

IMPORTANT: ONLY USE A NICKEL OR COPPER BASED ANTI-SEIZE LUBRICANT.

Ensure all parts to be lubricated have been thoroughly and appropriately cleaned before lubricating; see above section on cleaning for further guidance. Lack of adequate lubrication is the most common cause of premature wear and tool failure. It is important that all relevant parts of the tool are adequately lubricated for the tool to function correctly. Lubricant should be generously applied to the below parts.

NSD Series:

- Inside walls of the tool
- All components of the drive train assembly with the exception of the cylinder pin and blind hole located in the drive plates

NHC Series:

- Inside walls of the tool
- All components of the Hex Link Cassette

IMPORTANT: FOR NSD TOOLS, NEVER LUBRICATE THE BLIND HOLE ON THE DRIVE PLATE. DOING SO COULD CAUSE PROBLEMS WITH OPERATING

TIP: Frequently inspect the tool for lubrication to prolong the problem free life of the tool.

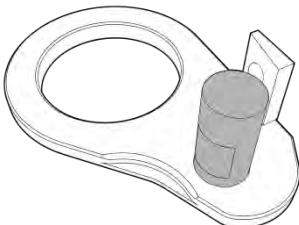
TIP: If you have an extra tool, organise a program to frequently change the tools every twenty joints. When meeting stringent requirements, inspect and lubricate the tool.

Reassembly of the NSD Series

Before reassembling the tool, ensure all relevant components have been adequately cleaned and lubricated. To reassemble the tool follow the below steps. Any deviation from the below steps may result in the tool not functioning correctly.

1. Ensure all components of the drive train assembly and inside walls of the tool are adequately lubricated, with the exception of the blind hole in the drive plates and cylinder pin.

2. Place the drive plate with the retainer wall attached on the inside plate onto a flat surface.

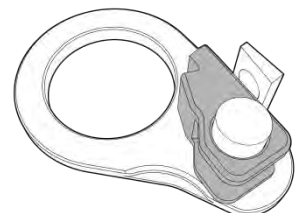


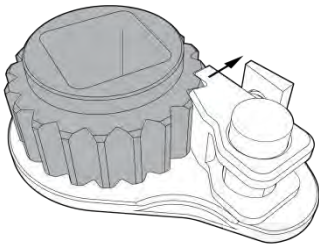
3. Push cylinder pin into the drive plate blind hole.
 - a. The cylinder pins for the NSD-6, NSD-8, NSD-11, NSD-20 and NSD-30 will have a flat edge along the circumference. Ensure this flat side of the cylinder drive pin is facing away from the spring wall.
 - b. The NSD-45 and NSD-60 will have a screw covered window for cylinder drive pin installation.



4. Now lubricate the circumference of the cylinder drive pin, being careful not to lubricate the top of the pin that will later slot into the other blind hole.

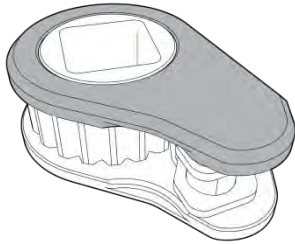
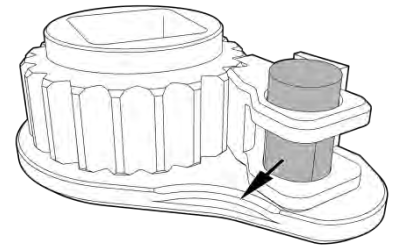
5. Place the drive pawl over the cylinder pin and insert the drive pawl spring against the retainer wall.





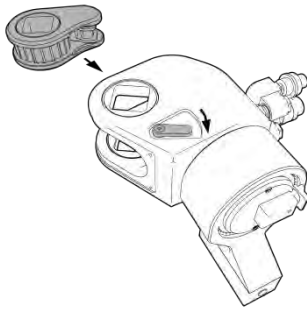
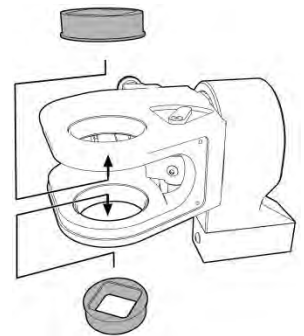
6. Ensure the drive pawl is pressed against the spring retainer wall and slot the drive gear onto the drive plate. The drive gear teeth should slot nicely against the drive pawl as shown.

7. Release the drive pawl to set and lock the gear. Then rotate the gear 90 degrees to secure the drive pawl spring. Ensure the cylinder drive pin flat side is still facing away from the spring wall.



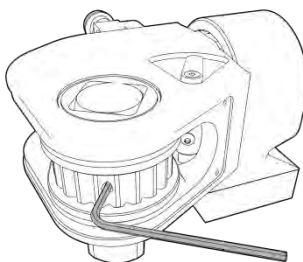
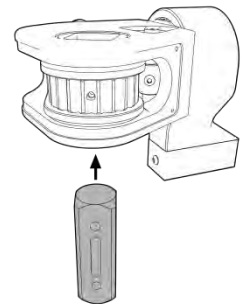
8. Now place the second drive plate over the drive pawl and gear. The top side of the cylinder pin should now slot into the other blind hole.

9. Place the two bushings into the two holes located on the tool body where the drive square is to go. The two bushings are inserted from the inside of the tool. Ensure the lip on both bushings is facing towards the inside of the tool body and slot into the hole.



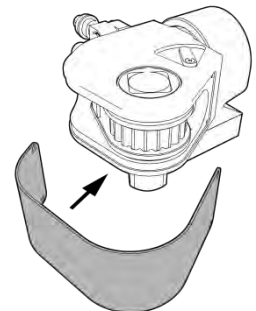
10. Slide the drive train assembly into the tool body, ensuring that the flat side of the cylinder pin is facing the tool. When inserting the drive train assembly, pull the latching pawl handle and line up the drive train assembly with the bushing.

11. Push the square drive through the square drive hole, making sure that the center key is in line with the gear set screw hole.



12. Place and completely tighten the gear set screw into the hole. Once the screw is completely tightened, unscrew the same set screw out by a 1/4 turn to allow for the square drive to slide easily from side to side.

13. Place the dust cover back over the tool body and secure with the retaining screws.



Reassembly of the NHC Series

Before reassembling the tool, ensure all relevant components have been adequately cleaned and lubricated. To reassemble the tool follow the below steps. Any deviation from the below steps may result in the tool not functioning correctly.

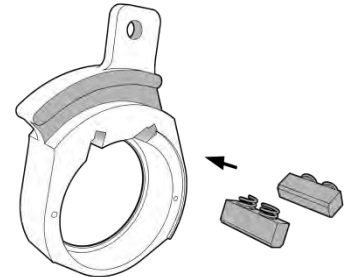
1. Ensure all components of the Hex Link Cassette and inside walls of the tool are clean and adequately lubricated, including the Hex Link Cassette railing.

2. Insert the two positive drives with springs into the drive spring channels located on the cassette head interior rim

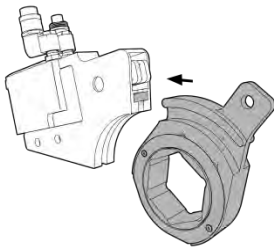
NOTE: While inserting the positive drives ensure the springs are compressed against the positive drives.



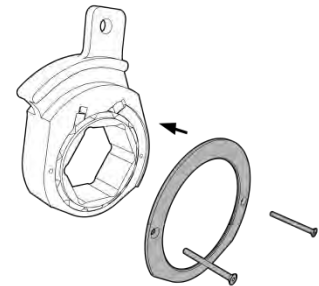
3. Insert the drive gear into the cassette head.



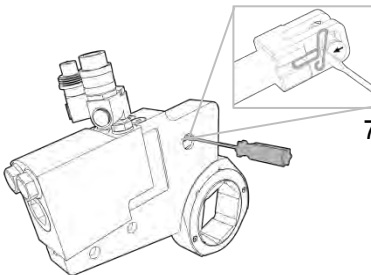
4. Place set head shields against either side of the drive gear contained in the cassette head and tighten the set head shield screws using an Allen key.



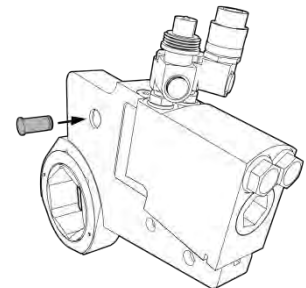
5. Slide the Hex Link Cassette into the tool body.



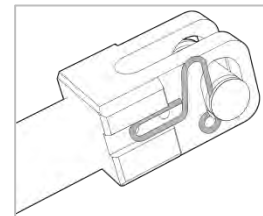
6. Once the Hex Link Cassette is in place insert the cylinder drive pin through the cylinder drive pin hole.



7. In the cylinder drive pin hole, pull the quick-clip away from the cylinder drive pin and push the cylinder drive pin fully into the hole.



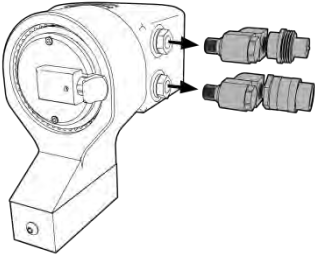
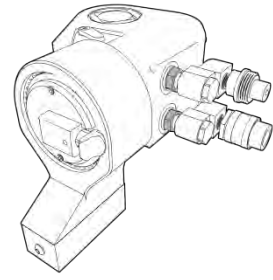
8. Release the quick-clip and ensure the cylinder drive pin is secured under the quick-clip.



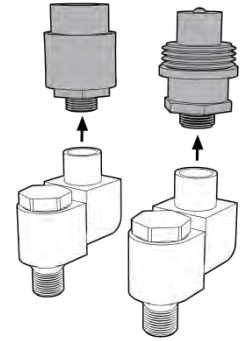
Dual-Plane Swivel Fittings Disassembly

To Disassemble the Dual Plane Swivel Fittings follow the below instructions:

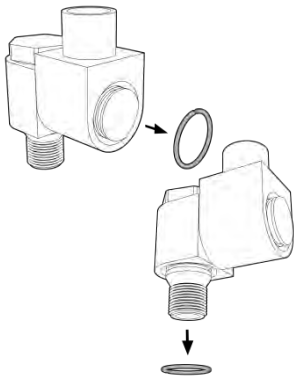
1. Place a 3/4" wrench on the swivel fitting adaptor to stop it loosening during the below next step.



2. Using a 3/4" wrench, loosen the bolts at the top of the swivel fitting stem and remove the swivel fitting stem from the tool body.



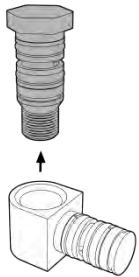
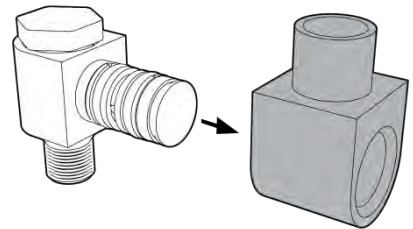
3. Unscrew the quick connect couplings and remove from the female swivel fitting body.



4. Remove the retaining circlips securing the swivel fitting stem and swivel fitting body in place.

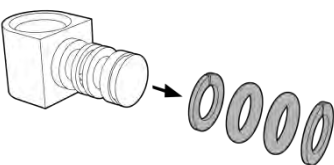
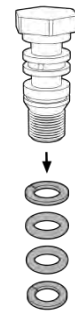
TIP: Use a small screwdriver or a similar tool to remove the circlips.

5. Slide the female swivel fitting body away from the dual-plane swivel fitting body.



6. Slide the swivel fitting stem out from the dual-plane swivel fitting body.

7. Remove the seals and Teflon® backup rings from the swivel fitting stem.



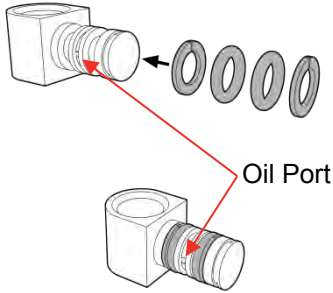
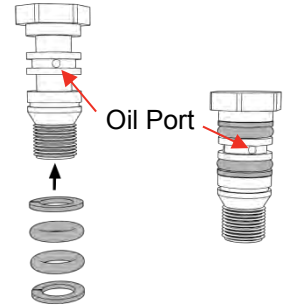
8. Remove the seals and Teflon® backup rings from the dual-plane swivel fitting body.

Dual Plane Swivel Fittings Assembly

To Reassemble the Dual-Plane swivel fittings follow the below instructions:

1. Replace and install the Teflon® backup rings and swivel fitting stem seals on to the swivel fitting stem, using a lubricant like petroleum jelly.

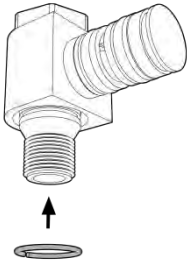
NOTE: The Teflon backup rings must be positioned behind the swivel fitting stem seals relative to the oil port.



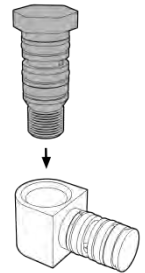
2. Replace and install the Teflon® backup rings and swivel fitting stem seals on to the dual-plane swivel fitting body, using a lubricant like petroleum jelly.

NOTE: The Teflon backup rings must be positioned behind the swivel fitting stem seals relative to the oil port.

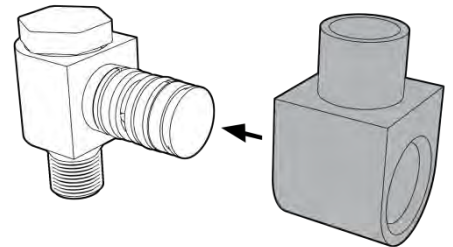
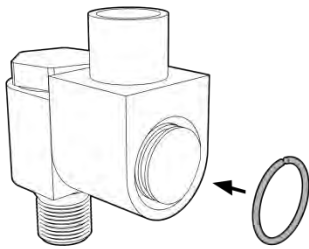
3. Slot the swivel fitting stem through the female receptor in the dual-plane swivel fitting body, using a lubricant like petroleum jelly.



4. Place one of the retaining circlips at the base of the swivel fitting stem securing it to the dual-plane swivel fitting body.



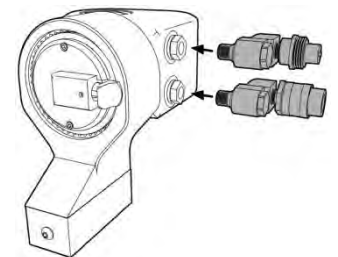
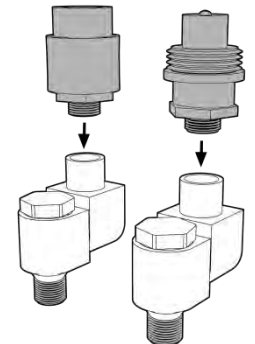
5. Slide the female swivel fitting body over the dual-plane swivel fitting body, using a lubricant like petroleum jelly.



6. Place the other retaining circlip onto the end of the dual-plane swivel fitting body, securing the female swivel fitting body to the dual-plane swivel fitting body.

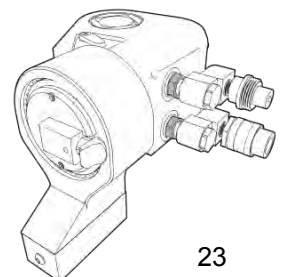
7. Screw the quick-connect couplings in to the female swivel fitting body.

NOTE: Make sure Teflon tape is applied to the threads on the base of the quick-connect couplings before attaching to the swivel fitting body.



8. Reattach the swivel fittings onto the wrench by tightening the bolt at the top of the stem.

9. Ensure the swivel fitting adaptors are still secure by tightening the nut at the bottom of the stem.



Warranty

All Norbar products are guaranteed against faulty workmanship and materials for a period of 12 months from date of purchase.

Norbar will repair products that fail to give satisfactory service due to defective workmanship or materials. We cannot accept responsibility for defects or failures caused by improper usage of the tools under conditions for which they were not intended, including overloading, lack of maintenance and neglecting to follow the instructions outlined within this manual.

Norbar cannot be held responsible or liable in any circumstances for any direct, indirect or consequential loss of damage, which the purchaser or others may incur.

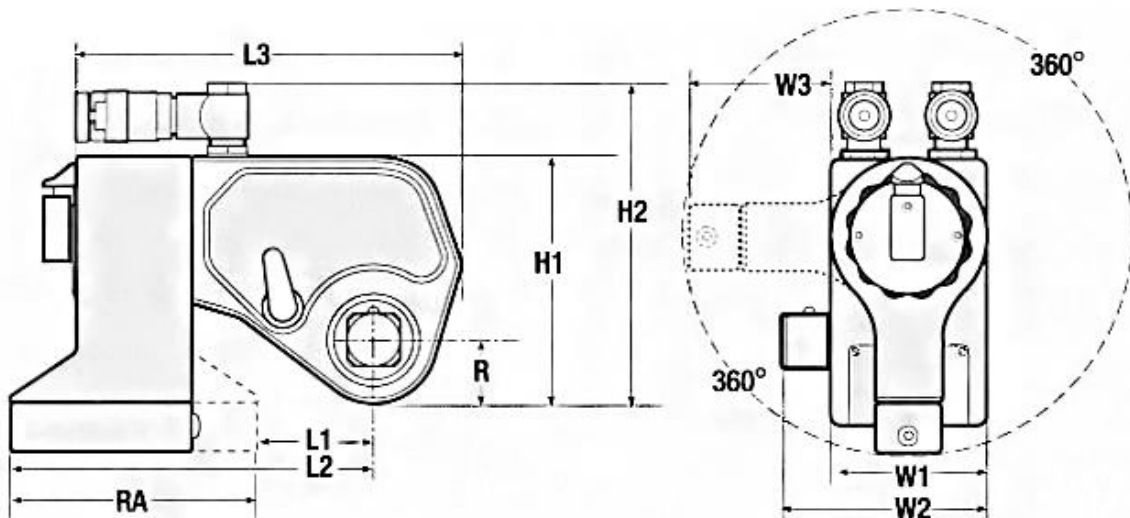
When making a claim, proof of purchase must accompany goods.

SPECIFICATIONS

Accuracy: +/- 3% with a +/- 1% repeatability

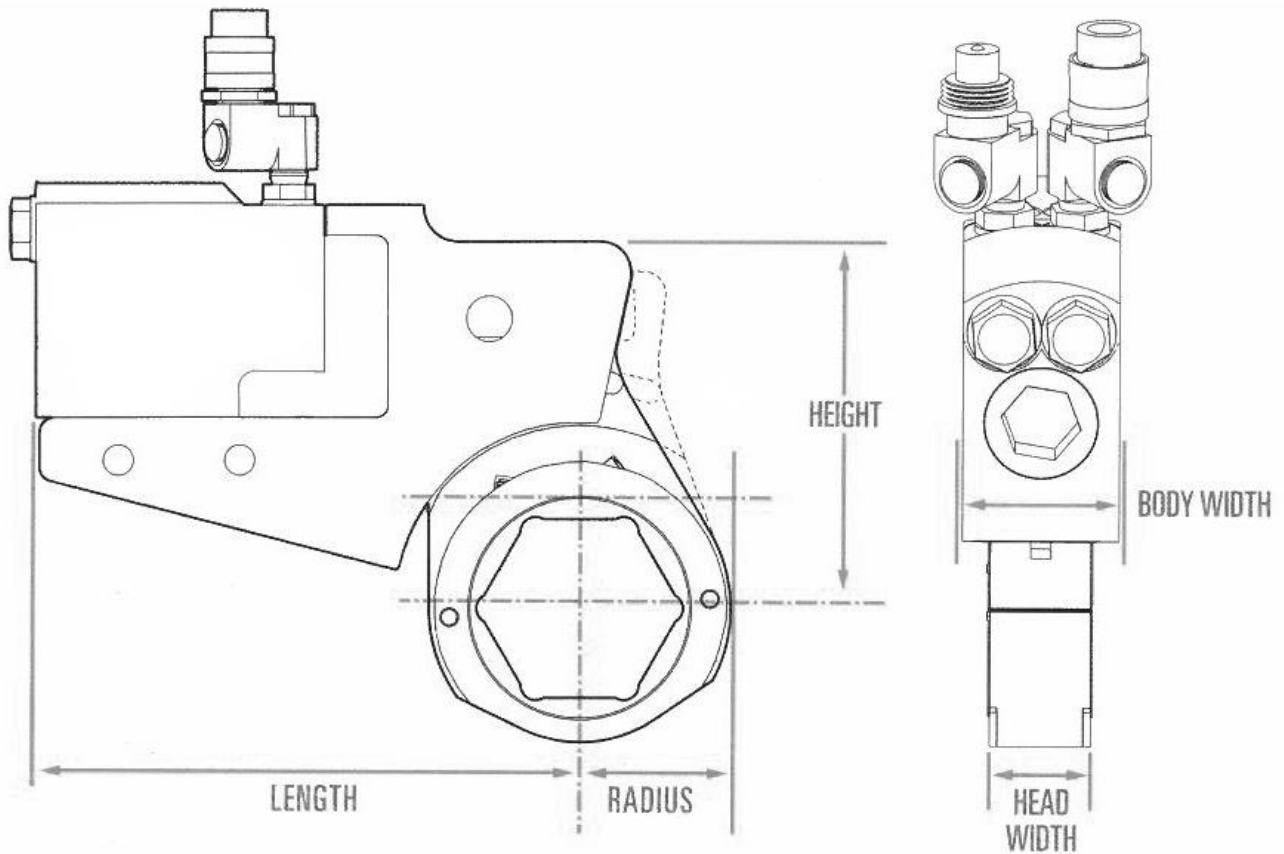
NSD Series

Model	Part Number	Torque Output		Square Drive (In)	Dimensions (mm)										Weight (kg)
		Minimum	Maximum		L1	L2	L3	H1	H2	W1	W2	W3	R	RA	
NSD-1	73200	194 N·m (143 lbf-ft)	1,874 N·m (1,382 lbf-ft)	¾"	40	133	151	104	145	50	69	56	30	94	3.18
NSD-3	73201	355 N·m (262 lbf-ft)	3,960 N·m (2,921 lbf-ft)	1"	47	183	202	124	166	70	91	81	32	136	6.35
NSD-6	73202	765 N·m (564 lbf-ft)	6,928 N·m (5,110 lbf-ft)	1 ½"	55	193	214	151	199	76	114	89	44	139	9.53
NSD-8	73203	1,150 N·m (848 lbf-ft)	11,585 N·m (8,545 lbf-ft)	1 ½"	52	175	227	172	214	99	136	122	46	165	14.06
NSD-11	73204	1,407 N·m (1,038 lbf-ft)	14,633 N·m (10,793 lbf-ft)	1 ½"	57	222	239	187	232	99	136	127	52	127	16.33
NSD-20	73205	2,377 N·m (1,753 lbf-ft)	24,315 N·m (17,934 lbf-ft)	2 ½"	88	264	295	233	274	126	189	141	76	191	34.02
NSD-30	73206	3,577 N·m (2,638 lbf-ft)	34,986 N·m (25,804 lbf-ft)	2 ½"	88	276	298	248	289	149	213	141	79	191	41.28
NSD-45	73207	5,966 N·m (4,400 lbf-ft)	63,223 N·m (46,631 lbf-ft)	2 ½"	186	318	338	285	320	146	210	140	83	189	68.04
NSD-60	73208	6,932 N·m (5,113 lbf-ft)	74,441 N·m (54,905 lbf-ft)	2 ½"	150	373	406	356	396	184	248	146	95	223	134.26



NHC Series

Model	Part Number	Torque Output		Dimensions (mm)				Hex Range (In)	Weight with Head (kg)
		Minimum	Maximum	Length	Height	Body Width	Head Width		
NHC-1	73220	159 N·m (117 lbf·ft)	1,754 N·m (1,294 lbf·ft)	159	102	28	24	3/4" – 2"	3.29
NHC-3	73221	399 N·m (294 lbf·ft)	4,168 N·m (3,074 lbf·ft)	178	146	37	27 or 30	1 1/4" – 2 15/16"	4.20
NHC-7	73222	904 N·m (667 lbf·ft)	9,354 N·m (6,899 lbf·ft)	235	159	38	38	2" – 3 7/8"	6.35
NHC-10	73223	1,342 N·m (990 lbf·ft)	13,423 N·m (9,900 lbf·ft)	248	203	50	50	2 3/8" – 4 1/4"	11.11
NHC-17	73224	2,051 N·m (1,513 lbf·ft)	21,627 N·m (15,951 lbf·ft)	286	235	50	62	2 3/4" – 5 3/8"	19.05
NHC-25	73225	3,064 N·m (2,260 lbf·ft)	32,024 N·m (23,620 lbf·ft)	286	235	74	75	3 1/2" – 5 3/4"	25.85
NHC-50	73226	4,711 N·m (3,475 lbf·ft)	60,720 N·m (44,785 lbf·ft)	391	267	74	75	4 5/8" – 7 1/4"	38.56



TROUBLE SHOOTING

The following is only a guide, for more complex faults please contact your local Norbar distributor or Norbar directly.

Problem	Likely Solutions
Cylinder will not cycle	<p>Check hydraulic oil in the pump and refill if necessary.</p> <p>Quick coupler ball may be dirty, try cleaning.</p> <p>Quick coupler ball is not tightened completely, try tightening.</p> <p>Hose may be restricted, check for and remove any restrictions.</p> <p>Four way valve is not shifting.</p> <p>Remote control is damaged.</p> <p>Piston seal is damaged.</p>
Piston will not advance	<p>Check the quick connects are securely connected to the tool and pump.</p> <p>The quick connects may be defective. Replace any defective quick connects.</p> <p>The remote control switch may be defective. Refer to manufacturers guidelines for replacing if defective.</p> <p>There may be dirt in the direction-control valve in the pump. Return the pump to the manufacturer for repair.</p>
Piston will not retract	<p>The hose connections may have been reversed. Ensure all connections are correct. Refer to the 'Hose Connections' section in this manual for more details.</p> <p>The retract hose may not be connected. Check this is connected securely to relieve pressure in the system.</p>
Socket/Square drive will not turn, but cylinder is cycling.	<p>Check the drive pawl spring.</p> <p>The tool is not engaging with its reaction point..</p>
Cylinder will not produce torque, but will cycle when off the bolt.	<p>The piston seal may be damaged.</p> <p>Bad relief valves on and in pump.</p> <p>Solenoid valve fault on pump. Service the pump.</p>
Slow cycle while tool is off the bolt	<p>The four way valve may be leaking</p> <p>The pump valve may be leaking</p> <p>Oil filter on the pump may be clogged. Check the manufacturer's guidelines for replacing if clogged.</p> <p>There may be an obstruction in the hose or cylinder ports. Remove any obstructions.</p> <p>The quick couplers may be damaged, dirty, or not tightened completely. Ensure these are not damaged, clean, and tightened correctly to form a tight seal.</p>
Cylinder does not build-up pressure	<p>The piston seal and/or end plug seal may be leaking. Replace any defective O-rings to stop the leaking.</p> <p>The quick connects may be damaged or defective. Replace any damaged or defective quick connects.</p>

Problem	Likely Solutions
The square drive on the NSD will not rotate.	<p>There may be an accumulation of grease or dirt in the teeth of the gear and drive pawl. Refer to the maintenance section to clean the grease and dirt out.</p> <p>Some of the teeth on the gear and/or drive pawl may have broken. Refer to the maintenance section to disassemble the drive train assembly and replace any damaged parts.</p> <p>The front of the piston rod may be broken. Replace this if broken.</p> <p>The cylinder drive pin may be broken. Refer to the maintenance section within this manual to disassemble the drive train assembly and replace the cylinder drive pin.</p>
The tool locks on to the nut/bolt.	<p>The tool may be operating backwards due to reversed hydraulic connections. Check all connections are correct on the tool and pump. Refer to the 'Hose Connections section for further guidance.</p> <p>The latching pawl may be loaded when the tool is at maximum power. Press the advance button on the pumps remote and let the pump build to the previously set pressure. Continue to press the advance button after the set pressure has been reached, then pull back on one of the latching pawl handles and release the advance button while holding the latching pawl handle back.</p>
Hose is damaged or leaking.	<p>Discard of the broken hose and replace.</p> <p>TIP: Cut the broken hose in half to ensure it cannot continue to be used before discarding.</p>
Tool fittings are damaged or leaking.	Replace broken fittings with steel high-pressure fittings.
Hydraulic pump fails to build up pressure.	Refer to the hydraulic pump manual for solutions.
The cylinder/tool leaks	The back cap seal may be damaged, replace if necessary.
Swivel fitting seal is leaking	The swivel fitting seal may be damaged, replace if necessary.
Cylinder seal is leaking	The O-ring on the pressure set screw may be damaged. Replace the cylinder O-ring plug.
Piston rod seal is leaking	The piston rod seal may be damaged. Replace the piston rod seal.
Swivel fitting adaptor seal is leaking	The swivel fitting adaptor seal may be damaged. Replace the swivel fitting adaptor seal.
Tool begins tightening immediately after switched on.	The hose connections have reversed. Press the advance button to release the tool and then switch the pump off. After the pump is turned off, correct the reversed hose connections. Refer to 'Hose Connections' for further guidance.
Nut/Bolt returns with the retract stroke when using the NSD series tools.	The latching pawl may not be engaging. Refer to the 'Maintenance' section to ensure all parts of the drive train assembly are clean and undamaged. Replace any damaged/broken components.
The pressure reading is erratic.	<p>The hydraulic oil level may be low. Check the oil level and add oil if needed.</p> <p>A defective gauge or loss of prime may have occurred. Refer to the hydraulic pumps manual for guidance.</p>

Problem	Likely Solutions
Tool does not cycle despite the gauge displaying a pressure build-up.	The quick connects may be defective or loose. Check the hose connections. Refer to 'Hose Connections' for further guidance. The Solenoid may not be working. Check component and replace if necessary.
On the NHC tool, the head shields are separating from the Hex Link Cassette head.	The head shield screws have become loose during use. Tighten or replace the screws as necessary.

GLOSSARY OF TERMS

Word or Term	Meaning
NSD	Norbar Square Drive series of Hydraulic Torque Wrenches.
NHC	Norbar Hexagon Cassette series of Hydraulic Torque Wrenches.
NHL	Norbar Hex Link Cassette – Hexagonal Cassettes for use with NHC models.
Hex	Hexagonal.
Hydraulic Pump	Unit used to pump hydraulic oil to a specified pressure.
Hydraulic hoses	Specialist hoses used to connect the hydraulic tool to the hydraulic pump.
Quick connects	Connections used on the hydraulic tool, hydraulic pump and hydraulic hoses to couple the hydraulic hoses to both the tool and pump. A female quick connect will couple to a male quick connect.
Back-cap seal	O Ring seal to prevent loss of hydraulic oil from the rear of the piston chamber.
Swivel fitting seal	O Ring seal to prevent loss of hydraulic oil from the dual plane swivel fittings.
Piston rod seal	O Ring seal to prevent hydraulic oil escaping from the cylinder.
Swivel fitting adaptor seal	Compression seal designed to work with the steel thread adaptor for the swivel fittings.
Dual-Plane Swivel Fittings	Hydraulic oil is transferred through these swivels that allow movement in 360° in two planes.
Quick-Clip	Device used to secure the Hex Link Cassette to the NHC tool.
Reaction Arm	Device used to counteract applied torque for the NSD series tools.
Reaction Pad	Device used to counteract applied torque for the NHC series tools.



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