ORIGINAL INSTRUCTIONS

ENS HYDRAULIC NUTSPLITTER

OPERATION MANUAL

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1. Introduction

The ENS Nutsplitter is a hydraulically powered cutting tool offering a fast, reliable and effective solution to the removal of seized and corroded engineering nuts.

In operation, the Nutsplitter is located around the nut and hydraulic power applied using a pump unit. The Nutsplitter's blade penetrates the nut using a combined cutting and wedging action until the nut is split open. The nut can now be removed by hand or spanner, or alternatively apply a second cut at the opposite side to the first, to completely sever the nut in half.

The main components of the ENS Nutsplitter are illustrated in Fig.1 below.

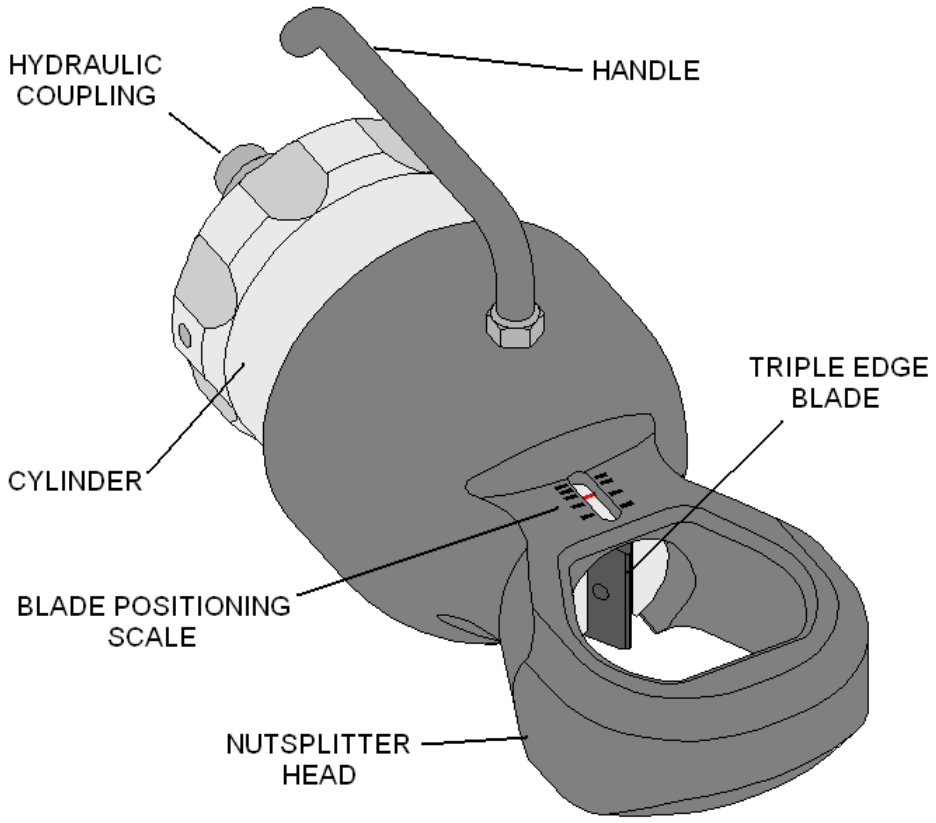

Fig 1. ENS Nutsplitter

SAFETY

The ENS Nutsplitter is a high power cutting tool and we strongly recommend that all users are fully trained and competent in the use of Nutsplitting systems. Incorrect use of the equipment or failure to follow any of the safety precautions included within this manual could lead to serious Operator injury.

2. Technical Specifications

The following technical data is applicable to all ENS Nutsplitters:

CYLINDER DESIGN	:	Single acting cylinder, spring assisted piston retract
MAXIMUM PRESSURE	:	689 Bar (10,000psi)
OPERATING TEMP. LIMITS	:	-20°C to +50°C
HYDRAULIC OIL TYPE	:	Grade 46 hydraulic oil Houghtosafe 620 or equivalent

ENS NUTSPLITTER RANGE

TOOL REF	BOLT DIAMETER		APPROX. WEIGHT	CYLINDER VOLUME
	Imperial	Metric		
ENS1-1	3/4” 7/8” 1”	M20 M22 M24 M27	6.7 kg	63.0 cm^3
ENS1-2	3/4” 7/8” 1” 1-1/8” 1-1/4”	M20 M22 M24 M27 M30 M33	6.9 kg	
ENS2-1	1-1/8” 1-1/4” 1-3/8” 1-1/2”	M30 M33 M36 M39	15.8 kg	128.0 cm^3
ENS2-2	1-1/8” 1-1/4” 1-3/8” 1-1/2” 1-5/8” 1-3/4”	M30 M33 M36 M39 M42 M45	16.0 kg	
ENS3-1	1-3/4” 1-7/8” 2”	M45 M48 M52	42.0 kg	366.0 cm^3
ENS3-2	1-3/4” 1-7/8” 2” 2-1/4”	M45 M48 M52 M56	42.5 kg	
ENS3-3	1-3/4” 1-7/8” 2” 2-1/4” 2-1/2”	M45 M48 M52 M56 M60 M64	43.0 kg	
ENS3-4	1-3/4” 1-7/8” 2” 2-1/4” 2-1/2” 2-3/4”	M45 M48 M52 M56 M60 M64 M68 M72	44.0 kg	
ENS4-1	2-3/4” 3”	M76 M80	73.0 kg	745.0 cm^3
ENS4-2	2-3/4” 3” 3-1/4” 3-1/2”	M76 M80 M85 M90	75.0 kg	

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3. Power Requirements

The ENS Nutsplitter requires a hydraulic pump unit, connecting hose and couplings in order to operate. All components must be capable of operating at the system maximum working pressure of 689 Bar (10,000psi).

Hydraulic Pump Units

In general, manually operated pump units are used to the power the ENS Nutsplitter. When using manually operated pumps they must posses an oil reservoir large enough to satisfy the Nutsplitter cylinder capacity requirements, as indicated in the table below.

ENS Nutsplitter Ref	Max. Pressure	Pump usable oil capacity (min)
ENS1-1 : ENS1-2	689 Bar (10,000psi)	95.0 cm^3 (5.80 in^3)
ENS2-1 : ENS2-2	689 Bar (10,000psi)	190.0 cm^3 (11.60 in^3)
ENS3-1 : ENS3-2 : ENS3-3 : ENS3-4	689 Bar (10,000psi)	550.0 cm^3 (33.50 in^3)
ENS4-1 : ENS4-2	689 Bar (10,000psi)	1100.0 cm^3 (67.0 in^3)

Air or Electric Powered Pumps

Due to the wide array of powered pump units available, it is recommended that SPX Bolting Systems be contacted for advice, prior to using the Nutsplitter

4. Safety

Always adopt safe working practices when working with pressurised equipment. Protective clothing including eye and head protection must always be worn as well as gloves and safety footwear. Exhibit common sense and most importantly of all, READ AND UNDERSTAND THE OPERATING MANUAL AND PROCEDURES.

a) Never exceed the Nutsplitter maximum working pressure of 689 Bar (10,000psi).

b) Keep hands and fingers clear of the Nutsplitter head and blade area, before and during operation. Fingers could be inadvertently trapped if care is not taken.

c) Use the lifting handles provided to manoeuvre and hold the Nutsplitter in position. Until the pressure is applied, the Nutsplitter will require stabilising by the operator. Always use the handle to support and hold, and watch for potential entrapment. Note that the ENS 3 and 4 series tools weigh in excess of 20Kg and are provided with lifting eyes in addition to a handle. The handle must only be used for positioning, with the weight of the Nutsplitter supported by lifting equipment (via the lifting eye).

d) Keep other personnel clear of the working area and only allow trained personnel to use the equipment. Ideally rope off the working area.

e) Never stand behind, or in front, of a working Nutsplitter. Always stand to the side of the tool.

f) The Nutsplitter is designed to cut ordinary, hexagonal engineering nuts. Do not under any circumstances attempt to cut round, 12-point or bi-hex nuts. For cutting square nuts, please consult SPX Bolting Systems prior to use.

g) Do not cut the nut into small pieces. A maximum of two cuts should be applied with the second cut always at 180° to the first.

h) The Nutsplitter should not be subjected to shock. Never strike the Nutsplitter with a hammer.

i) Use the correct size Nutsplitter for the nut to be cut. Do not insert shims or packing pieces in an attempt to cut a nut that is not within the specified size range.

j) Wear gloves when handling nuts that have been removed using a Nutsplitter, as sharp edges can cause cuts to fingers

k) Take care when handling equipment. Quick connect couplings are especially susceptible to knocks and damage and therefore care must be taken. Note that damaged couplings are difficult to connect. Do not force couplings.

l) Allow time for the Nutsplitter to fully retract. Fluid under pressure could be ejected from an un-retracted cylinder should a coupling be knocked / damaged during handling.

m) Check that hoses are in good condition and undamaged. When assembling the hydraulic hose, do not unduly bend hoses beyond their safe bend radius limit or kink the hose.

n) Do not retighten any equipment whilst under pressure.

o) The hydraulic cylinder is designed for use as a component part of the Nutsplitter only. It should not be used for any other purpose (i.e. jacking, lifting, etc.) other than that intended.

p) Do not strike, misuse or abuse any of the equipment. If any abuse or misuse of the equipment is evident, the warranty shall be invalid and the Manufacturer shall not be responsible for any injuries or failures as a result.

q) If not in use, and when practical, disconnect the pump from the power supply to prevent accidental starting. Also ensure tensioning tools are depressurised.

r) Should power failure occur during pressurisation, always depressurise the system before investigating. Disconnect the power supply until the power has been restored.

THE ENS NUTSPLITTER IS DESIGNED FOR THE SPLITTING OF HEXAGONAL ENGINEERING NUTS ONLY. DO NOT USE IT FOR ANY OTHER PURPOSE

5. Assembly

The ENS Nutsplitter incorporates a hydraulic cylinder with several interchangeable heads, and a replaceable cutting blade.

Assembling the head to the cylinder

1. Ensure that the cylinder is fully retracted. Disconnect the cylinder from the power supply.

2 Insert the cylinder into the head, aligning the slot in the blade holder with the locating pin protruding into the bore of the head. Rotate the cylinder and engage the threads. Ensure that the cylinder threads have full engagement prior to use.

3. Gently tighten the plastic grub screw located within the barrel of the head in order to provide a slight drag as the cylinder is rotated (this prevents unwanted rotation of the cylinder during use).

Assembly / changing the cutting blade

The Nutsplitter blade incorporates three separate cutting edges in order to provide maximum blade life. Should one of the edges becomes chipped or damaged, the blade can be removed from the holder, rotated 120°, and re-installed providing a new cutting edge. Once all three edges are damaged, the blade is discarded and a new blade fitted. The ENS Nutsplitter blades are not designed to be re-sharpened.

Blade removal and installation is carried out as follows;

NOTE : It is not necessary to remove the Nutsplitter head in order to install or change a blade.

1. Ensure that the cylinder is fully retracted. Disconnect the cylinder from the power supply.

2 Remove the blade by sliding it out of the blade holder and out through the underside of the Nutsplitter head. A gentle tap on the top of the blade may be required to dislodge the blade from the holding mechanism.

3. Re-install the new blade by sliding it into the dovetail shaped groove in the blade holder until it clicks into position. If correctly installed, the bottom edge of the blade holder should be level with the underside of the blade holder.

TAKE CARE WHEN HANDLING NEW, USED OR DAMAGED NUTSPLITTER BLADES AS THE SHARP EDGES CAN CAUSE CUTS TO HANDS.

6. Blade Positioning Scale

The blade positioning scale is used pre-set the blade cutting distance in order to prevent damage to the bolt thread as the nut is cut.

The blade positioning scale can be used with the following bolt and nut forms

- Imperial thread forms - Unified bolt threads (UN) with heavy series hex nuts
- Metric thread forms - Metric bolt thread (M) with standard series hex nuts

NOTE : The positioning scale numerals refer to the bolt diameter, not the nut A/F size

Blade positioning is carried out as follows;

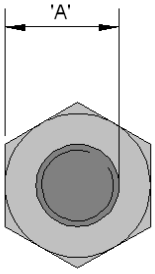
1. Ensure that the Nutsplitter is fully retracted. This is important as unless the Nutsplitter is fully retracted, blade positioning will be incorrect.
2. Identify the bolt / nut size and form, and rotate the Nutsplitter cylinder until the red marker line, visible through the positioning scale slot on the top of Nutsplitter head, aligns with the required bolt size marker line on the head.
3. The Nutsplitter blade position is now set for the selected bolt.

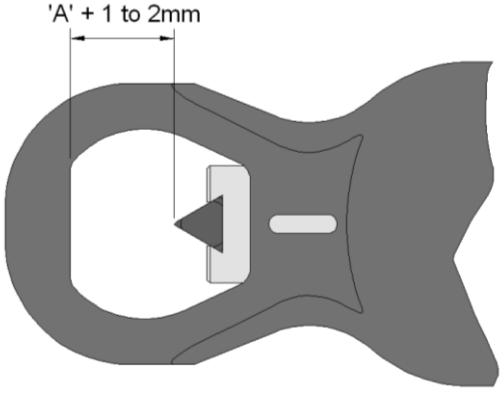
NOTE : The blade positioning scale will only prevent damage to the bolt thread if each nut is to be cut <u>once</u> only. If the nut is to be split in half by a second cut at 180° to the first, there is no guarantee that the bolt will remain undamaged following the second cut.

Although the Blade Positioning Scale can only be used with Metric and UN series thread forms, it is still possible to pre-set the nut splitter blade position to eliminate thread damage to other bolt and nut thread forms. In order to do this, the Operator must make some nut and bolt measurements and adjust the Nutsplitter as indicated below

1. Advance the Nutsplitter Blade to full stroke and hold at that position. It is not necessary to apply and hold a high pressure to keep the blade at full stroke.
2. On the nut to be cut, measure the distance between the edge of the bolt and the furthest nut flat, illustrated as distance ‘A’ in the diagram below.
3. Rotate the Nutsplitter cylinder until the distance between the tip of the blade to the flat within the head ring is equal to the previously measured distance ‘A’, <u>plus</u> 1 to 2mm.

   Ensure that the Nutsplitter cylinder threads are not exposed from the head (blade marker line will be off the scale if this occurs, and the Nutsplitter should not be used in this condition)
4. Retract the Nutsplitter and it is now ready for use.





7. Using the Nutsplitter

The following procedure is for use with the ENS Nutsplitter and outlines the basic steps in order to carry out a nut splitting operation. It is important that personal protective clothing (gloves, footwear, safety helmet, full face visor) is worn at all times not only by the Operator, but also by any personnel within the work area.

SAFETY: Prior to commencement of nut splitting ensure that:

- All necessary safety precautions have been carried out
- Personnel involved in nut splitting are competent and fully trained in the use of hydraulic Nut splitting tools and techniques.
- The procedure to be used is authorised by a responsible Engineer.
- The joints / pipe work to be worked on are not 'live'. Joints must be at zero pressure and free from hazardous substances.

STAGE 1 If required, using the blade positioning scale, adjust the blade cutting depth in order to prevent damage to the bolt threads.

STAGE 2 Lubricate the Nutsplitter blade cutting edge and flanks using a quality anti-seize lubricant in order to reduce cutting friction and extend blade life.

It is recommended to use a Molybdenum disulphide based anti-seize compound, however it is important to check with site personnel that the lubricant will not affect equipment and plant.

STAGE 3 Connect the Nutsplitter to the pump unit. Ensure that couplings are fully assembled together. (Most couplings are self-sealing when disconnected to prevent oil spillage, therefore they will restrict oil flow if not fully connected).

STAGE 4 Locate the Nutsplitter head over the nut, positioning the nut centrally within the head and firmly against the head flat. Ensure that the underside of the head is seated against the flange face such that the blade will completely cut the length of the nut.

NOTE: Use the lifting handles provided to manoeuvre and hold the Nutsplitter in position. Until the pressure is applied, the Nutsplitter will require stabilising by the operator. Always use the handle to support and hold, and watch for potential entrapment.

STAGE 5 Operate the pump and observe the blade as it advances toward the nut, ensuring that the blade will penetrate in the centre of the nut flat. If the blade appears to be going to cut offset from the centre of the nut flat, stop the pump unit and reposition the nut within the head

STAGE 6 Once that the blade penetrates the nut in the correct position, continue to apply hydraulic pressure until the nut is severed. As the blade cuts deeper into the nut, a loud crack will be heard the moment that the nut splits.

On larger nuts, it may prove an advantage to periodically retract the blade (during the cutting operation) and re-apply the lubricant in order to increase cutting efficiency.

STAGE 7 Usually, once the nut has been severed by a single cut, it is possible to remove it by hand (wearing gloves) or an oversize spanner. If not, a second cut may be applied (always opposite the first) in order to half the nut completely.

STAGE 8 Retract the Nutsplitter.

8. Maintenance and Servicing

Post-Use Maintenance

In order to keep the ENS Nutsplitter system in good working condition, it is recommended that simple post-use maintenance be carried following each period of use.

ENS Nutsplitter

1. Connect to the pump unit and ensure that the Nutsplitter piston is fully retracted. This may take several minutes for large Nutsplitters.

2. Wipe away any debris that may have accumulated, particularly the inner head ring and the blade. Metal fragments may still be present in this area therefore gloves must be worn.

3. It is preferable to spray the Nutsplitter with water repellent spray (WD40), prior to placing back into storage.

Hoses and Ancillaries

1. Clean and inspect each hydraulic hose and quick connect coupling. Check the entire length of the hose for cuts, abrasions and damage. Any evidence of hose damage and the entire hose must be replaced.

2. Coat each quick connect coupling with a water repellent spray (WD40).

Maintenance, Servicing and Warranty

In addition to post-use maintenance, and to ensure that the Product Warranty remains valid, it is recommended that routine maintenance and servicing be carried out by the Manufacturer or Authorised Service Centre.

Maintenance and servicing should be carried out in accordance with the manufacturers ‘ Equipment Maintenance and Servicing Manual’.

All ENS Nutsplitters are supplied under the Manufacturers’ standard terms and conditions.

All components shall be guaranteed for a period of twelve months from the date of purchase against material defects and workmanship. All components shall be guaranteed for a period of twelve months from the date of purchase against defects arising from normal use, with the following exclusions;

- Hydraulic seals and back-up rings
- Nutsplitter Blades
- Bushes and bearings
- O-ring seals
- Quick-disconnect couplings
- Labels and decals
- Springs
- Paints and coatings
- Plastic screws

End of Life and Disposal

In accordance with our End of Life Policy, should the product be no longer required for use, it should be returned to SPX Bolting Systems where it shall be disposed of in a safe and environmentally friendly manner.

9. Fault finding

Fault	Possible Cause	Remedy
Nutsplitter will not hold pressure	1. Cylinder seal leakage 2. Cylinder relief valve leakage 3. Coupling leaking 4. Pump unit	1. Change Seal 2. Check valve operation 3. Replace coupling 4. Replace pump unit
Nutsplitter will not build up pressure	1. Pump release valve 2. Low pump oil level 3. Cylinder seal leakage 4. Cylinder relief valve leakage 5. Coupling leaking	1. Shut pump release valve 2. Check oil level 3. Change Seal 4. Check valve operation 5. Replace coupling
Nutsplitter will not retract, or retracts slowly.	1. Hose restriction 2. Coupling 3. Pump release valve 4. Weak cylinder spring 5. Hydraulic oil too thick	1. Change hose 2. Tighten or replace 3. Fully open valve 4. Replace spring 5. Use correct oil (Grade 46)
Nutsplitter builds up pressure, but blade doesn't move or partially moves	1. Hose restriction 2. Coupling not fully assembled 3. Piston fully stroked	1. Change hose 2. Fully tighten coupling 3. Retract and reset cylinder
Difficulty in hose connection	1. Pressure within hose 2. Damaged coupling	1. Vent hose 2. Replace coupling

10. Frequently Asked Questions

1. Should I apply an anti-seize compound or a cutting lubricant to the Nutsplitter blade?

   An anti-seize compound will work better with the ENS Nutsplitter blade configuration. The action of the blade is to use a wedging action, therefore it is important to reduce the friction on the blade flanks, especially on large nuts where the blade penetration depth is much greater. The anti-seize compound also helps to prevent 'pick-up' of the nut material during the cut.

2. Which anti-seize compound should I use?

   Tests have shown that Molybdenum Disulphide based lubricants provide superior cutting performance over conventional greases and copper based lubricants. However, any lubricant will augment the cutting action and help preserve blade life.

3. Can the Nutsplitter be used without an anti-seize compound applied to the blade?

   Yes, but the cutting performance and blade life may be impaired. If cutting nuts dry, it is important to inspect the blade after each cut, removing debris from the blade and removing metal 'pick-up' using a file.

4. How can you tell if the blade is blunt or needs changing?

   A blunt blade does not necessarily mean that the blade needs changing. Chips along the blade edge or sides are an indicator that the blade needs renewal. Small chips on the blade will certainly lead to complete fracture under continued usage. The blade design incorporates three cutting edges, therefore it is better to present a new edge once an edge becomes chipped.

5. Can a chipped blade edge be re-sharpened?

   It is not recommended that the blade be re-sharpened.

6. The Nutsplitter is at full pressure but the nut has not yet split?

   Check that the blade positioning scale has been set correctly for the nut that is being cut (the Nutsplitter may be at full stroke). If the scale is set correct, rotate the cylinder one full turn clockwise and re-apply the Nutsplitter.

   If the nut still does not split, then try the following;

   - *Re-lubricate the blade and the groove in the nut (where the blade has been). Re-apply the Nutsplitter, positioning the blade back into groove in the nut and re-apply the pressure.*

   If unsuccessful,

   - *Re-lubricate the blade and the groove in the nut. Reposition the Nutsplitter onto the nut such that the blade penetrates into the same groove, but only 2/3 of the depth of the nut. Re-apply the pressure.*

   Should the nut still fail to split, then the next size Nutsplitter with more load capacity is required.

7. The blade positioning scale has been set, but bolt thread damage still occurs?

   Such is the wide dimensional tolerances for nuts and bolts, the blade positioning scale acts as a guide only. Some slight adjustments may be required once that one or two nuts have been cut. If the blade damages a bolt, rotate the cylinder anticlockwise, half a turn at a time, until bolt damage eliminates. Remember that bolt damage is unavoidable if a second is applied, due to the recoil of the head springing the unsupported bolt back against the blade.

8. Can the Nutsplitter be used to cut square, bi-hex, round, etc. nuts in addition to standard hex nuts?

   No, the Nutsplitter must never be used to cut nut shapes other than standard hexagonal nuts. Attempting to cut these other nut shapes places adverse strains on the Nutsplitter head with a risk of it fracturing.

9. Can the Nutsplitter be used in flameproof environments?

   As the nut splits, sparks can be emitted, therefore it is not recommended that Nutsplitters are used in flameproof areas. The risk of sparks can be reduced (but not eliminated), by directing a water spray over the nut, bolt and blade area during cutting.

10. Hydraulic oil is leaking from the hole in the underside of the blade holder. Does this mean that the cylinder seal is leaking?

    No. The hole in the underside of the blade holder is the outlet for hydraulic oil emitted from the internal relief valve. If oil weeps from this hole it means that the relief valve has operated due to an excessive pressure.

EC DECLARATION OF CONFORMITY

We declare under our sole responsibility that our Nut Splitter Model:

ENS series

to which this declaration relates are in conformity with the following:

EN, EN-ISO, ISO standards	**Title**
Per the provisions of the Machinery Safety Directive	**2006/42 EC**
EN_ISO 12100:2011	Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
EN 4413:2010	Hydraulic Fluid Power – general rules and safety requirements for systems & their components

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We, the undersigned, hereby declare that the equipment specified conforms to the above European Communities Directive(s) and Standard(s).

Ahington January 02, 2013

Christophe Bouvet, Managing Director

David Campbell, Design Director

Form No 10_____
Rev 1 Jan 2, 2013