

# NS12TI NS15TI NS20TI

INTEGRAL  
HYDRAULIC  
NUT SPLITTERS



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22/08/2017

# 1.

## INTRODUCTION

The Equalizer™ NS Range of tools has been developed to assist in the removal of corroded, seized or damaged nuts.

The NS tools have a shrouded cutting head to contain the split nut and have been developed to increase the access to tight flange joints. The tools have no exposed finger pinch points and are supplied with a swivel handle and a safety lanyard as standard.



It is essential that the users familiarise themselves with the contents of this manual prior to using the tool.

This manual contains information for the following tools:

- NS12TI Integral Hydraulic Nut Splitter
- NS15TI Integral Hydraulic Nut Splitter
- NS20TI Integral Hydraulic Nut Splitter

# 2.

## TOOL SAFETY

### 2.1

#### GENERAL SAFETY

These instructions cover the safe operation and maintenance of THE EQUALIZER **NS12TI**, **NS15TI** and **NS20TI** NUT SPLITTER tools. The use of these tools should be as part of a broader task-based risk assessment, which should be carried out by the operation supervisor or other competent person.

Failure to comply with the safety information contained within this manual could result in personal injury or equipment damage. Read all instructions, warnings and cautions carefully, and follow all safety precautions.

The safety of the operator, any assisting personnel and the general public is of paramount importance. Always work in accordance with applicable national, local, site & company-wide safety procedures.

### 2.2

#### PERSONNEL COMPETENCY

Only personnel deemed competent in the use of mechanical and hydraulic equipment should use these tools.

### 2.3

#### DISCLAIMER

Equalizer cannot be held responsible for injury or damage resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. If in doubt as to the safety precautions and applications, contact Equalizer using the contact details at the back of this manual.

## 2.4

### DEFINITION OF TERMS

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.



**DO:** an illustration showing how the tool should be used.



**DON'T:** an illustration showing an incorrect way to use a tool.

## 2.5

### HAZARDS



**WARNING:** ensure all hydraulic components are rated to a safe working pressure of 700 bar (10 000 psi).



**WARNING:** Do not overload equipment. The risk of hydraulic overloading can be minimised by using the Equalizer Hand Pump, which has a factory-set safety valve preventing the safe working pressure being exceeded.

If alternative hydraulic pumps are used, ensure that there are adequate systems to limit the working pressure to 700 bar (10 000 psi).



**CAUTION:** ensure components are protected from external sources of damage, such as excessive heat, flame, moving machine parts, sharp edges and corrosive chemicals.



**CAUTION:** Take care to avoid sharp bends and kinks in hydraulic hoses. Bends and kinks can cause severe back-up pressure and cause hose failure. Protect hoses from dropped objects; a sharp impact may cause internal damage to hose wire strands. Protect hoses from crush risks, such as heavy objects or vehicles; crush damage can cause hose failure.



**WARNING:** Applying pressure to a damaged hose may cause it to rupture.



**WARNING:** Immediately replace worn or damaged parts. Use only genuine Equalizer parts from approved distributors or service centres. Equalizer parts have been engineered and manufactured to be fit-for-purpose.



**DANGER:** To minimise risk of personal injury keep hands and feet away from the tool and workpiece during operation.



**WARNING:** Always wear suitable clothing and Personal Protective Equipment (PPE). Do not handle pressurised hoses; escaping oil under pressure can penetrate the skin, causing serious injury. Seek medical attention immediately if oil penetration is suspected.



**WARNING:** Only pressurize complete and fully connected hydraulic systems. Do not pressurize systems that contain unconnected couplers.



**CAUTION:** Do not lift hydraulic equipment by the hoses or couplers. Use only the designated carrying handles.



**CAUTION:** Lubricate tools as directed in this manual prior to operation. Use only approved lubricants of high quality, following the lubricant manufacturers instructions.



**CAUTION:** Only use the designated anchor point for fixing the safety lanyard. Do not attach the safety lanyard to the plastic handle.



**DANGER:** Care should be taken when using the safety lanyard to avoid entanglement with body parts.



The vibration total value to which this tool is subjected does not exceed 2.5 m/s<sup>2</sup>.

# 3.

If the specification of the nut is unknown then a vernier calliper or measure tape should be used to determine the Across-Flats (A/F) size of the nut to be split and the correct tool.

## TOOL OPERATION

### 3.1

#### GENERAL GUIDANCE

The Equalizer™ Nut Splitter Tools have been designed to fit a range of nut sizes and grades and the correct tool should be selected prior to commencing work by following the instructions in this section.



**CAUTION:** A thick grease should be applied to the Cutting Tip **before every cut**. This will ease the splitting operation, prolong the life of the Cutting Tip and limit the risk of sparking and debris projectiles.



### 3.2

#### TOOL SELECTION



**CAUTION:** It is important that the correct tool is selected for each nut and the correct Cutting Tip is used for each tool. Each tool in the Nut Splitter range comes with the appropriate Cutting Tips for that tool. Please refer to the table below to choose the correct tool for your application.

NS TOOLS	UNC HEAVY HEX STUD SIZE	UNC HEAVY NUT A/F SIZE	METRIC STUD SIZE	METRIC NUT A/F SIZE
NS12	1/2", 5/8"	0.88" to 1.06"	M12, M16, M20	19 mm to 30 mm
NS15	3/4", 7/8"	1.25" to 1.44"	M16, M20, M22	24 mm to 32 mm
NS20	7/8", 1", 1-1/8"	1.44" to 1.81"	M24, M27, M30	36 mm to 46 mm
NS36	1-1/4", 1-3/8", 1-1/2", 1-5/8"	2" to 2.56"	M33, M36, M39, M42	50 mm to 65 mm
NS50	1-5/8", 1-3/4", 1-7/8"	2.56" to 2.94"	M42, M45, M48	65 mm to 75 mm

### 3.3

## HYDRAULIC TOOL OPERATION

Prior to operation, ensure the air-vent in the integral hand pump is not obstructed. Any obstruction in the air-vent can cause a vacuum in the system which can limit the cylinder's travel.

The NS12TI, NS15TI and NS20TI Nut Splitter use an integral hydraulic pump to drive the cylinder and advance the Cutting Tip to split the nut. The hydraulic pressure is applied using the integrated hand pump, enabling accurate control of the force applied.

The integral hand pump has a control lever which allows the user to select advance (+) or retract (-)



### ACTUATING THE NS12TI/NS15TI/NS20TI

When advance (+) is selected, pumping the handle will advance the piston with the Cutting Tip and split the nut.



### RETRACTING THE NS12TI/NS15TI/NS20TI

Selecting Retract (-) will depressurise the cylinder and cause it to retract under the force of its internal spring. The handle doesn't need to be pumped to retract the cylinder.

### USING THE NS12TI/NS15TI/NS20TI

Position the tool as per Section 3.6.

When the pump is operated the piston and the Cutting Tip will advance. Ensure the tool is flat against the flange and the Cutting Tip perpendicular to the nut throughout the operation. Slowly actuate the Nut Splitter to advance the Cutting Tip against a flat of the nut and increase the pressure until the nut splits.

Releasing the pump will depressurise the cylinder and cause it to retract under the force of its internal spring.

It is likely that the nut will require a second split to fully remove the nut from the stud. Ideally a second split should be carried out at 180° to the first cut, splitting the nut in half to enable removal.

After the nut has been split, always check the Cutting Tip for damage and replace if required before positioning the tool on another nut.



**CAUTION:** Split nuts often have sharp edges and should be handled with great care.

### 3.4

## HANDLE

The handle can be swivelled around the central axis of the tool, to improve access to the nut and allow the tool to be easily held in the vertical or horizontal orientation.

### 3.5

## SAFETY LANYARD

The NS tools are supplied with a secure anchor point and a safety lanyard. The safety lanyard should be used to minimise the risks associated with the tool dropping.

Attach one end of the safety lanyard to the tool using the supplied shackle. The other end of the safety lanyard should be fixed to a secure point close to the work-site using an appropriate shackle.

Avoid using the safety lanyard as a means for picking up or carrying the tool. Do not fix the safety lanyard to the handle.

The anchor point and safety lanyard have been engineered to safely sustain a drop over the full safety lanyard length. It is recommended that all parts are inspected following a drop incident, as damage may compromise the safety of the tool.



**CAUTION:** Only use the designated anchor point for fixing the safety lanyard. Do not attach the safety lanyard to the plastic handle.

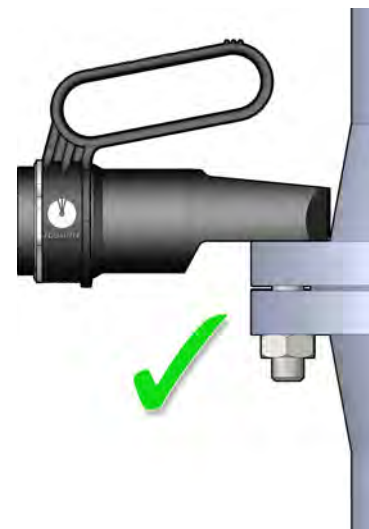
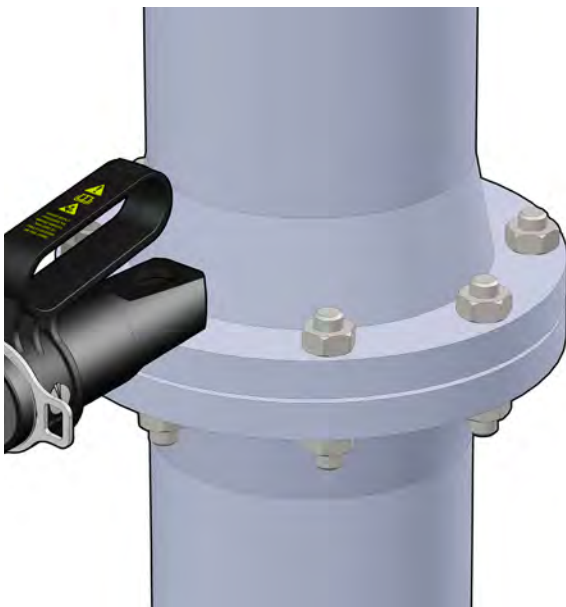
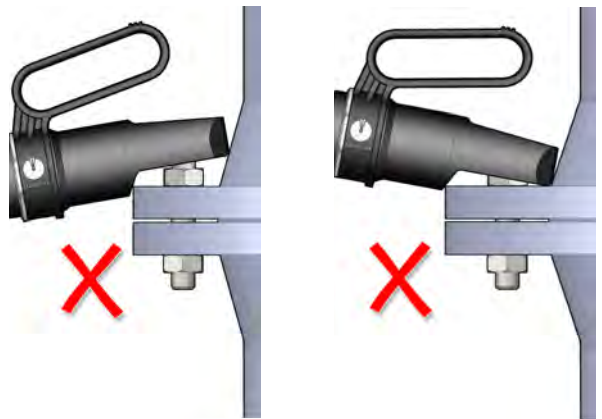
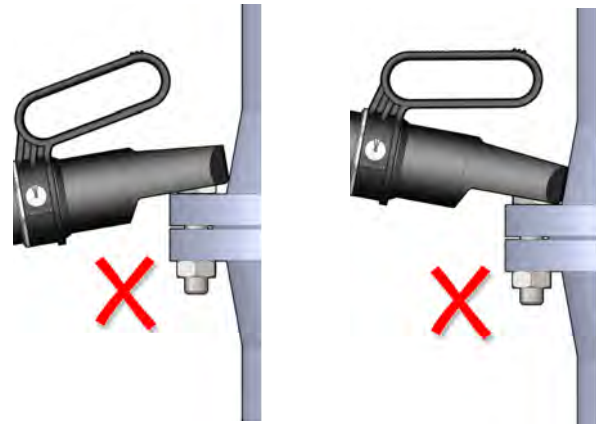


**DANGER:** Care should be taken when using the safety lanyard to avoid entanglement with body parts.

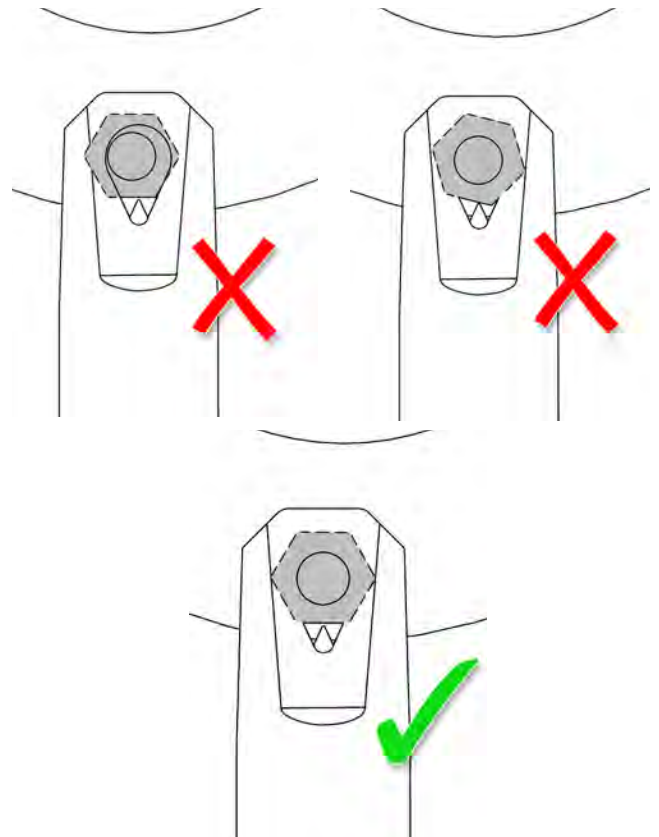
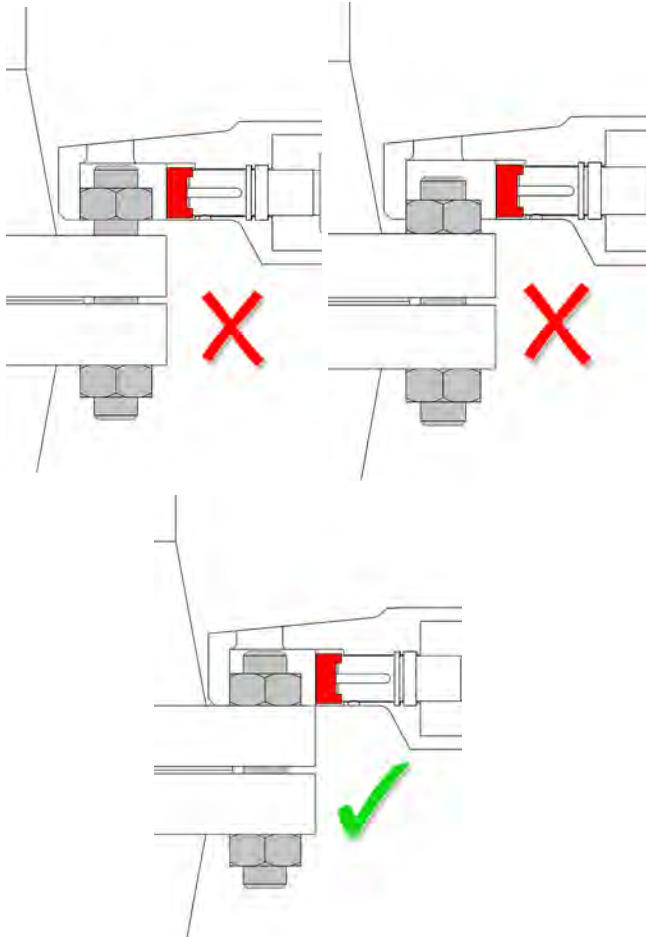
### 3.6 POSITIONING THE TOOL

Prior to splitting the nut, an assessment should be carried out to determine the most appropriate positioning of the tool around the nut.

Please see next page for more information.



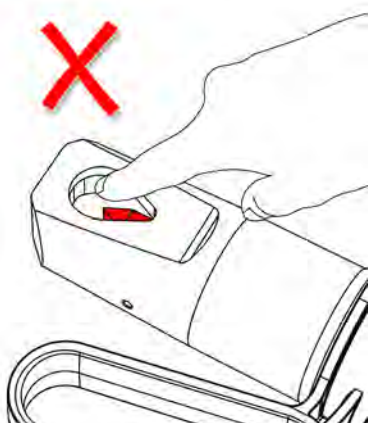
Place the tool on the nut with the flat surface of the cutting head flat against one of the nut flats and the Cutting Tip centered. Ensure the bottom face of the cutting head sits flat on the same surface that the nut is seated.



**CAUTION:** It is recommended that suitable hearing protection, i.e. ear defenders or ear plugs are worn.



**CAUTION:** It is recommended that a face shield or suitable eye protection, i.e. safety glasses or goggles are worn.





# 4.

## TOOL MAINTENANCE

### 4.1 INSPECTION

A thorough inspection should be carried out prior to usage, storage or transportation to ensure the completeness and condition of the tool.

Inspection should include:

- visual inspection of the outer parts of the tool, checking for obvious damage, degradation or missing parts
- visual inspection of the Cutting-Tip (this may require tool actuation)

Cleaning and servicing should be undertaken as required prior to the tool being used, stored or transported.

### 4.2 CLEANING

To lightly clean the tool, wipe gently with a damp cloth.

If more thorough cleaning is required (for example following immersion in water) carry out the following cleaning procedure:

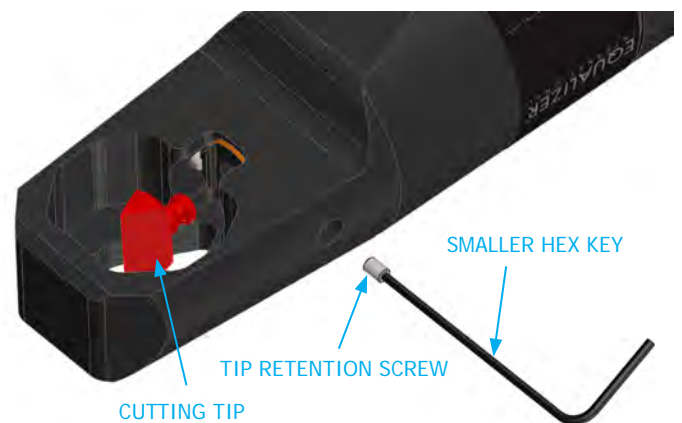
- strip the tool down, observing the schematics in section 8
- clean the components using detergent, following the manufacturer's guidelines
- rinse the components to remove traces of detergent
- dry the components thoroughly

Inspect, service and lubricate the tool immediately after the cleaning process.

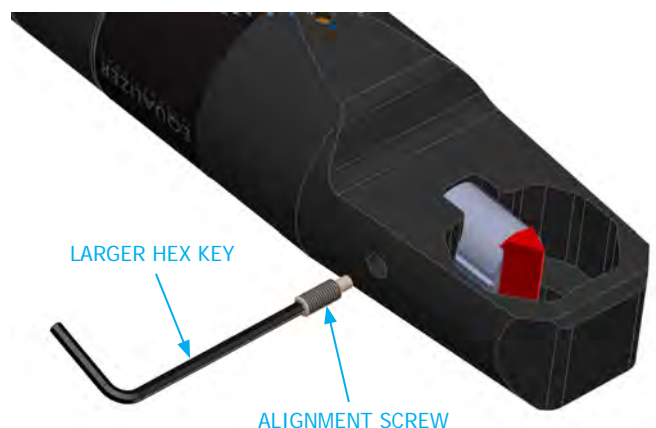
### 4.3 CUTTING TIP REPLACEMENT

Ensure the correct Cutting Tip is fitted to the tool and has been checked for damage. Some minor blunting is acceptable, but cracked or chipped Cutting Tips should be replaced.

The Cutting Tip is retained in the piston by the tip retention screw. Unscrew the tip retention screw with a hex-key and pull the Cutting Tip out to replace. Do not apply excessive force when inserting the Cutting Tip into the tool. If the Cutting Tip does not come out easily, slightly extend the piston to gain better access. When replacing the Cutting Tip, the tip retention screw and alignment screw should also be replaced every time.



**CAUTION:** Ensure the retention grub screw is fully inserted in the piston before actuating the tool.



## 4.4

### MAINTENANCE

Replace missing, worn or damaged parts. Use only genuine Equalizer parts from approved distributors or service centres. Equalizer parts have been engineered and manufactured to be fit-for-purpose.

Do not apply excessive force when inserting the Cutting Tips into the tool. Always replace the tip retention screw and alignment screw when replacing the Cutting Tip.

The alignment screw in the side of the cutting head sits in the slot of the piston and keeps the Cutting Tip aligned. This screw should not be fully tightened; back off the alignment screw by 1/4 turn after insertion.



If topping up or replacing hydraulic oil as part of a service, use only premium quality hydraulic oil of the grade 15 cSt.

A thick grease should be applied to the Cutting Tip **before every cut**. This will ease the splitting operation, prolong the life of the Cutting Tip and limit the risk of sparking and debris projectiles.

## 4.5

### STORAGE & TRANSPORTATION

Equalizer tools should be stored in a cool dry place. Tools should always be cleaned, serviced and lubricated prior to storage. Ensure that tools are stored in their designated packing cases.

## 4.6

### OPERATING CONDITIONS

Minimum Cutting Tip Contact Temperature: -20 °C  
 Maximum Cutting Tip Contact Temperature: 70 °C

## 4.7

### SUB-SEA USAGE

#### Using Equalizer Integral Hydraulic Nut-Splitters

The NS12TI/NS15TI/NS20TI are actuated by means of single-acting spring-return hydraulic cylinder and can be used sub-sea providing the following actions are taken:

- The pump release valve is fully opened and remains open until the tool has descended to the working depth. This will allow the pressure to equalise.
- The tool is actuated via the hand-pump by a diver.
- Upon completion of works the release valve is left in the fully-open position until the tool has ascended to the surface.
- The tool and pump are stripped-down, cleaned and lubricated immediately to minimise corrosion.

# 5.

## TECHNICAL SPECIFICATIONS

### 5.1

#### NS12TI KIT CONTENTS

Product Code: NS12TISTD

- 1 x NS12TI Nut Splitter
- 1 x Spare Cutting Tip
- 1 x Spare Tip Retention Screw
- 1 x Spare Alignment Screw
- 1 x Hex key for Tip Retention Screw
- 1 x Hex key for Alignment Screw
- 1 x Safety Lanyard
- 1 x Instruction Manual
- 1 x Carry Case



580 mm x 350 mm x 180 mm (22.8" x 13.8" x 7.1")

Tool only Weight: 5.8 kg (12.8 lb)  
Gross Kit Weight: 9.0 kg (20.0 lb)

### 5.2

#### NS12TI TOOL DIMENSIONS



### 5.3

#### NS15TI KIT CONTENTS

Product Code: NS15TISTD

- 1 x NS15TI Nut Splitter
- 1 x Spare Cutting Tip
- 1 x Spare Tip Retention Screw
- 1 x Spare Alignment Screw
- 1 x Hex key for Tip Retention Screw
- 1 x Hex key for Alignment Screw
- 1 x Safety Lanyard
- 1 x Instruction Manual
- 1 x Carry Case



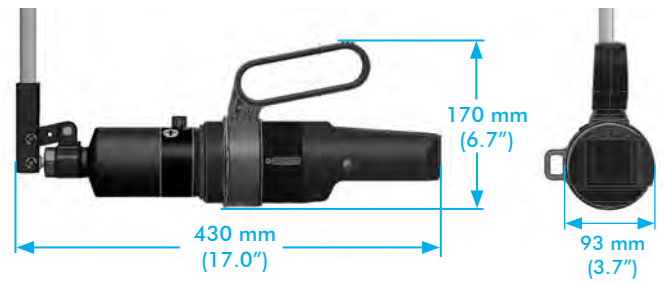
580 mm x 350 mm x 180 mm (22.8" x 13.8" x 7.1")

Tool only Weight: 6.3 kg (13.9 lb)  
Gross Kit Weight: 9.4 kg (20.7 lb)

## 5.4 NS15TI TOOL DIMENSIONS



## 5.6 NS20TI TOOL DIMENSIONS



## 5.5 NS20TI KIT CONTENTS

Product Code: NS20TISTD

- 1 x NS20TI Nut Splitter
- 1 x Spare Cutting Tip
- 1 x Spare Tip Retention Screw
- 1 x Spare Alignment Screw
- 1 x Hex key for Tip Retention Screw
- 1 x Hex key for Alignment Screw
- 1 x Safety Lanyard
- 1 x Instruction Manual
- 1 x Carry Case



580 mm x 350 mm x 180 mm (22.8" x 13.8" x 7.1")

Tool only Weight: 9.4 kg (20.7 lb)  
Gross Kit Weight: 12.6 kg (27.9 lb)

# 6.

## TROUBLESHOOTING

### 6.1

#### NS12TI/NS15TI/NS20TI

#### TROUBLESHOOTING

##### THE PISTON ADVANCES BUT THE TOOL DOES NOT SPLIT THE NUT

**POSSIBLE CAUSE:**

The Cutting Tip is damaged.

**RECOMMENDED ACTION:**

Remove pressure from the system then check for any damage to the Cutting Tip. If signs of damage are present then replace Cutting Tip. (See Section 4.3).

**POSSIBLE CAUSE:**

The Cutting Tip is not aligned.

**RECOMMENDED ACTION:**

Remove pressure from the system then check that the alignment screw is located in the alignment slot on the piston, if necessary replace the alignment screw. (See Section 4.3).

##### THE PISTON ADVANCES SOME OF THE WAY AND THEN STOPS PROGRESSING

**POSSIBLE CAUSE:**

The air-vent is obstructed by dirt or debris.

**RECOMMENDED ACTION:**

Carefully unblock the air-vent using a small blunt object.

##### THE PISTON DOES NOT MOVE

**POSSIBLE CAUSE:**

There is an air-lock within the hydraulic system.

**RECOMMENDED ACTION:**

Select Retract (-) and prime pump to circulate oil around the system.

**POSSIBLE CAUSE:**

Insufficient oil in the hydraulic system.

**RECOMMENDED ACTION:**

Refill with clean oil and bleed the hydraulic system.

**POSSIBLE CAUSE:**

Retract (-) is selected.

**RECOMMENDED ACTION:**

Select Advance (+) and pump the handle.

**POSSIBLE CAUSE:**

Air has accumulated around pump inlet when used upside down.

**RECOMMENDED ACTION:**

Bleed any air from the hydraulic reservoir. Inspect the tool for oil leaks on the reservoir, possibly indicative of a perished bladder. Refer to an approved Equalizer distributor for repair.

**POSSIBLE CAUSE:**

The inlet check-valve or intermediate valve ball has become stuck.

**RECOMMENDED ACTION:**

Dismantle the check valve, free and clean the valve balls. Refer to an approved Equalizer distributor for repair.

##### THE PISTON MOVES AS INTENDED BUT DOES NOT SEEM TO BE ACHIEVING FULL PRESSURE

**POSSIBLE CAUSE:**

Intermediate valve not seating / relief valve leaking.

**RECOMMENDED ACTION:**

Check cleanliness of valve ball. Re-seat using a hammer and punch. Refer to an approved Equalizer distributor for further instruction.

##### HYDRAULIC PRESSURE SLOWLY DIMINISHES AND THE PUMP HANDLE DOES NOT RISE

**POSSIBLE CAUSE:**

The release valve is leaking.

**RECOMMENDED ACTION:**

Refer to an approved Equalizer distributor for further instructions.

**POSSIBLE CAUSE:**

The piston seal is leaking.

**RECOMMENDED ACTION:**

Inspect the tool for oil leaks, possibly indicative of a perished seal. Refer to an approved Equalizer distributor for further instructions.

**TOOL ACTUATION FEELS SOFT AND UNRESPONSIVE****POSSIBLE CAUSE:**

There is air in the hydraulic system.

**RECOMMENDED ACTION:**

Bleed the hydraulic system. Refer to an approved Equalizer distributor for further instruction.

**THE CUTTING TIP DOES NOT LAST AS WELL AS EXPECTED****POSSIBLE CAUSE:**

Using very hard nuts (such as 2H grade) will significantly shorten the life of a Cutting Tip.

**RECOMMENDED ACTION:**

Ensure grease is applied generously to the Cutting Tip before each cut. When cutting very hard nuts ensure an adequate stock of spare Cutting Tips are available.

**THE TOOL IS NOT SPLITTING THE NUT, EVEN AT FULL PRESSURE****POSSIBLE CAUSE:**

Sometimes multiple attempts are required to split larger or particularly high-grade (e.g. 2H nuts).

**RECOMMENDED ACTION:**

Release the pressure and actuate the tool repeatedly until the nut is split.

**RECOMMENDED ACTION:**

Check the Cutting Tip is sharp and that grease has been applied generously.

# 7.

## REGULATORY INFORMATION

### 7.1

#### REGISTERED HEAD OFFICE

EQUALIZER INTERNATIONAL LTD.  
Equalizer House  
Claymore Drive  
Aberdeen  
Scotland  
AB23 8GD

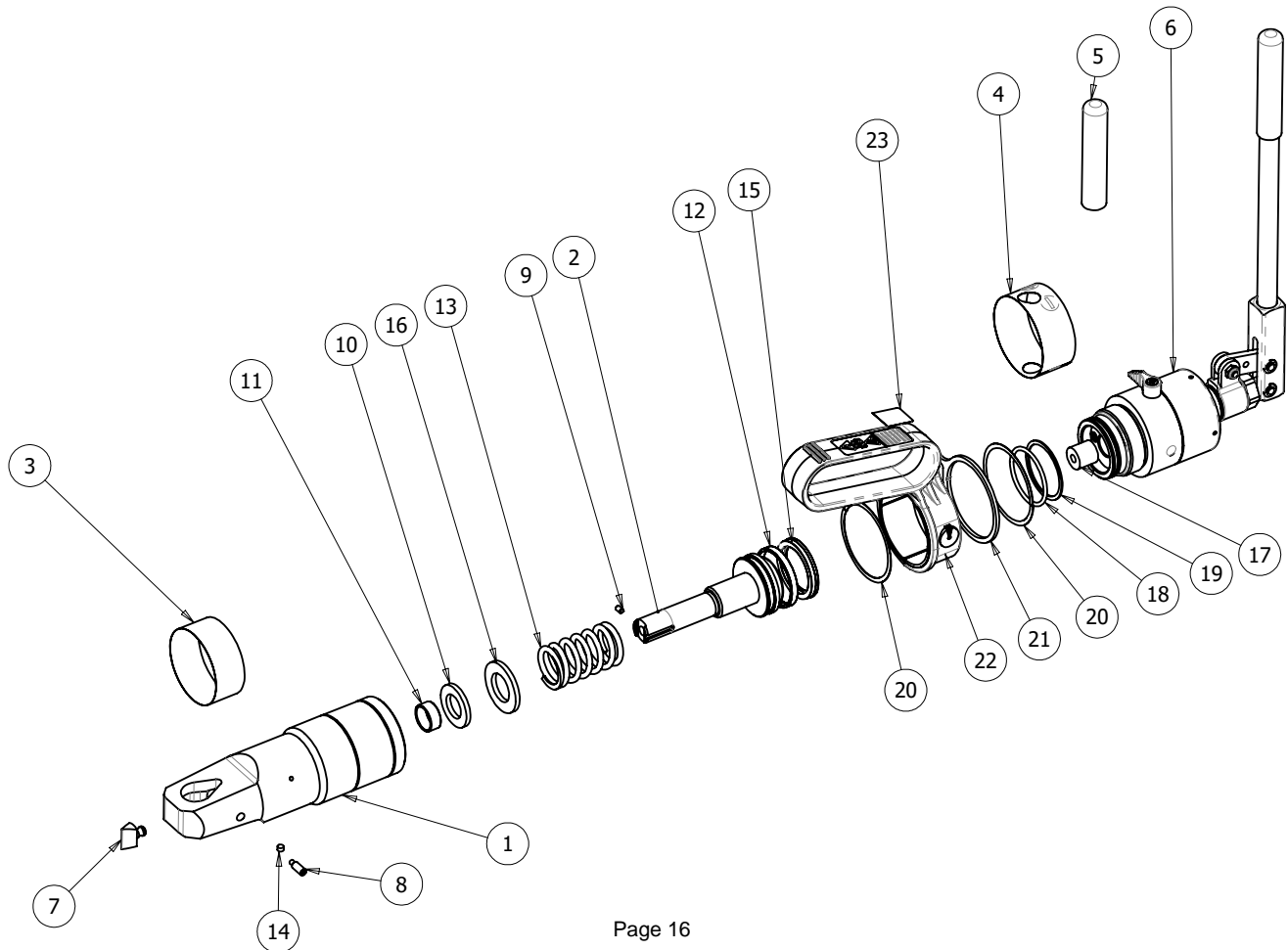
# 8.

## PARTS LISTS & SERVICE KITS

# NS12TI PARTS LIST

1080000-01 REV.04

ITEM NO.	PART NO	DESCRIPTION	QTY
1	NOT AVAILABLE	CUTTING HEAD	1
2	1000300-01	NS12/15 PISTON	1
3	NOT AVAILABLE	NS12TI BODY STICKER WRAP	1
4	840313-01	DECAL TI PUMP WRAP	1
5	306502-01	HANDLE GRIP	1
6	1010100-01	INTEGRAL PUMP	1
7	KIT 1075100-01	NS12 CUTTING TIP	1
8		ALIGNMENT SCREW	1
9		M4 x 6mm GRUB SCREW	1
10	KIT 1001700-01	M20 FLAT WASHER TO ISO 7089/DIN 125A	1
11		WMU PLAIN BUSHING	1
12		BEARING STRIP	1
13		COMPRESSION SPRING	1
14		CYL VENT PLUG	1
15		PISTON LIP SEAL	1
16		M24 FLAT WASHER TO ISO 7089/DIN 125A	1
17		CYLINDER NOSE ADAPTOR	1
18		O-RING	1
19		BACK-UP RING	1
20	KIT 1001800-01	SPIRAL RETAINING RING	2
21		ANCHOR POINT	1
22		HANDLE	1
23		HANDLE STICKER	1

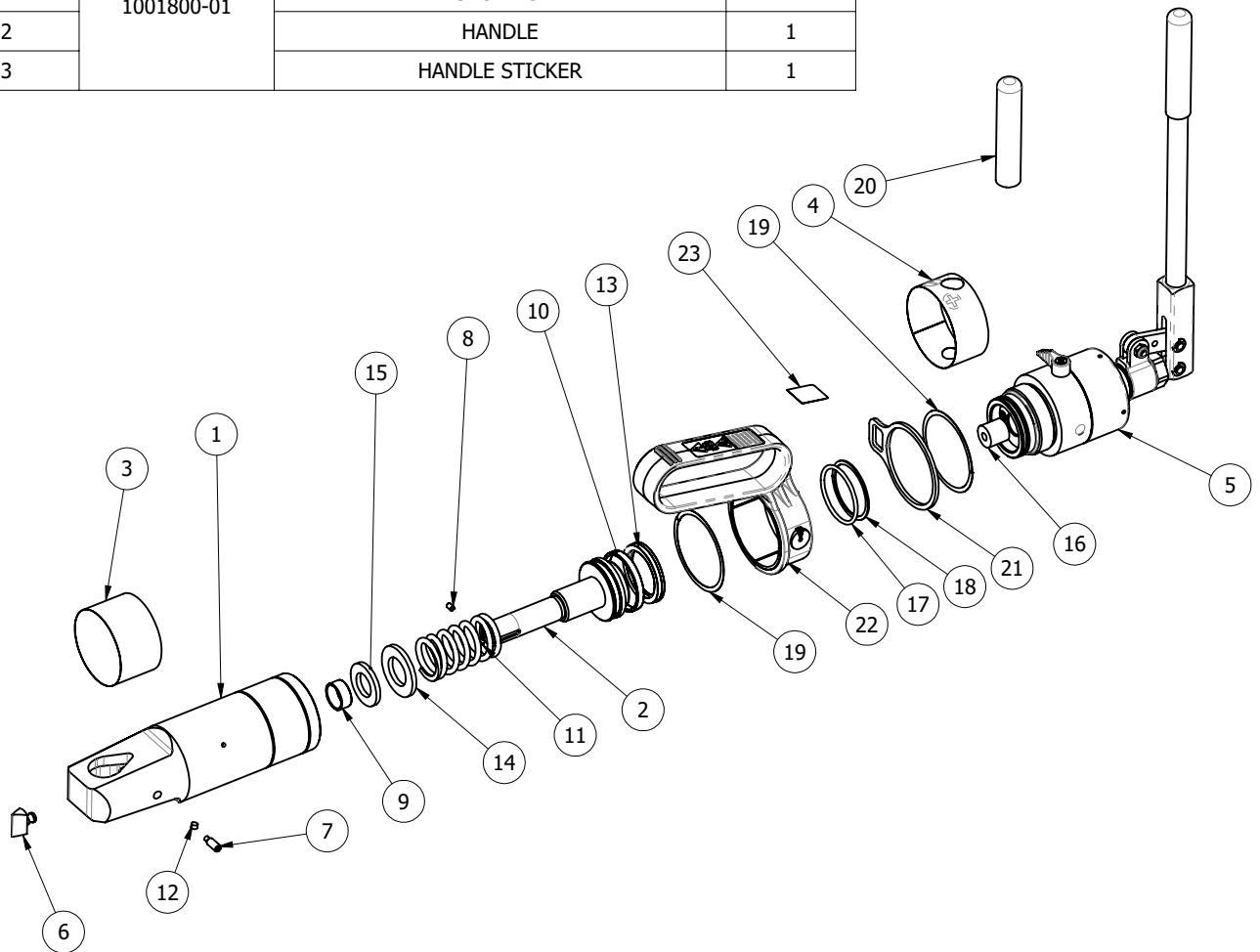




# NS15TI PARTS LIST

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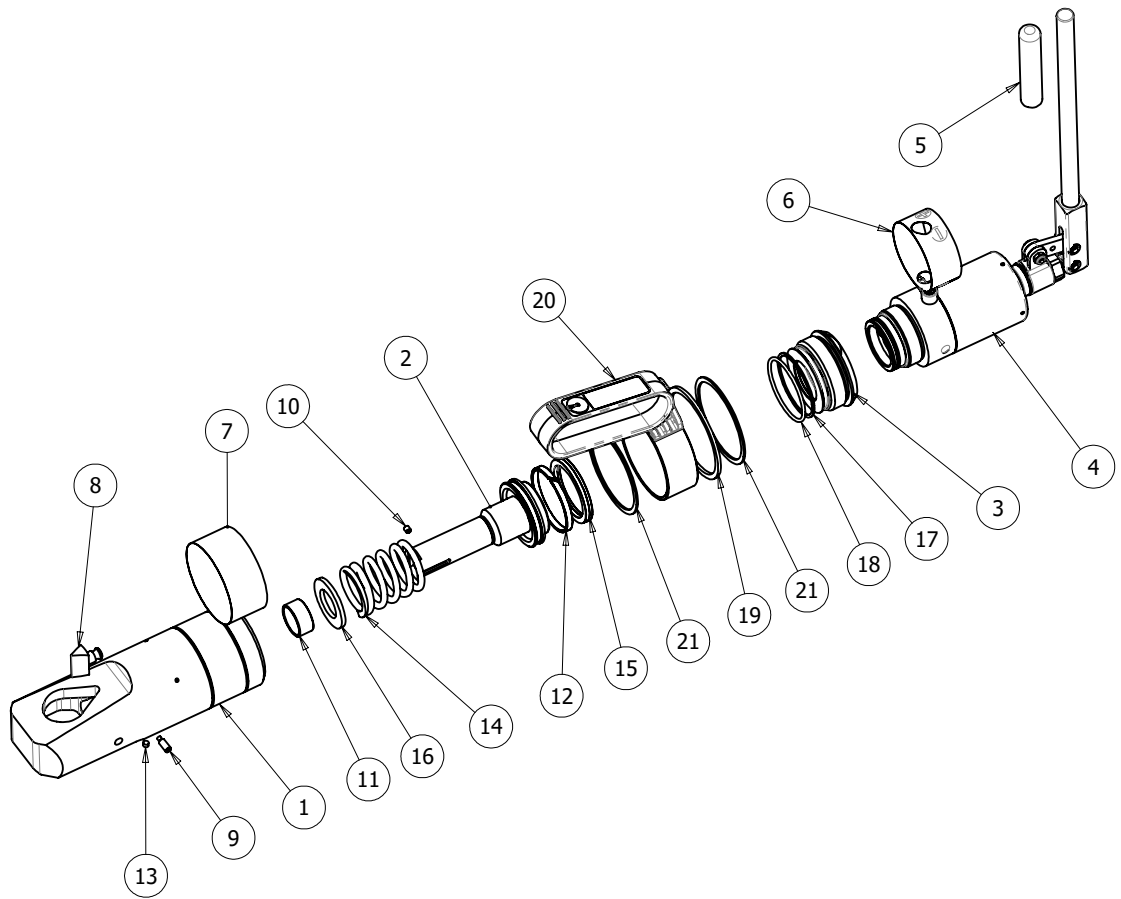
ITEM NO.	PART NO	DESCRIPTION	QTY
1	NOT AVAILABLE	CUTTING HEAD	1
2	1000300-01	NS12/15 PISTON	1
3	NOT AVAILABLE	NS15TI BODY STICKER WRAP	1
4	840313-01	DECAL TI PUMP WRAP	1
5	1010100-01	INTEGRAL PUMP	1
6	KIT 1005100-01	NS15 CUTTING TIP	1
7		ALIGNMENT SCREW	1
8		M4 x 6mm GRUB SCREW	1
9	KIT 1001700-01	WMU PLAIN BUSHING	1
10		BEARING STRIP	1
11		COMPRESSION SPRING	1
12		CYL VENT PLUG	1
13		PISTON LIP SEAL	1
14		M24 FLAT WASHER TO ISO 7089/DIN 125A	1
15		M20 FLAT WASHER TO ISO 7089/DIN 125A	1
16		CYLINDER NOSE ADAPTOR	1
17		O-RING	1
18		BACK-UP RING	1
19	KIT 1001800-01	SPIRAL RETAINING RING	2
20		HANDLE GRIP	1
21		ANCHOR POINT	1
22		HANDLE	1
23		HANDLE STICKER	1



# NS20TI PARTS LIST

1090000-01 REV.04

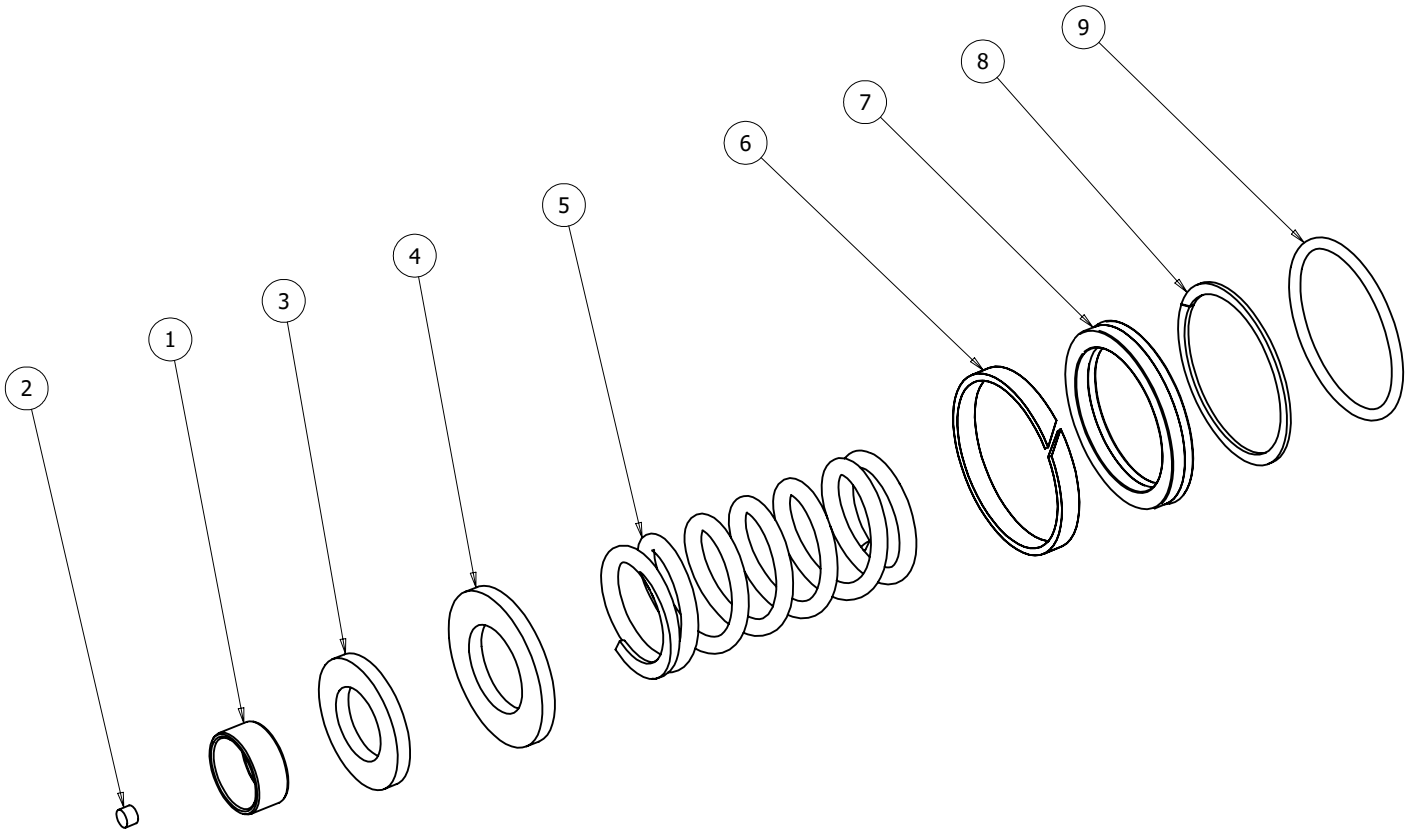
ITEM NO.	PART NO	DESCRIPTION	QTY
1	NOT AVAILABLE	CUTTING HEAD	1
2	1020300-01	PISTON	1
3	1090200-01	INTEGRAL ADAPTOR SLEEVE	1
4	1090100-01	INTEGRAL PUMP UNIT	1
5	306502-01	HANDLE GRIP	1
6	840313-01	DECAL TI PUMP WRAP	1
7	NOT AVAILABLE	NS20TI Body Sticker Wrap	1
8	KIT 1025100-01	NS20 CUTTING TIP	1
9		ALIGNMENT SCREW	1
10		M5 SCKT SET SCREW	1
11	KIT 1021900-01	PLAIN BUSHING	1
12		BEARING STRIP	1
13		CYL VENT PLUG	1
14		COMPRESSION SPRING	1
15		PISTON LIP SEAL	1
16		M27 FLAT WASHER TO ISO 7089/DIN 125A	1
17		BACK-UP RING	1
18		O-RING	1
19		ANCHOR POINT (PLATING)	1
20	KIT 1023000-01	MODULAR HANDLE ASSEMBLY	1
21		SPIRAL RING	2



# **NS12 & NS15 CYLINDER SERVICE KIT**

**1001700-01 REV.03**

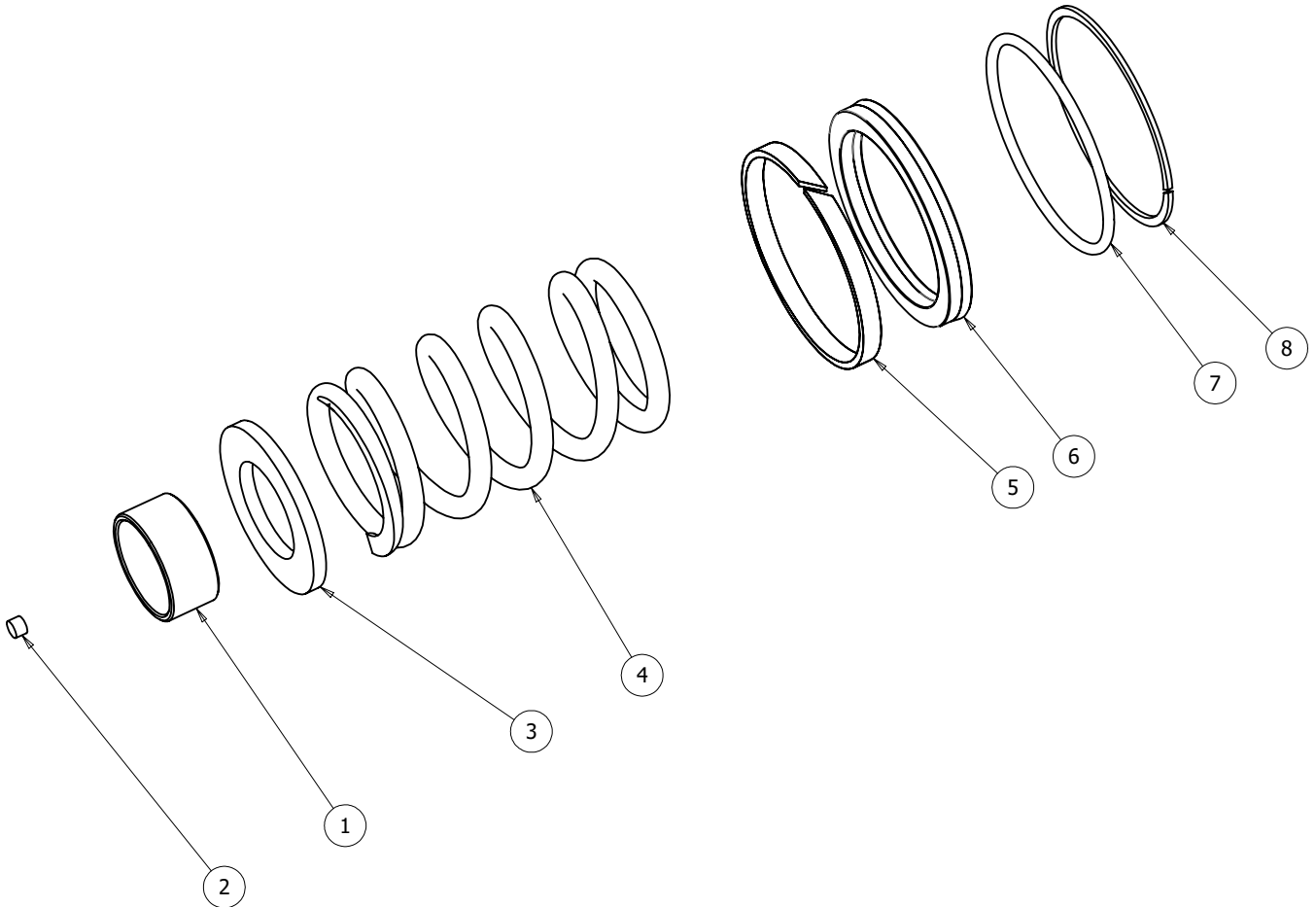
ITEM NO.	DESCRIPTION	QTY
1	WMU PLAIN BUSHING	1
2	CYL VENT PLUG	1
3	M20 FLAT WASHER TO ISO 7089/DIN 125A	1
4	M24 FLAT WASHER TO ISO 7089/DIN 125A	1
5	COMPRESSION SPRING	1
6	BEARING STRIP	1
7	PISTON LIP SEAL	1
8	BACK-UP RING	1
9	O-RING	1



# **NS20 CYLINDER SERVICE KIT**

**1021900-01 REV.05**

ITEM NO.	DESCRIPTION	QTY
1	WMU PLAIN BUSHING	1
2	CYL VENT PLUG	1
3	M27 FLAT WASHER TO ISO 7089/DIN 125A	1
4	COMPRESSION SPRING	1
5	BEARING STRIP	1
6	PISTON LIP SEAL	1
7	O-RING	1
8	BACK-UP RING	1

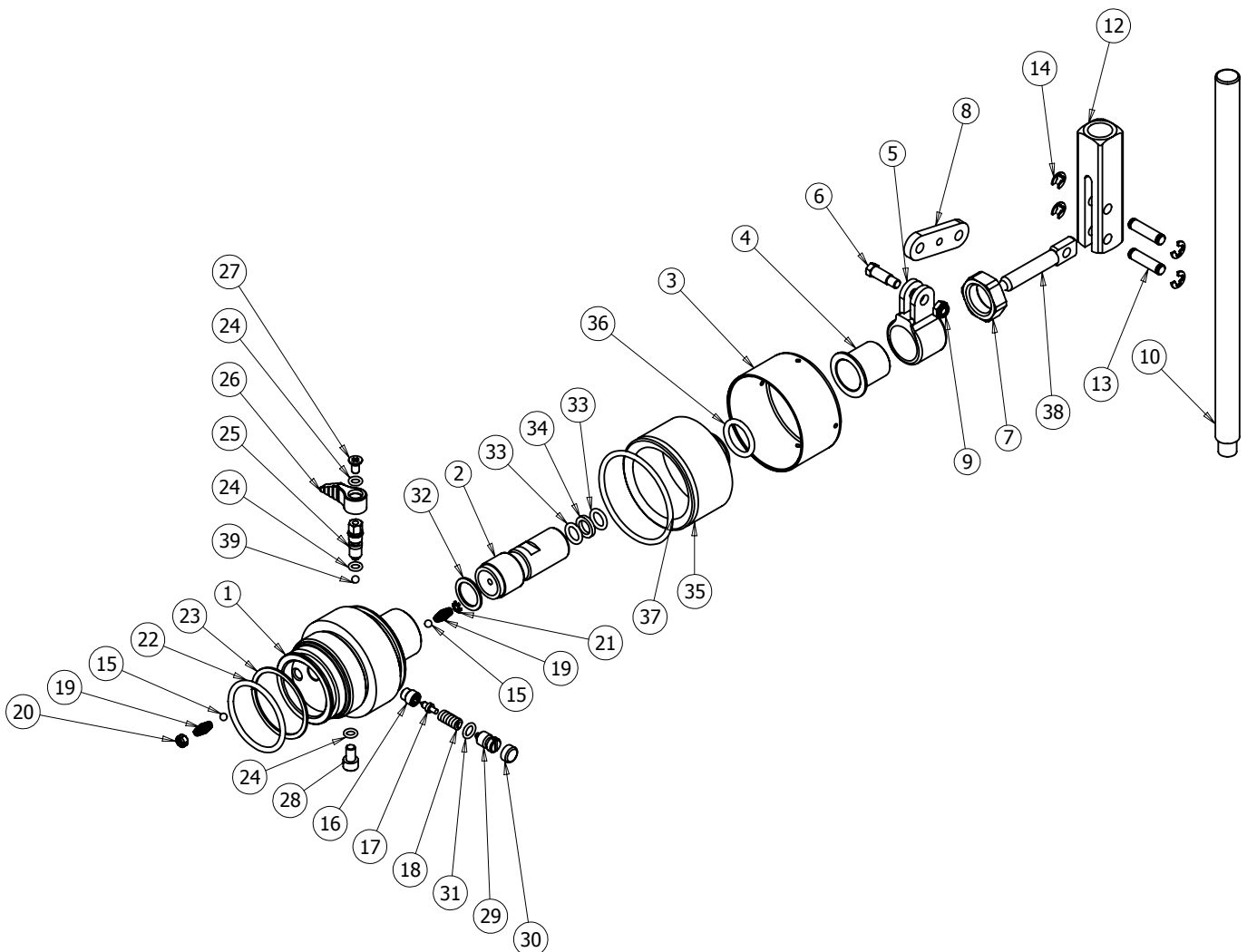


# NS12TI & NS15TI INTEGRAL PUMP PARTS LIST

## 1010100-01 REV.01

ITEM	PART NO.	DESCRIPTION	QTY
1	840301-01	PUMP MANIFOLD	1
2	1010101-01	PUMP PISTON HOUSING	1
3	1010102-01	PUMP BLADDER HOUSING	1
4	372401-01	PISTON HOUSING CAP	1
5	372501-01	SWIVEL CLEVIS	1
6	373201-01	CLEVIS SCREW	1
7	373301-01	NYLON LOCKING NUT	1
8	373101-01	LINK CONNECTOR	1
9	372601-01	RETAINING NUT	1
10	373401-01	HANDLE ROD	1
11	306501-01	HANDLE GRIP	1
12	KIT 840160-01	HANDLE CLEVIS	1
13		CLEVIS PIN	2
14		E-CLIP	4
15	KIT 375020-01	STEEL BALL	2
16		CONE SEAT	1
17		CONE	1
18		LONG SEPARATOR SPRING	1
19		SPRING	2
20		SCREW	1
21		SPRING LOCK	1

ITEM	PART NO.	DESCRIPTION	QTY
22	KIT 1010104-01	O-RING	1
23		BACK-UP RING	1
24		O-RING	3
25		RELIEF VALVE SCREW	1
26		RELIEF VALVE KNOB	1
27		FIXING SCREW	1
28		OIL FILL SCREW	1
29		OVERLOAD COVER SCREW	1
30		CAP	1
31		O-RING	1
32		WASHER	1
33		O-RING	2
34		BACK-UP RING	1
35		RESERVOIR BLADDER	1
36		O-RING	1
37		O-RING	1
38		PUMP PISTON ROD	1
39		STEEL BALL	1

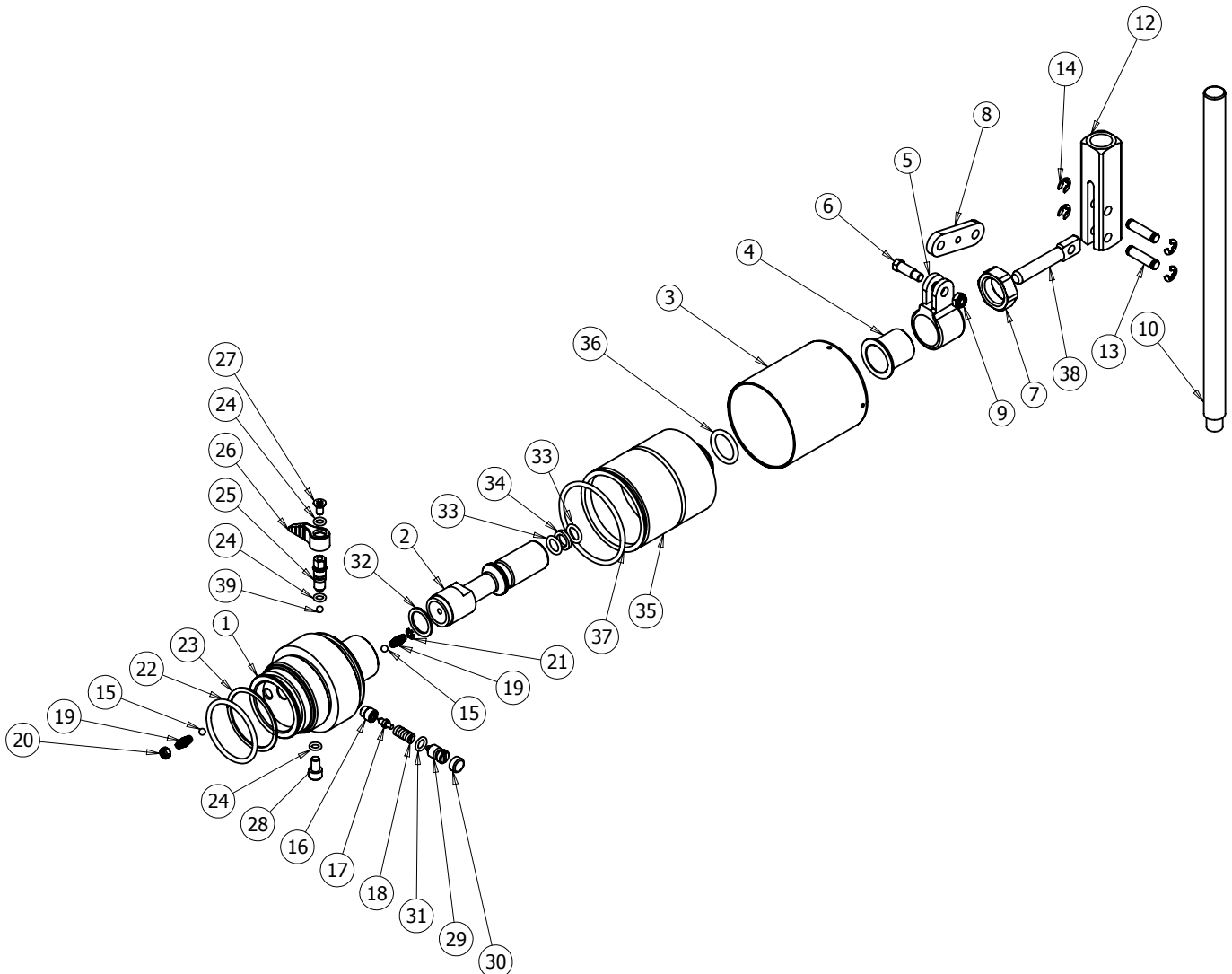


# NS20TI INTEGRAL PUMP PARTS LIST

## 1090100-01 REV.01

ITEM	PART NO.	DESCRIPTION	QTY
1	840301-01	PUMP MANIFOLD	1
2	376901-01	PUMP PISTON HOUSING	1
3	840302-01	PUMP BLADDER HOUSING	1
4	372401-01	PISTON HOUSING CAP	1
5	372501-01	SWIVEL CLEVIS	1
6	373201-01	CLEVIS SCREW	1
7	373301-01	NYLON LOCKING NUT	1
8	373101-01	LINK CONNECTOR	1
9	372601-01	RETAINING NUT	1
10	373401-01	HANDLE ROD	1
11	306501-01	HANDLE GRIP	1
12	KIT 840160-01	HANDLE CLEVIS	1
13		CLEVIS PIN	2
14		E-CLIP	4
15	KIT 840130-01	STEEL BALL	2
16		CONE SEAT	1
17		CONE	1
18		LONG SEPARATOR SPRING	1
19		SPRING	2
20		SCREW	1
21		SPRING LOCK	1

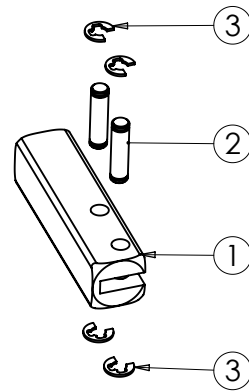
ITEM	PART NO.	DESCRIPTION	QTY
22	KIT 840120-01	O-RING	1
23		BACK-UP RING	1
24		O-RING	3
25		RELIEF VALVE SCREW	1
26		RELIEF VALVE KNOB	1
27		FIXING SCREW	1
28		OIL FILL SCREW	1
29		OVERLOAD COVER SCREW	1
30		CAP	1
31		O-RING	1
32		WASHER	1
33		O-RING	2
34		BACK-UP RING	1
35		RESERVOIR BLADDER	1
36		O-RING	1
37		O-RING	1
38		PUMP PISTON ROD	1
39		STEEL BALL	1



# CLEVIS SERVICE KIT

**840160-01 REV.01**

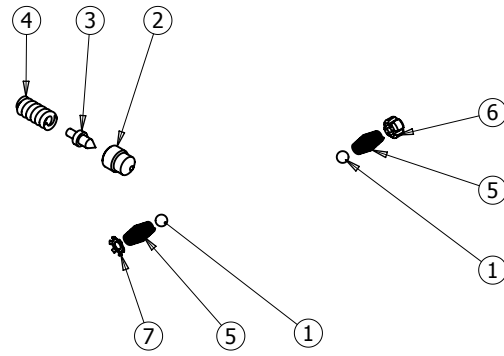
ITEM NO.	DESCRIPTION	QTY
1	HANDLE CLEVIS	1
2	CLEVIS PIN	2
3	RETAINING RING	4



# **INTEGRAL MANIFOLD SERVICE KIT**

**840130-01 REV.03**

ITEM NO.	DESCRIPTION	QTY.
1	STEEL BALL	2
2	CONE SEAT	1
3	CONE	1
4	LONG SEPARATOR SPRING	1
5	SPRING	2
6	SCREW	1
7	SPRING LOCK	1

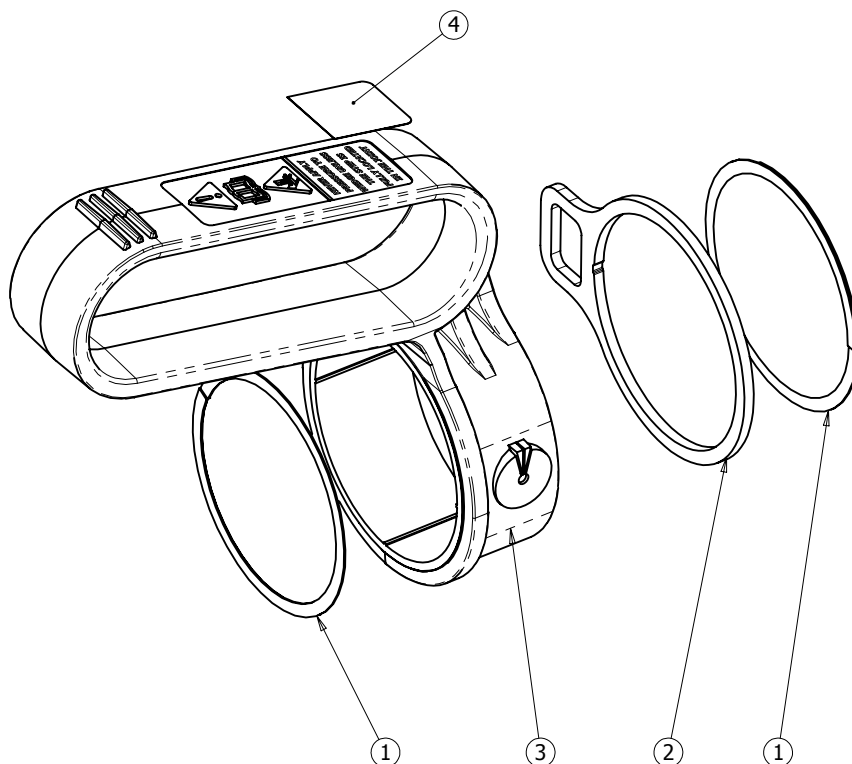




# **NS12 / NS15 HANDLE SERVICE KIT**

**1001800-01 REV.02**

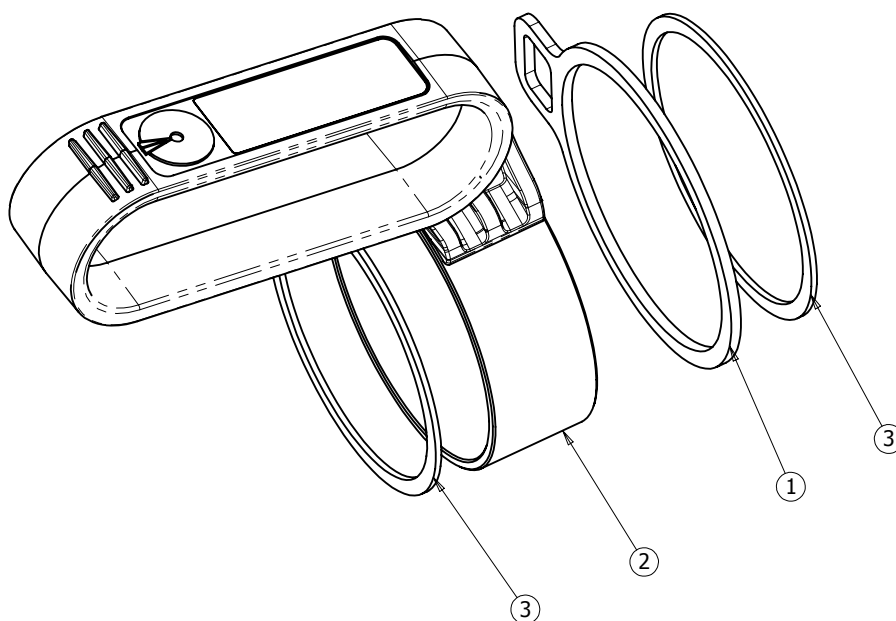
ITEM NO.	DESCRIPTION	QTY
1	SPIRAL RETAINING RING	2
2	ANCHOR POINT	1
3	HANDLE	1
4	HANDLE STICKER	1



# **NS20 HANDLE SERVICE KIT**

**1023000-01 REV.03**

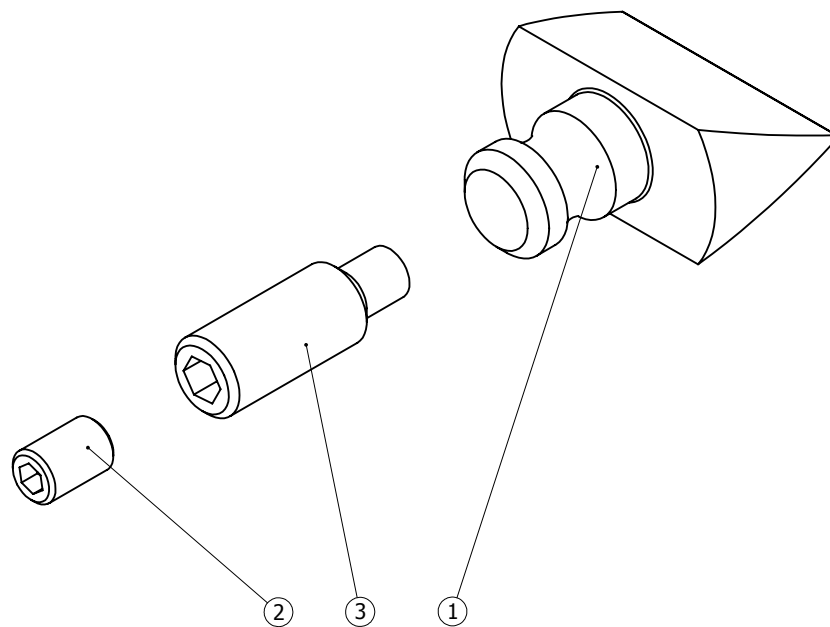
ITEM NO.	DESCRIPTION	QTY
1	ANCHOR POINT	1
2	Modular Handle Assembly	1
3	Spiral Ring	2



# **NS12 CUTTING TIP SERVICE KIT (1x)**

**1075100-01-01 REV.02**

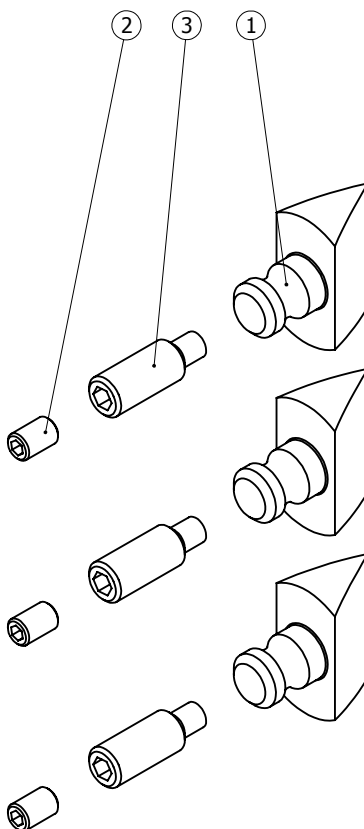
ITEM NO.	DESCRIPTION	QTY
1	NS12 CUTTING TIP	1
2	M4 x 6mm Grub Screw	1
3	ALIGNMENT SCREW	1



# **NS12 CUTTING TIP SERVICE KIT (3x)**

**1075300-01-01 REV.02**

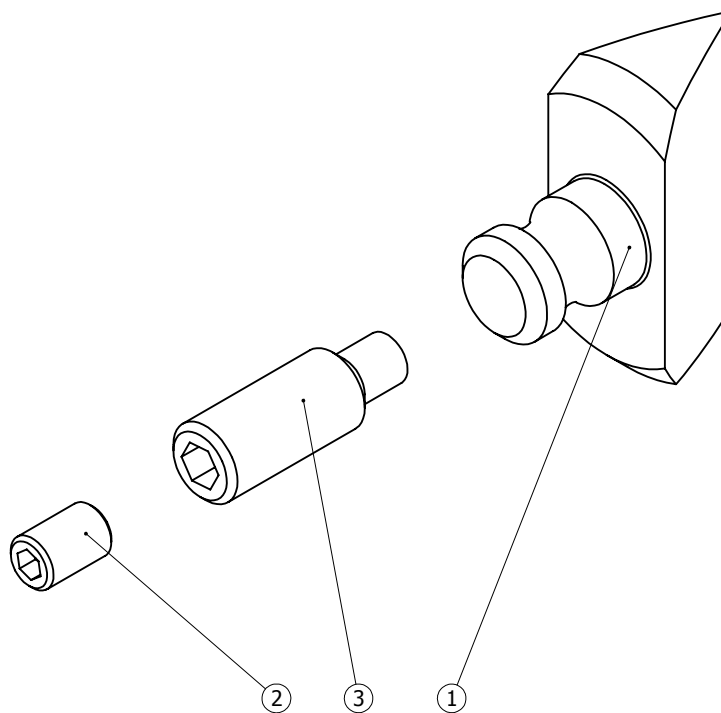
ITEM NO.	DESCRIPTION	QTY
1	NS12 CUTTING TIP	3
2	M4 x 6mm Grub Screw	3
3	ALIGNMENT SCREW	3



## **NS15 CUTTING TIP SERVICE KIT (1x)**

**1005100-01-01 REV.02**

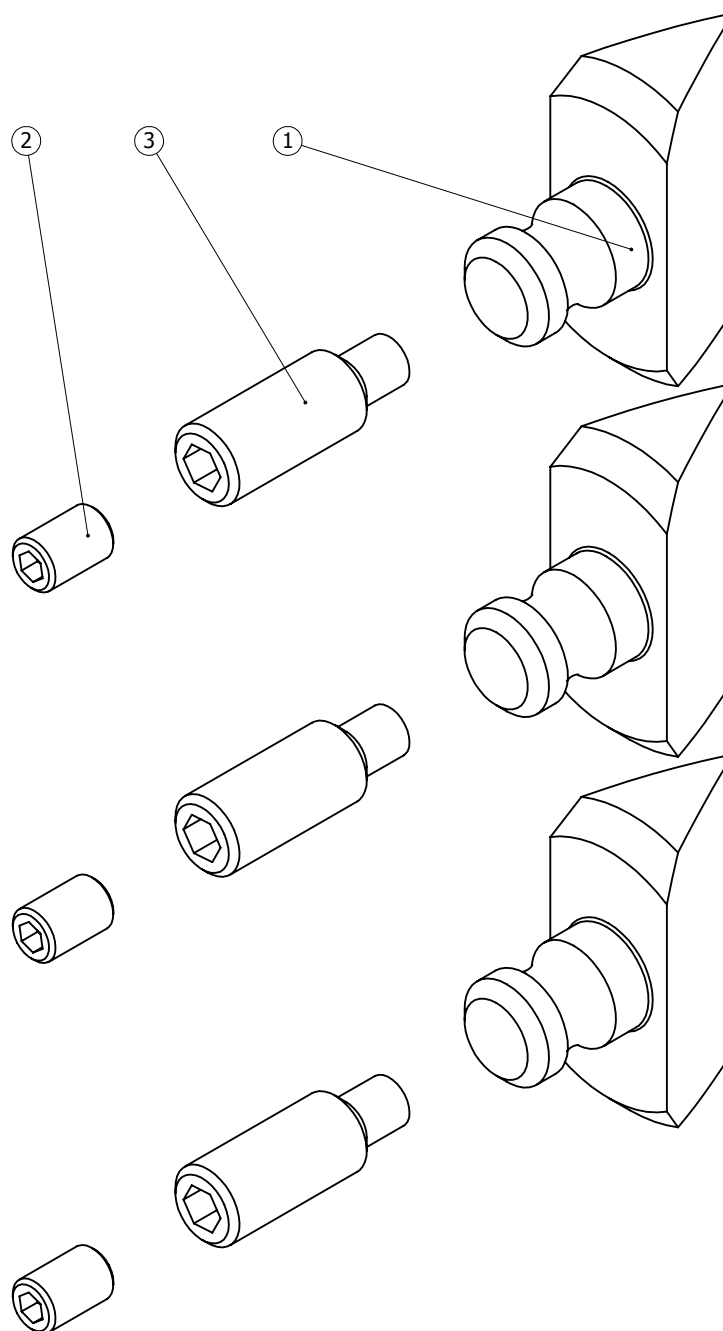
ITEM NO.	DESCRIPTION	QTY
1	CUTTING TIP	1
2	M4 x 6mm Grub Screw	1
3	ALIGNMENT SCREW	1



# **NS15 CUTTING TIP SERVICE KIT (3x)**

**1005300-01-01 REV.02**

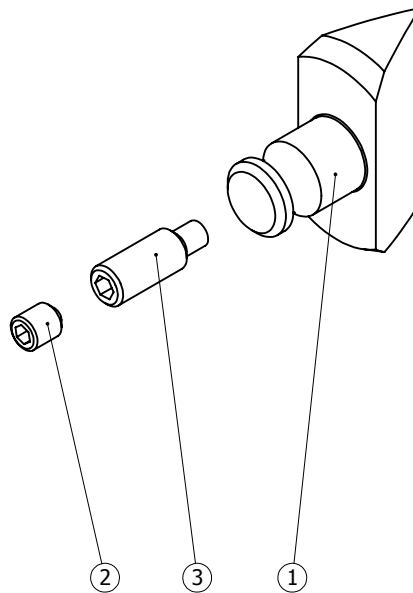
ITEM NO.	DESCRIPTION	QTY
1	CUTTING TIP	3
2	M4 x 6mm Grub Screw	3
3	ALIGNMENT SCREW	3



# **NS20 CUTTING TIP SERVICE KIT (1x)**

**1025100-01-01 REV.02**

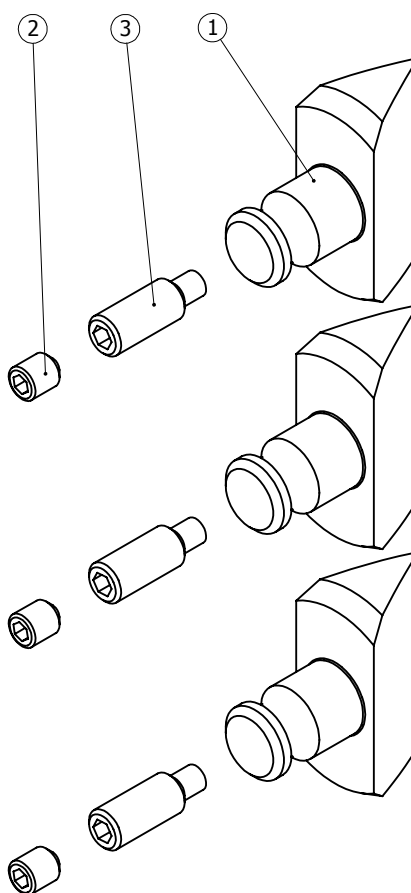
ITEM NO.	DESCRIPTION	QTY
1	CUTTING TIP - COATING	1
2	M5 SCKT SET SCREW	1
3	ALIGNMENT SCREW	1



# **NS20 CUTTING TIP SERVICE KIT (3x)**

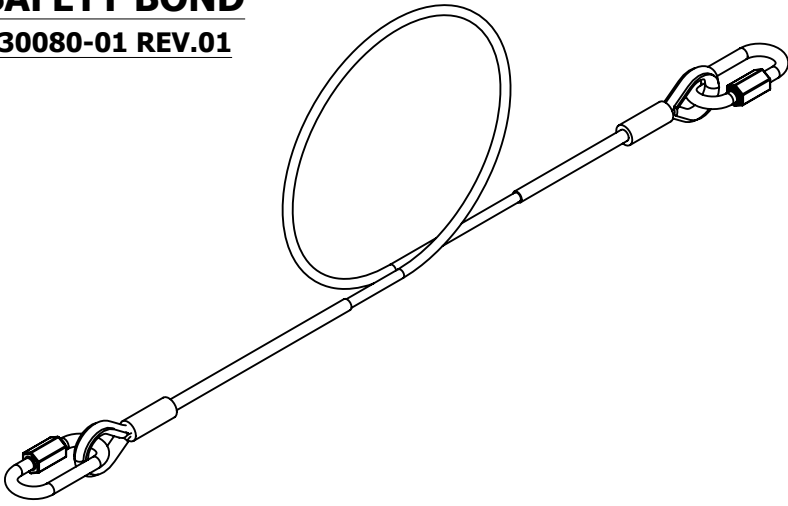
**1025300-01-01 REV.02**

ITEM NO.	DESCRIPTION	QTY
1	CUTTING TIP - COATING	3
2	M5 SCKT SET SCREW	3
3	ALIGNMENT SCREW	3





**SAFETY BOND**  
**830080-01 REV.01**





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