

FC10TE

HYDRAULIC
FLANGE CLOSING
TOOL



CONTENTS

1. INTRODUCTION
2. TOOL SAFETY
 - 2.1 GENERAL SAFETY
 - 2.2 PERSONNEL COMPETENCY
 - 2.3 DISCLAIMER
 - 2.4 DEFINITION OF TERMS
 - 2.5 HAZARDS
3. FC10TE HYDRAULIC FLANGE CLOSING TOOL
 - 3.1 TOOL CAPABILITIES
 - 3.2 TOOL FUNCTION
 - 3.3 KIT CONTENTS
 - 3.4 TOOL DIMENSIONS
 - 3.5 TOOL MAINTENANCE
4. REGULATORY INFORMATION
 - 4.1 REGISTERED HEAD OFFICE
5. PARTS LISTS & SERVICE KITS

15/02/2019

1.

INTRODUCTION

The Equalizer FC10TE Hydraulic Flange Pulling Tools are tools designed to assist in the maintenance and installation of pipeline flange assemblies.

The FC10TE Hydraulic Flange Pulling Tools are used to close any flange joint made up of flanges with a bolt hole of 22mm (7/8") or greater producing a pulling force of up to 20T when used as recommended in pairs. The FC10TE can close from a distance of 600mm.

The use of these instructions will promote safe use, and maximise the service life of the tool.

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

This manual contains information for the following tools:

- FC10TE Flange Closing Tool

2.

SAFETY INFORMATION

2.1

GENERAL SAFETY

These instructions cover the safe operation and maintenance of THE EQUALIZER **FC10TE** HYDRAULIC 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 (10000 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 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).



DANGER: 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.



WARNING: Never place fingers in a joint held by an activated tool



CAUTION: Never hammer or force the tool into a bolt hole; if it does not fit easily you are using the wrong size of tool.

3.

FC10TE

HYDRAULIC FLANGE CLOSING TOOL

3.1

TOOL CAPABILITIES

CLOSING FORCE

Closing force = 10 tonnes per tool

It is recommended that tools are used in pairs, giving 2 x 10 = 20 tonnes

If using the Equalizer HP550S/D Hand Pump (or if a hydraulic pressure gauge is fitted), the spreading force per tool can be determined by taking a reading from the gauge.

Gauge pressures will produce spreading forces as set out below.

Pressure	Bar	69	207	345	483	690
	psi	1000	3000	5000	7000	10000
Spreading force	T	1	3	5	7	10

RANGE OF APPLICATION

Closing distance = 600mm - 0mm (23.5" - 0")

Can be used on any flange joint with flange bolt holes of 22mm (7/8") or greater.

Hydraulic oil grade: 15 centistokes(cSt) @ 40°C tested by ASTM D 445



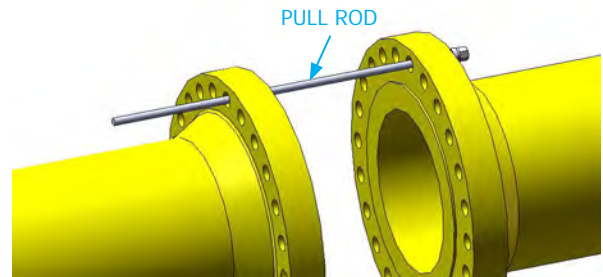
The FC10TE has not been designed or certified as lifting equipment. If the tool is being used to close flange joints with a Vertical Axis the FC10TE must be used in conjunction with certified lifting equipment.

3.2

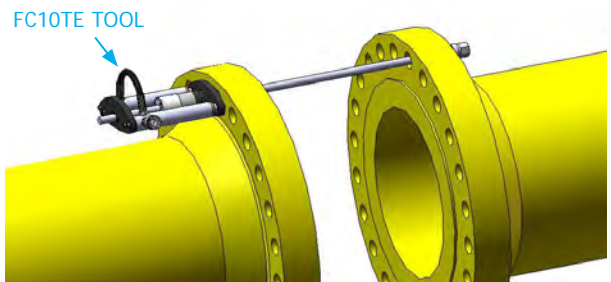
FC10TE TOOL FUNCTION

FC10TE GENERAL GUIDANCE

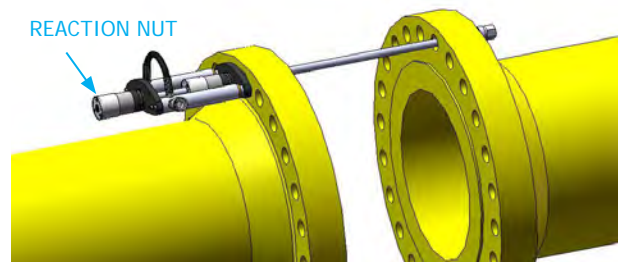
1. The Pull Rod is inserted through the corresponding bolt holes in the flanges.



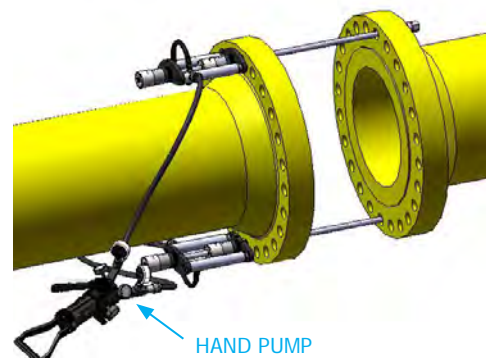
2. The FC10TE Tool is slid over the pull rod until the face of the tool comes into contact with the flange.



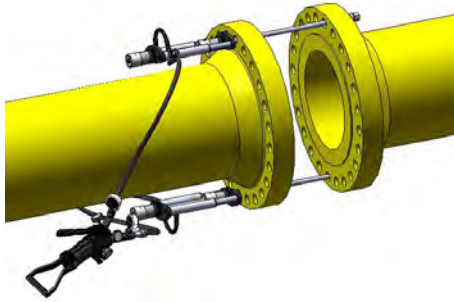
3. The ratchet nut is slid over the pull rod and locked into the tool.



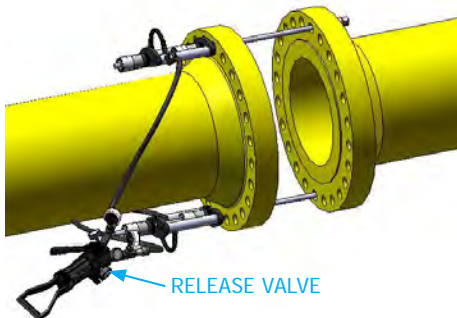
4. The hydraulic hand pump and hoses are connected



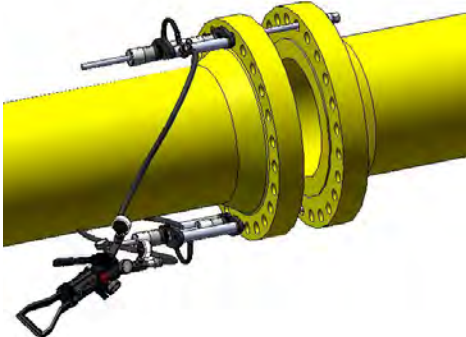
- The Hand Pump is actuated until the cylinders reach full stroke.



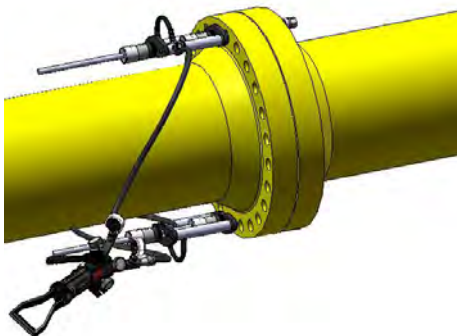
- The Hydraulic pressure is released and the cylinders are allowed to fully retract.



- The Hand Pump is actuated until the cylinders reach full stroke.



- Steps 6 and 7 are repeated until the flange joint is closed.

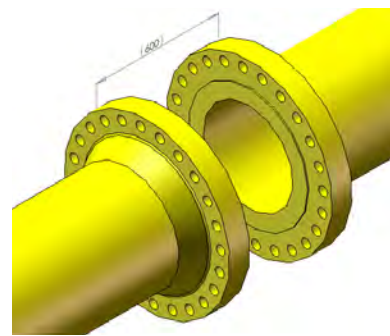


INSTALLATION AND OPERATION

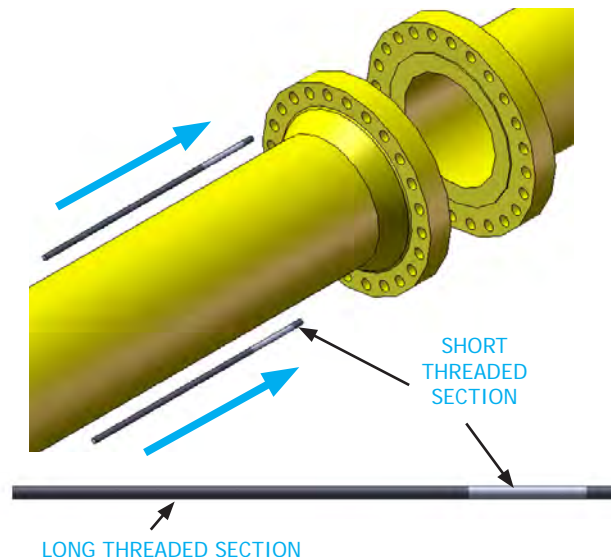


Note: Prior to attaching the FCT10TE it is important that the location of the tools around the flange joint is considered. The tools should be attached to the bolt holes at the points where the highest load is expected. Consideration should also be given to the flange Gasket/Seal ring, it may be necessary to insert the Gasket/Seal ring Prior to attaching the tools.

- The flanges are placed with a gap of no more than 600mm between the backs of the flanges and within reasonable alignment.

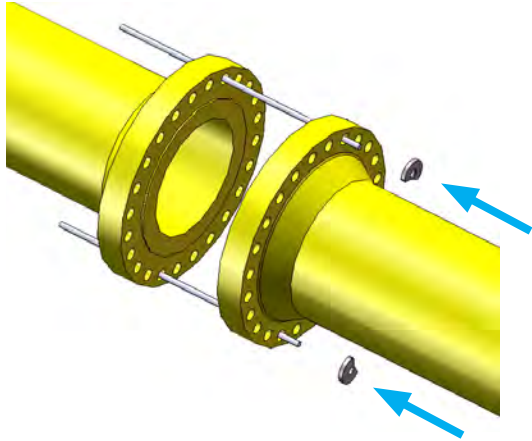


- Having determined the best location for the tools insert both pull rods through the bolt holes in one flange and into the corresponding bolt holes of the mating flange.

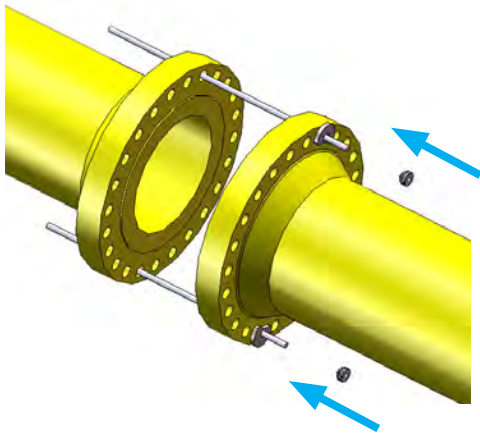


CAUTION: The Pull Rod has a long threaded section and a short threaded section. The threads on both sections are different!, The short threaded end of the Pull Rod must be passed through the flanges to mate with the pull nut.

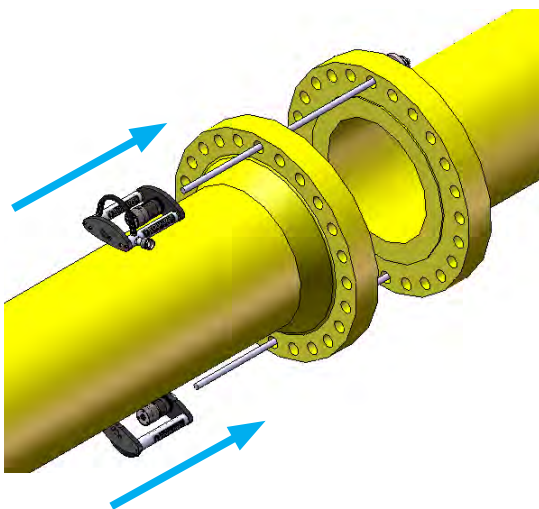
3. The Rod washers are slid over the Pull Rod and rotated to align with the curvature of the flange.



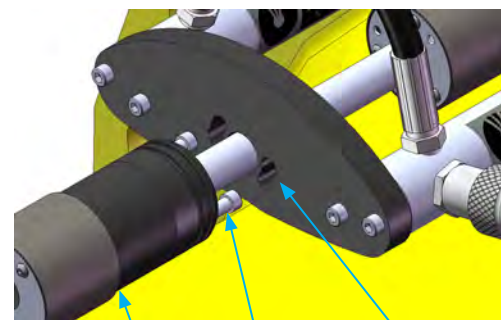
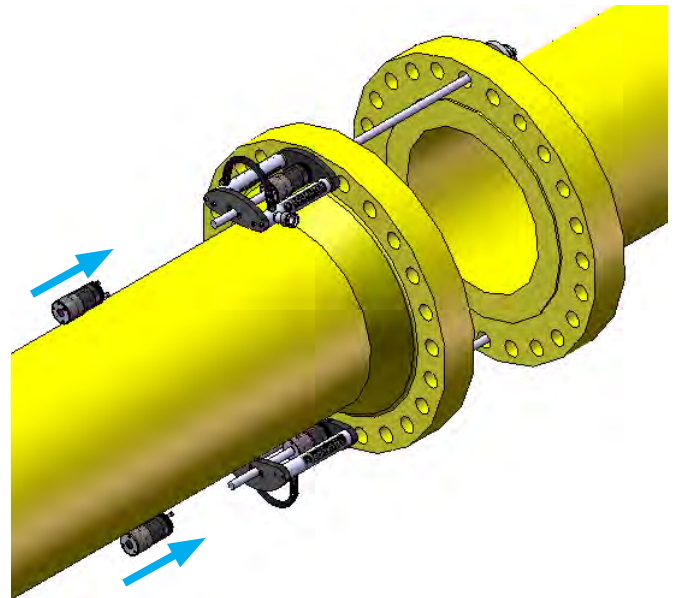
4. The Pull Nuts are threaded on to the pull rod.



5. The FC10TE tools are slid on to the Pull Rods until the face of the tools are in contact with the back of the flange. You will feel / hear a clicking as the Primary Ratchet nut slides along the Pull Rod.



6. The Secondary Ratchet Nuts are then slid up the pull rods until the nut retaining pins engage in the key holes in the FC10TE's rear plate.



PULL ON THE
RELEASE SLEEVE
TO RETRACT
THE NUT

PULL ON THE
MAIN BODY TO
ADVANCE THE
NUT



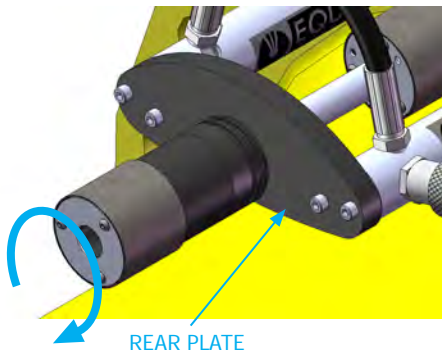
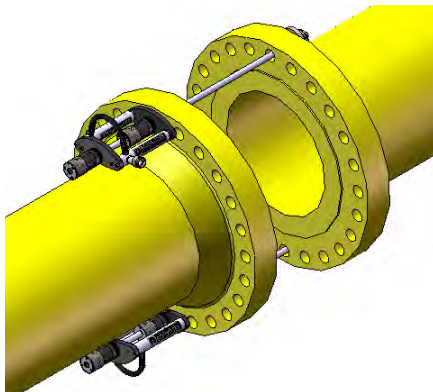


Note: The Ratchet Nut is designed to move freely when advanced along the pull rod (indicated by the green arrow). The nut can only be advanced by gripping on the nut body.

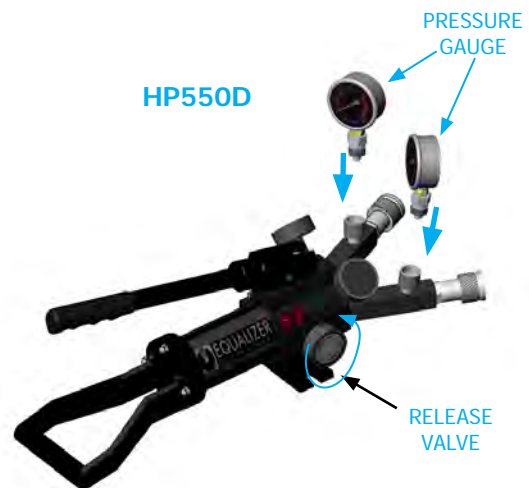
The nut will lock on to the pull rod when a force is applied to the load face of the nut. It is not possible to move the nut until the load is removed from the load face of the nut.

The nut can only be retracted by pulling on the release sleeve in the retract direction (indicated by the yellow arrow).

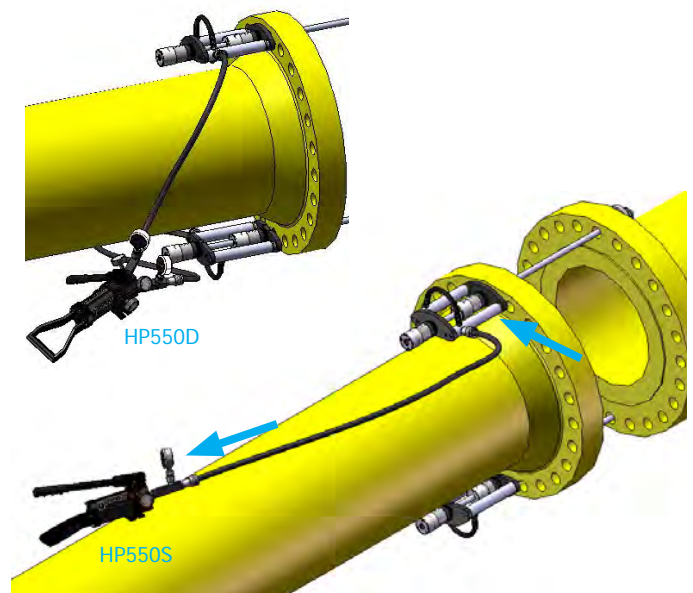
7. Rotate the secondary ratchet nuts clockwise 30 degrees to lock them on to the rear plate.



8. Check that the release valves on the hand pumps are open by rotating fully anti-clockwise and then connect the Pressure gauges to the pump ensuring all the couplers are fully hand tight.



9. The Pumps can now be connected to the tools using the Hoses supplied. ensure all couplers are fully tightened.



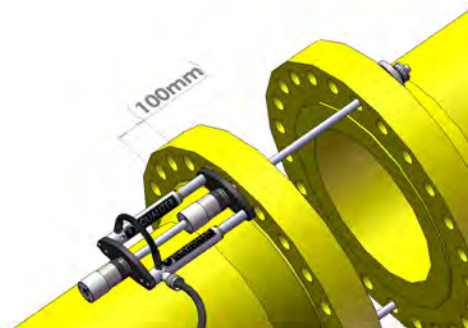


Note: Prior to operating the Equalizer Hydraulic Hand Pumps please read the Hydraulic Hand Pump Manual. This is included in all tool kits and is also available for download from www.equalizerinternational.com

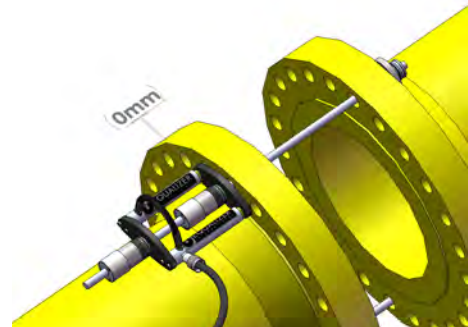
10. Close the release valve on the pump by turning clockwise. To commence flange closing gently prime the pump(s) adjusting the pressure on each tool as necessary to maintain parallelism between flange faces. If the pressure increases to 10,000 PSI with no movement of the flanges then a greater number of tools will be required to close the joint.



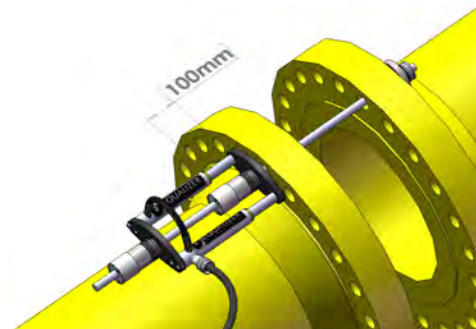
11. Continue priming the Hand Pump until the actuators have reached full stroke 100mm (4").



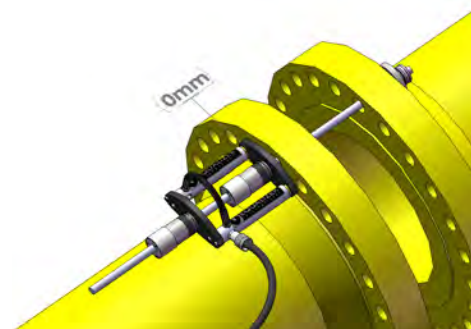
12. Release the hydraulic pressure from the system. This will allow the Actuators to retract and the secondary ratchet nut to advance along the pull rod automatically.



13. Once the Actuators have fully retracted close the release valve and continue priming the hand pump until the actuators have reached full stroke.

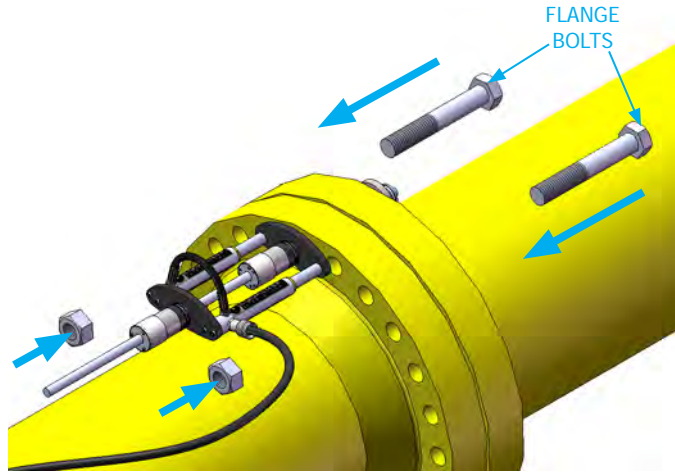


14. Repeat steps 12 and 13 to continue closing the gap between flange faces. Adjust the pressure on each tool as necessary to maintain an even gap around the joint.



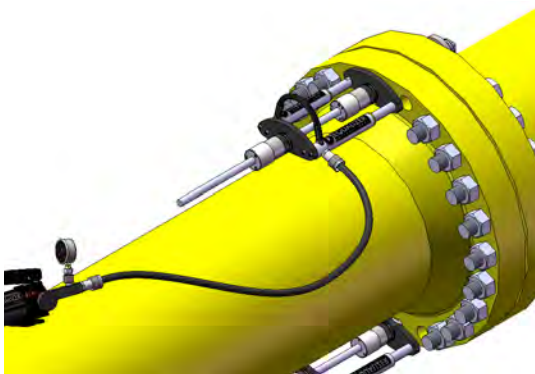
Note: If you are experiencing misalignment of the flanges during the final stages of closing the joint Equalizer International's Flange Alignment tools can be used in conjunction with the FC10TE. For information on these tools please visit "www.equalizerinternational.com"

15. Once the flange joint has been fully closed insert and tighten as many bolts as possible with the FC10TE still in position.

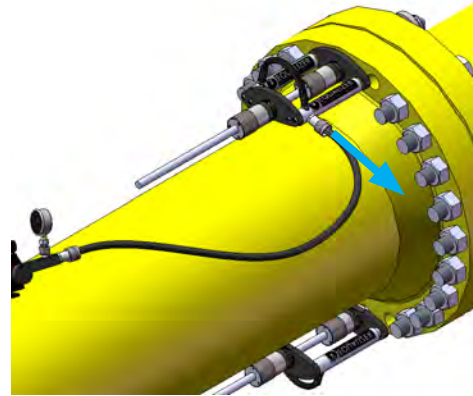


CAUTION: The FC10TE Ratchet Nuts will not release until they are fully unloaded, this is achieved by tightening the flange bolts until all the load has been transferred onto them.

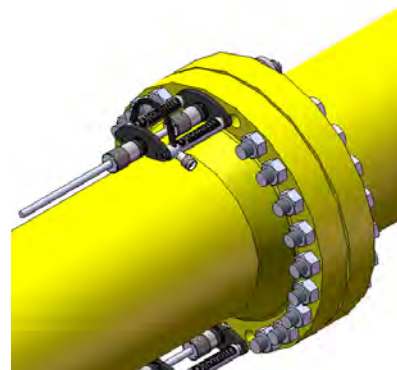
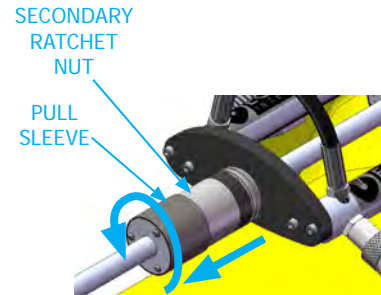
16. Once the flange bolts have been tightened sufficiently to remove any load from the FC10TE turn the release valves on the pump(s) anticlockwise to release the pressure from the hydraulic system.



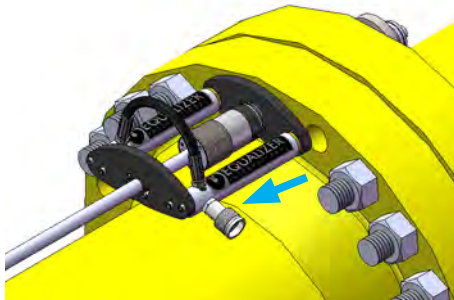
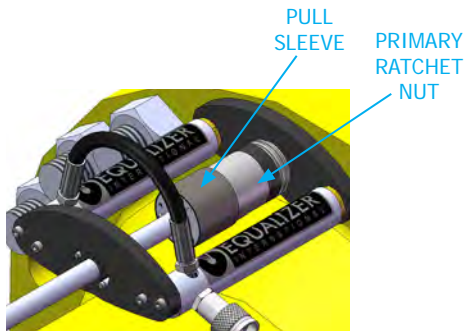
17. Now that the pressure has been released from the system the hydraulic Pump and Hoses can be detached.



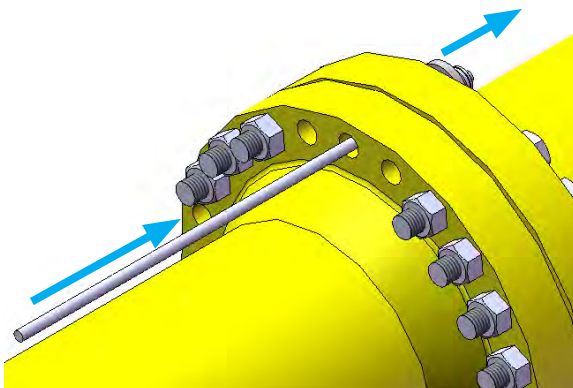
18. Now that the load has been released from the tools, the secondary ratchet nut can be removed. Rotate the nut anticlockwise through 30 degrees to disengage it from the rear plate then slide the nut off by gripping and pulling on the pull sleeve section of the nut.



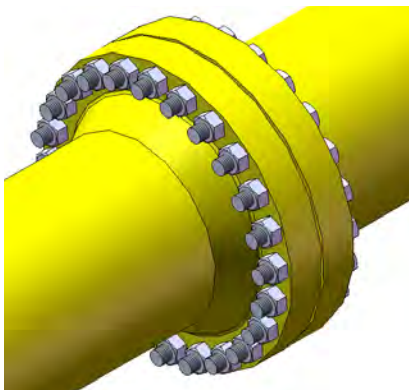
19. The FC10TE can now be removed by gripping and pulling on the pull sleeve section of the primary nut.



20. The Pull Rod complete with pull nut and washer can now be withdrawn from the flange joint.



21. Now that the tool has been removed all the flange bolts can be inserted and tightened in accordance with the relevant procedure.



3.3

KIT CONTENTS

FC10TE STANDARD KIT

Product Code: FC10TESTD

- 1 x FC10TE Tool
- 2 x 10,000 psi (700 bar) 5T Hydraulic cylinders
- 1 x 10,000 psi (700 bar) HP550S Sealed Hand Pump with Gauge
- 1 x 10,000 psi (700 bar) Hydraulic Hose, 2m (78.75")
- 1 x Instruction Manual
- 1 x Carry-Case with Protective Foam Inserts



Carry Case dimensions:
890 x 570 x 165 mm
(35.04" x 22.44" x 6.50")

Tool Weight: 11kg (24.25 lb)
Gross Kit Weight: 23.5kg (51.80 lb)

FC10TE MAXI KIT

Product Code: FC10TEMAX

- 2 x FC10TE Tools
- 4 x 10,000 psi (700 bar) 5T Hydraulic cylinders
- 1 x 10,000 psi (700 bar) HP550D Sealed Hand Pump with Gauges
- 2 x 10,000 psi (700 bar) Hydraulic Hose, 2m (78.75")
- 1 x Instruction Manual
- 1 x Carry-Case with Protective Foam Inserts

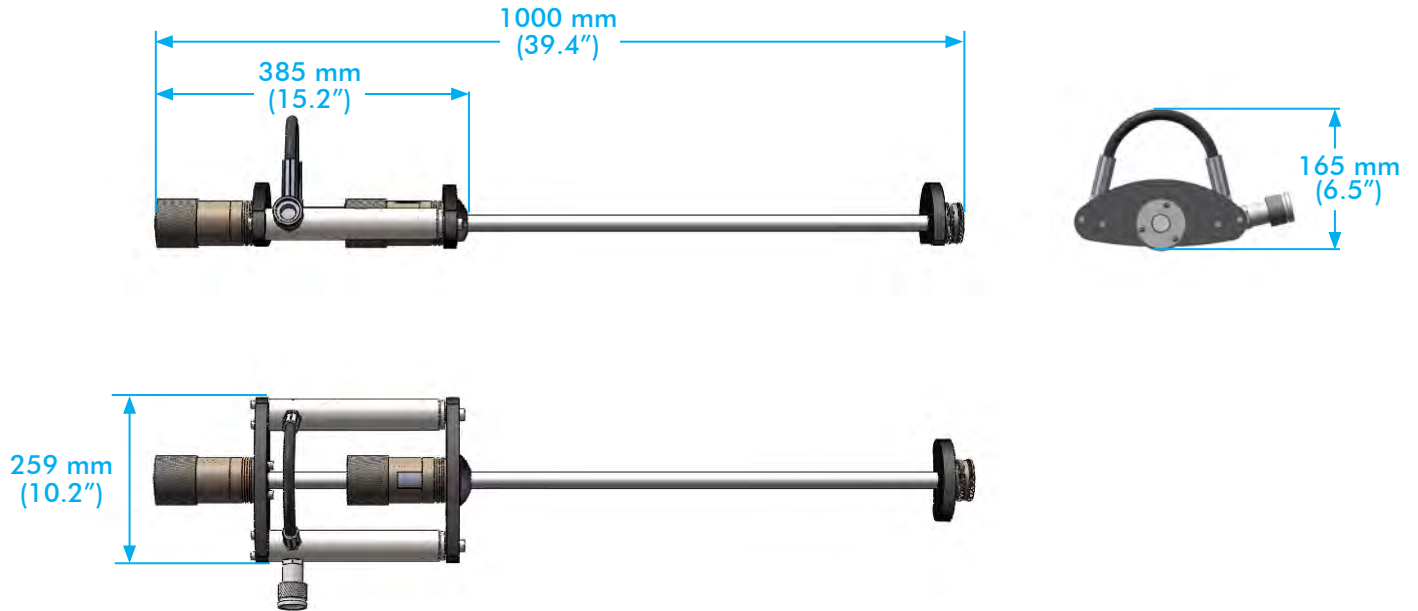


Carry Case dimensions:
890 x 570 x 165 mm
(35.04" x 22.44" x 6.50")

Tool Weight: 11kg (24.25 lb)
Gross Kit Weight: 36.5kg (50.47 lb)

3.4

FC10TE TOOL DIMENSIONS



3.5 FC10TE TOOL MAINTENANCE

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:

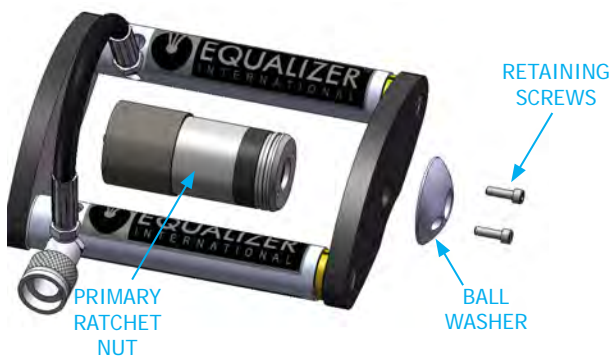
- visual inspection of the outer parts of the tool, checking for obvious damage, degradation or missing parts.

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

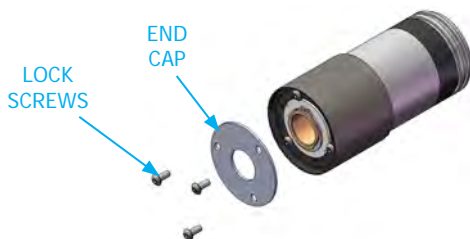
CLEANING

At regular intervals and specifically after exposure to salt water Equalizer FC10TE tools should be dismantled, and all parts cleaned with a clean rag and WD40 (or similar) to remove dirt and old grease, and then relubricated: The following procedure should be followed when dismantling and rebuilding the tools.

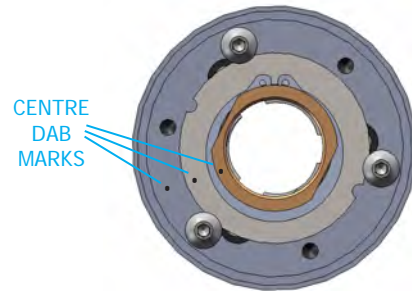
1. Unscrew and remove the primary ratchet nut retaining screws. This will allow the ball washer and ratchet nut to be removed from the assembly.



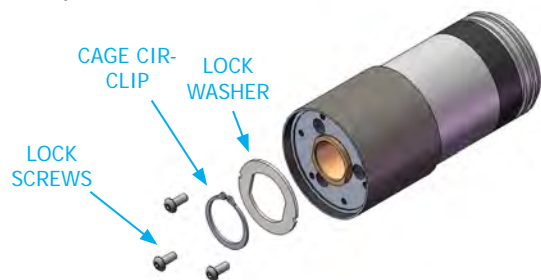
2. Unscrew and remove the three lock screws and remove the end cap from the ratchet nut.



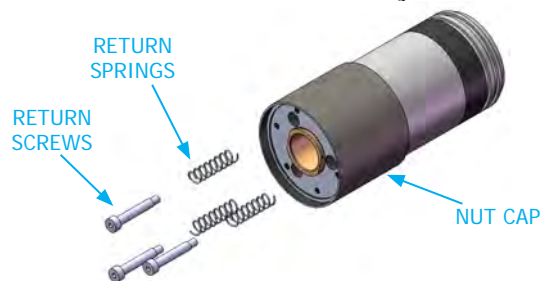
3. Before disassembling the nut any further, take note of the three centre dab marks on the cage rear ring, the lock washer, and the nut cap. These marks should be aligned.



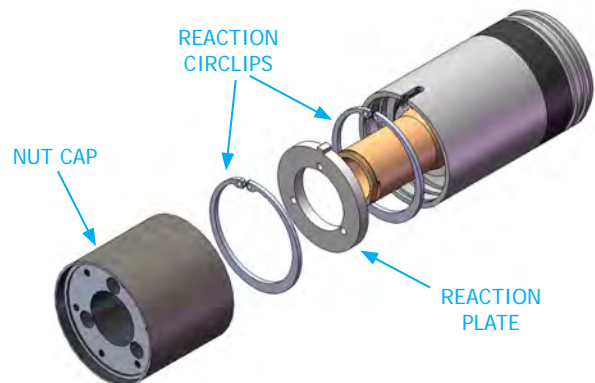
4. Unscrew the lock screws and remove the cage circlip. The lock washer can now be removed to expose the Nut Cap Return Screws.



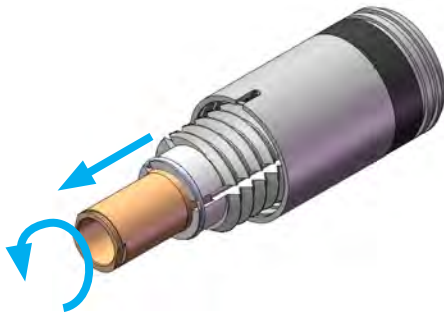
5. Unscrew and remove the Nut Cap Return Screws and return springs this will allow the Nut Cap to be removed from the Ratchet Nut Body.



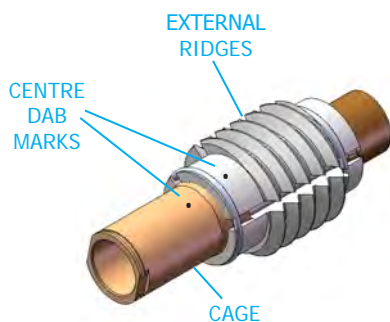
6. Having removed the Nut Cap you can then remove the upper Reaction Circlip, the Reaction Plate and the lower Reaction Circlip.



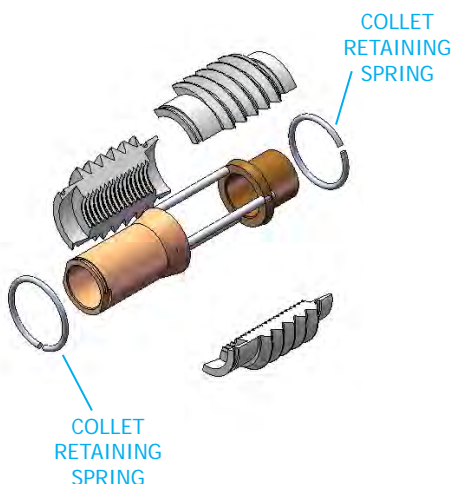
7. Unscrew and remove complete collet assembly from the nut body.



8. Having removed the collet assembly please note the centre dab marks indicating the position of the first collet section. Please also note that the collet segments are arranged on the cage such that the external ridges form one continuous thread.



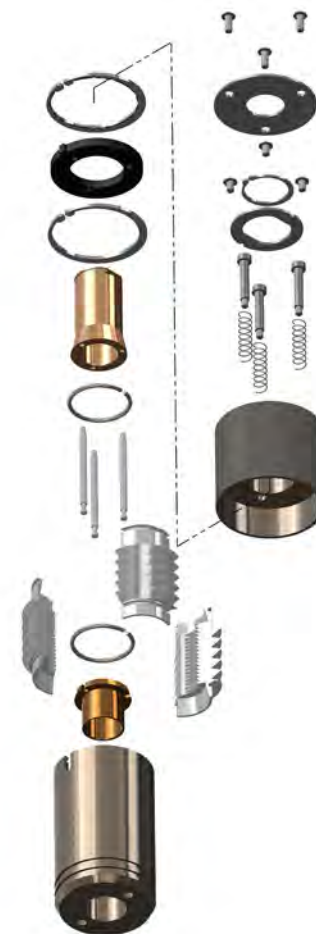
9. Unclip the Collet Retaining Springs and remove the Collet Segments from the Cage.



10. Clean all components with a rag and WD40 (or similar), removing any visible dirt or grit (paying particular attention to the Collet Segments, Cage and Nut Body).

Smear all mating surfaces with a high performance molybdenum disulphide grease such as Rocol Sapphire Hi-Load 2.

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.



11. Reassemble by reversing steps 1-9

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

STORAGE AND 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.

LONG-TERM STORAGE - MAINTENANCE PLAN

1. Rub components down with a dry cloth to remove moisture.
2. Coat EVERY surface and contact point with a corrosion inhibitor. Where necessary, coat inside and outside of component
3. Nuts and threads must also be coated with a corrosion inhibitor.
4. Once surfaces have been coated, seal individual components in clear plastic bags or clear vacuum bags or clear shrink wrap.
NOTE: bags/shrink wrap must be clear for visibility. Take care when using shrink wrap that the tool is/ components are still easy to see.
5. Remove all or, where not vacuum sealed, as much air from bags as possible.
6. Once bags have been closed and sealed DO NOT re-open. Any visual inspections must be done with closed and sealed bags. If bags are opened the components will have to be dried, re-coated and re-sealed in bags/ shrink wrap.
7. Replace silica gel (100g) EVERY TIME the case is opened.
NOTE: depending on moisture content of air, silica gel should be changed weekly.
8. Visually inspect kits after 30-days and every 30-days thereafter. Remember to replace silica gel before closing case.

4.

REGULATORY INFORMATION

4.1

REGISTERED HEAD OFFICE

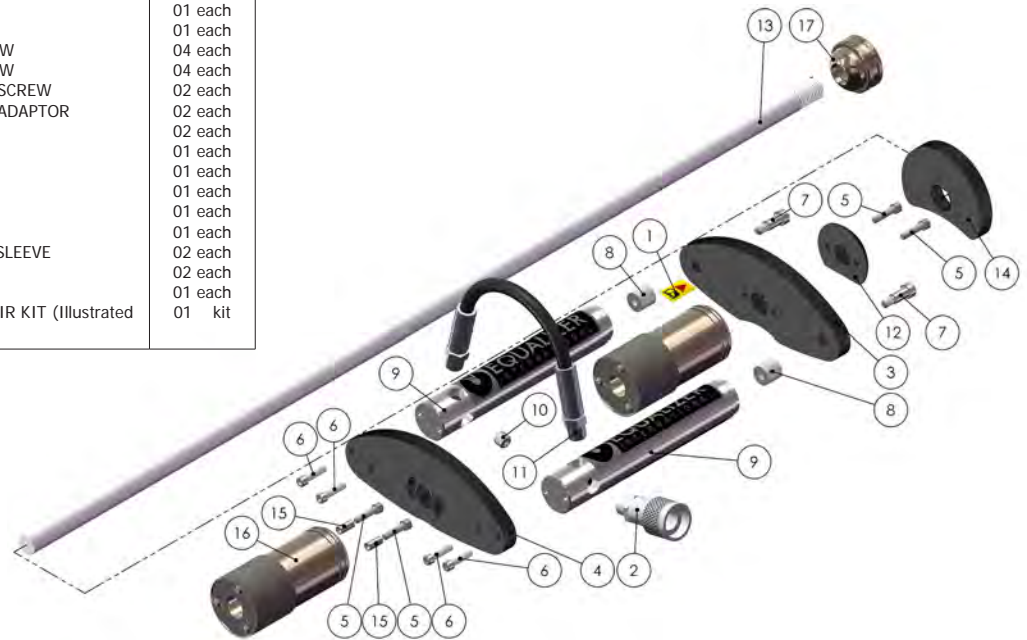
EQUALIZER INTERNATIONAL LTD.
Equalizer House
Claymore Drive
Aberdeen
Scotland
AB23 8GD

5.

PARTS LISTS & SERVICE KITS

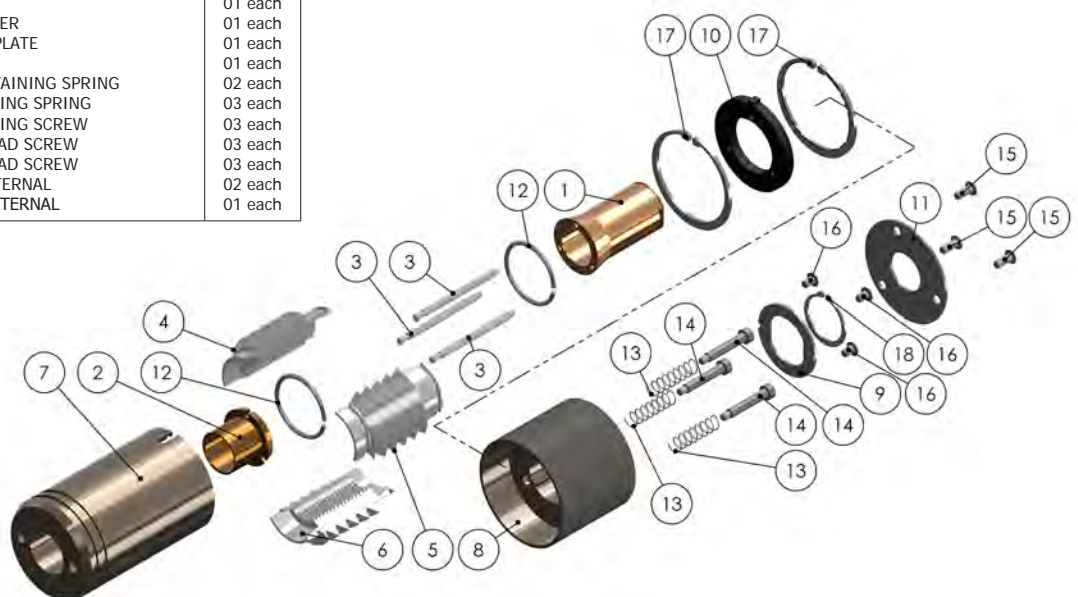
FC10TE PART LIST

ITEM	KIT PART No.	DESCRIPTION	QTY.
01	070001-01	READ INSTR. STICKER	01 each
02	300901-01	HYDRAULIC COUPLER	01 each
03	750101-01	FRONT PLATE	01 each
04	750201-01	REAR PLATE	01 each
05	752101-01	SCKT HEAD SCREW	04 each
06	752201-01	SCKT HEAD SCREW	04 each
07	752301-01	CYLINDER NOSE SCREW	02 each
08	752401-01	CYLINDER NOSE ADAPTOR	02 each
09	752501-01	5T H. CYLINDER	02 each
10	752506-01	SET SCREW	01 each
11	752601-01	COUPLING HOSE	01 each
12	752701-01	BALL WASHER	01 each
13	752801-01	PULL ROD	01 each
14	752901-01	ROD WASHER	01 each
15	753001-01	NUT RETAINING SLEEVE	02 each
16	753501-01	RATCHET NUT	02 each
17	754001-01	PULL NUT	01 each
18	752510-01	CYLINDER REPAIR KIT (Illustrated on next page)	01 kit



RATCHET NUT PART LIST

ITEM	PART No.	DESCRIPTION	QTY.
01	750301-01	CAGE REAR RING	01 each
02	750401-01	CAGE FRONT RING	01 each
03	750501-01	CAGE SIDE BAR	03 each
04	750601-01	COLLET SEGMENT 1	01 each
05	750701-01	COLLET SEGMENT 2	01 each
06	750801-01	COLLET SEGMENT 3	01 each
07	751001-01	NUT BODY	01 each
08	751101-01	NUT CAP	01 each
09	751201-01	LOCK WASHER	01 each
10	751301-01	REACTION PLATE	01 each
11	751401-01	END CAP	01 each
12	751501-01	COLLET RETAINING SPRING	02 each
13	751601-01	CAP RETAINING SPRING	03 each
14	751701-01	CAP RETAINING SCREW	03 each
15	751801-01	BUTTON HEAD SCREW	03 each
16	751802-01	BUTTON HEAD SCREW	03 each
17	751901-01	CIRCLIP INTERNAL	02 each
18	752001-01	CIRCLIP EXTERNAL	01 each



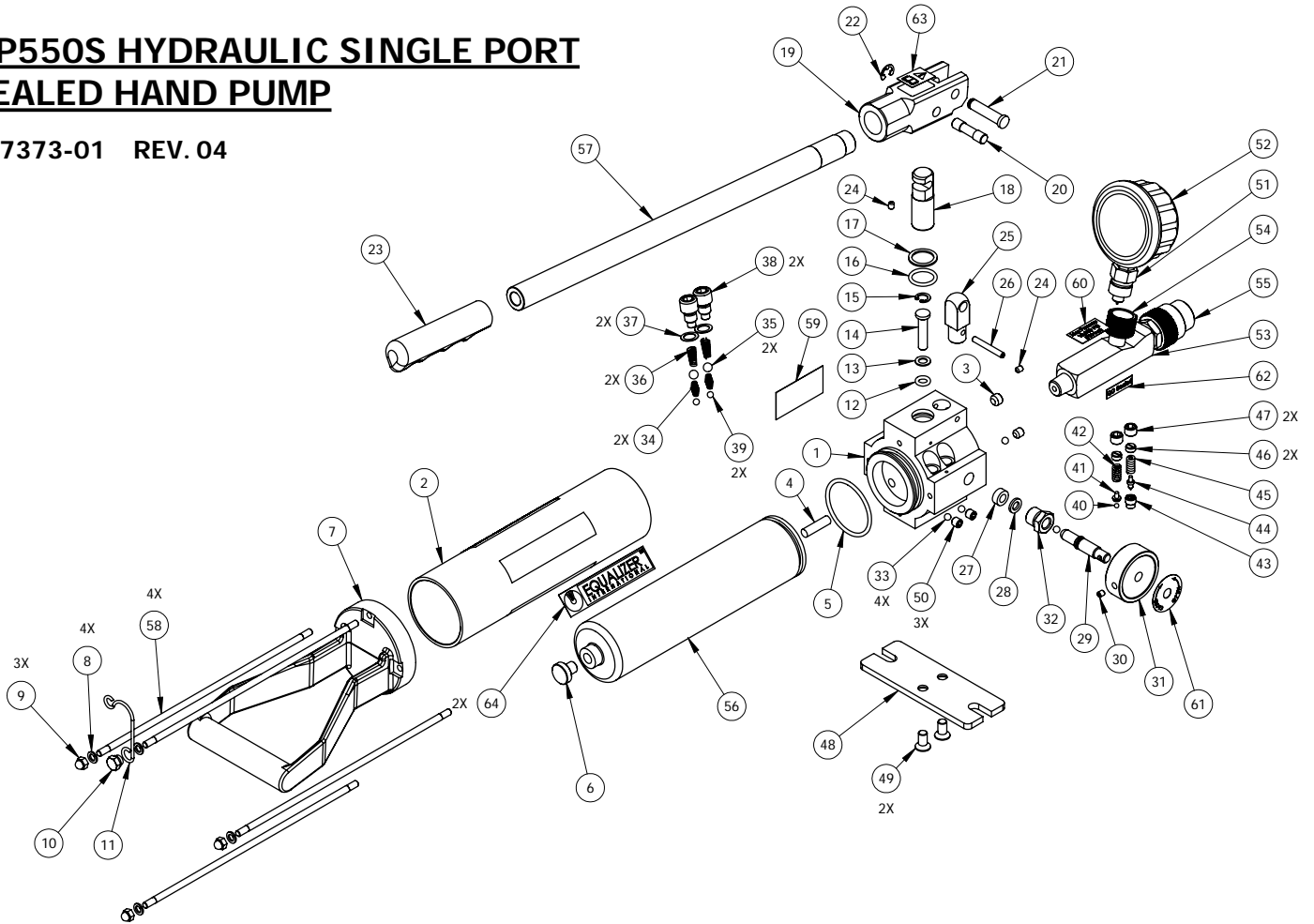
5TE HYDRAULIC CYLINDER PART LIST

ITEM	PART No.	DESCRIPTION	QTY.
1	300901-01	HYDRAULIC COUPLER	01
2	510707-01	SCREW	01
3	752502-01	CYLINDER BASE	01
4	752503-01	PISTON ROD	01
5	752504-01	SPRING	01
6	752505-01	SPRING LOCK	01
7H	752506-01	SET SCREW	01
8	771106-01	FASTE NUT	01
9H	771107-01	SCREW M5X16	01
10	752510-01	5T. CYLINDER SERVICE KIT	01
11	376601-01	GASKET SEAL	01
12	771103-01	O-RING	01
13	771104-01	BACK-UP RING	01
14	771105-01	WIPER	01



HP550S HYDRAULIC SINGLE PORT SEALED HAND PUMP

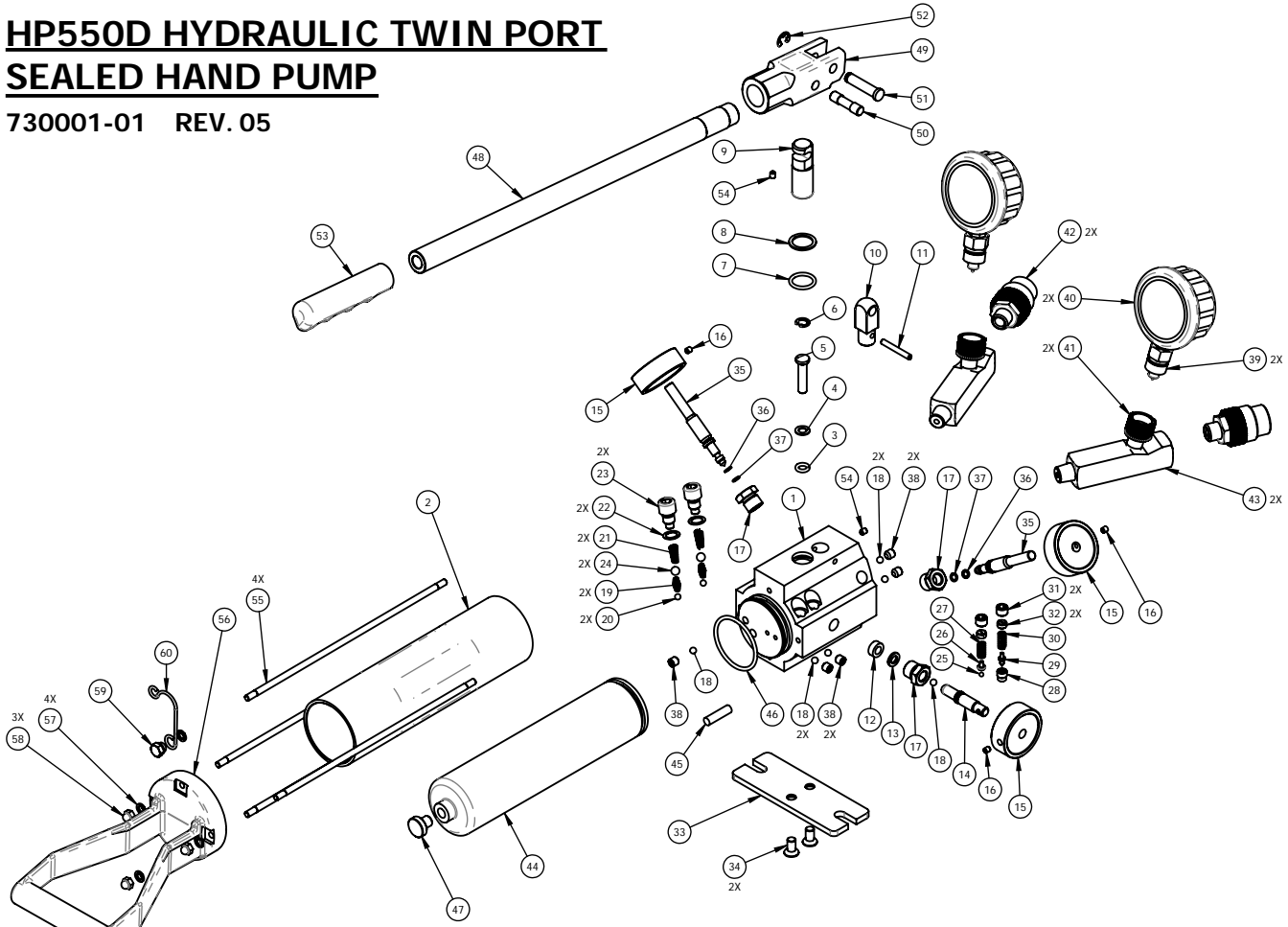
737373-01 REV. 04



ITEM	KIT/PART No.	DESCRIPTION	QTY.	ITEM	KIT/PART No.	DESCRIPTION	QTY.
1	710101-01	PUMP HOUSING	1	33	F/K/R	CHECK BALL	4
2	708002-01	RESERVOIR	1	34	G	SPRING	2
3	707067-01	SCREW	1	35	G	STEEL BALL	2
4	A/N	OIL FILTER	1	36	G	OUTLET BALL SPRING	2
5	A/N	O-RING	1	37	G	COPPER WASHER	2
6	A/N	REFILLING PLUG	1	38	G	VALVE COVER SCREW	2
7	B/P	TAIL BASE	1	39	G/Q	STEEL BALL	2
8	B/P	SPRING WASHER	4	40	H	STEEL BALL	1
9	B/P	NUT	3	41	H	SPRING END CAP	1
10	B/P	PUMP RETAINING CLIP NUT	1	42	H	L.P. SPRING	1
11	B/P	PUMP RETAINING CLIP	1	43	H	CONE SEAT	1
12	C	O-RING	1	44	H	CONE	1
13	C	BACK-UP RING	1	45	H	LONG SEPARATOR SPRING	1
14	C	H.P. PISTON	1	46	H	SCREW	2
15	C	SNAP RING	1	47	H	SET SCREW	2
16	C	O-RING	1	48	I	BASE PLATE	1
17	C	BACK-UP RING	1	49	I	SCREW	2
18	C	L.P. PISTON	1	50	K	SCREW	3
19	D/O	YOKE	1	51	L	GAUGE COUPLER MALE	1
20	D/O	PISTON PIN	1	52	L	GAUGE	1
21	D/O	YOKE PIN	1	53	M	PORT GAUGE ADAPTOR	1
22	D/O	RETAINING RING	1	54	M	GAUGE COUPLER FEMALE	1
23	D/O	HANDLE GRIP	1	55	M	3/8" NPT COUPLER 10ksi	1
24	D/O	SCREW	2	56	N	RESERVOIR BLADDER	1
25	E	YOKE BASE	1	57	O	HANDLE	1
26	E	SPRING PIN	1	58	P	SCREW	4
27	F	SPACER	1	59	ON REQUEST	HP550S STICKER	1
28	F	WASHER	1	60	070260-01	MAX PRESSURE STICKER	1
29	F	RELEASE VALVE SCREW	1	61	070059-01	OPEN-CLOSE STICKER	1
30	F/J	M5 SCKT SET SCREW	1	62	070013-01	OC SEALED STICKER	1
31	F/J	RELEASE KNOB	1	63	070001-01	WARNING READ INSTRUCTION STICKER	1
32	F/J	ADAPTOR	1	64	070058-01	EQUALIZER LOGO RESERVOIR STICKER	2

HP550D HYDRAULIC TWIN PORT SEALED HAND PUMP

730001-01 REV.05



ITEM NO.	PART NO	SUP PART NO	KIT	DESCRIPTION	QTY	ITEM NO.	PART NO	SUP PART NO	KIT	DESCRIPTION	QTY
1	720101-01	F0366	-	PUMP HOUSING	1	34	715001-01	H0189	I	SCREW	2
2	708002-01	D0853	-	RESERVOIR	1	35	720401-01	E1721Z	J	VALVE SCREW	2
3	711001-01	GA050	C	O-RING	1	36	720501-01	G0270	J	BACK-UP RING	2
4	711101-01	G0108	C	BACK-UP RING	1	37	720601-01	G0086	J	O-RING	2
5	711201-01	E0164	C	H.P. PISTON	1	38	713201-03	H0003Z	K	SCREW	5
6	711301-01	I0035	C	SNAP RING	1	39	707073-01	CP212	L	GAUGE COUPLER MALE	2
7	711401-01	GA127	C	O-RING	1	40	302501-01	M0031-EG	L	GAUGE	2
8	711501-01	G0126	C	BACK-UP RING	1	41	707072-01	CP211	M	GAUGE COUPLER FEMALE	2
9	711601-01	E0165	C	L.P. PISTON	1	42	300901-01	CP331	M	COUPLER	2
10	712201-01	C0617Z	E	YOKE BASE	1	43	302502-01	E174S	M	PORT GAUGE ADAPTOR	2
11	712301-01	B1177	E	SPRING PIN	1	44	708001-01	G0564	N	RESERVOIR BLADDER	1
12	712501-01	G0105	F	SPACER	1	45	710201-01	M0001	A/N	OIL FILTER	1
13	712601-01	J0156	F	WASHER	1	46	707003-01	G0102	A/N	O-RING	1
14	712901-01	H0053Z	F	RELEASE VALVE SCREW	1	47	710501-01	E0772	A/N	REFILLING PLUG	1
15	713001-01	E1604	F/J	RELEASE KNOB	3	48	708004-01	D0854	O	HANDLE	1
16	300401-01	H0050	F/J	M5 SCKT SET SCREW	3	49	712001-01	C0686	D/O	YOKE	1
17	712701-01	H0052Z	F/J	ADAPTOR	3	50	711701-01	E0389Z	D/O	PISTON PIN	1
18	712801-01	K0001	F/K/R	CHECK BALL	6	51	711801-01	E0005Z	D/O	YOKE PIN	1
19	713501-02	J0045	G	SPRING	2	52	711901-01	I0001Z	D/O	RETAINING RING	1
20	707029-01	K0002	G/Q	STEEL BALL	2	53	201202-01	G0664	D/O	HANDLE GRIP	1
21	713701-02	J0001	G	OUTLET BALL SPRING	2	54	707013-01	H0048Z	D/O	SCREW	2
22	713801-02	J0002	G	COPPER WASHER	2	55	708003-01	H0338Z	P	SCREW	4
23	713901-02	H0006Z	G	VALVE COVER SCREW	2	56	710701-01	F0335	B/P	TAIL BASE	1
24	713601-02	K0003	G	STEEL BALL	2	57	707009-01	J0036	B/P	SPRING WASHER	4
25	714001-02	K0011	H	STEEL BALL	1	58	710901-01	H0325	B/P	NUT	3
26	714101-02	E0006	H	SPRING END CAP	1	59	717401-01	E3102	B/P	PUMP RETAINING CLIP NUT	1
27	714201-01	J0140	H	L.P. SPRING	1	60	717402-01	J0530	B/P	PUMP RETAINING CLIP	1
28	377201-01	E1749	H	CONE SEAT	1						
29	377301-01	E1748	H	CONE	1						
30	377401-01	J0389	H	LONG SEPARATOR SPRING	1						
31	717404-01	H0054R	H	SET SCREW	2						
32	717403-01	E2098	H	SCREW	2						
33	714901-01	C0687A	I	BASE PLATE	1						



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