

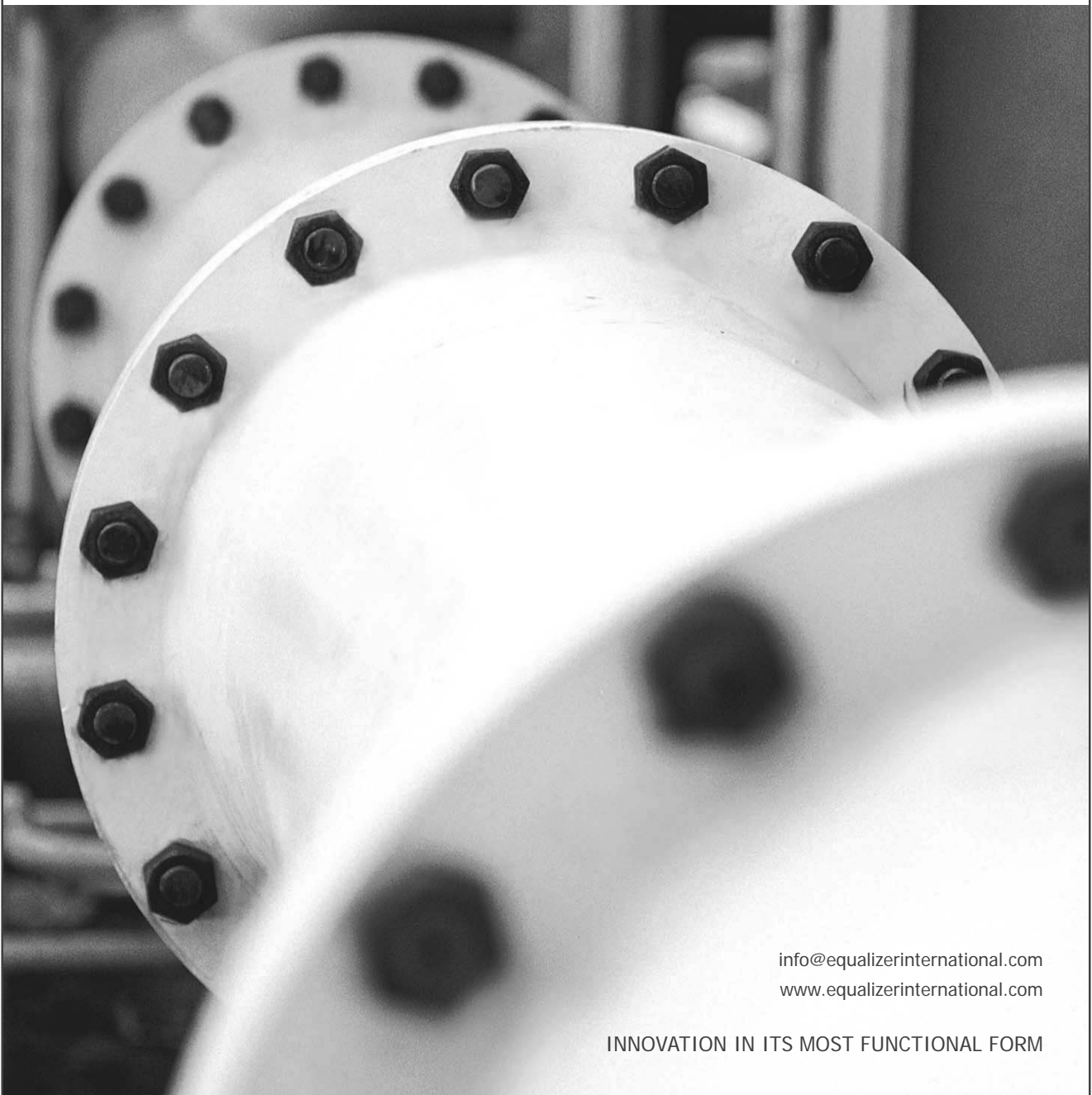
FC10TE

HYDRAULIC FLANGE CLOSING TOOL

Operator Instruction Manual



EQUALIZER[™]
INTERNATIONAL



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www.equalizerinternational.com

INNOVATION IN ITS MOST FUNCTIONAL FORM



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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.



2. SAFETY INFORMATION

The operator MUST read this manual prior to using the tools.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury; read the manual fully!

Read all the following instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation.

Equalizer International Ltd cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Equalizer International Ltd when in doubt as to the safety precautions and applications. To protect your warranty, use only good quality hydraulic oil of the grade 15cSt.

Only people competent in the use of hydraulic equipment should use these tools.

In all installations the site safety requirements must be adhered to. ALSO the safety of the operator, and when present, any assisting personnel, is of paramount importance along with the safety of others including, when present, the general public.

These instructions are only to cover the safe operation of THE EQUALIZER FC10TE HYDRAULIC TOOLS, during normal maintenance/installation operations. All other safety aspects must be controlled by the operation supervisor.



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.



IMPORTANT: Operator must be competent in the use of hydraulic equipment. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the Equalizer equipment.



WARNING: To avoid personal injury and possible equipment damage, make sure all hydraulic components are rated to a safe working pressure of 700 bar (10,000 psi)



WARNING: Do not overload equipment. Overloading causes equipment failure and possible personal injury.

The risk of overloading can be avoided by using the Equalizer Hand Pump, which has its safety valve set to 700 bar by the factory. If alternative pumps are used, ensure they are rated at a safe working pressure of 700 bar (10,000 psi).



CAUTION: Make sure that all system components are protected from external sources of damage, such as excessive heat, flame, moving machine parts, sharp edges and corrosive chemicals.



CAUTION: Avoid sharp bends and kinks that will cause severe back-up pressure in hoses. Bends and kinks lead to premature hose failure. Do not drop heavy objects onto hoses. A sharp impact may cause internal damage to hose wire strands; applying pressure to a damaged hose may cause it to rupture. Do not place heavy weights on the hoses, or allow vehicles to roll over the hoses; crush damage will lead to premature hose failure.



WARNING: Immediately replace worn or damaged parts with genuine Equalizer parts. Equalizer parts are designed to fit properly and withstand rated loads. For repair or maintenance service contact your Equalizer distributor or service centre.



DANGER: To avoid 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. If oil is injected under the skin, seek medical attention immediately.



WARNING: Never pressurize unconnected couplers. Only use hydraulic equipment in a connected system.



IMPORTANT: Do not lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport.



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.



CAUTION: Do not operate the equipment without lubricating all moving parts as in section 7. Use only high pressure molybdenum disulphide grease.



3. KIT COMPONENTS

FC10TE STANDARD KIT COMPONENTS

- 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

Product Code: FC10TESTD



FC10TE MAXI KIT COMPONENTS

- 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

Product Code: FC10TEMAX





4. TECHNICAL DATA

FC10TE TECHNICAL DATA

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 HP350S/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

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

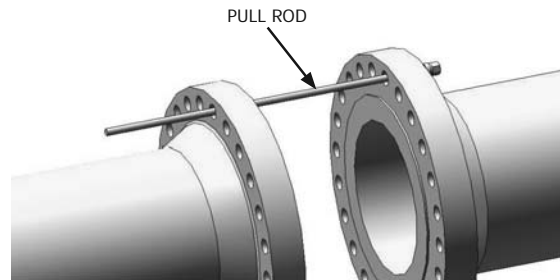


The FC10TE has not been designed or certified as lifting equipment. If the tool is being used to close flange joints with a Vertical Axis the FC10TE must be used in conjunction with certified lifting equipment.

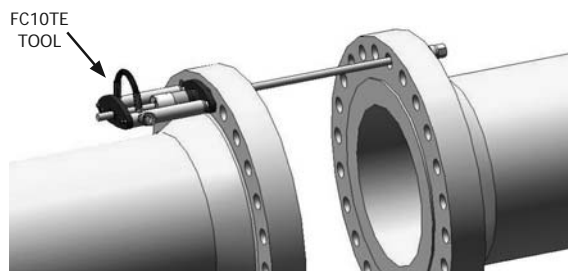


5. HOW THE FC10TE HYDRAULIC FLANGE CLOSING TOOL WORKS

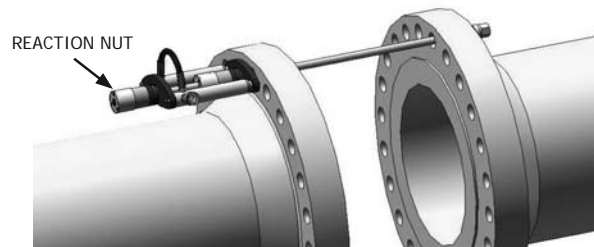
1. The Pull Rod is inserted through the corresponding bolt holes in the flanges.



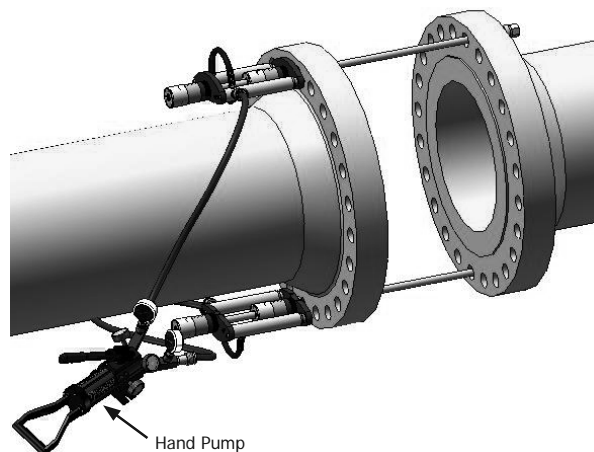
2. The FC10TE Tool is slid over the pull rod until the face of the tool comes into contact with the flange.



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

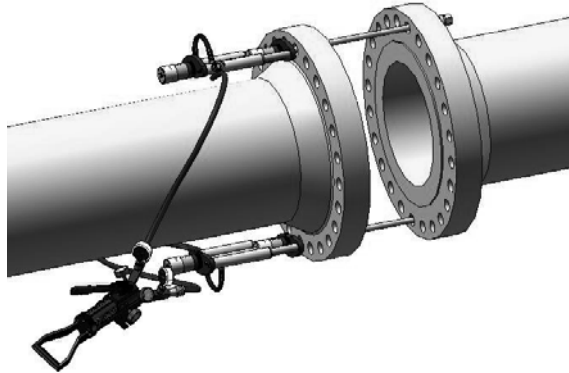


4. The hydraulic hand pump and Hoses are connected

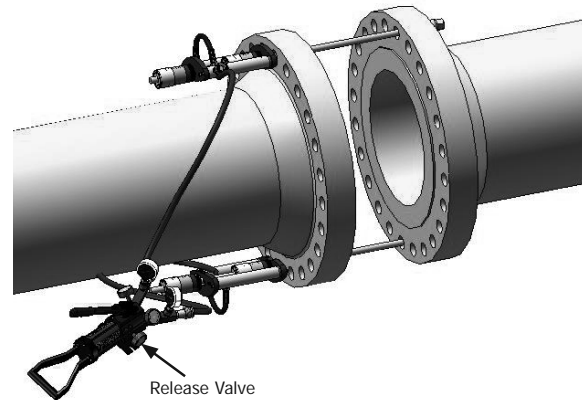




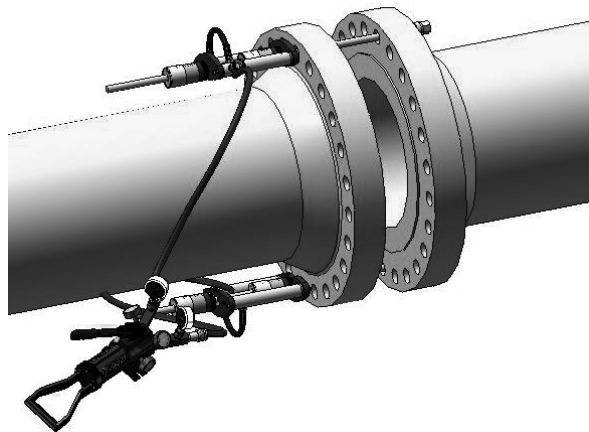
5. The Hand Pump is actuated until the cylinders reach full stroke.



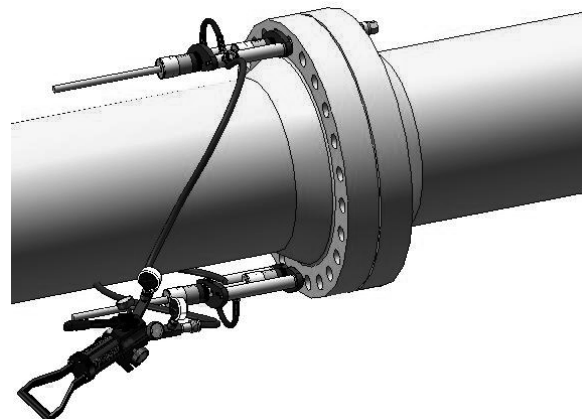
6. The Hydraulic pressure is released and the cylinders are allowed to fully retract.



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



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



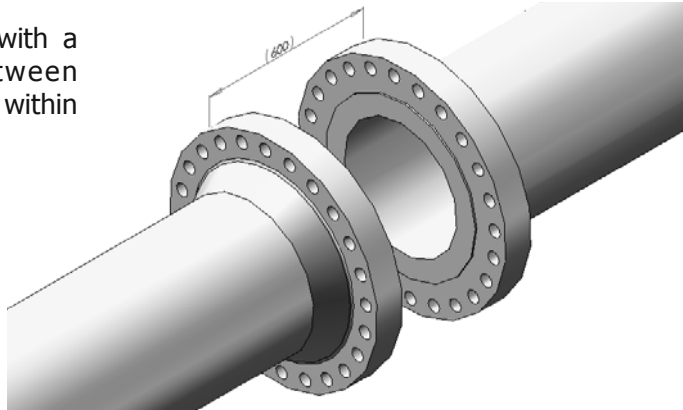


6. INSTALATION AND OPERATION

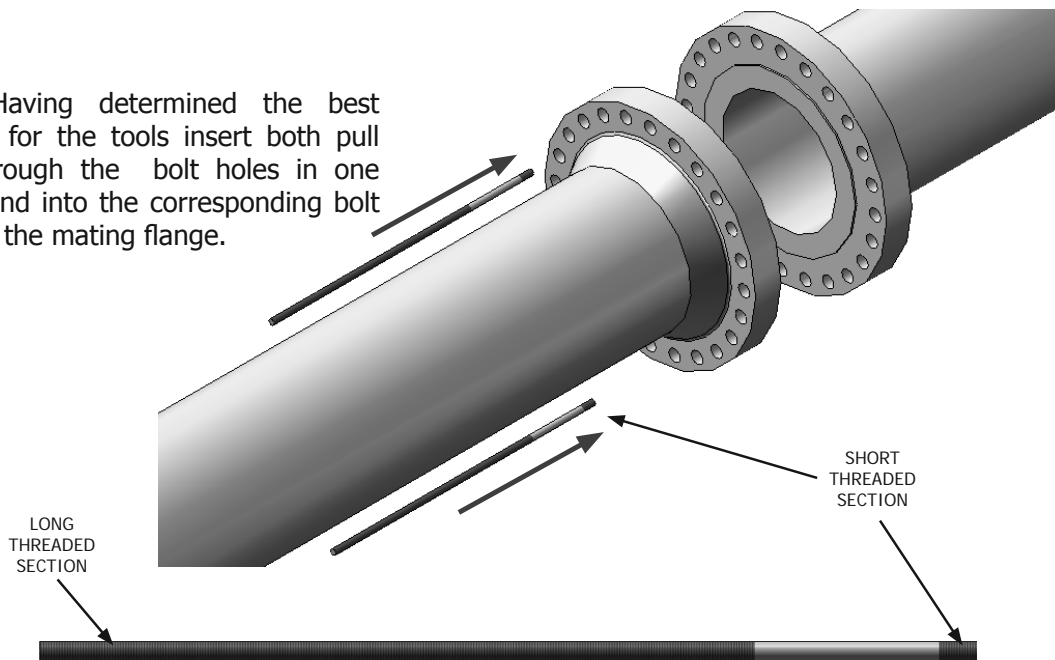


Note: Prior to attaching the FCT10TE it is important that the location of the tools around the flange joint is considered. the tools should be attached to the bolt holes at the points where the highest load is expected. Consideration should also be given to the flange Gasket / Seal ring, it may be necessary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

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



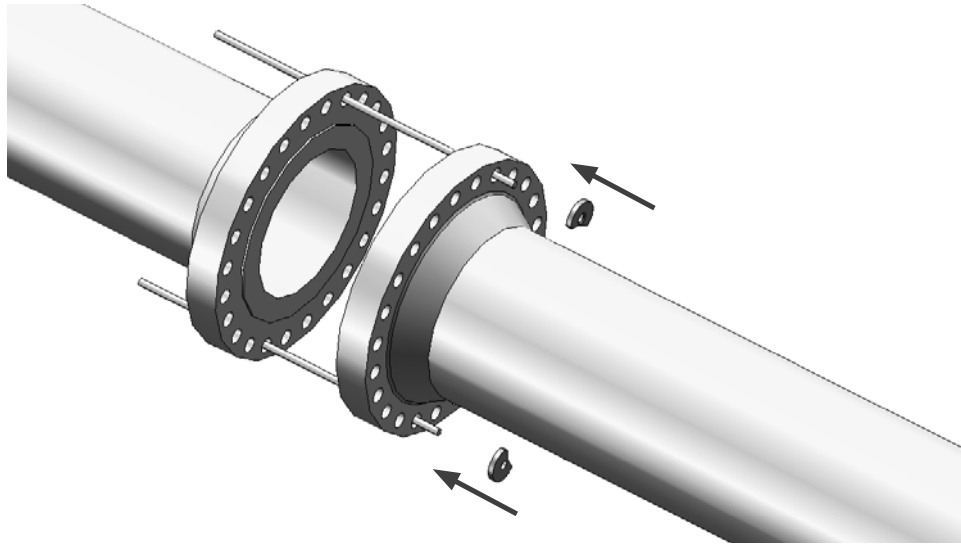
2. Having determined the best location for the tools insert both pull rods through the bolt holes in one flange and into the corresponding bolt holes of the mating flange.



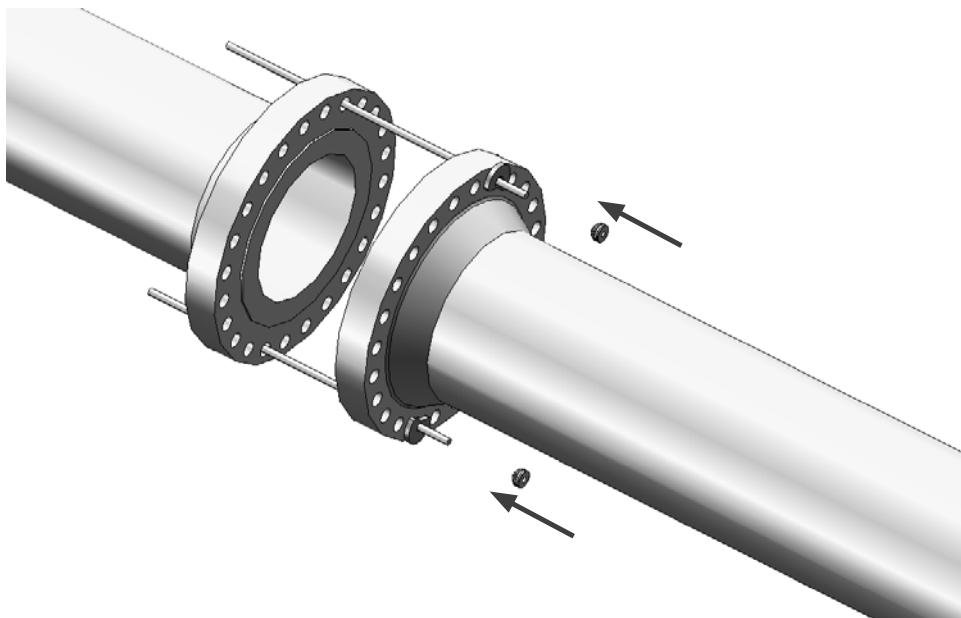
CAUTION: The Pull Rod has a long threaded section and a short threaded section. The threads on both sections are different!, The short threaded end of the Pull Rod must be passed through the flanges to mate with the pull nut.



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

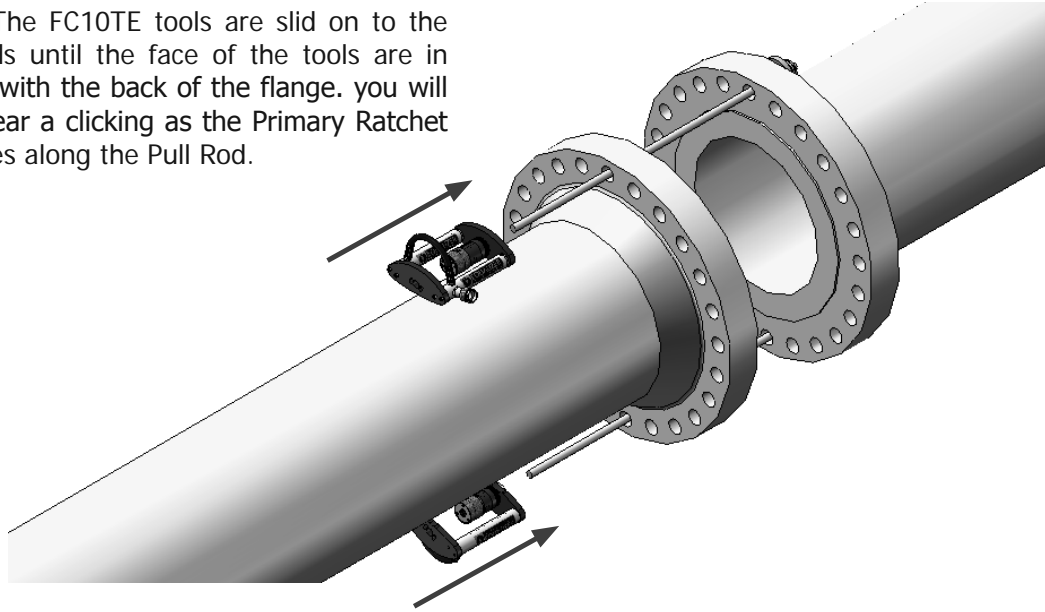


- 4.** The Pull Nuts are threaded on to the pull rod.

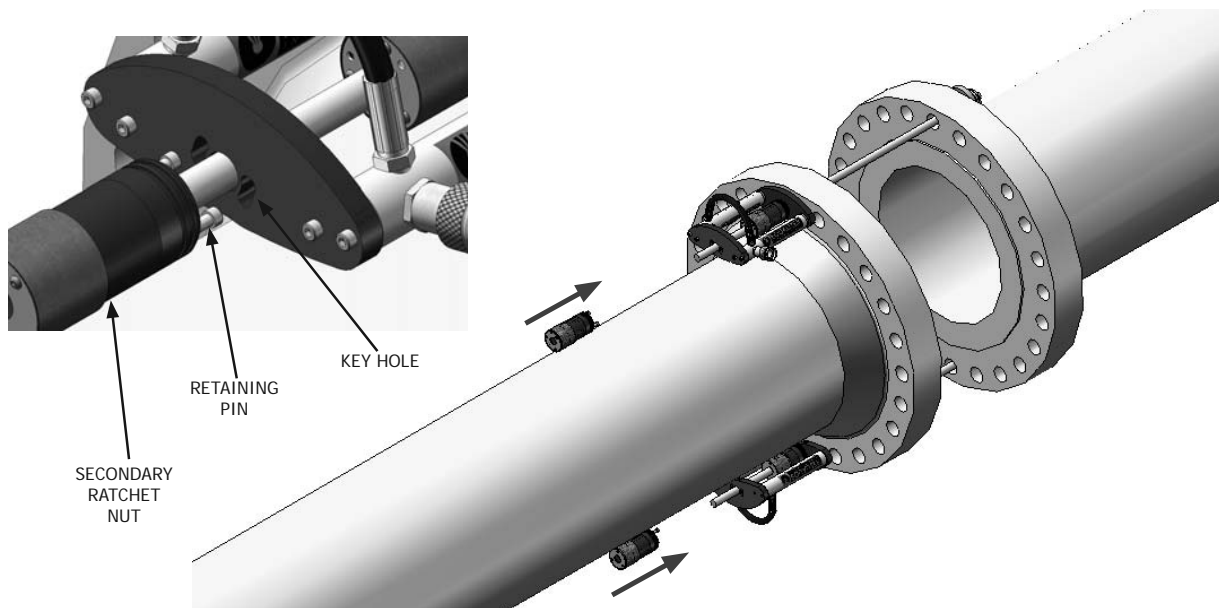


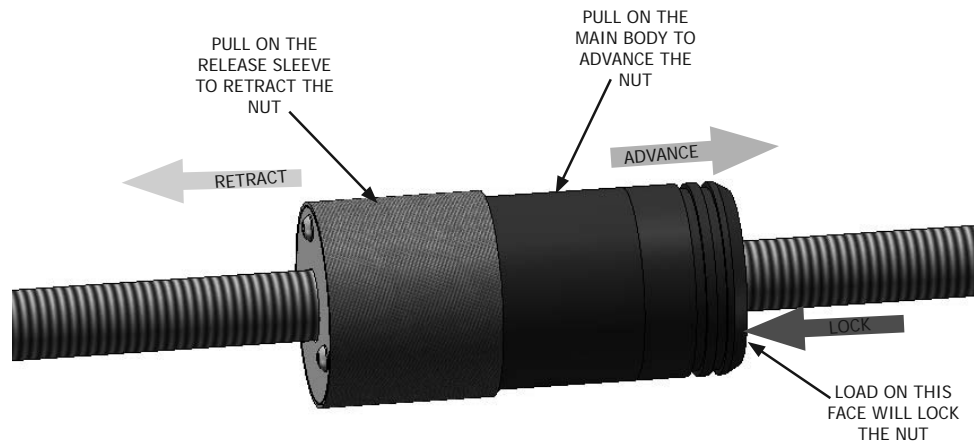


5. The FC10TE tools are slid on to the Pull Rods until the face of the tools are in contact with the back of the flange. you will feel / hear a clicking as the Primary Ratchet nut slides along the Pull Rod.



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.





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.

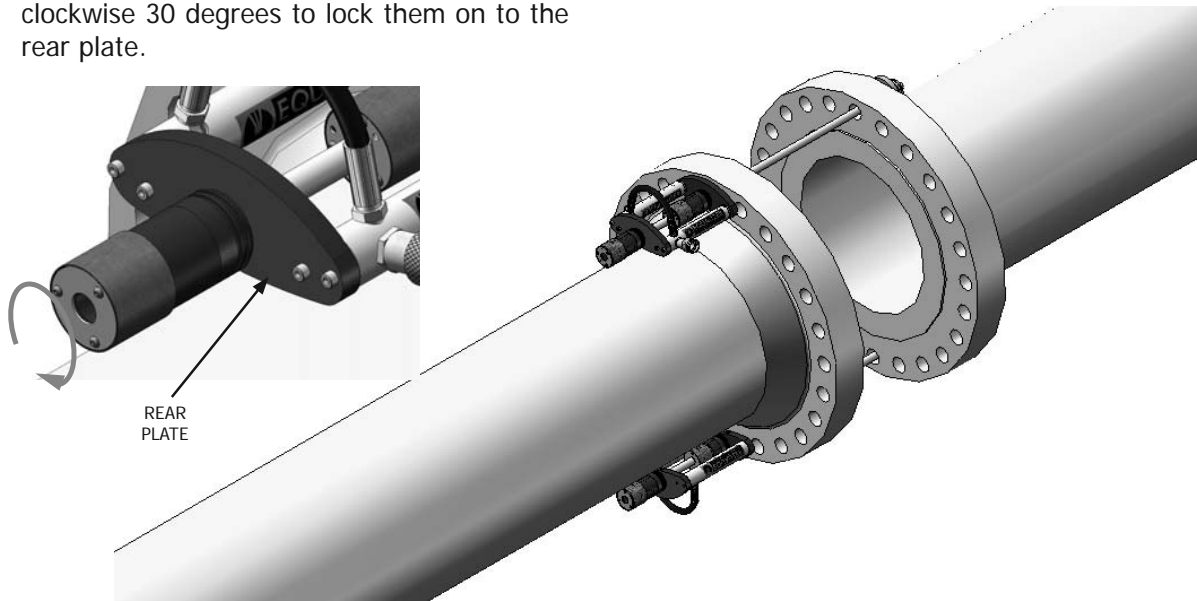
The nut will lock on to the pull rod when a force is applied to the load face of the nut.

It is not possible to move the nut until the load is removed from the load face of the nut.

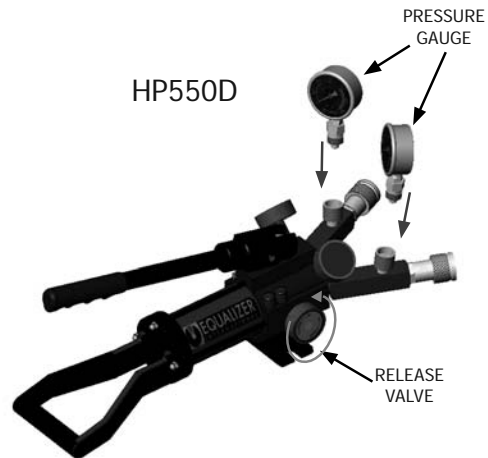
The nut can only be retracted by pulling on the release sleeve in the retract direction (indicated by the yellow arrow).



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

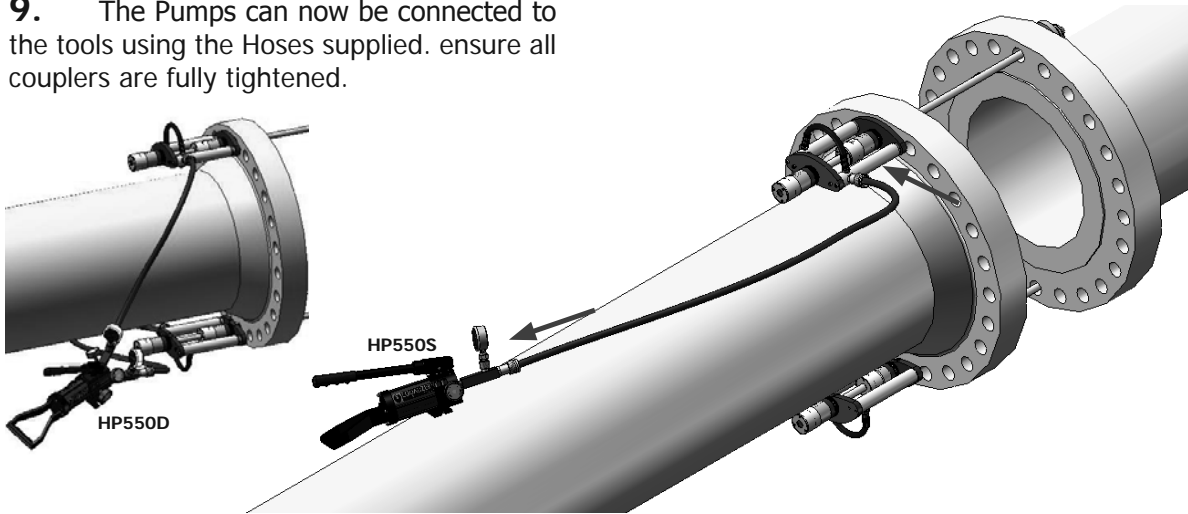


8. Check that the release valves on the hand pumps are open by rotating fully anti-clockwise and then connect the Pressure gauges to the pump ensuring all the couplers are fully hand tight.



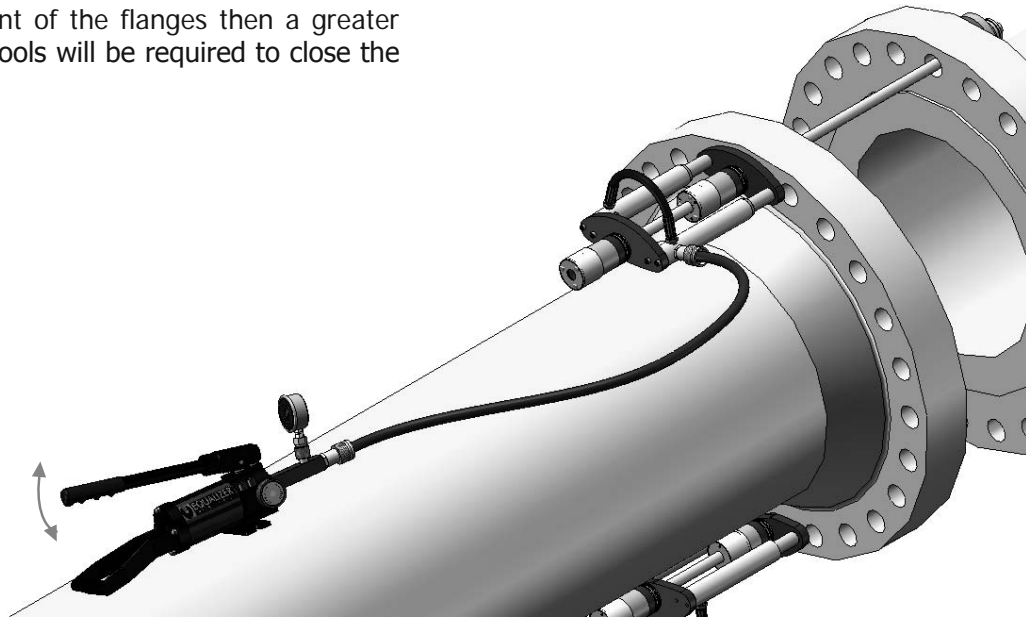


9. The Pumps can now be connected to the tools using the Hoses supplied. ensure all couplers are fully tightened.



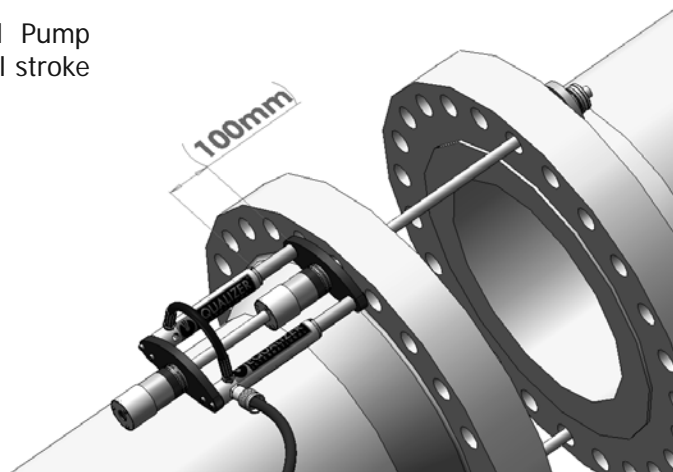
Note: Prior to operating the Equalizer Hydraulic Hand Pumps please read the Hydraulic Hand Pump Manual. This is included in all tool kits and is also available for download from "www.equalizerinternational.com".

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.

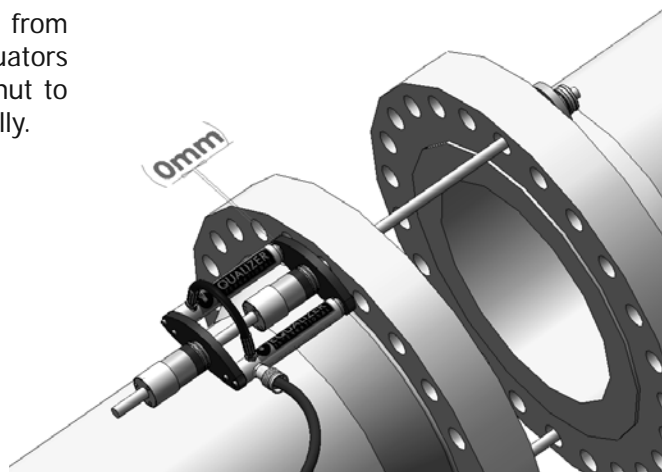




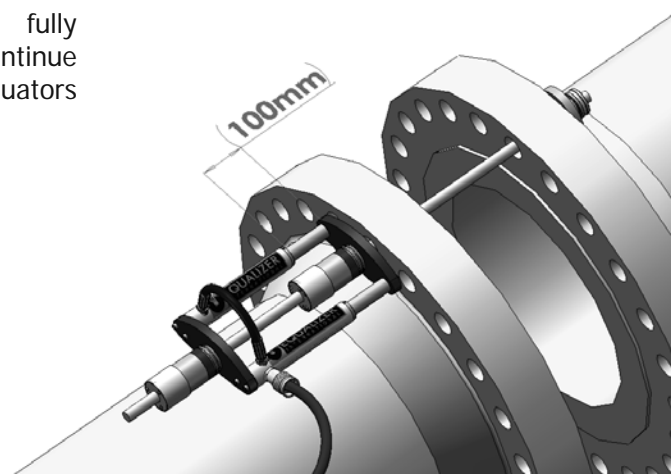
11. Continue priming the Hand Pump until the actuators have reached full stroke 100mm (4").



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.

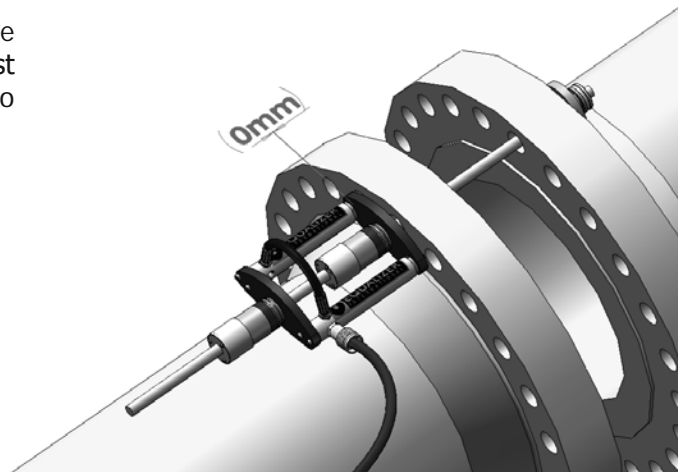


13. Once the Actuators have fully retracted close the release valve and continue priming the hand pump until the actuators have reached full stroke.



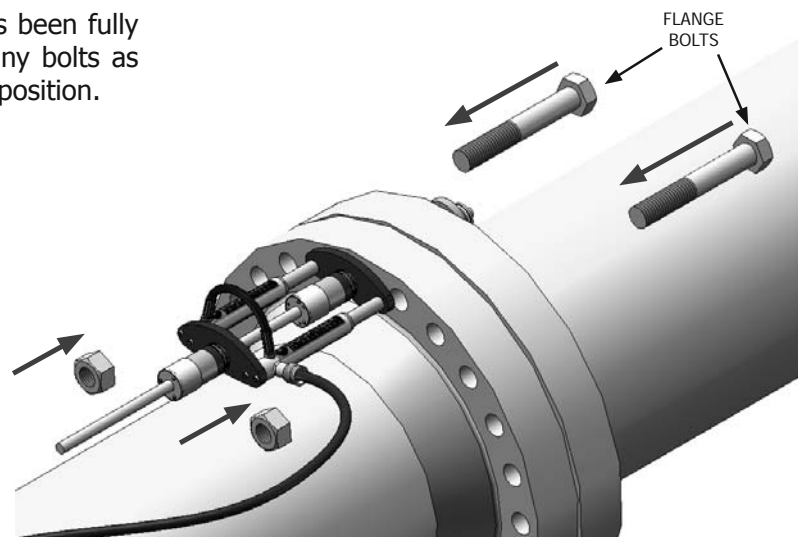


- 14.** Repeat steps 12 and 13 to continue closing the gap between flange faces. Adjust the pressure on each tool as necessary to maintain an even gap around the joint.



Note: If you are experiencing miss-alignment 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".

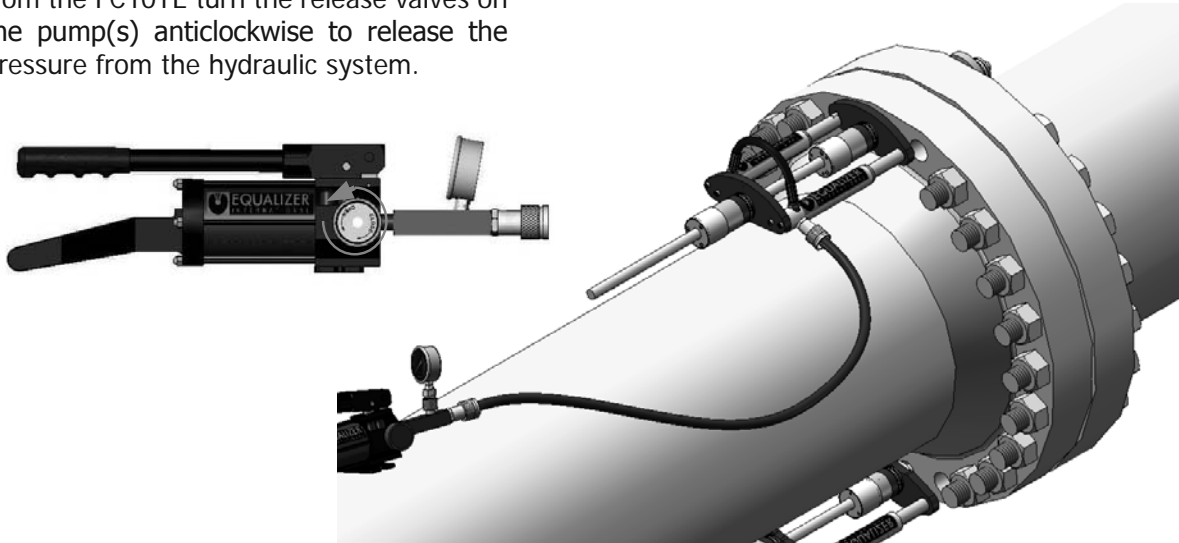
- 15.** Once the flange joint has been fully closed insert and tighten as many bolts as possible with the FC10TE still in position.



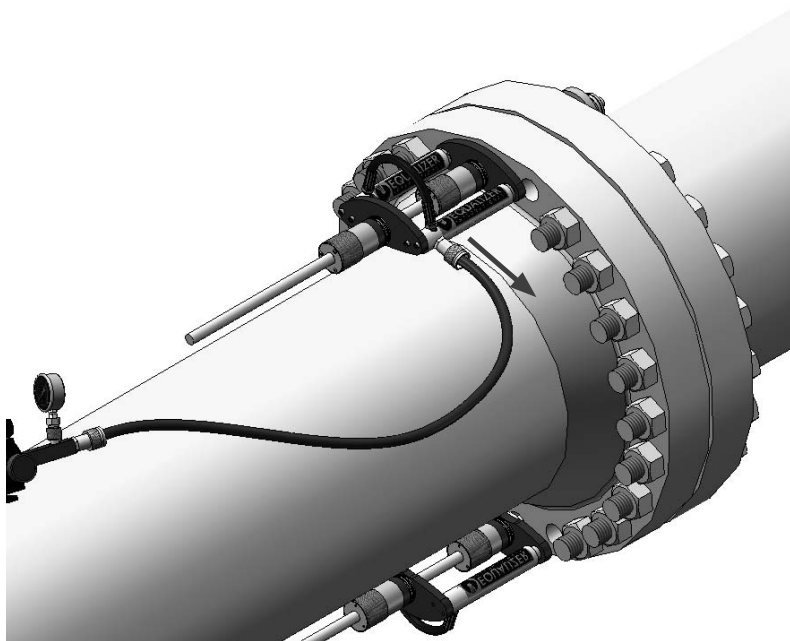
CAUTION: The FC10TE Ratchet Nuts will not release until they are fully unloaded, this is achieved by tightening the flange bolts until all the load has been transferred onto them.



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.

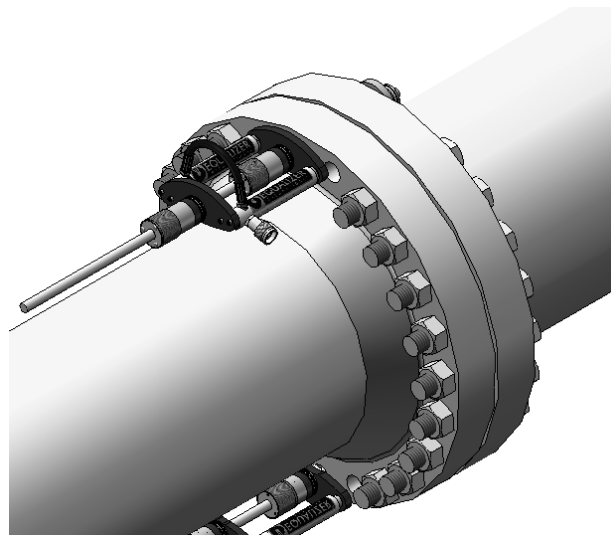
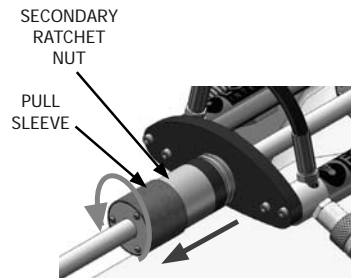


17. Now that the pressure has been released from the system the hydraulic Pump and Hoses can be detached.

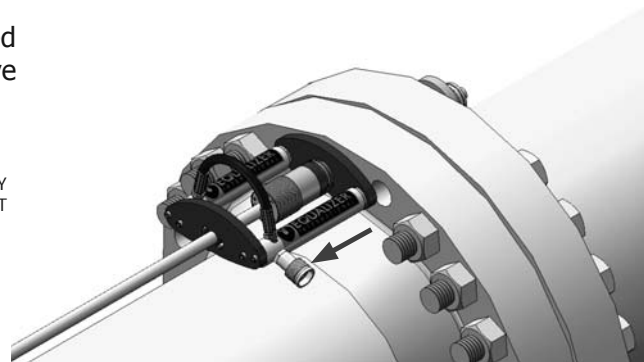
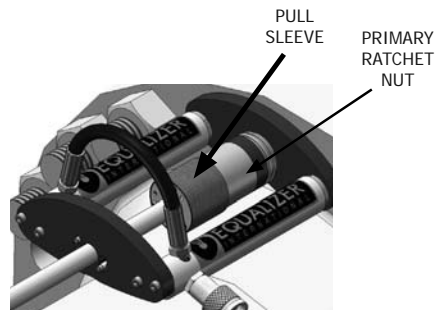




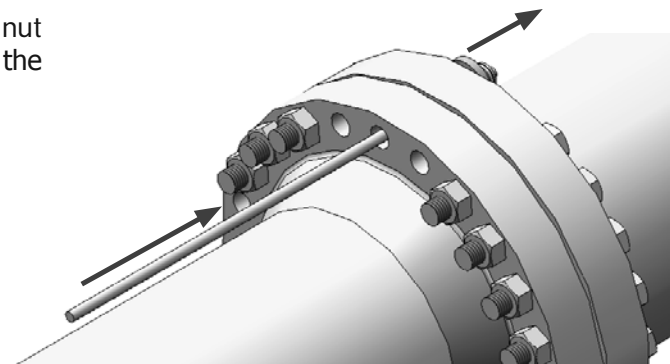
18. Now that the load has been released from the tools, the secondary ratchet nut can be removed. Rotate the nut anticlockwise through 30 degrees to disengage it from the rear plate then slide the nut off by gripping and pulling on the pull sleeve section of the nut.



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

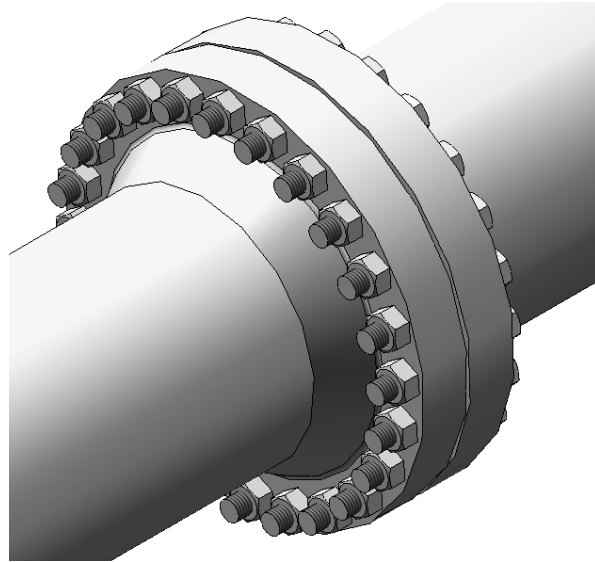


20. The Pull Rod complete with pull nut and washer can now be withdrawn from the flange joint.





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



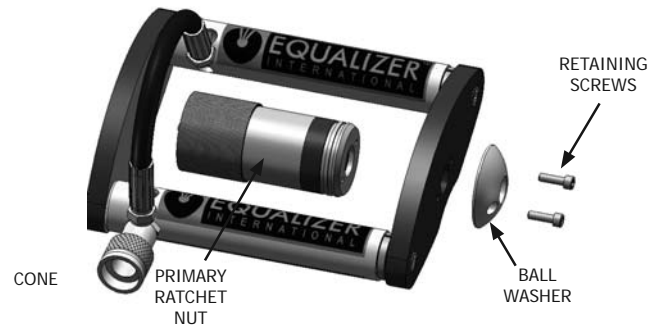


7. EXAMINATION, MAINTENANCE AND STORAGE

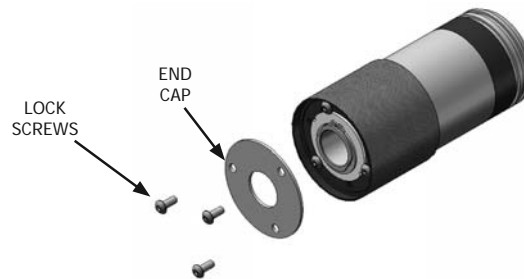
On return from each job and before allocation against subsequent work the completeness of the Equalizer FC10TE hydraulic tool kits must be established and items examined to ensure that they are serviceable. The FC10TE tools should be stored in a cool dry place.

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.

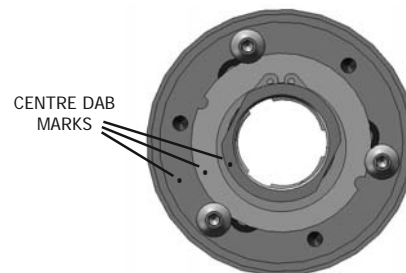
1. Unscrew and remove the primary ratchet nut retaining screws. This will allow the ball washer and ratchet nut to be removed from the assembly.



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

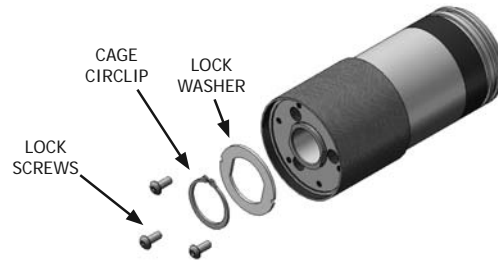


3. Before disassembling the nut any further, take note of the three centre dab marks on the cage rear ring, the lock washer, and the nut cap. These marks should be aligned.

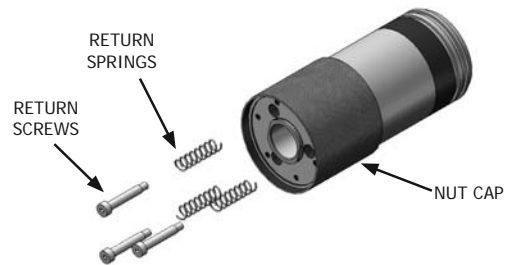




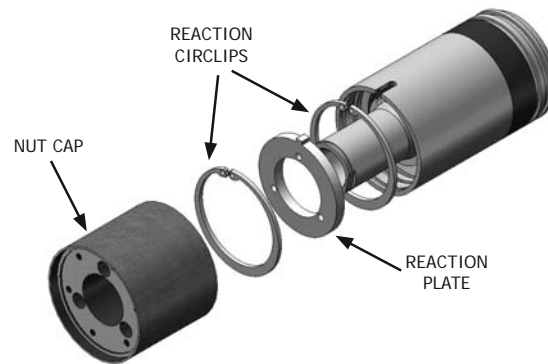
4. Unscrew the lock screws and remove the cage circlip. The lock washer can now be removed to expose the Nut Cap Return Screws.



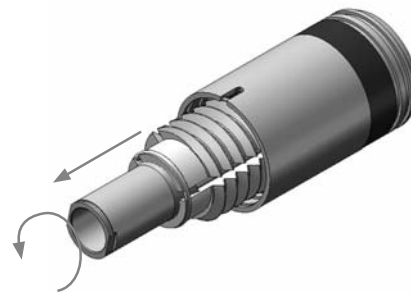
5. Unscrew and remove the Nut Cap Return Screws and return springs this will allow the Nut Cap to be removed from the Rathet Nut Body.



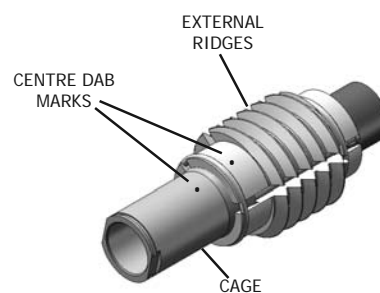
6. Having removed the Nut Cap you can then remove the upper Reaction Circlip, the Reation Plate and the lower Reaction Circlip.



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

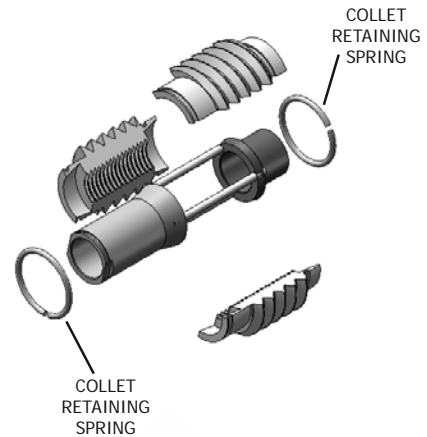


8. Having removed the collet assembly please note the centre dab marks indicating the position of the first collet section. Please also note that the collet segments are arranged on the cage such that the external ridges form one continuous thread.





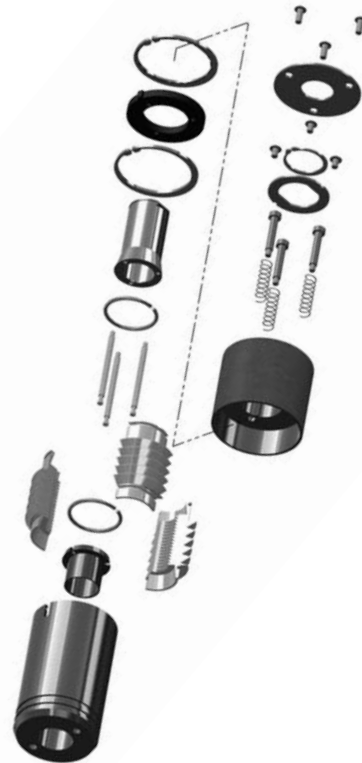
9. Unclip the Collet Retaining Springs and remove the Collet Segments from the Cage.



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.

Inspect all components for wear and damage. Replace all worn and damaged components with genuine Equalizer spares.



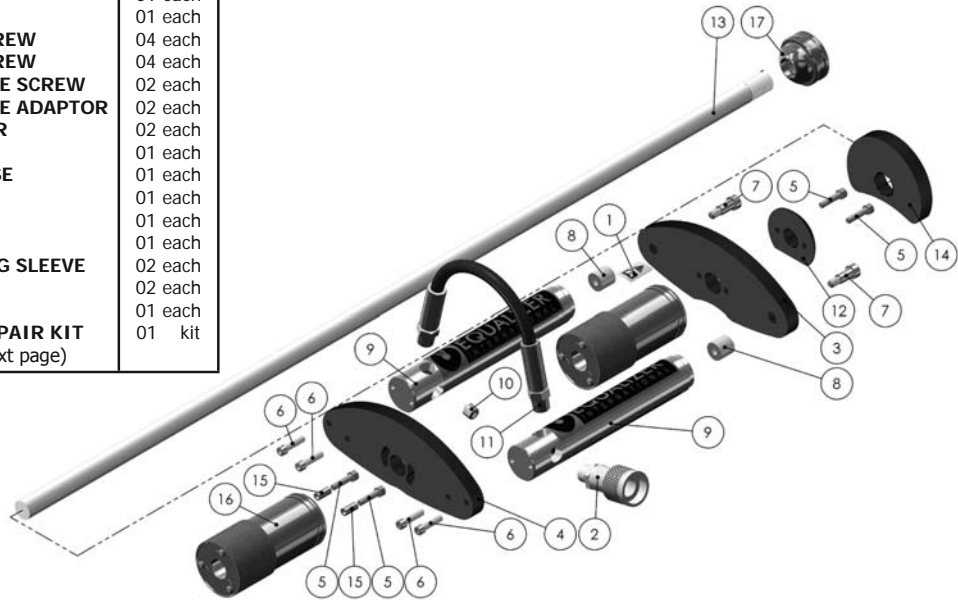
11. Reassemble by reversing steps 1-9



8. PARTS LISTS

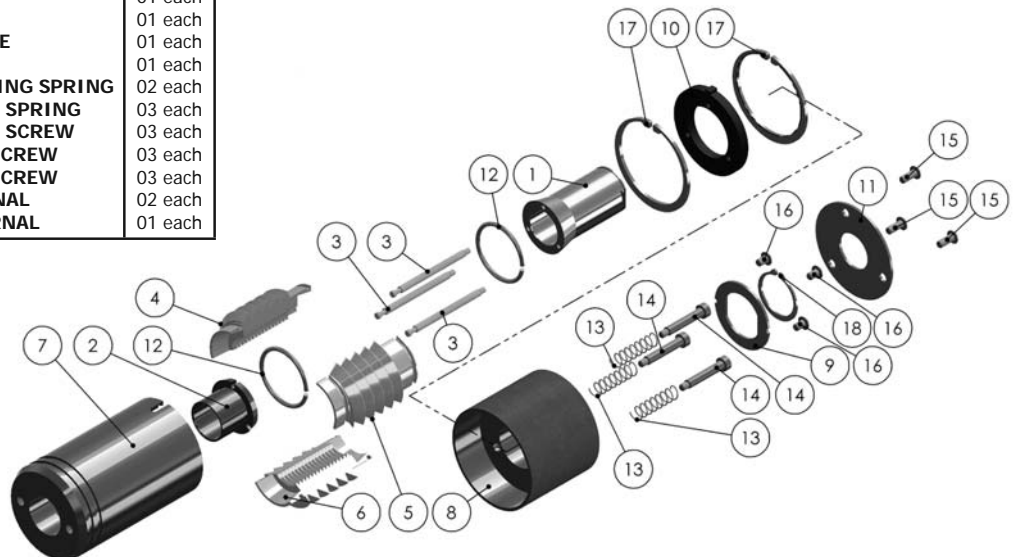
FC10TE PART LIST

ITEM NO.	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

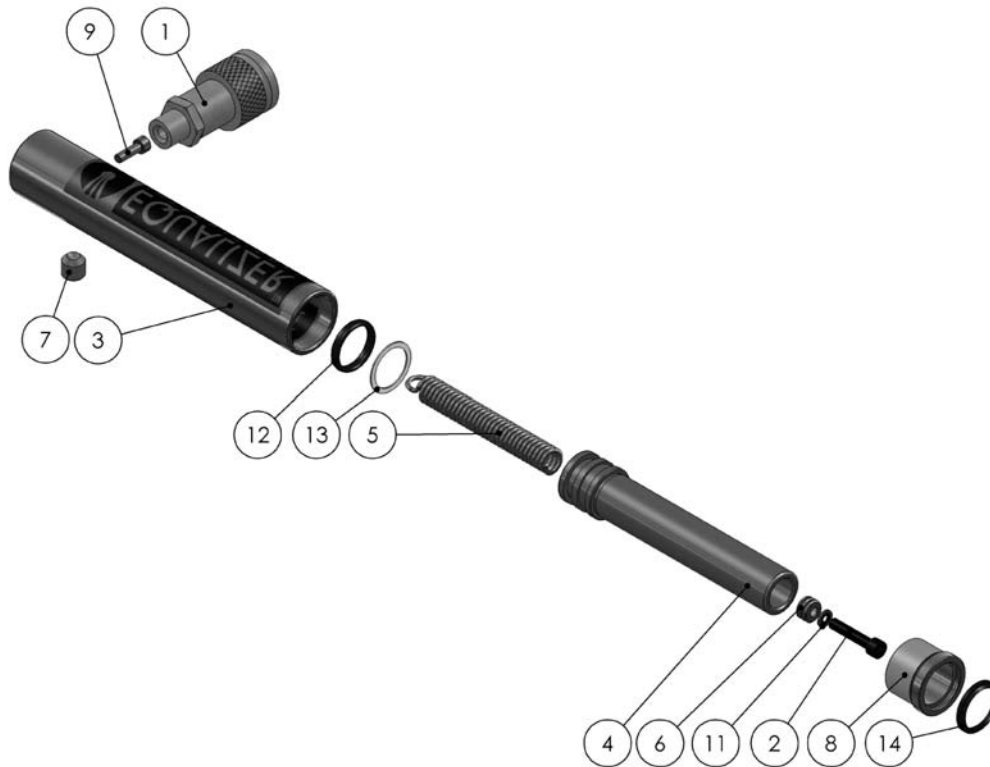
ITEM NO.	PART NO	DESCRIPTION	QTY.
01	750301-01	CAGE REAR RING	01 each
02	750401-01	CAGE FRONT RING	01 each
03	750501-01	CAGE SIDE BAR	03 each
04	750601-01	COLLET SEGMENT 1	01 each
05	750701-01	COLLET SEGMENT 2	01 each
06	750801-01	COLLET SEGMENT 3	01 each
07	751001-01	NUT BODY	01 each
08	751101-01	NUT 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 HYDRAULI CYLINDER PART LIST

ITEM NO.	PART NO	DESCRIPTION	QTY.
01	300901-01	HYDRAULIC COUPLER	01 each
02	510707-01	SCREW	01 each
03	752502-01	CYLINDER BASE	01 each
04	752503-01	PISTON ROD	01 each
05	752504-01	SPRING	01 each
06	752505-01	SPRING LOCK	01 each
07	752506-01	SET SCREW	01 each
08	771106-01	FASTE NUT	01 each
09	771107-01	SCREW M5X16	01 each
10	752510-01	5T. CYLINDER SERVICE KIT	01 kit
11		GASKET SEAL	01 each
12		O-RING	01 each
13		BACK-UP RING	01 each
14		WIPER	01 each

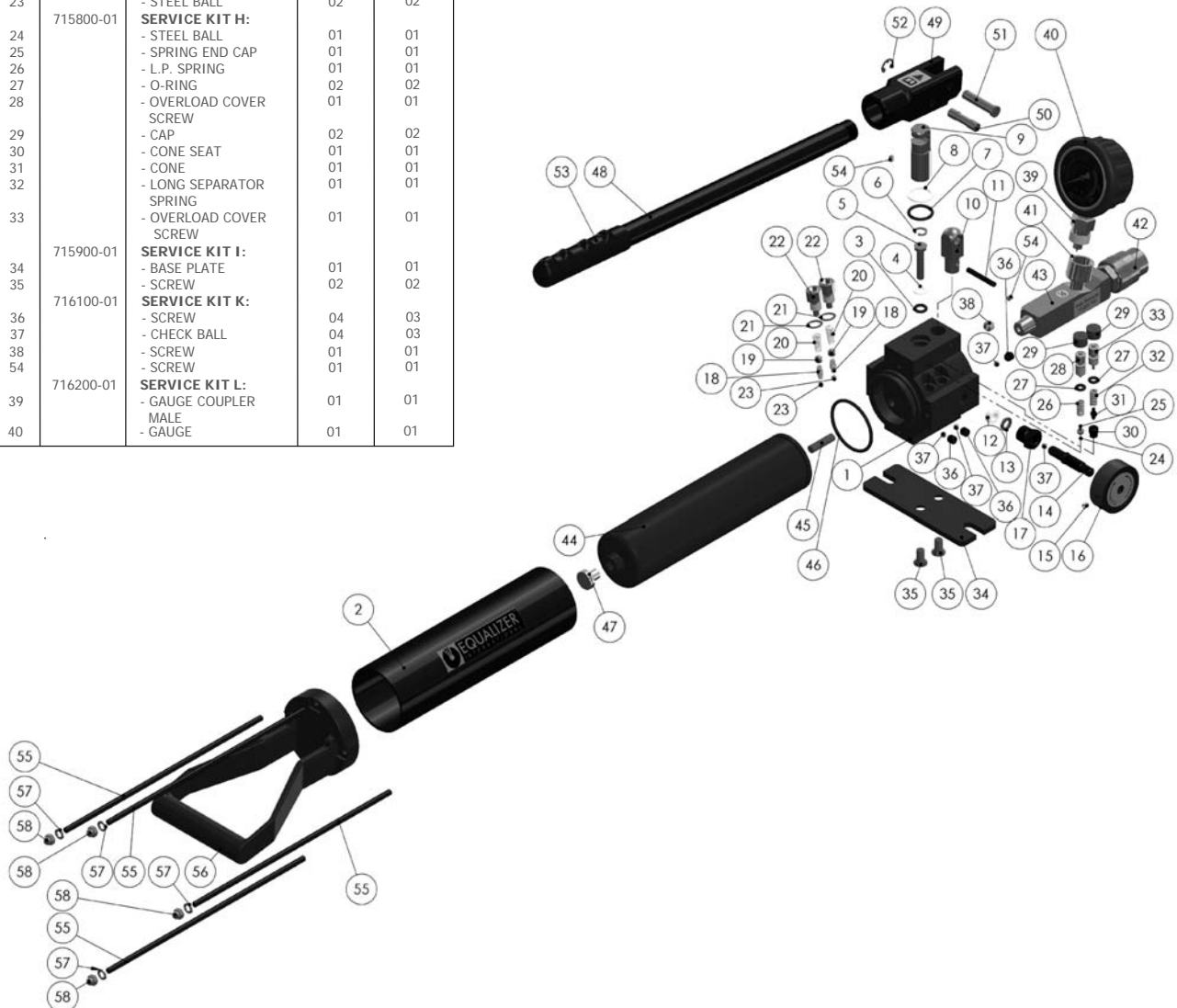




HP550S HYDRAULIC SINGE PORT SEALED HAND PUMP

ITEM	PART No.	DESCRIPTION	KIT QUANTITY	PUMP QUANTITY
01	710101-01	PUMP HOUSING		01
02	730601-01	RESERVOIR		01
	715300-01	SERVICE KIT C:		
03		- O-RING	01	01
04		- BACK-UP RING	01	01
05		- H.P. PISTON	01	01
06		- SNAP RING	01	01
07		- O-RING	01	01
08		- BACK-UP RING	01	01
09		- L.P. PISTON	01	01
	715500-01	SERVICE KIT E:		
10		- YOKE BASE	01	01
11		- SPRING PIN	01	01
	715600-01	SERVICE KIT F:		
12		- SEAL	01	01
13		- WASHER	01	01
14		- RELEASE VALVE	01	01
		- SCREW		
15		- SCREW	01	01
16		- RELEASE KNOB	01	01
17		- COUPLERS	01	01
37		- CHECK BALL	01	01
	715700-01	SERVICE KIT G:		
18		- SPRING	02	02
19		- STEEL BALL	02	02
20		- OUTLET BALL SPRING	02	02
21		- COPPER WASHER	02	02
22		- VALVE COVER SCREW	02	02
23		- STEEL BALL	02	02
	715800-01	SERVICE KIT H:		
24		- STEEL BALL	01	01
25		- SPRING END CAP	01	01
26		- L.P. SPRING	01	01
27		- O-RING	02	02
28		- OVERLOAD COVER SCREW	01	01
29		- CAP	02	02
30		- CONE SEAT	01	01
31		- CONE	01	01
32		- LONG SEPARATOR SPRING	01	01
33		- OVERLOAD COVER SCREW	01	01
	715900-01	SERVICE KIT I:		
34		- BASE PLATE	01	01
35		- SCREW	02	02
	716100-01	SERVICE KIT K:		
36		- SCREW	04	03
37		- CHECK BALL	04	03
38		- SCREW	01	01
54		- SCREW	01	01
	716200-01	SERVICE KIT L:		
39		- GAUGE COUPLER	01	01
40		- MALE GAUGE	01	01

ITEM	PART No.	DESCRIPTION	KIT QUANTITY	PUMP QUANTITY
41	716300-01	SERVICE KIT M:	01	01
		- GAUGE COUPLER		
42		- FEMALE COUPLER	01	01
43		- PORT GAUGE ADAPTOR	01	01
	735100-01	SERVICE KIT N:		
44		- RESERVOIR BLADDER	01	01
45		- OIL FILTER	01	01
46		- O-RING	01	01
47		- REFILLING PLUG	01	01
	735300-01	SERVICE KIT O:		
48		- HANDLE	01	01
49		- YOKE	01	01
50		- PISTON PIN	01	01
51		- YOKE PIN	01	01
52		- RETAINING RING	01	01
53		- HANDLE GRIP	01	01
54		- SCREW	01	01
	735200-01	SERVICE KIT P:		
55		- SCREW	04	04
56		- TAIL BASE	01	01
57		- SPRING WASHER	04	04
58		- NUT	04	04

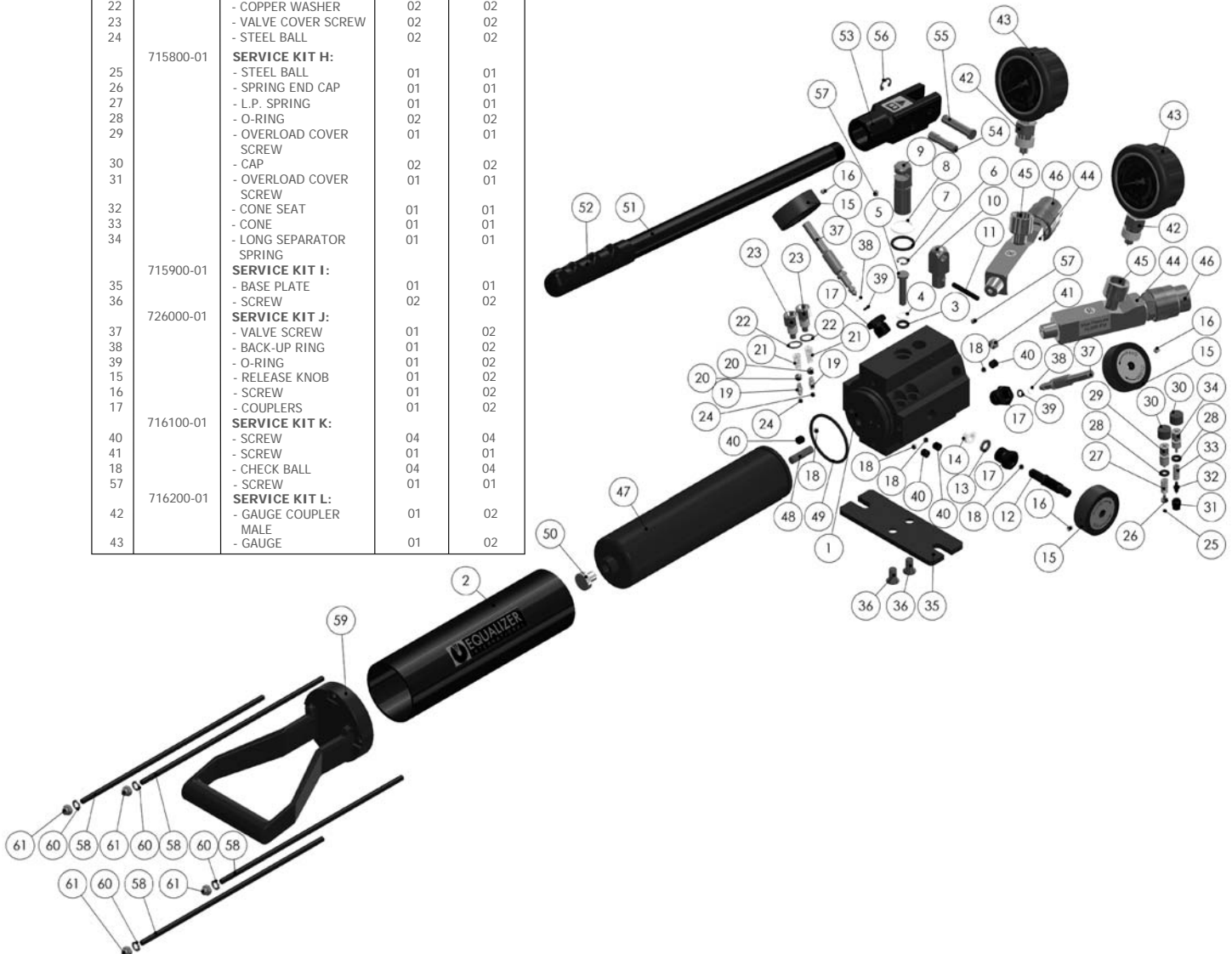




HP350D HYDRAULIC TWIN PORT SEALED HAND PUMP

ITEM	PART No.	DESCRIPTION	KIT QUANTITY	PUMP QUANTITY
01	720101-01	PUMP HOUSING		01
02	710601-01	RESERVOIR		01
	715300-01	SERVICE KIT C:		
03		- O-RING	01	01
04		- BACK-UP RING	01	01
05		- H.P. PISTON	01	01
06		- SNAP RING	01	01
07		- O-RING	01	01
08		- BACK-UP RING	01	01
09		- L.P. PISTON	01	01
	715500-01	SERVICE KIT E:		
10		- YOKE BASE	01	01
11		- SPRING PIN	01	01
	715600-01	SERVICE KIT F:		
12		- RELEASE VALVE SCREW	01	01
13		- WASHER	01	01
14		- SEAL	01	01
15		- RELEASE KNOB	01	01
16		- SCREW	01	01
17		- COUPLERS	01	01
18		- CHECK BALL	01	01
	715700-01	SERVICE KIT G:		
19		- SPRING	02	02
20		- STEEL BALL	02	02
21		- OUTLET BALL SPRING	02	02
22		- COPPER WASHER	02	02
23		- VALVE COVER SCREW	02	02
24		- STEEL BALL	02	02
	715800-01	SERVICE KIT H:		
25		- STEEL BALL	01	01
26		- SPRING END CAP	01	01
27		- L.P. SPRING	01	01
28		- O-RING	02	02
29		- OVERLOAD COVER SCREW	01	01
30		- CAP	02	02
31		- OVERLOAD COVER SCREW	01	01
32		- CONE SEAT	01	01
33		- CONE	01	01
34		- LONG SEPARATOR SPRING	01	01
	715900-01	SERVICE KIT I:		
35		- BASE PLATE	01	01
36		- SCREW	02	02
	726000-01	SERVICE KIT J:		
37		- VALVE SCREW	01	02
38		- BACK-UP RING	01	02
39		- O-RING	01	02
15		- RELEASE KNOB	01	02
16		- SCREW	01	02
17		- COUPLERS	01	02
	716100-01	SERVICE KIT K:		
40		- SCREW	04	04
41		- SCREW	01	01
18		- CHECK BALL	04	04
57		- SCREW	01	01
	716200-01	SERVICE KIT L:		
42		- GAUGE COUPLER MALE	01	02
43		- GAUGE	01	02

ITEM	PART No.	DESCRIPTION	KIT QUANTITY	PUMP QUANTITY
	716300-01	SERVICE KIT M:		
44		- PORT GAUGE ADAPTOR	01	02
45		- GAUGE COUPLER FEMALE	01	02
46		- COUPLER	01	02
	735100-01	SERVICE KIT N:		
47		- RESERVOIR BLADDER	01	01
48		- OIL FILTER	01	01
49		- O-RING	01	01
50		- REFILLING PLUG	01	01
	735300-01	SERVICE KIT O:		
51		- HANDLE	01	01
52		- HANDLE GRIP	01	01
53		- YOKE	01	01
54		- PISTON PIN	01	01
55		- YOKE PIN	01	01
56		- RETAINING RING	01	01
57		- SCREW	01	01
	735200-01	SERVICE KIT P:		
58		- SCREW	04	04
59		- TAIL BASE	01	01
60		- SPRING WASHER	04	04
61		- NUT	04	04



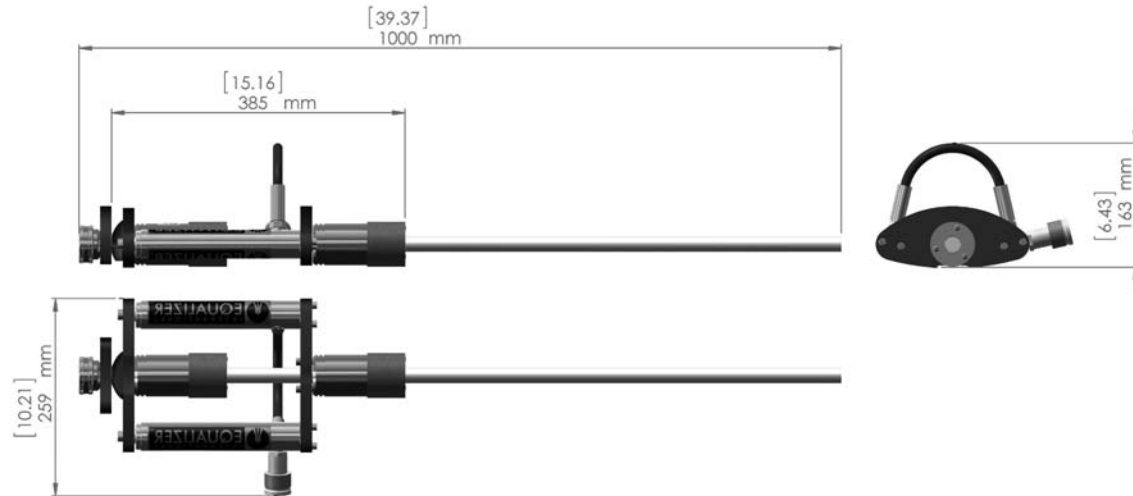


9. WEIGHTS AND DIMENSIONS

FC10TESTD WEIGHTS AND DIMENSIONS

TOOL WEIGHT =11kg (24.25 lbs)
GROSS KIT WEIGHT =23.5kg (51.80 lbs)

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



FC10TEMAX WEIGHTS AND DIMENSIONS

TOOL WEIGHT =11kg (24.25 lbs)
GROSS KIT WEIGHT =36.5kg (50.47 lbs)

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

