FC10TE

HYDRAULIC
FLANGE CLOSING TOOL

Operator Instruction Manual

EQUALIZER™ INTERNATIONAL

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www.equalizerinternational.com

INNOVATION IN ITS MOST FUNCTIONAL FORM

INDEX

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 recomended 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 32cSt.

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 of 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

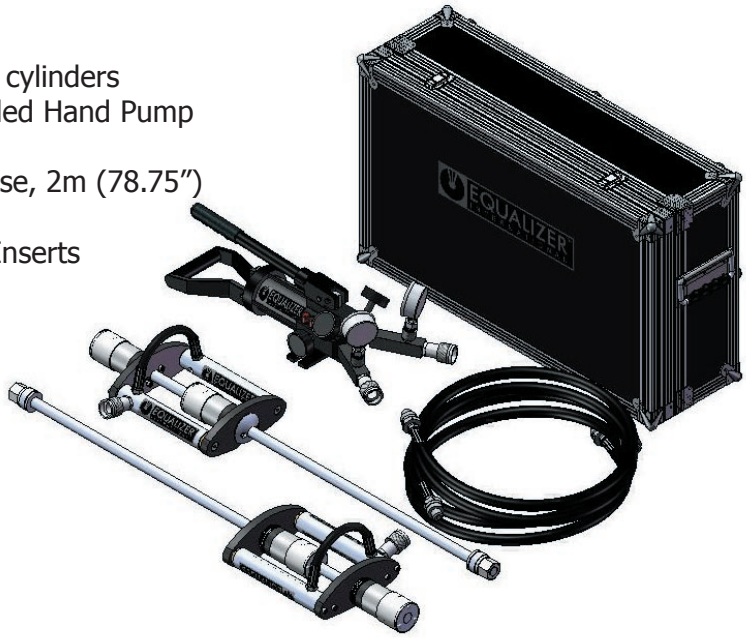
1 x FC10TE Tool
2 x 10,000 psi (700 bar) 5T Hydraulic cylinders
1 x 10,000 psi (700 bar) HP350S Sealed Hand Pump with Gauge
1 x 10,000 psi (700 bar) Hydraulic Hose, 2m (78.75”)
1 x Instruction Manual
1 x Carry-Case with Protective Foam Inserts

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) HP350D 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")

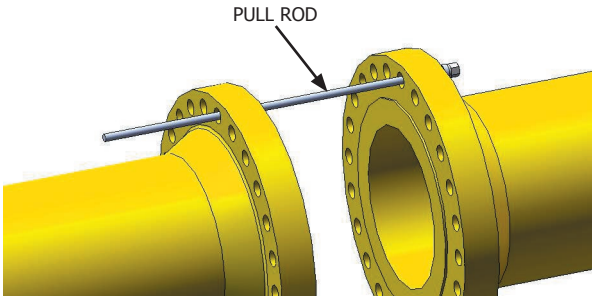
Can be used on any flange joint with flange bolt holes of 22mm (7/8") or greater.

Hydraulic oil grade: 32 centistokes(cSt) @ 40°C tested by ASTM D 445

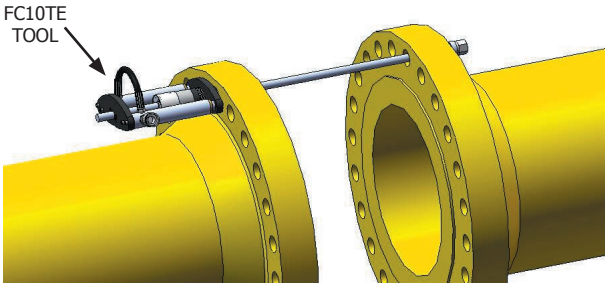
The FC10TE has not been designed or certified as lifting equipment. If the tool is being used to close flange joints with a Vertical Axis the FC10TE must be used in conjuction with certified lifting equipment.

5. HOW THE FC10TE HYDRAULIC FLANGE CLOSING TOOL WORKS

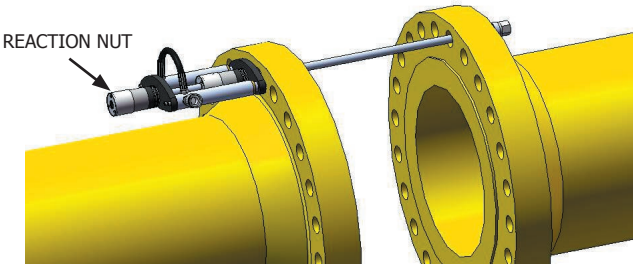
1. The Pull Rod is inserted through the coresponding bolt holes in the flanges.



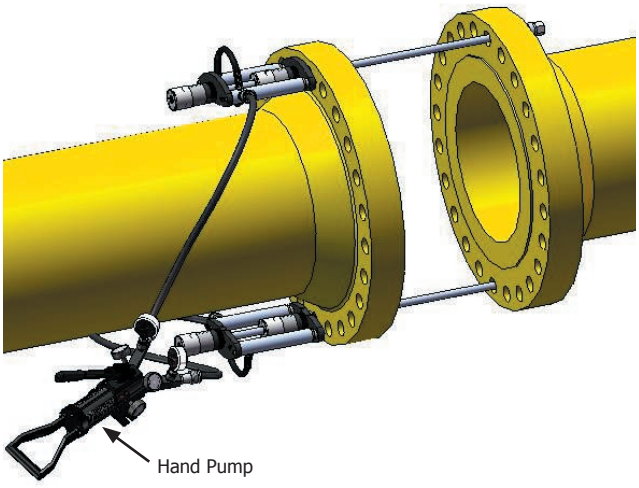
2. The FC10TE Tool is slid over the pull rod untill the face of the tool comes into contact with the flange.



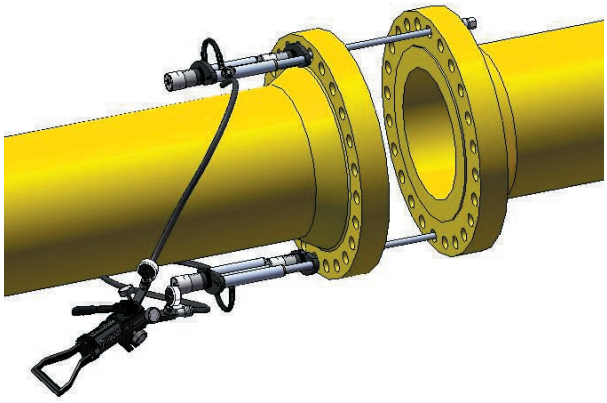
3. The ratchet nut is slid over the pull rod and locked into the tool.



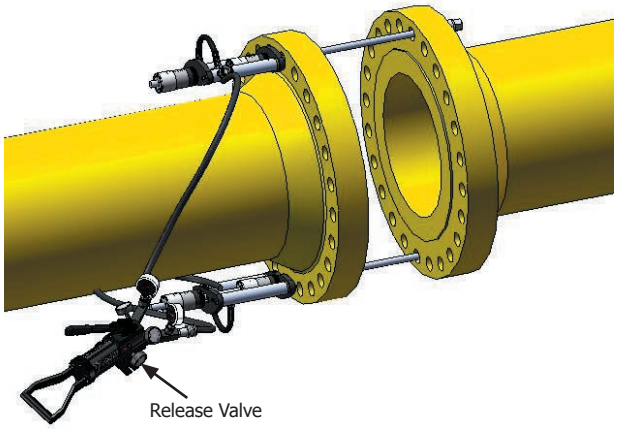
4. The hydraulic hand pump and Hoses are connected



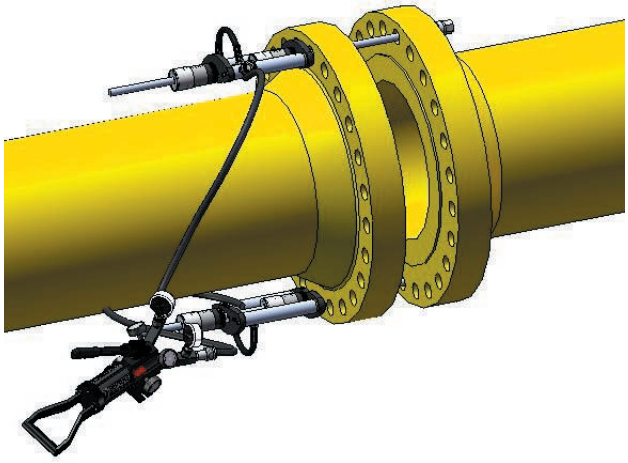
5. The Hand Pump is actuated untill the cylinders reach full stroke.



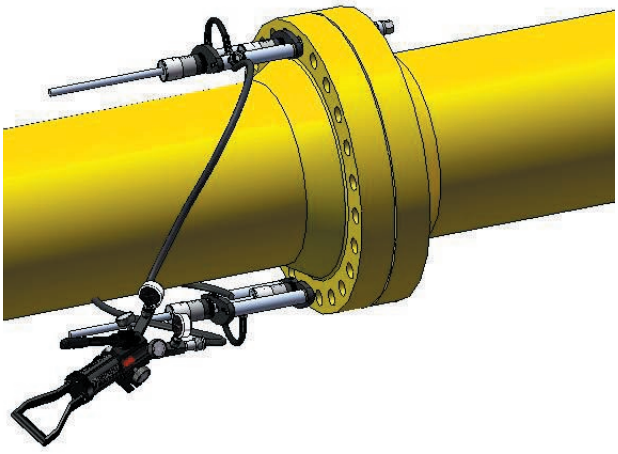
6. The Hydraulic pressure is released and the cylinders are allowed to fully retract.



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



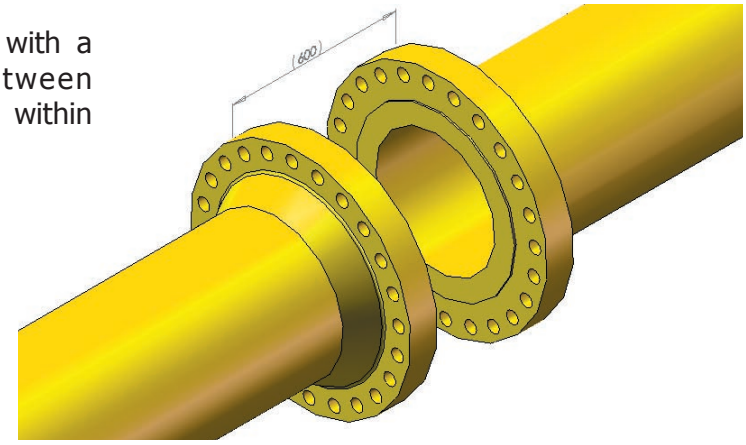
8. Steps 6 and 7 are repeated untill the flange joint is closed .



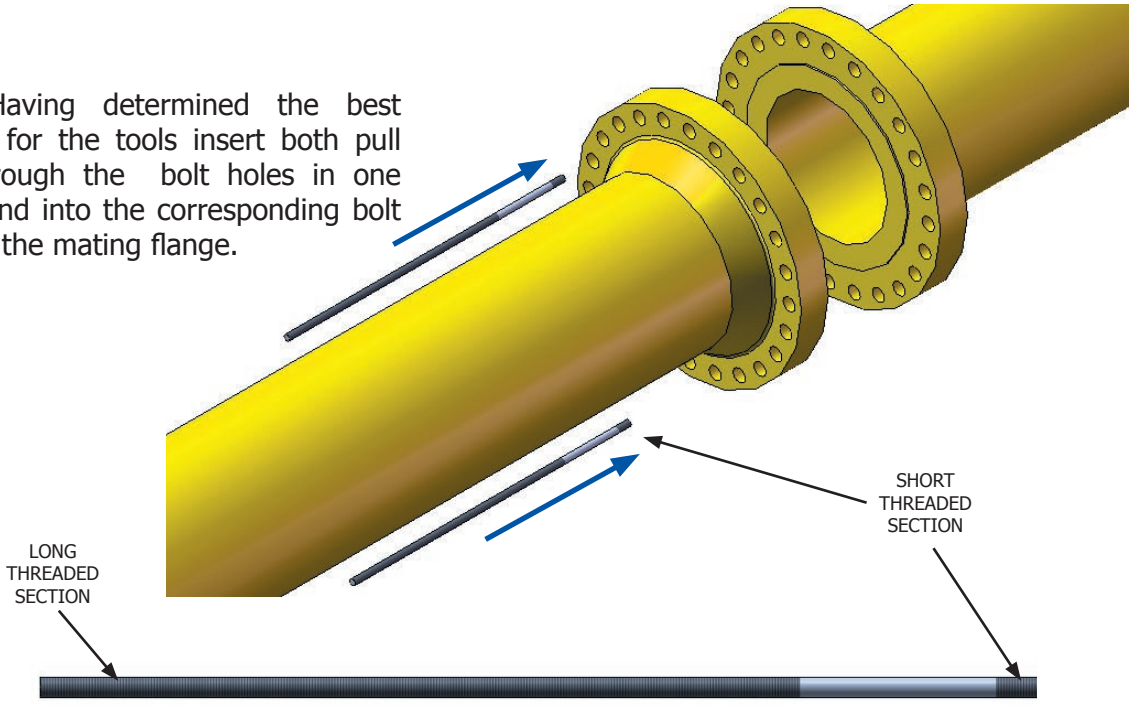
6. INSTALATION AND OPERATION

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 neccesary 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 allignment.

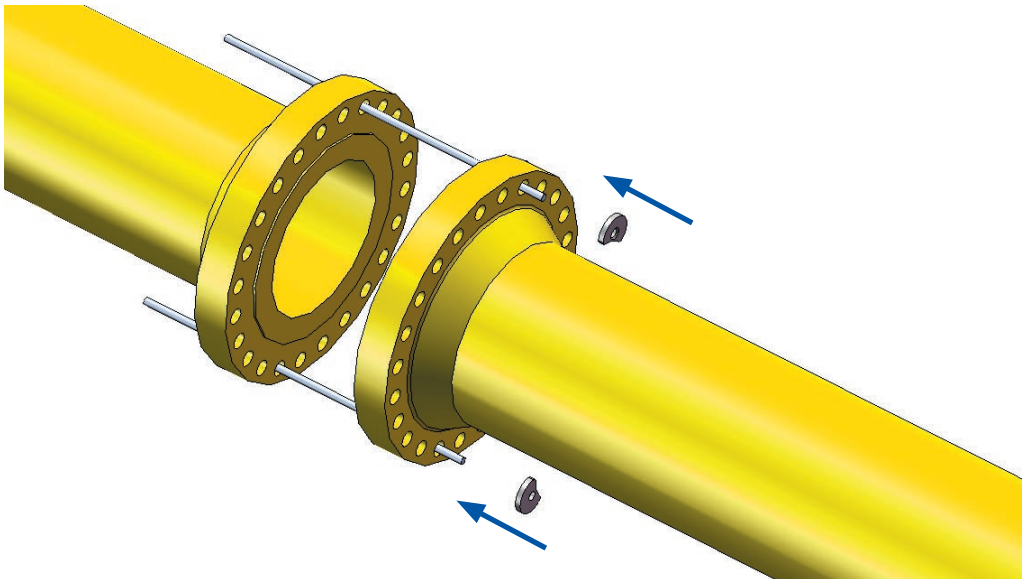


2. Having determined the best location for the tools insert both pull rods through the bolt holes in one flange and into the corresponding bolt holes of the mating flange.

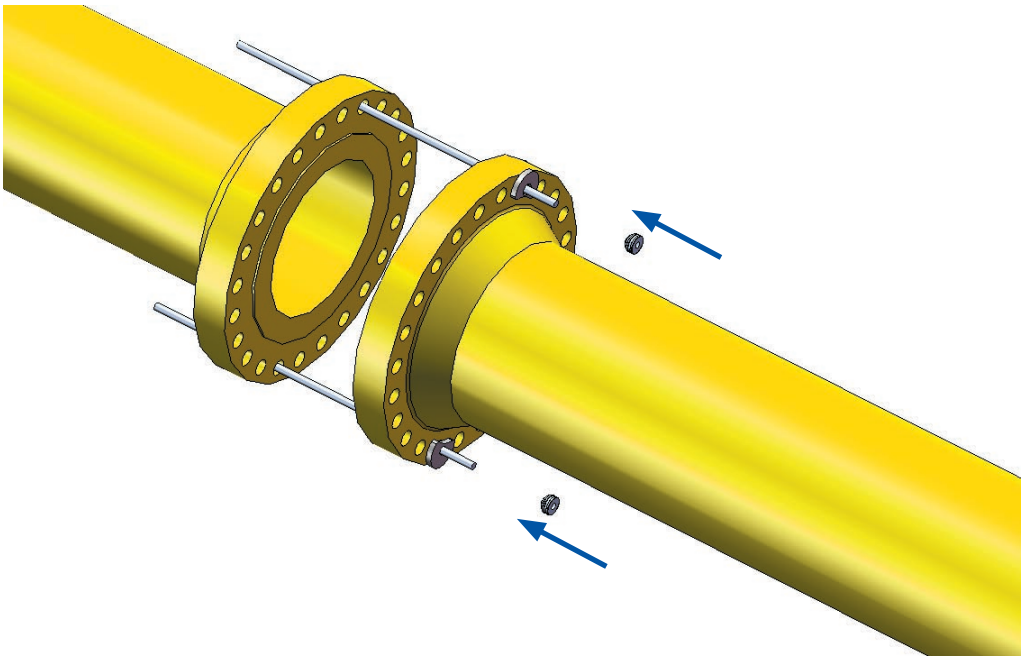


CAUTION: The Pull Rod has a long threaded section and a short threaded section. The threads on both sections are different!, The short threaded end of the Pull Rod must be passed through the flanges to mate with the pull nut.

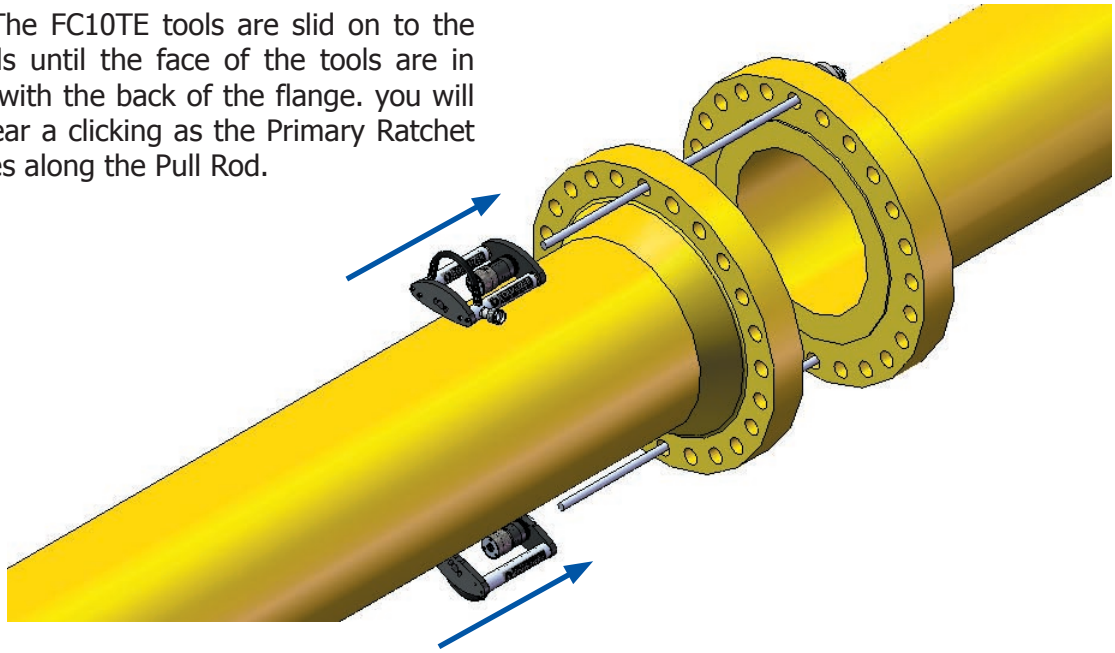
3. The Rod washers are slid over the Pull Rod and rotated to allign with the curvature of the flange .



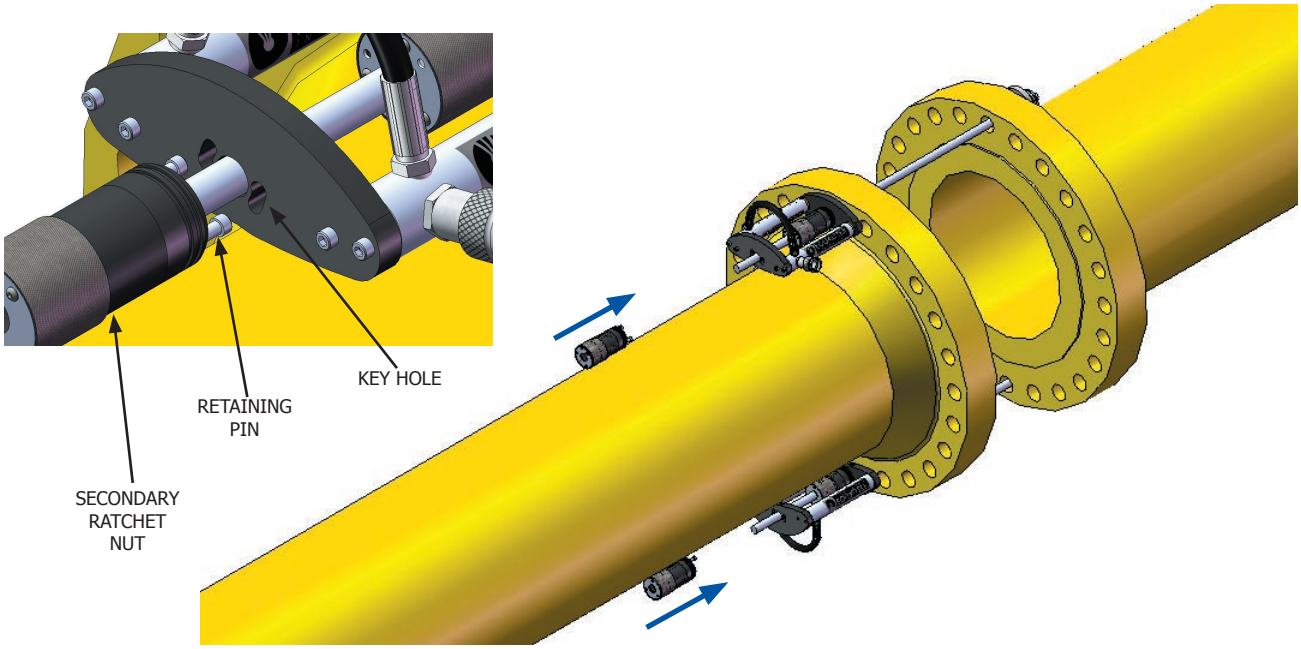
4. The Pull Nuts are threaded on to the pull rod.

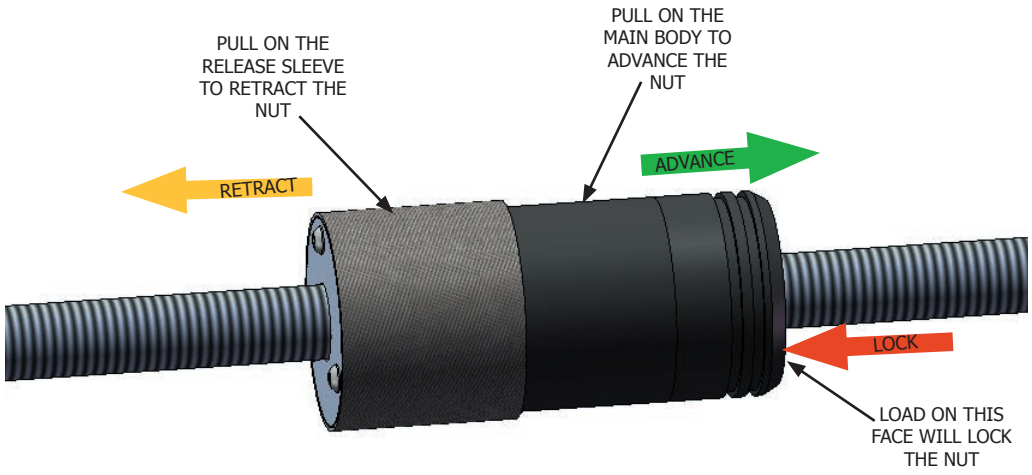


5. The FC10TE tools are slid on to the Pull Rods until the face of the tools are in contact with the back of the flange. you will feel / hear a clicking as the Primary Ratchet nut slides along the Pull Rod.



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



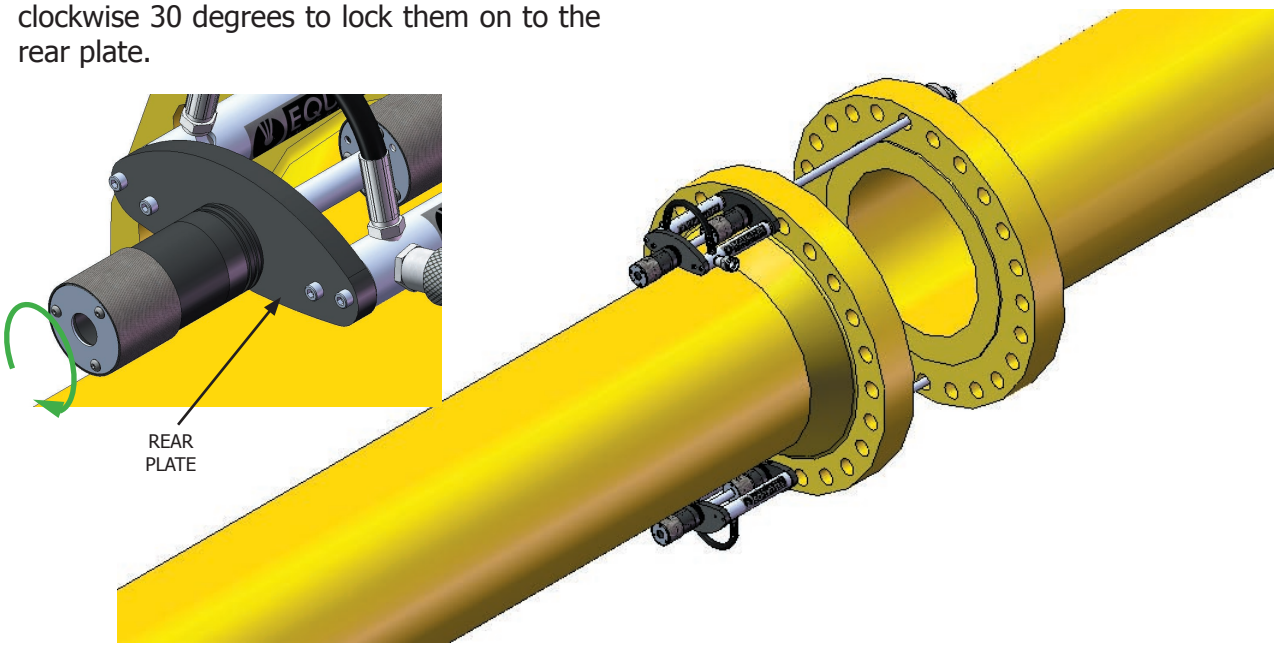


Note: The Ratchet Nut is designed to move freely when advanced along the pull rod (indicated by the green arrow).
The nut can only be advanced by gripping on the nut body.

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 untill the load is removed from the load face of the nut.

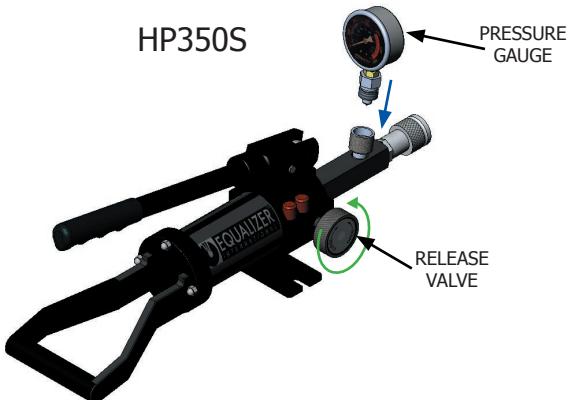
The nut can only be retracted by pulling on the release sleeve in the retract direction (indicated by the yellow arrow).

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

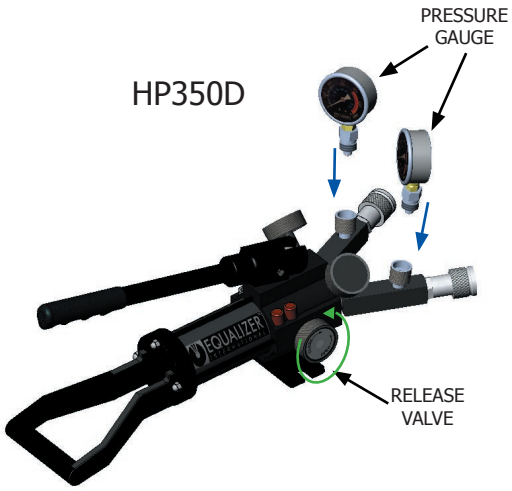


8. Check that the release valves on the hand pumps are open by rotating fully anti-clockwise and then connect the Pressure gauges to the pump ensuring all the couplers are fully hand tight.

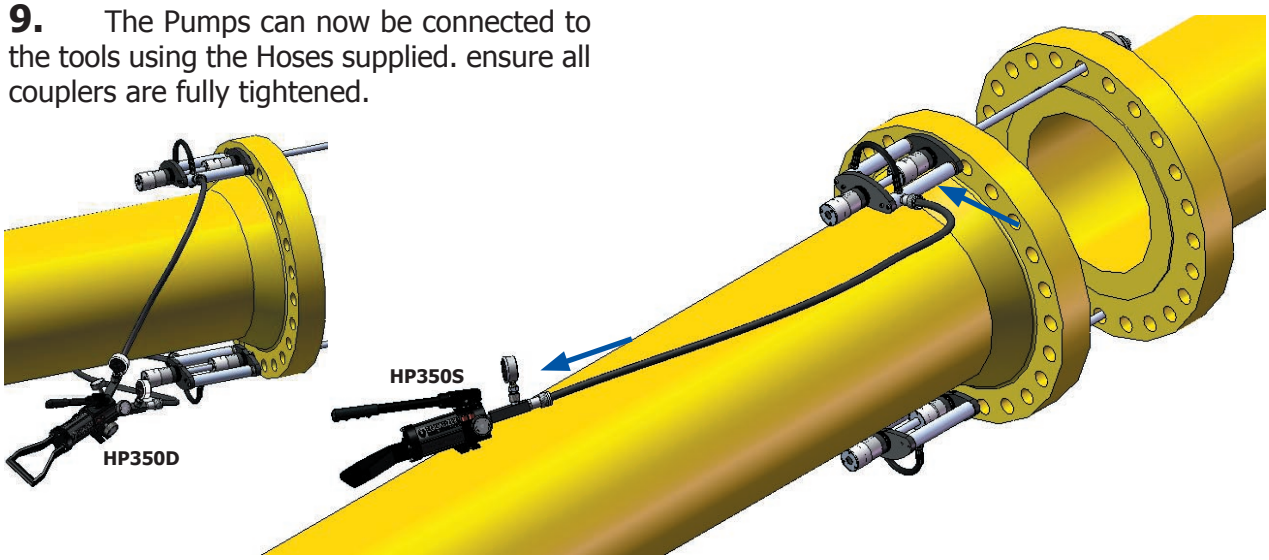
HP350S



HP350D

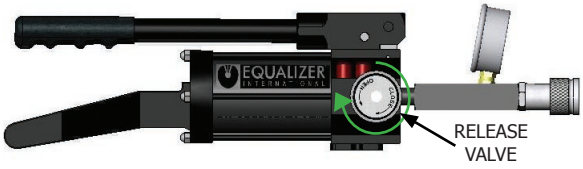


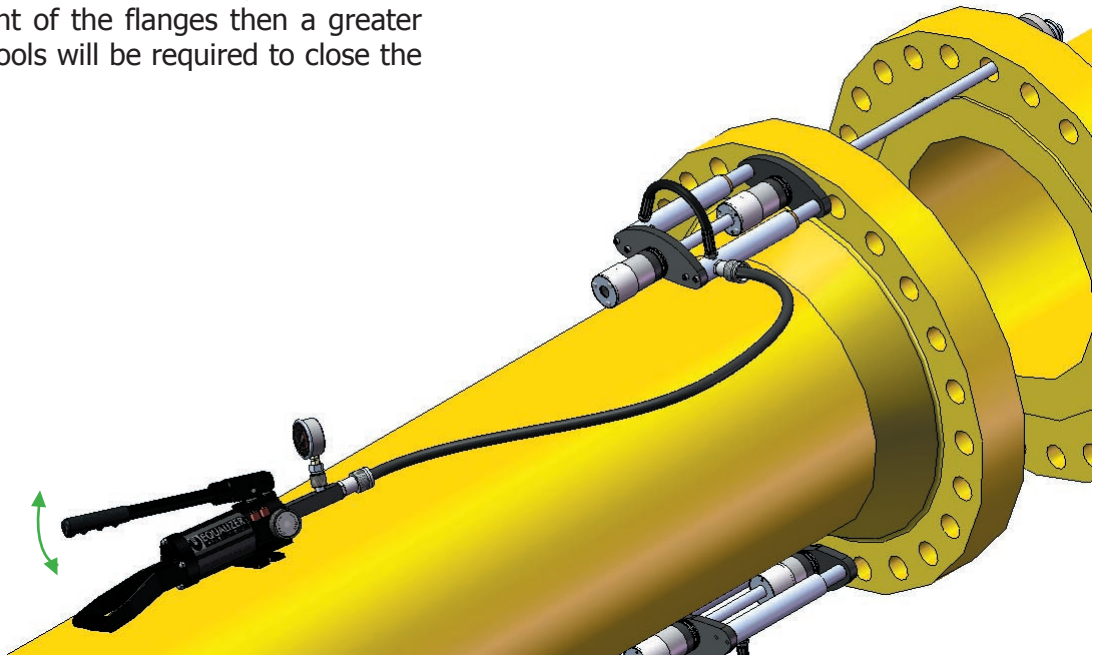
9. The Pumps can now be connected to the tools using the Hoses supplied. ensure all couplers are fully tightened.



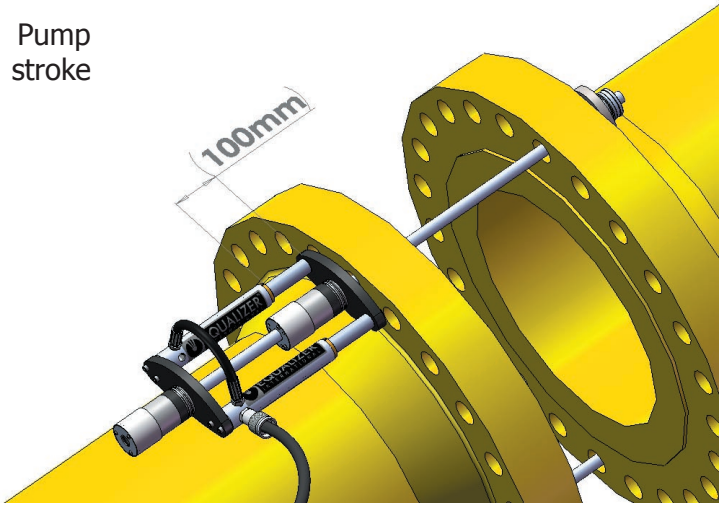
Note: Prior to operating the Equalizer Hydraulic Hand Pumps please read the Hydraulic Hand Pump Manuall. This is included in all tool kits and is also available for download from "www.equalizerinternational.com" .

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 neccessary to maintain parrallelism 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.

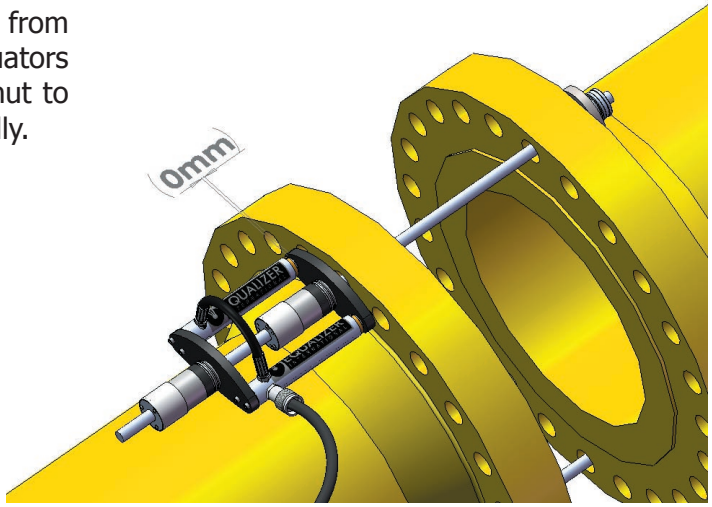




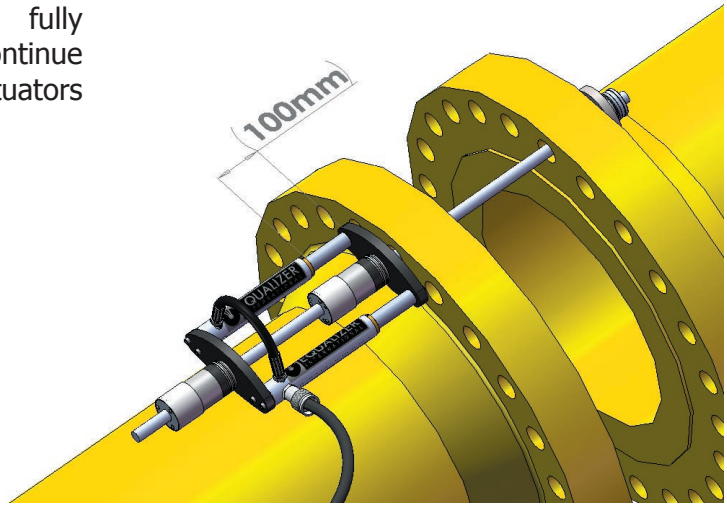
11. Continue priming the Hand Pump untill the actuators have reached full stroke 100mm (4”).



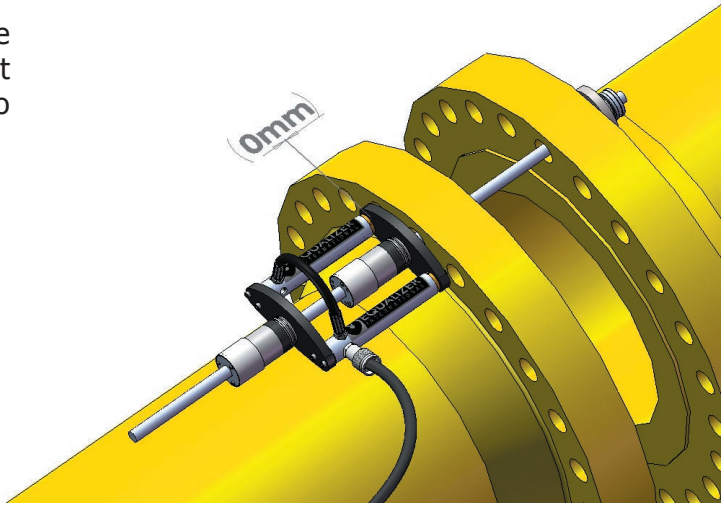
12. Release the hydraulic pressure from the system. This will allow the Actuators to retract and the secondary ratchet nut to advance along the pull rod automatically.



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

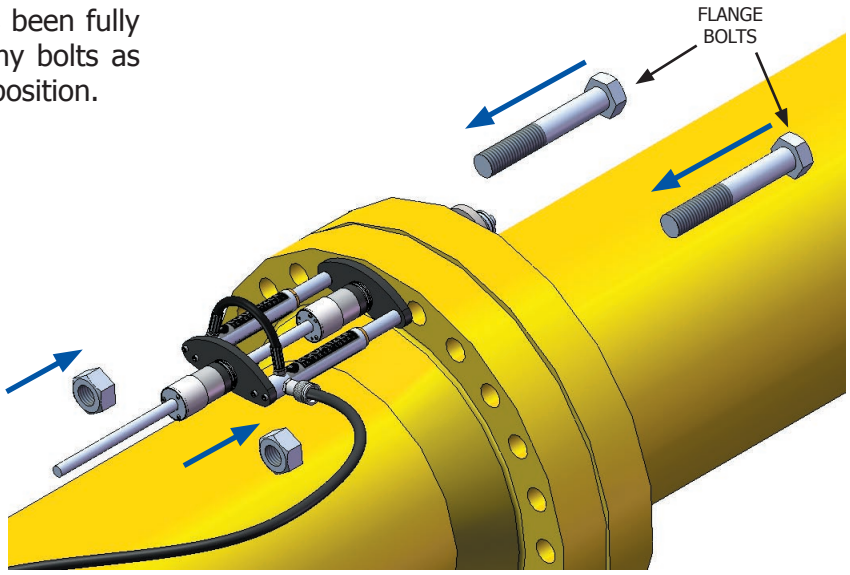


14. Repeat steps 12 and 13 to continue closing the gap between flange faces. Adjust the pressure on each tool as neccesary to maintain an even gap around the joint.



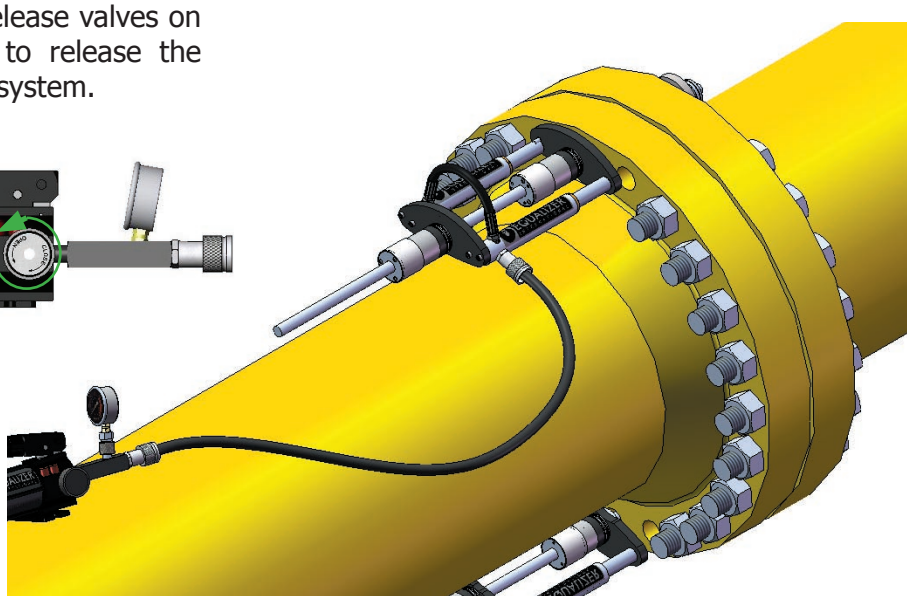
Note: If you are experiencing miss-allignment of the flanges during the final stages of closing the joint Equalizer International's Flange Allignment tools can be used in conjuction with the FC10TE. For information on these tools please vist "www.equalizerinternational.com" .

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

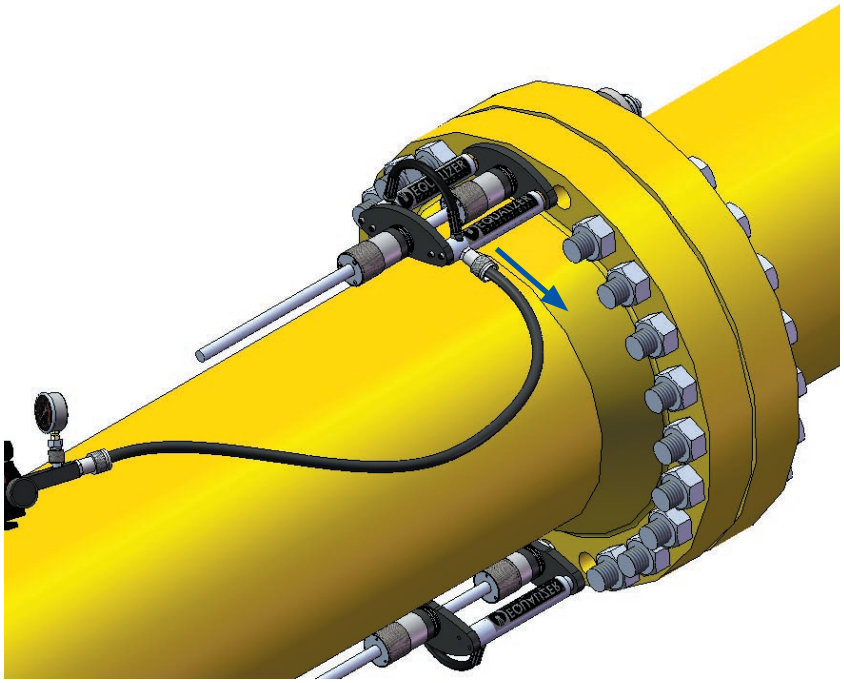


CAUTION: The FC10TE Ratchet Nuts will not release untill they are fullly unloaded, this is achieved by tightening the flange bolts untill all the load has been tranfered onto them.

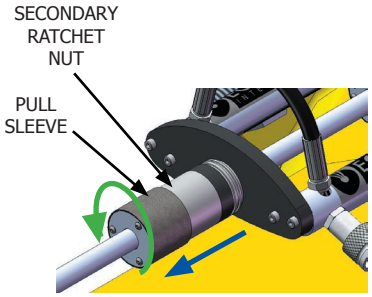
16. Once the flange bolts have been tightened sufficiently to remove any load from the FC10TE turn the release valves on the pump(s) anticlockwise to release the pressure from the hydraulic system.

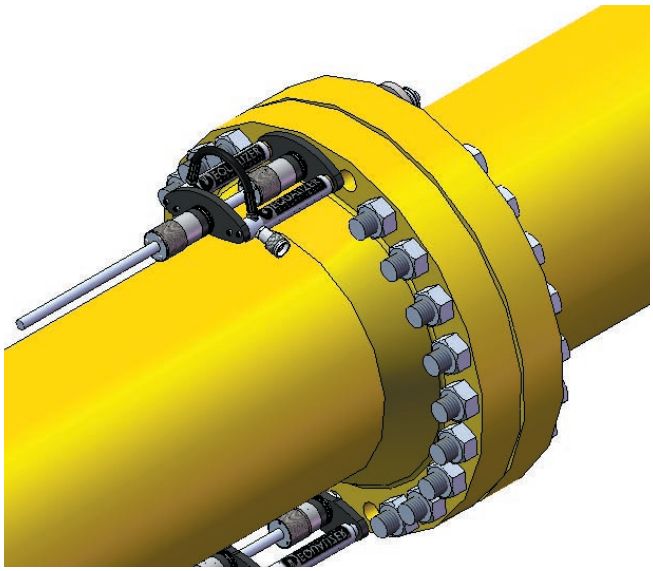


17. Now that the pressure has been released from the system the hydraulic Pump and Hoses can be detached.

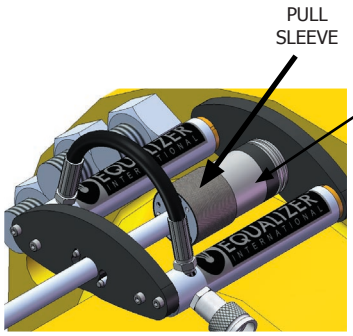


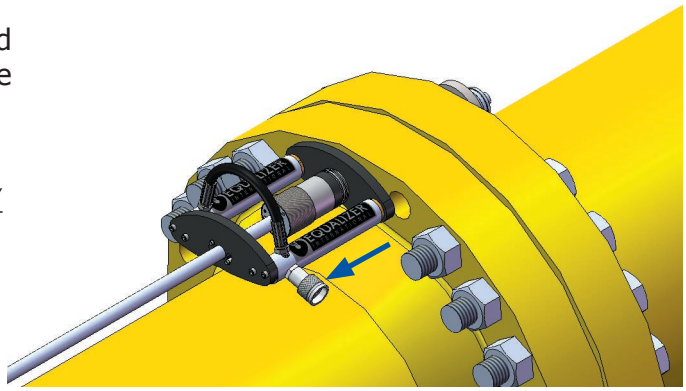
18. Now that the load has been released from the tools, the secondary ratchet nut can be removed. Rotate the nut anticlock wise through 30 degrees to disengage it from the rear plate then slide the nut off by gripping and pulling on the pull sleeve section of the nut.



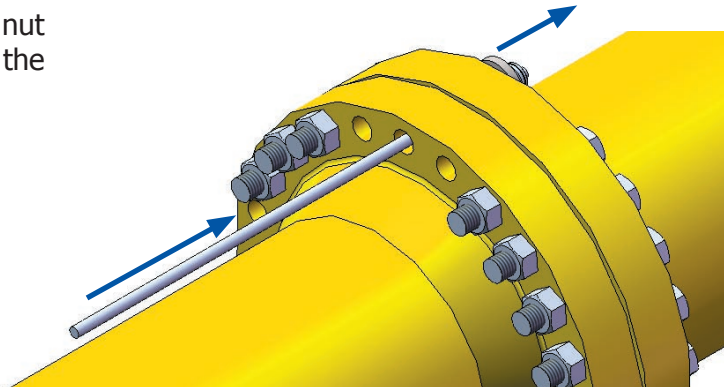


19. The FC10TE can now be removed by gripping and pulling on the pull sleeve section of the primary nut.

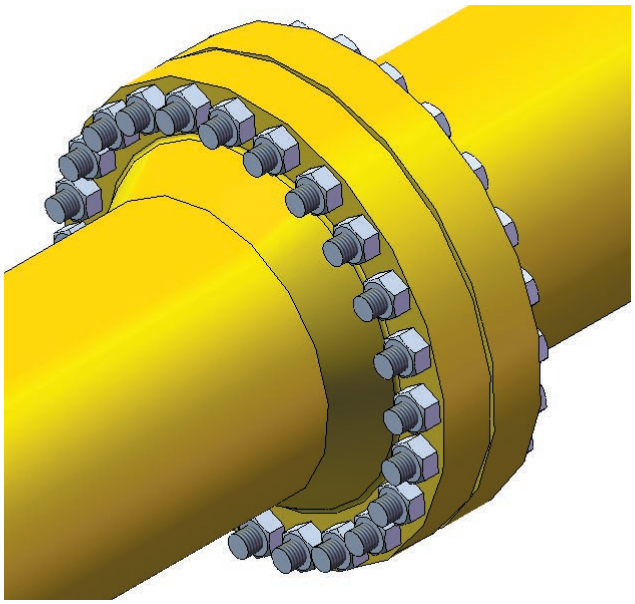




20. The Pull Rod complete with pull nut and washer can now be withdrawn from the flange joint.



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

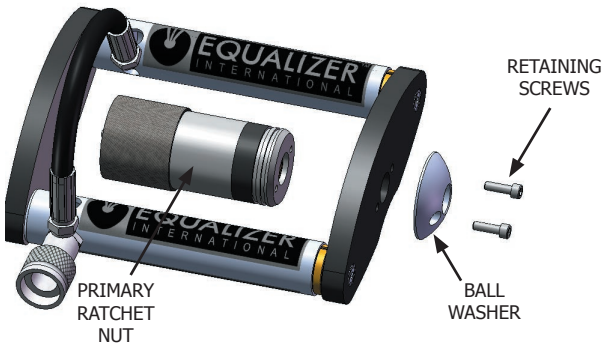


7. EXAMINATION, MAINTENANCE AND STORAGE

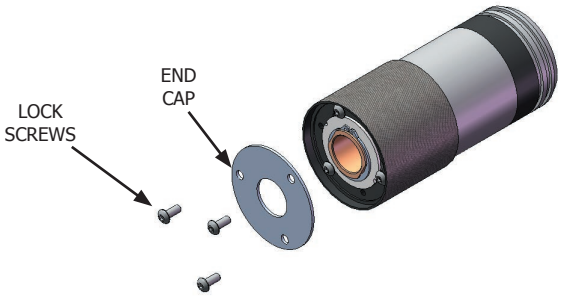
On return from each job and before allocation against subsequent work the completeness of the Equalizer FC10TE hydraulic tool kits must be established and items examined to ensure that they are serviceable. The FC10TE tools should be stored in a cool dry place.

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 distmantling and rebuilding the tools.

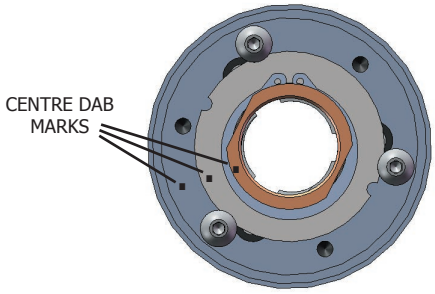
1. Unscrew and remove the primary ratchet nut retaining screws. This will allow the ball washer and ratchet nut to be removed from the assenbly.



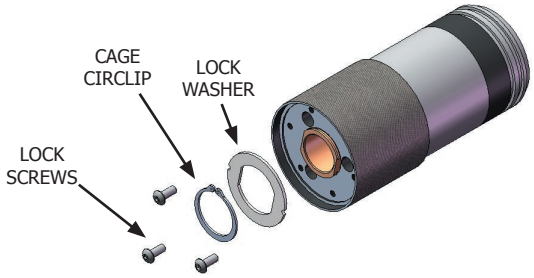
2. Unscrew and remove the three lock screws and remove the end cap from the ratchet nut.



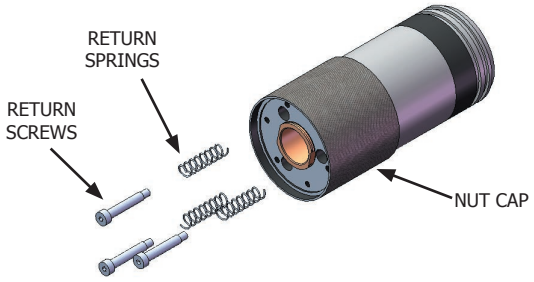
3. Before disasembling the nut any further, take note of the three centre dab marks on the cage rear ring, the lock washer, and the nut cap. These marks should be alligned.



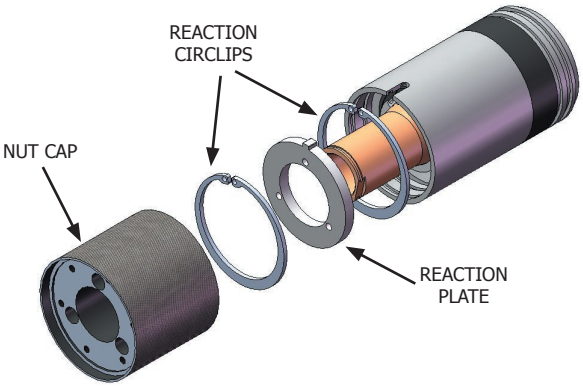
4. Unscrew the lock screws and remove the cage circlip. The lock washer can now be removed to expose the Nut Cap Return Screws.



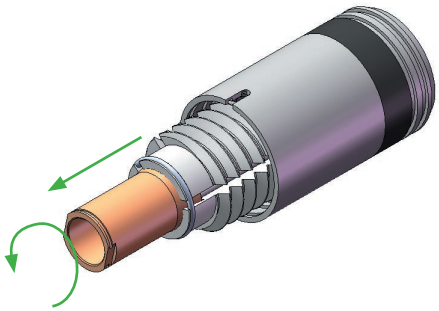
5. Unscrew and remove the Nut Cap Return Screws and return springs this will allow the Nut Cap to be removed from the Rathet Nut Body.



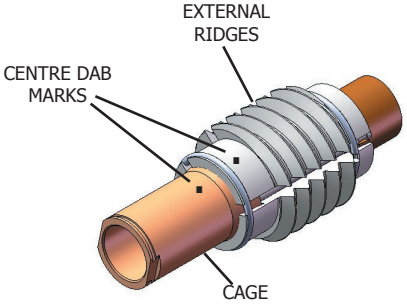
6. Having removed the Nut Cap you can then remove the upper Reaction Circlip, the Reation Plate and the lower Reaction Circlip.



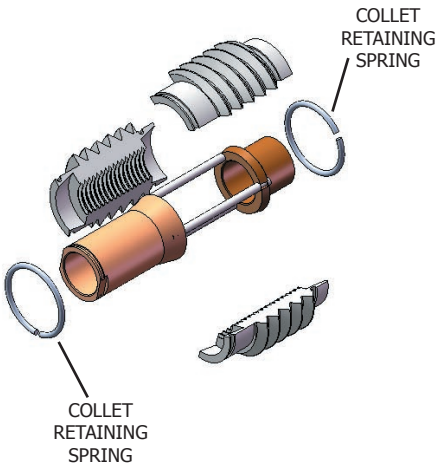
7. Unscrew and remove complete collet assembly from the nut body.



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.



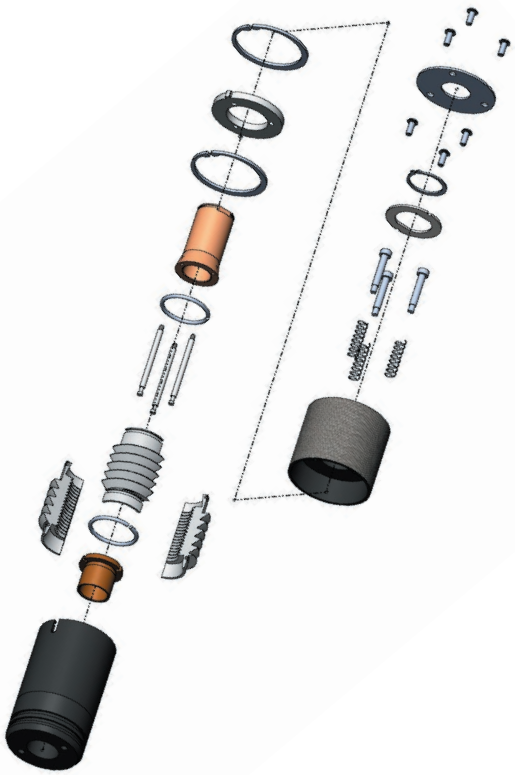
9. Unclip the Collet Retaining Springs and remove the Collet Segments from the Cage.



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.

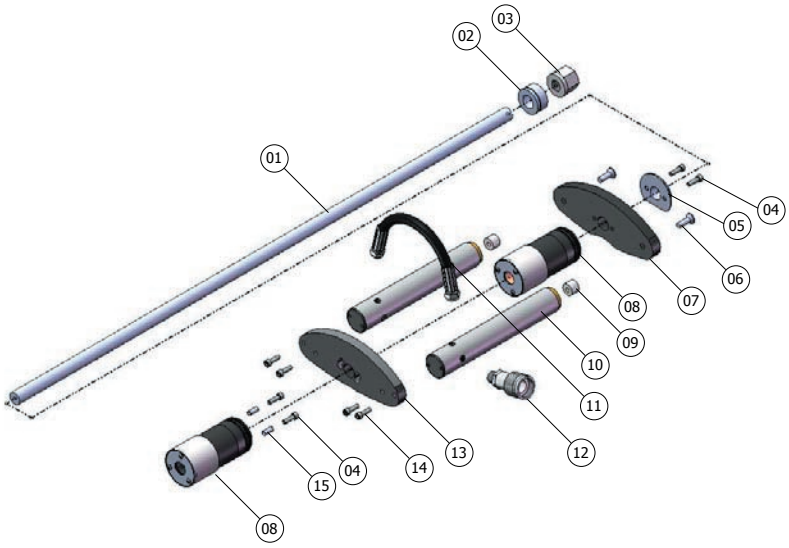


11. Reassemble by reversing steps 1-9

8. PARTS LISTS

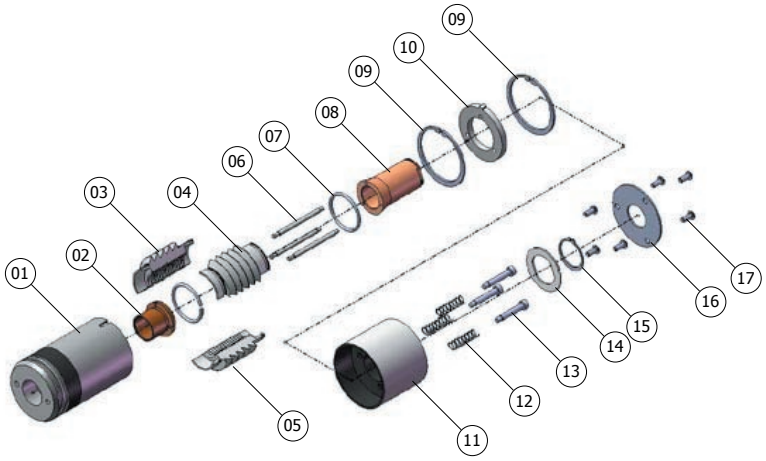
FC10TE PARTS LIST

ITEM	PART NO.	DESCRIPTION	QUANTITY
01	752801	PULL ROD	1
02	752901	ROD WASHER	1
03	640901	COLLET NUT	1
04	752101	NUT RETAINING SCREW	4
05	752701	BALL WASHER	1
06	752301	CYLINDER NOSE SCREW	2
07	750101	FRONT PLATE	1
08	753501	RATCHET NUT (SEE BELOW)	2
09	752401	CYLINDER NOSE ADAPTOR	2
10	752501	HYDRAULIC CYLINDER	2
11	752601	COUPLING HOSE	1
12	300901	FEMALE HALF COUPLER	1
13	750201	REAR PLATE	1
14	752201	CYLINDER RETAINING SCREW	4
15	753001	NUT RETAINING SLEEVE	2



RATCHET NUT PARTS LIST

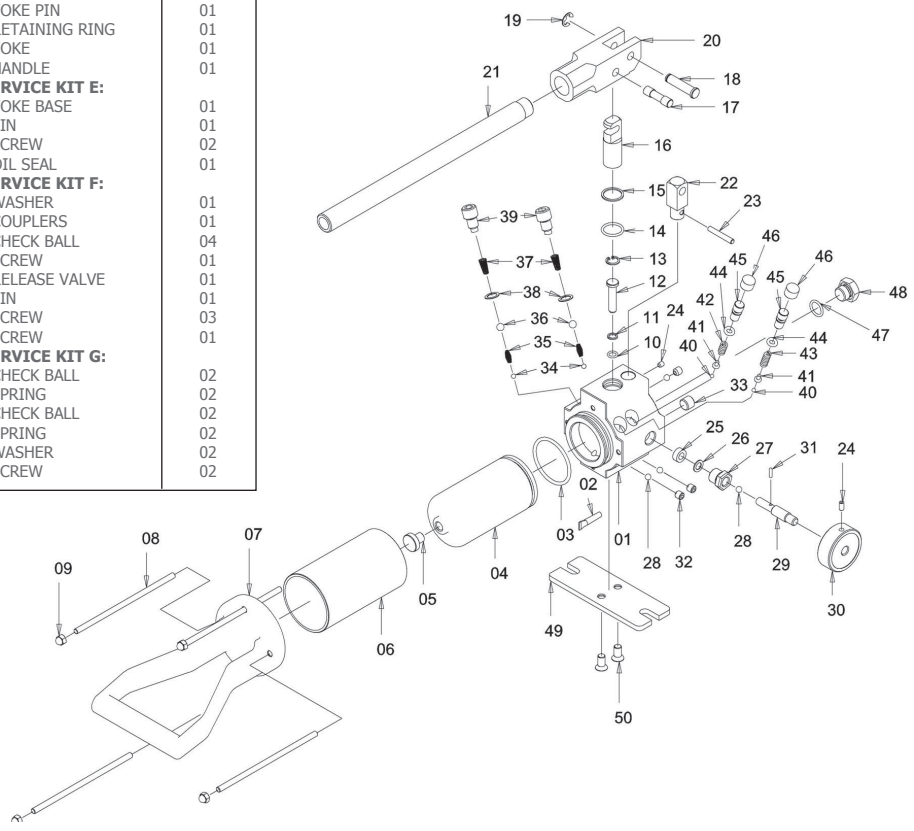
ITEM	PART NO.	DESCRIPTION	QUANTITY
01	751001	NUT BODY	1
02	750401	CAGE FRONT RING	1
03	750601	COLLET SEGMENT 1	1
04	750701	COLLET SEGMENT 2	1
05	750801	COLLET SEGMENT 3	1
06	750501	CAGE SIDE BAR	3
07	751501	COLLET RETAINING SPRING	2
08	750301	CAGE REAR RING	1
09	751901	REACTION CIRCLIP	2
10	751301	REACTION PLATE	1
11	751101	NUT CAP	1
12	751601	NUT CAP RETURN SPRING	3
13	751701	NUT CAP RETURN SCREW	3
14	751201	LOCK WASHER	1
15	752001	CAGE CIRCLIP	1
16	751401	END CAP	1
17	751801	LOCK SCREW	6



HP350S HAND PUMP

ITEM	PART No.	DESCRIPTION	QUANTITY
01	710101-01	**PUMP HOUSING**	01
	715100-01	**SERVICE KIT A:**	
02		- OIL FILTER	01
03		- O-RING	01
04		- RESERVOIR BLADDER	01
05		- REFILLING PLUG	01
06	710601-01	**RESERVOIR**	01
	715200-01	**SERVICE KIT B:**	
07		- TAIL BASE	01
08		- SCREW	04
09		- NUT	04
	715300-01	**SERVICE KIT C:**	
10		- O-RING	01
11		- BACK-UP RING	01
12		- PUMP PISTON	01
13		- SNAP RING	01
14		- O-RING	01
15		- BACK-UP RING	01
16		- PUMP PISTON	01
	715400-01	**SERVICE KIT D:**	
17		- PISTON PIN	01
18		- YOKE PIN	01
19		- RETAINING RING	01
20		- YOKE	01
21		- HANDLE	01
	715500-01	**SERVICE KIT E:**	
22		- YOKE BASE	01
23		- PIN	01
24		- SCREW	02
25		- OIL SEAL	01
	715600-01	**SERVICE KIT F:**	
26		- WASHER	01
27		- COUPLERS	01
28		- CHECK BALL	04
29		- SCREW	01
30		- RELEASE VALVE	01
31		- PIN	01
32		- SCREW	03
33		- SCREW	01
	715700-01	**SERVICE KIT G:**	
34		- CHECK BALL	02
35		- SPRING	02
36		- CHECK BALL	02
37		- SPRING	02
38		- WASHER	02
39		- SCREW	02

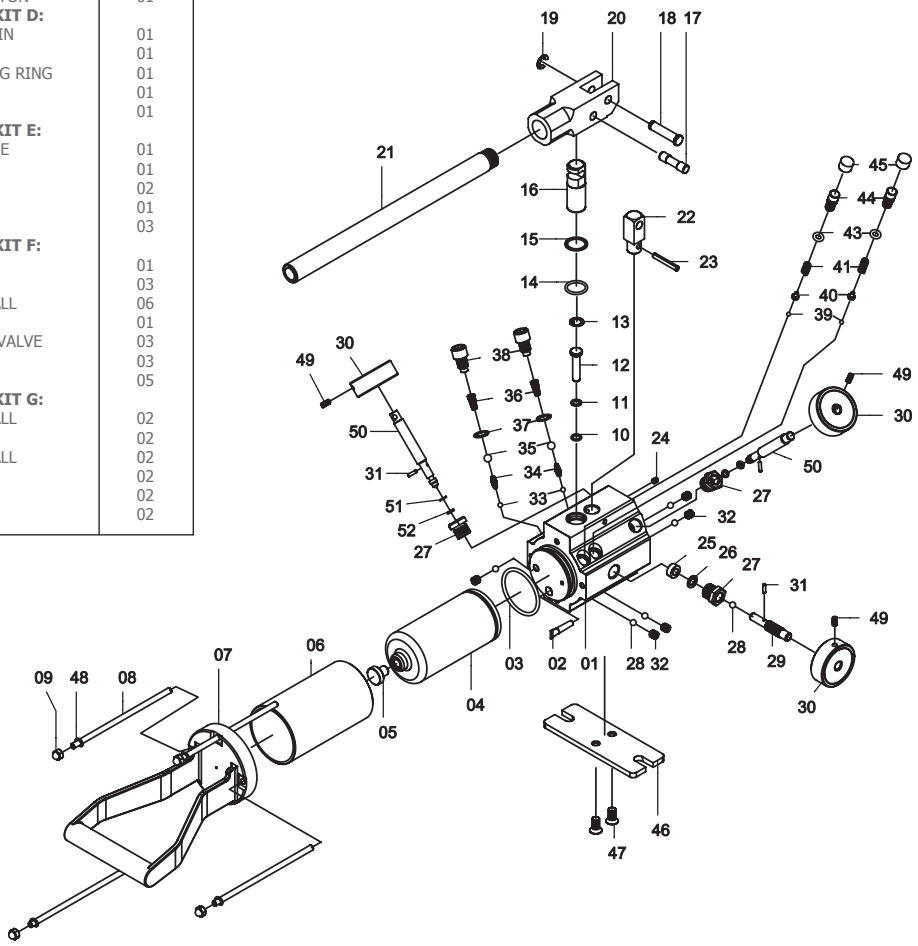
ITEM	PART No.	DESCRIPTION	QUANTITY
	715800-01	**SERVICE KIT H:**	
40		- CHECK BALL	02
41		- SPRING END CAP	02
42		- SPRING	01
43		- SPRING	01
44		- O-RING	02
45		- SCREW	02
46		- CAP	02
47	714701-01	**O-RING**	01
48	714802-01	**SCREW**	01
	715900-01	**SERVICE KIT I:**	
49		- BASE PLATE	01
50		- SCREW	02



HP350D HAND PUMP

ITEM	PART No.	DESCRIPTION	QUANTITY
01	720101-01	**PUMP HOUSING**	01
	715100-01	**SERVICE KIT A:**	
02		- OIL FILTER	01
03		- O-RING	01
04		- RESERVOIR BLADDER	01
05		- REFILLING PLUG	01
06	710601-01	**RESERVOIR**	01
	725200-01	**SERVICE KIT B:**	
07		- TAIL BASE	01
08		- SCREW	04
09		- NUT	04
48		- SPRING WASHER	04
	715300-01	**SERVICE KIT C:**	
10		- O-RING	01
11		- BACK-UP RING	01
12		- PUMP PISTON	01
13		- SNAP RING	01
14		- O-RING	01
15		- BACK-UP RING	01
16		- PUMP PISTON	01
	715400-01	**SERVICE KIT D:**	
17		- PISTON PIN	01
18		- YOKE PIN	01
19		- RETAINING RING	01
20		- YOKE	01
21		- HANDLE	01
	725500-01	**SERVICE KIT E:**	
22		- YOKE BASE	01
23		- PIN	01
24		- SCREW	02
25		- OIL SEAL	01
49		- SCREW	03
	725600-01	**SERVICE KIT F:**	
26		- WASHER	01
27		- COUPLER	03
28		- CHECK BALL	06
29		- SCREW	01
30		- RELEASE VALVE	03
31		- PIN	03
32		- SCREW	05
	715700-01	**SERVICE KIT G:**	
33		- CHECK BALL	02
34		- SPRING	02
35		- CHECK BALL	02
36		- SPRING	02
37		- WASHER	02
38		- SCREW	02

ITEM	PART No.	DESCRIPTION	QUANTITY
	715800-01	**SERVICE KIT H:**	
39		- CHECK BALL	02
40		- SPRING END CAP	02
41		- SPRING	01
42		- SPRING	01
43		- O-RING	02
44		- SCREW	02
45		- CAP	02
	715900-01	**SERVICE KIT I:**	
46		- BASE PLATE	01
47		- SCREW	02
	726000-01	**SERVICE KIT J:**	
50		- VALVE SCREW	02
51		- BACK-UP RING	02
52		- O-RING	02

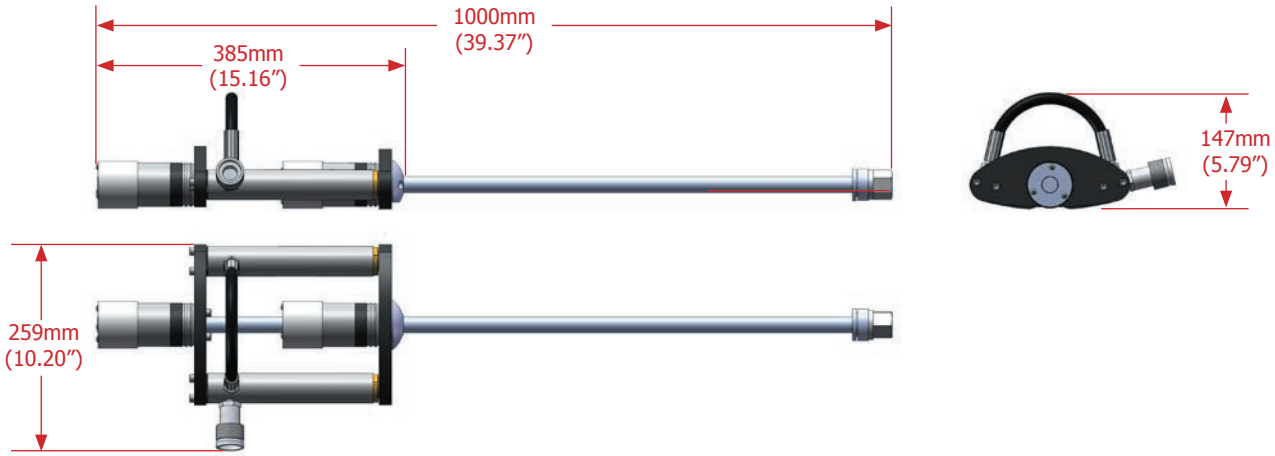


9. WEIGHTS AND DIMENSIONS

FC10TESTD WEIGHTS AND DIMENSIONS

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

Carry-Case Dimensions: 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 = 36.5 kg (51.80 lbs)

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