

OPERATOR INSTRUCTION MANUAL

M4TFE

H9TFE

FLANGE

ALIGNMENT

TOOLS

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1. INTRODUCTION

The M4TFE and H9TFE TOOLS are aids for use in normal maintenance and installation procedures, and enable the realignment of misaligned flanges within their respective working capacities. For example, all of the tools can be used to assist in the replacement of ring and other types of flange joint. The use of these instructions will promote safe use, and maximize the service life of the tools. It is recommended that the operator read the relevant sections of this instruction manual for the particular flange alignment tool to be used.

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.

We cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact your distributor 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 mechanical and 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 M4TFE AND H9TFE FLANGE ALIGNMENT 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 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 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 parts. Parts are designed to fit properly and withstand rated loads. For repair or maintenance service contact your 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.



CAUTION: Do not operate the equipment without lubricating all moving parts as in section 5.4, 6.4 & 7.4. Use only high pressure molybdenum disulphide grease.

3. TECHNICAL DATA

	Tool Description	Aligning Force
M4TFE	Mechanical Fixed Flange and Rotational Alignment Tool	4.0 T (40kN) from 50 ft/lbs (67.8 Nm) of torque
H9TFE	Hydraulic Fixed Flange and Rotational Alignment Tool	9.0 T (90 kN) from 10,000 psi (700 bar) of hydraulic pressure

4. FLANGE MISALIGNMENT DETERMINATION PROCEDURE

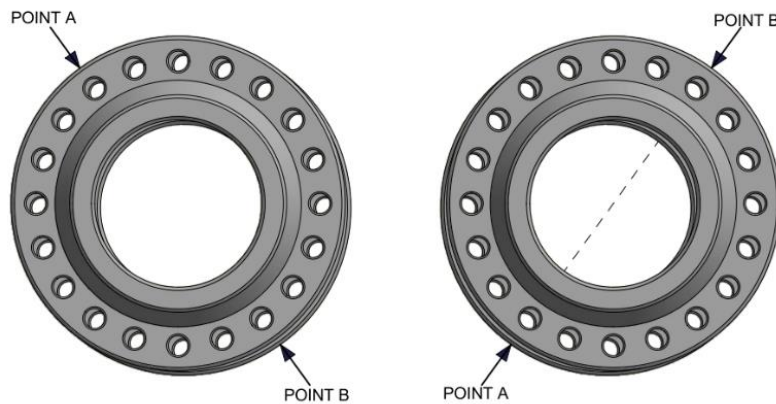
The tool being used must not be attached to a flanged joint prior to the misalignment procedure being carried out.

4.1 SIDEWARD MISALIGNMENT

1. Loosen and remove every second bolt around the flange, continue with this until misalignment occurs.

A flanged joint, once broken down, may spring out of alignment at any point, or in any direction around its circumference. Misalignment may not occur until only a few bolts remain.

2. At this point the direction of any misalignment should become obvious. The alignment tool being used should be attached at the maximum point of misalignment (point A or B in the examples shown below).



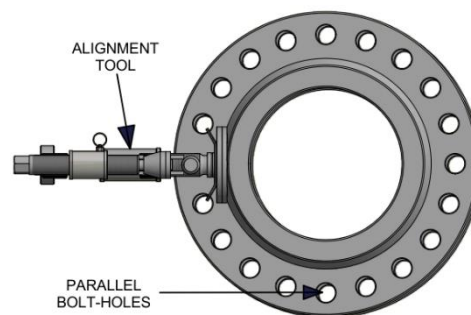
4.2 ROTATIONAL (TWIST) MISALIGNMENT

If the outer circumference of the flanges are in alignment but the operator is unable to fit the bolt into any two corresponding bolt-holes then rotational misalignment may have occurred.

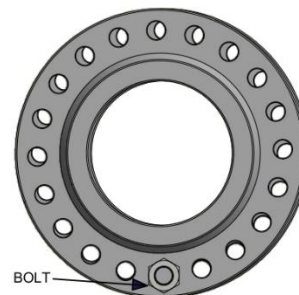
In this case the alignment tool can be attached to the most accessible point as misalignment occurs at all bolt-holes to the same degree.



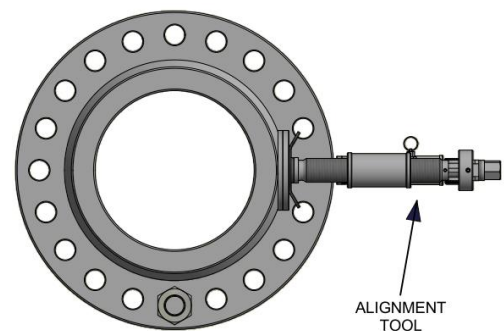
1. Attach the alignment tool at the most accessible/convenient point (as shown in sections) and use it to push the flanges out of alignment until one pair of bolt-holes becomes parallel.



2. Insert the bolt into the aligned bolt-hole and release the alignment tool. The load will transfer onto the bolt.



3. Repeat steps 1 and 2 at other points around the flange until all of the remaining bolt-holes are parallel and the rest of the bolts can be inserted.

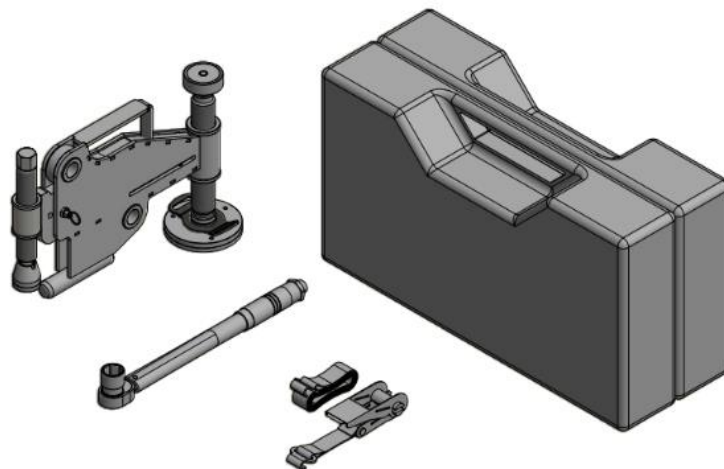


5. M4TFE MECHANICAL FIXED FLANGE AND ROTATIONAL ALIGNMENT TOOL

5.1 KIT COMPONENTS

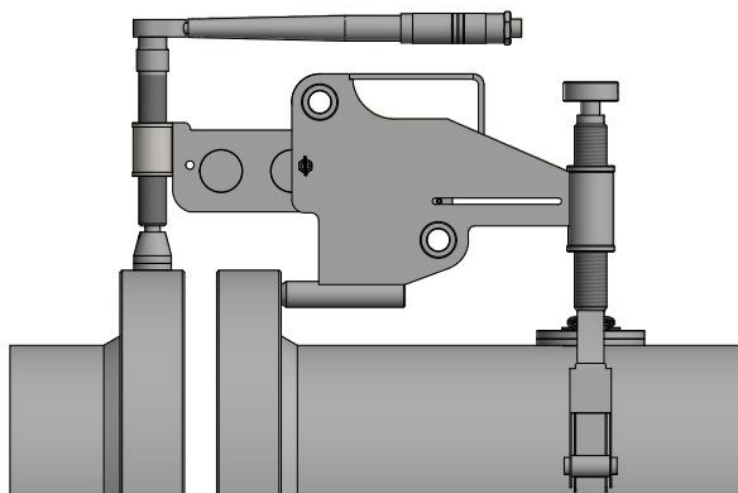
- 1 x M4TFE Tool
- 1 x 67.8 Nm Torque Wrench with 22 mm Socket
- 1 x Ratchet and Strap
- 1 x Molding Case

Product Code: M4TFE



5.2 HOW THE M4TFE WORKS

1. The M4TFE is secured to the lower of the two flanges by fully inserting the lift hook into the bolt-hole at the point of greatest misalignment.
2. The drop leg is adjusted down to the pipe while the tool is held level in the bolt-hole.
3. The wing retaining screw is loosened to allow the wing to be extended out.
4. The screw bolt is turned clockwise until the friction pad comes into contact with the circumference of the opposite flange.
5. The torque wrench is set to 50 ft/lbs (max), attached to the screw bolt and turned to screw down on the flange, bringing the joint into alignment.



5.3 INSTALLATION AND OPERATION

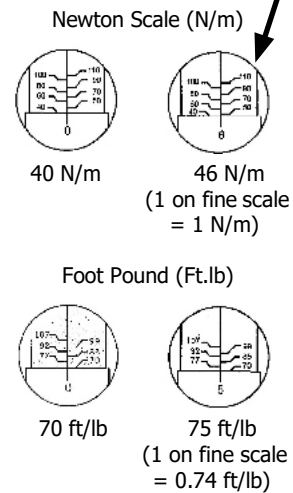
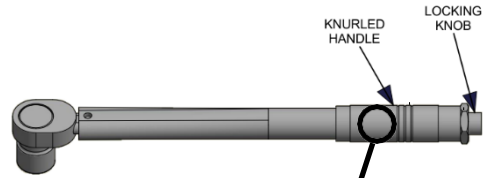


How to use the torque wrench

Balance the wrench in your left hand and unlock the knurled handle by turning the locking knob anti-clockwise. Set the torque amount by turning the knurled handle - see example 40-46 N/m

1. Turn the handle till 0 on fine scale reach 40 N/m on base scale
2. To set 46 turn handle till fine scale reach 6
3. Lock handle by turning the locking knob clockwise

Install the proper socket and attach to the tool. Pull handle till you feel and/or hear the wrench click. Setting of ft/lb scale is done in the same way as above.



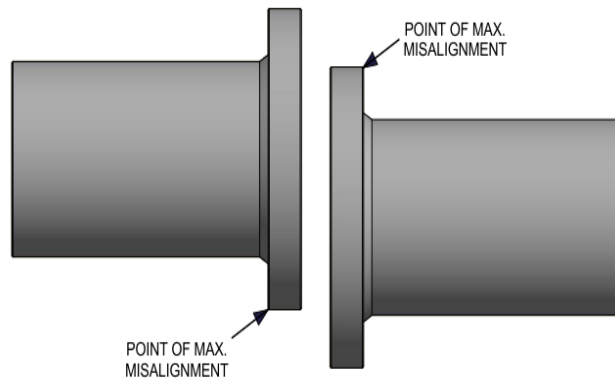
Do not pull after the wrench clicks. Use special care at low torque settings. If the wrench has not been used for some time: operate it several times at low torque to allow internal lubricant to recoat. When not in use set to lowest torque setting. Don't turn handle below lowest torque setting. Your torque wrench is a precision measuring instrument and should be treated as such. Clean only by wiping, do not use any type of cleaner which may affect the special internal lubricant with which this wrench is packed at the factory.



1. Do not attempt to turn the grip while it is locked
2. Do not turn the grip more than one turn below the lowest scale reading or above the highest scale reading

1. Carry out the Flange Misalignment Determination Procedure (see section 4) to determine the points of maximum misalignment.

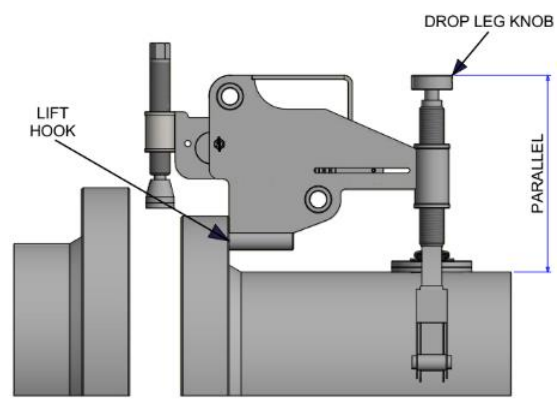
In this example the points of maximum misalignment are at the top and bottom of the joint.



2. Guide the lift hook into the bolt-hole at the maximum point of misalignment.

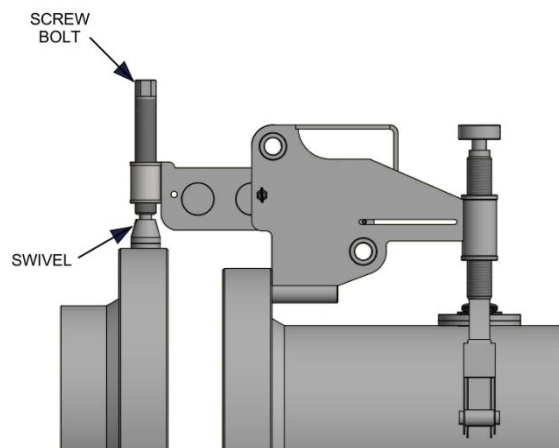
Adjust the drop leg down onto the pipe by turning the adjusting knob in a clockwise direction. The tool should be held up level within the bolt-hole during adjustment.

N.B. The tool must be parallel to the pipe at all times.

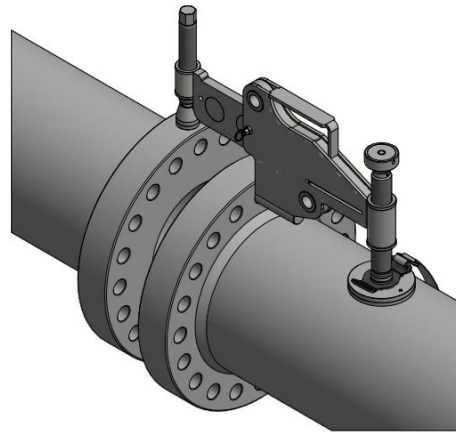


3. Loosen the wing retaining knob and extend the wing over to the opposite flange.

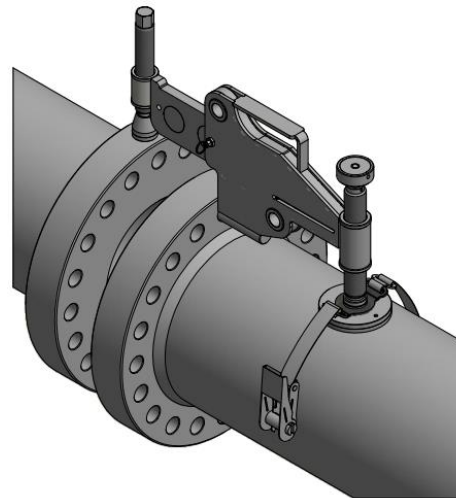
Rotate the screw bolt onto the surface of the opposite flange. Ensure that the tool is sitting level and that the friction pad on the base of the swivel is in full and even contact with the surface of the opposite flange.



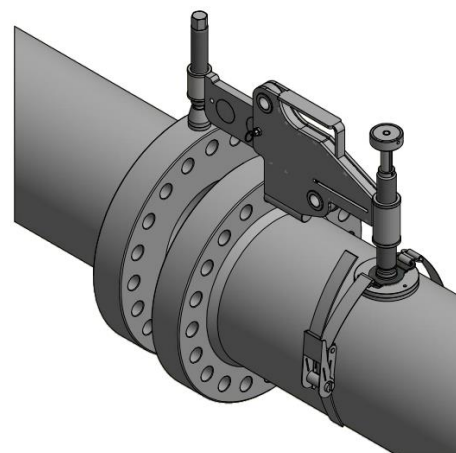
4. Attach the hook of the strap through the buckle on top of the base plate as shown.



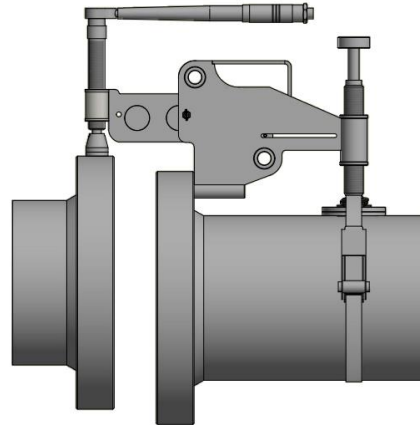
5. Now place the hook of the ratchet mechanism through the opposite side of the buckle as shown.



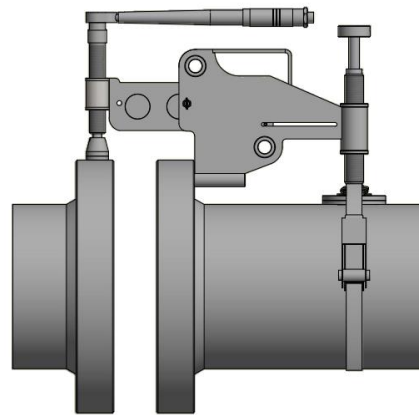
6. Feed the open end of the strap through the ratchet mechanism as shown. Tighten the strap using the ratchet mechanism.



7. The torque wrench should be set at 14 ft/lbs (19Nm) then attached to the screw bolt



8. Tighten the screw bolt in a clockwise direction until the flanges come into alignment; or the torque wrench "clicks"
If the torque wrench has clicked and the flanges are still mis-aligned adjust the torque wrench up to 24.2 ft/lbs (33 Nm) and continue until a maximum torque wrench setting of 50t/lbs (67.8N/m) is reached or the flanges are aligned.



The maximum safe working load is 50 ft/lbs (67.8 N/m)

exceeding 50 ft/lbs will result in damage to the tool

Once in alignment the bolts may be inserted and tightened.

After replacing all of the bolts (apart from the bolt which will go into the bolt-hole in which the M4TFE is located), remove the tool by reversing steps 2 -8.

Insert the last bolt and tighten.

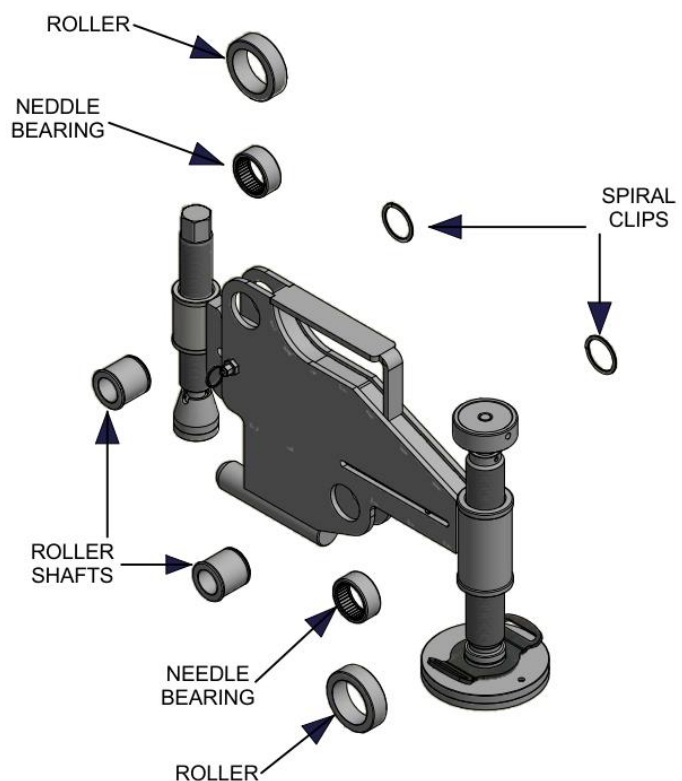


Care should be taken not to drop any of the component parts when removing them from the flange joint. This action will prevent injuries to either the operator's lower limbs, or to passers-by.

5.4 EXAMINATION, MAINTENANCE AND STORAGE

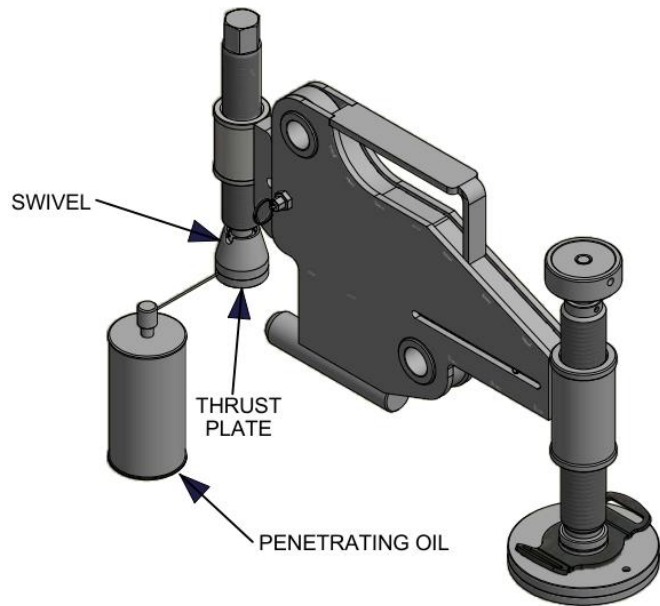
- On return from each job and before allocation against subsequent work the completeness of the M4TFE kit must be established and items examined to ensure that they are serviceable
- Any missing or damaged items are to be replaced as soon as possible and prior to the tool being used again
- Store the M4TFE in a cool dry place and ensure all machined surfaces are greased
- Return all items to carry case when not in use
- Ensure rollers, pins and wing remain grit free and that the rollers rotate freely
- Grease all moving parts regularly:

1. Secure the tool upright on a bench.
2. Using a small flat screw driver, lever out the end of the spiral clips and then rotate anti-clockwise and remove.
3. Slide the roller shafts out in order to remove the rollers and bearings for examination.
4. Inspect the roller shafts, rollers and bearings for damage. If there is no damage present then they can be cleaned, greased and re-assembled by reversing steps 1-4

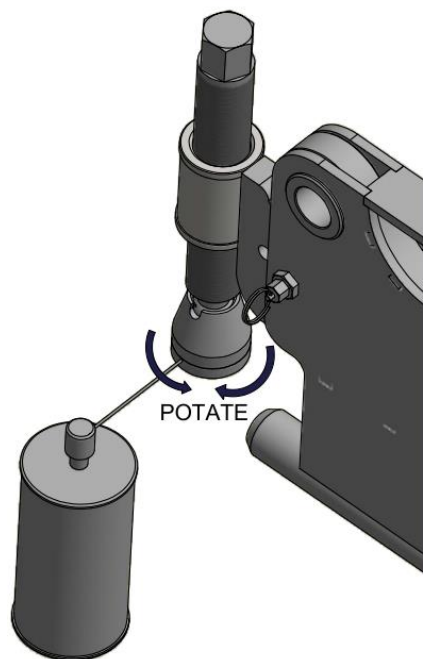


Recommended grease -
Hi-load bearing grease

5. It is important that the thrust bearing is free from dirt and corrosion and rotates freely.
6. With the use of a penetrating oil such as WD40 or similar. Spray the oil between the thrust plate and the swivel as shown opposite.

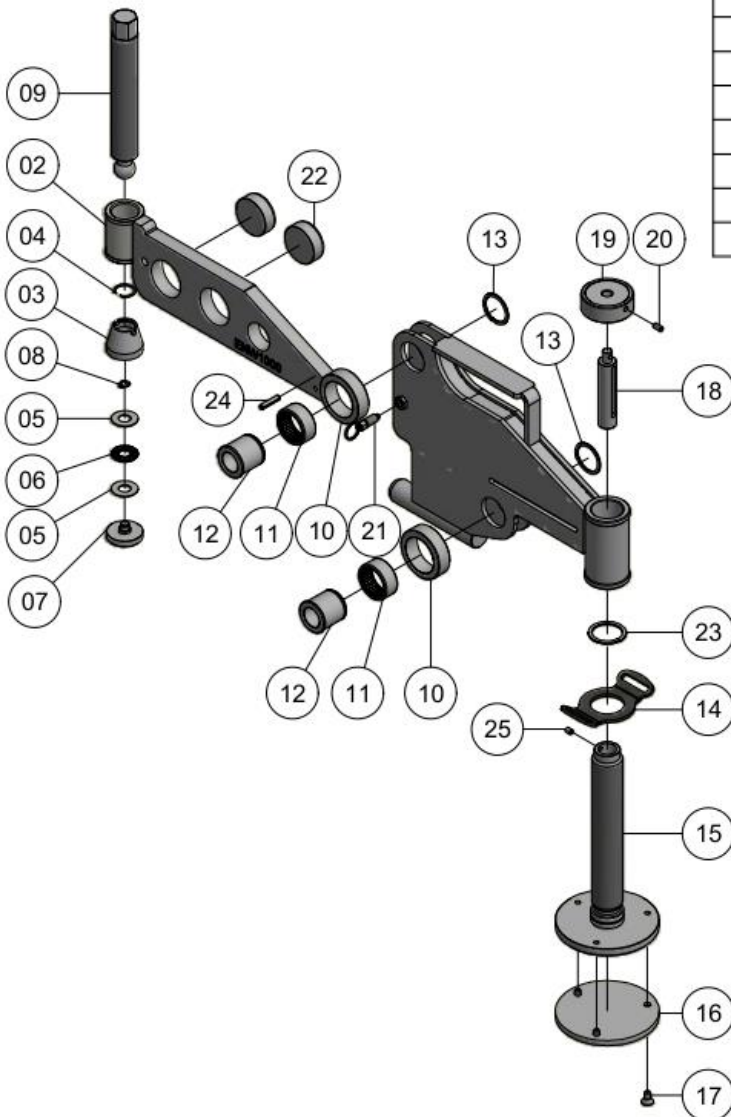


7. Ensure the thrust plate rotates freely before using the tool to align a flange joint



5.5 PARTS LIST

REF NO.	PARTS NO.	DESCRIPTION	QTY
01	B1355B	Main Body	1
02	B1356	Sliding Arm	1
03	E2889	Swivel	1
04	J0512	Spring Clip	1
05	K0092	Thrust Washer	2
06	K0093	Thrust Race	1
07	E2890	Friction Pad	1
08	I0136	Snap Ring	1
09	E2894	Screw Bolt	1
10	E2896	Bearing Base	2
11	K0091	Needle Bearing	2
12	E2891	Roller Shaft	2
13	J0513	Spirol Clip	2
14	C1372	Buckle	1
15	B1357	Leg Screw	1
16	G0837	Round Base Pad	1
17	H0398	Screw	3
18	E2893	Leg Extension Rod	1
19	E1604	Release Knob	1
20	H0050	Screw	1
21	B1358	M8 Spring Plunger	1
22	G0836	Arm Insert	2
23	J0514	Spirol Clip	1
24	I0140	Spring Pin	1
25	H0048	Screw	1



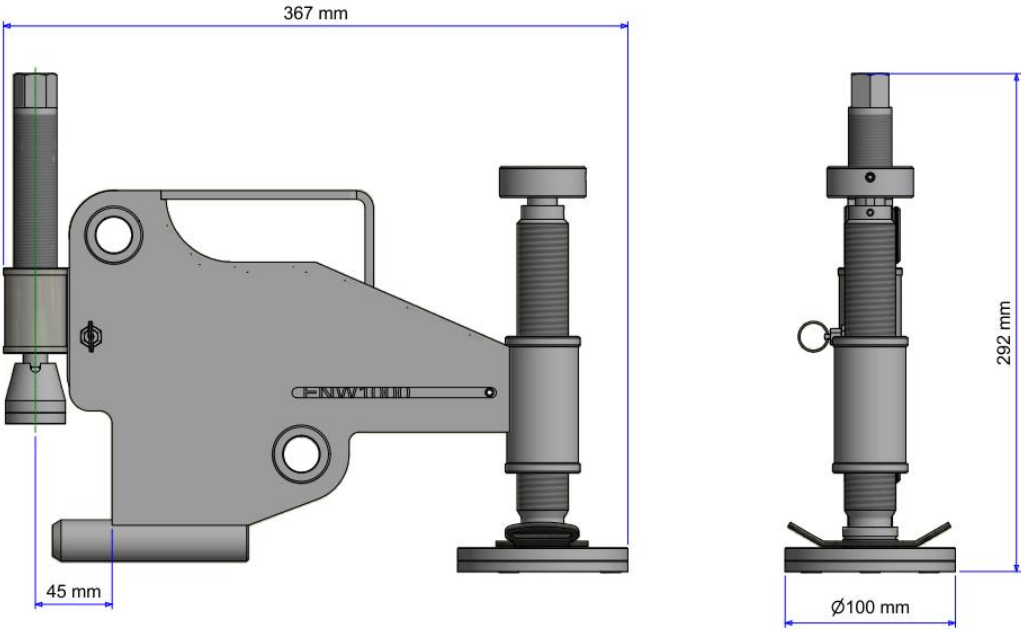
5.6 WEIGHTS AND DIMENSIONS

WEIGHTS

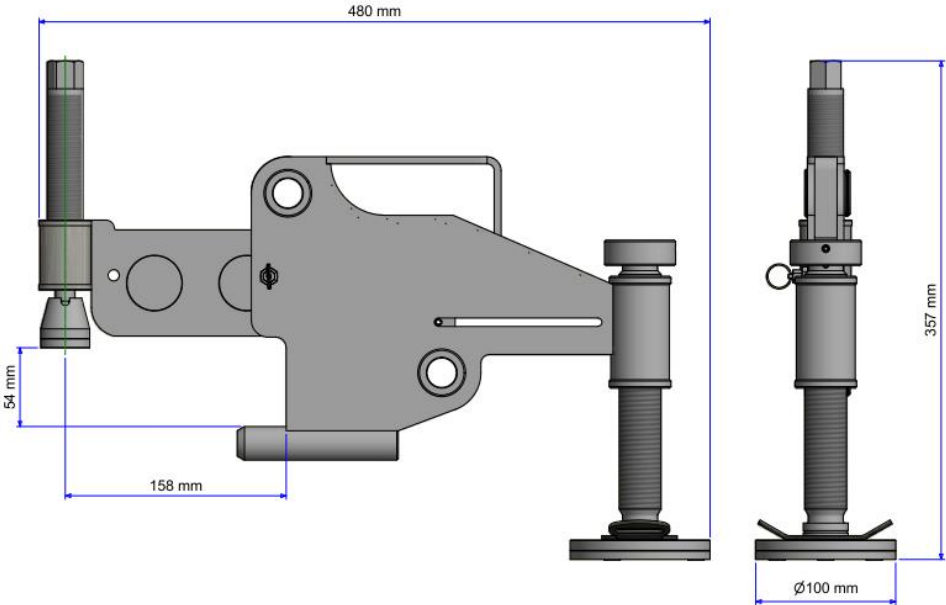
Tool only	= 8.6 kg
Torque wrench/socket	= 0.9 kg
Molding Case	= 2.5 kg
GROSS KIT WEIGHT	= 12.2 kg

DIMENSIONS

MINIMUM EXTENSION



MAXIMUM EXTENSION



5.7 TROUBLESHOOTING

Problem: The thrust plate is sliding along the circumference of the opposite flange as the tool is aligning the joint

Grit or Dirt on wing, rollers or bearings

Ensure the rollers are rotating freely and that there is no restrictions to the rollers on the wing surfaces such as grit or dirt

Wing is at full extension

Ensure the wing has sufficient travel left in order to allow the joint to align

Problem: The tool is attached and appears to be functioning properly, but the joint will not align

There may be something restricting the joint from aligning

Check the area around the joint to establish if there is an obstruction to the joint

The joint may require more than 4.0T (40 kN) force to align

If the joint requires more force than that of the 4.0 T (40kN) tool, then another method of aligning should be adopted

Problem: The thrust plate is twisting on the circumference of the flange when the screw bolt is tightened

There may be Grit or Dirt within the swivel / thrust plate

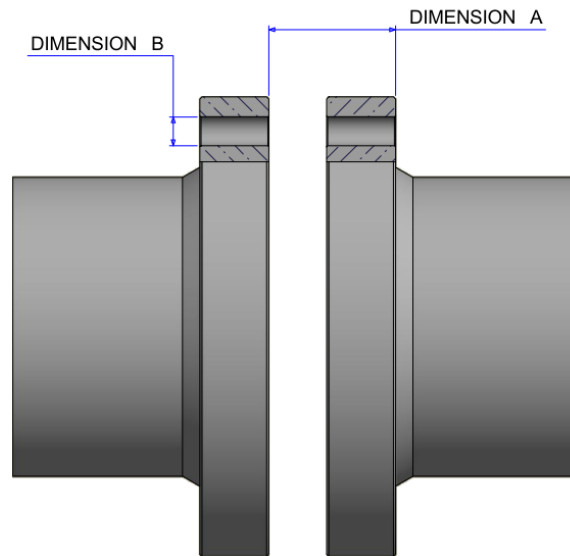
Check that the thrust plate rotates freely. If the thrust plate is not rotating then spray some penetrating liquid into the gap between the swivel and thrust plate in order to loosen it

5.8 APPLICATION DIMENSIONS

MINIMUM AND MAXIMUM FLANGE SIZES

Dimension A: must be between 30 and 133 mm (1.18" and 5.23")

Dimension B: bolt-hole diameter must be 25 mm (1.0") or greater

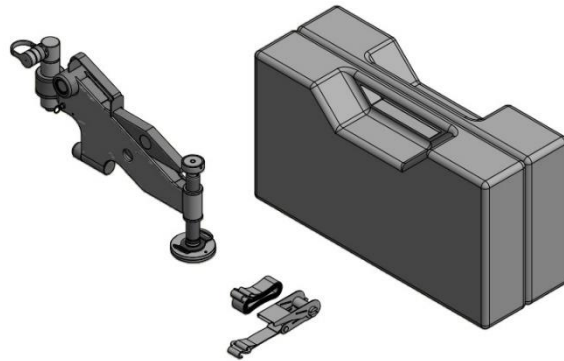


6. H9TFE HYDRAULIC FLANGE ALIGNMENT TOOL

6.1 KIT COMPONENTS

- 1 x H9TFE Tool c/w 6T Hydraulic Cylinder
- 1 x Molding Case
- 1 x Ratchet & Strap

Product Code: H9TFE



6.2 HOW THE H9TFE WORKS

1. The H9TFE is secured to the lower of the two flanges by fully inserting the lift hook into the bolt-hole which is parallel with the bolt-hole at the point of greatest misalignment.
2. The drop leg is adjusted down onto the pipe while the tool is held up level in the bolt hole.
3. The release knob should be loosened to allow the wing to be extended out to the required distance.
4. The hydraulic cylinder should then be adjusted down onto the circumference of the flange opposite by rotating it in a clockwise direction.
5. The hydraulic hose and pump are attached to the cylinder and the hand pump is primed, bringing the joint into alignment.

