

# FA1™

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# FLANGE ALIGNMENT TOOL





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## 1. INTRODUCTION

The Equalizer FA1™ TOOL is an aid of use in normal maintenance and installation procedures to enable the realignment of misaligned flanges within respective working capacities. For example, the tool 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 maximise the service life of the tools.

## 2. TOOL SAFETY

### 2.1 GENERAL SAFETY

These instructions cover the safe operation and maintenance of THE EQUALIZER **FA1™** FLANGE ALIGNMENT 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 700bar (10,000psi).



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). Do not handle pressurised hoses; escaping oil under pressure can penetrate the skin, causing serious injury. Seek medical attention immediately if oil penetration is suspected.



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



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



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



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



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

### 3. TECHNICAL DATA

	<b>Tool Description</b>	<b>Aligning Force</b>
<b>FA1TM</b>	Mechanical Flange Alignment Tool	1.0 T (10kN)

#### 3.1 KIT COMPONENTS

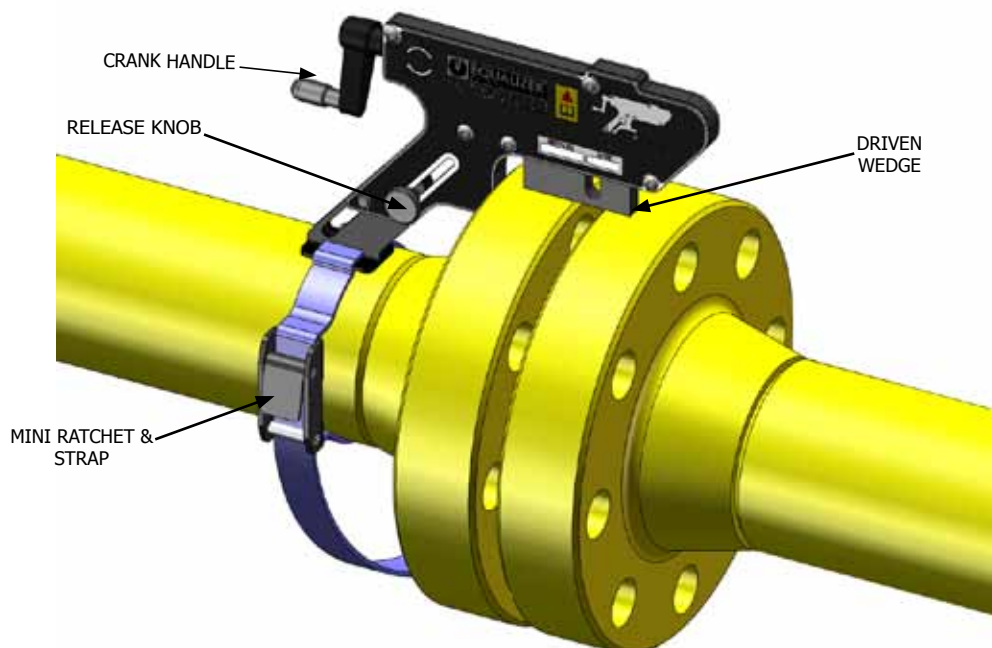
- 1 x FA1TM Tool
- 1 x Mini ratchet strap
- 1 x Instruction Manual

Product Code: FA1TMSTD



#### 3.2 HOW THE FA1TM WORKS

1. The FA1TM 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 release knob is slackened and the drop leg is adjusted down to the pipe while the tool is held level in the bolt-hole.
3. The drop leg release knob is then tightened until firm.
4. The strap and buckle are attached to the drop leg and around the pipe for added security.
5. The crank handle is then turned clockwise until the driven wedge comes into contact with the circumference of the opposite flange.



## 4. FLANGE MISALIGNMENT DETERMINATION PROCEDURE

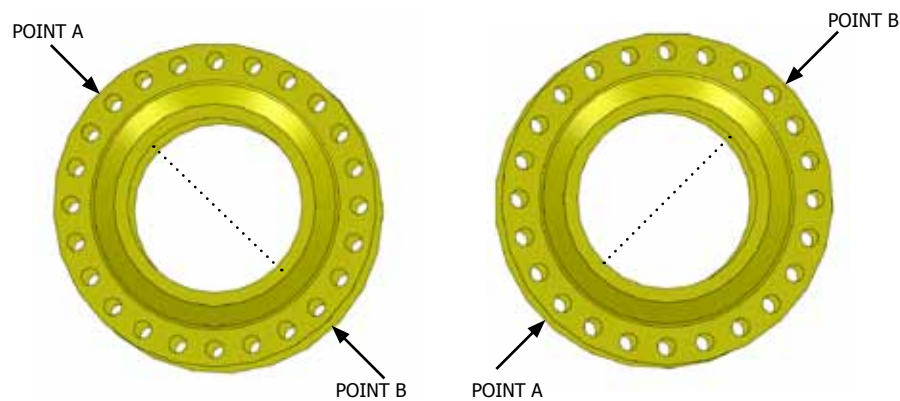
The tool being used must not be attached to a flanged joint prior to the misalignment procedure being carried out.

### 4.1 LATERAL MISALIGNMENT

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

A flange 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 misalignment (point A or point B in the examples shown below) as shown in sections 3.2 & 5.1.

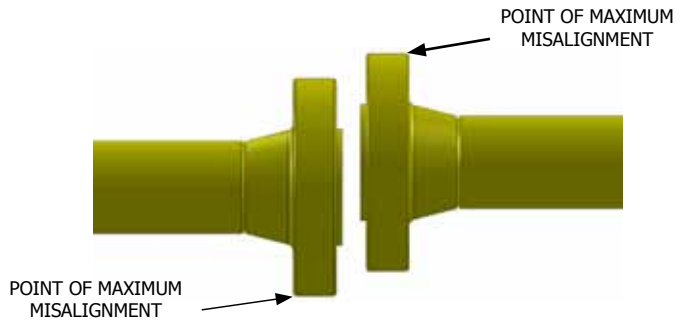


## 5. FA1TM MECHANICAL FLANGE ALIGNMENT TOOL

### 5.1 INSTALLATION AND OPERATION

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.

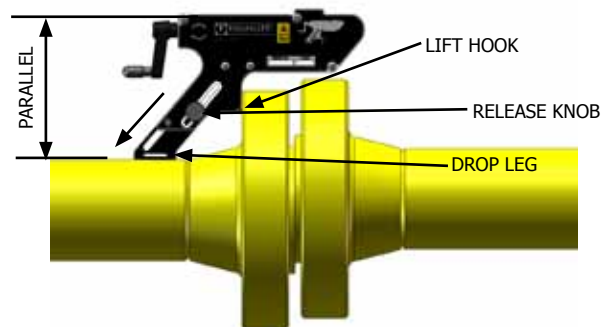


2. Guide the lift hook into the bolt-hole at the point of maximum misalignment.

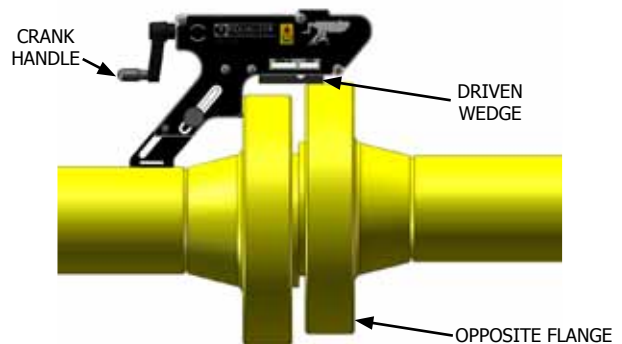
Adjust the drop leg down onto the pipe by slackening the release knob in an anticlockwise direction.

The tool should be held up level within the bolt-hole during adjustment.

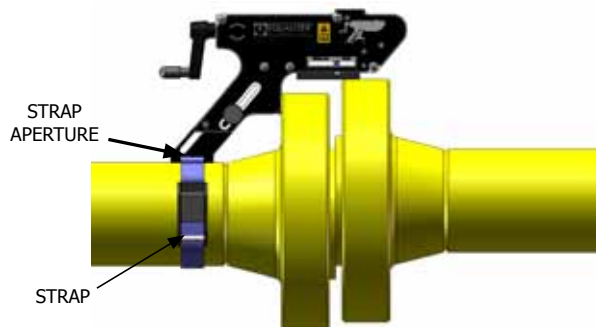
NB: The tool must be parallel to pipe during operation.



3. Rotate the crank handle clockwise until the driven wedge makes contact with the opposite flange.

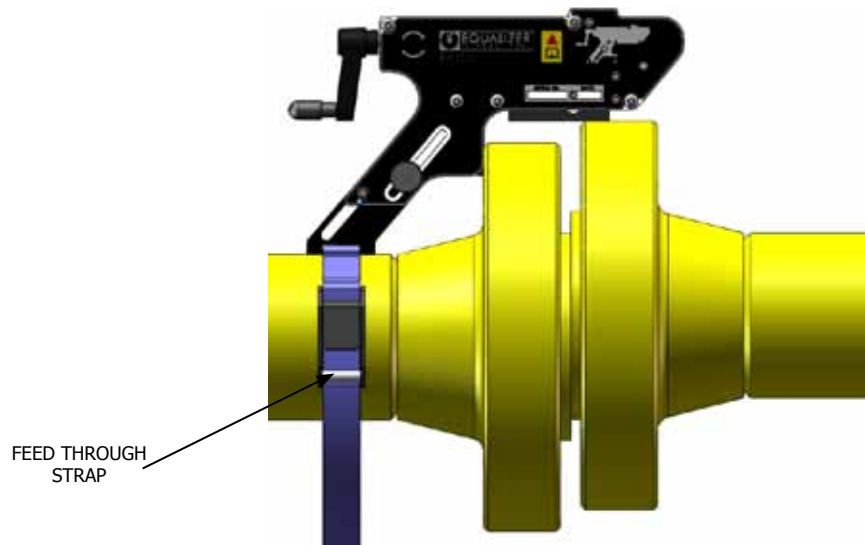


4. Thread the strap through the aperture on the base of the drop leg as shown.

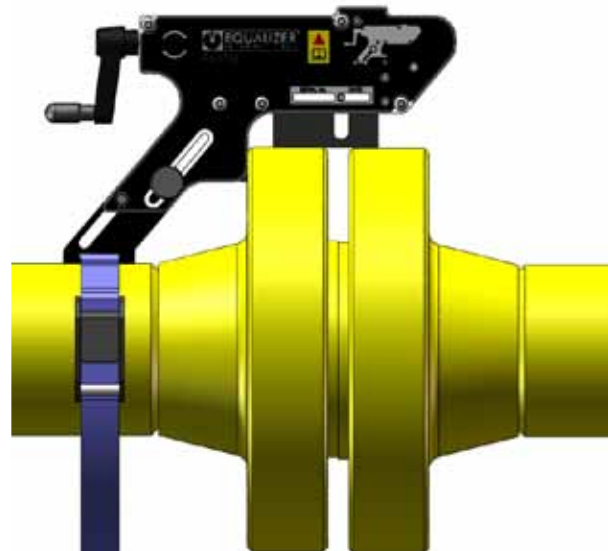
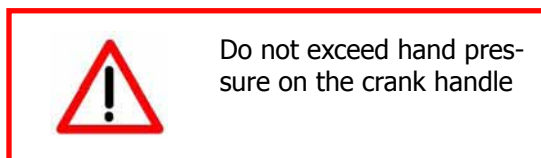




5. Feed the open end of the strap through the buckle mechanism as shown. Close the clasp to secure strap.



6. Now that everything is secured, rotate the handle clockwise to apply pressure to the circumference of the opposite flange & bring the flange joint in alignment.



7. 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 FA1™ is located) remove the tool by reversing steps 2-6. 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.

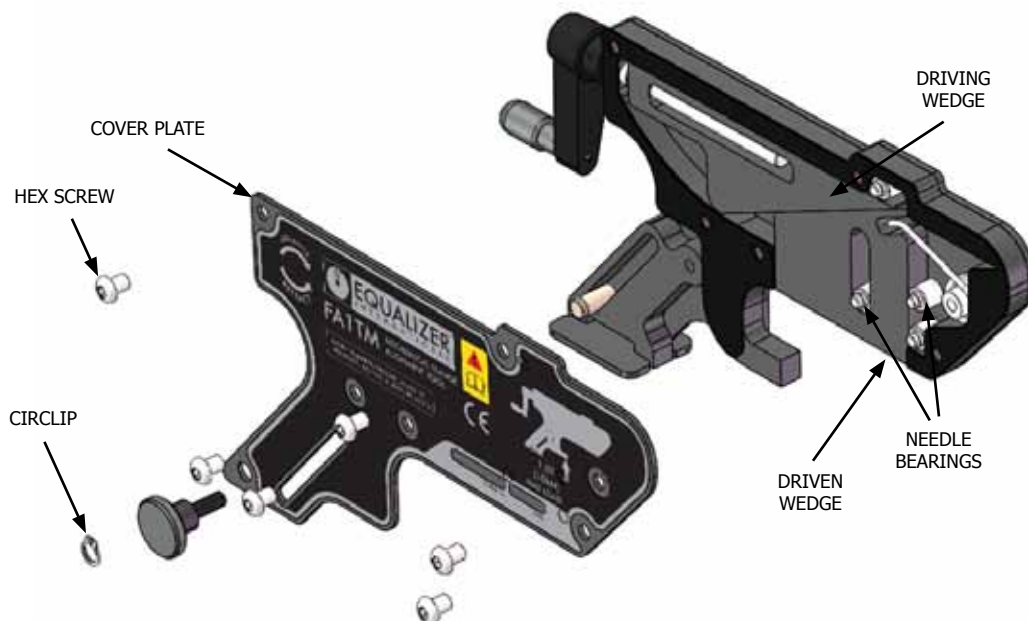
## 5.2 EXAMINATION & STORAGE

1. On return from each job before allocation against subsequent work, the completeness of the Equalizer FA1™ kit must be established and items examined to ensure that they are serviceable.
2. Any missing or damaged items are to be replaced as soon as possible and prior to the tool being used again.
3. Store the FA1™ in a cool, dry place and ensure all machined surfaces are greased.
4. Ensure wedges, pins and legs remain grit free and that parts move freely.

## 5.3 MAINTENANCE

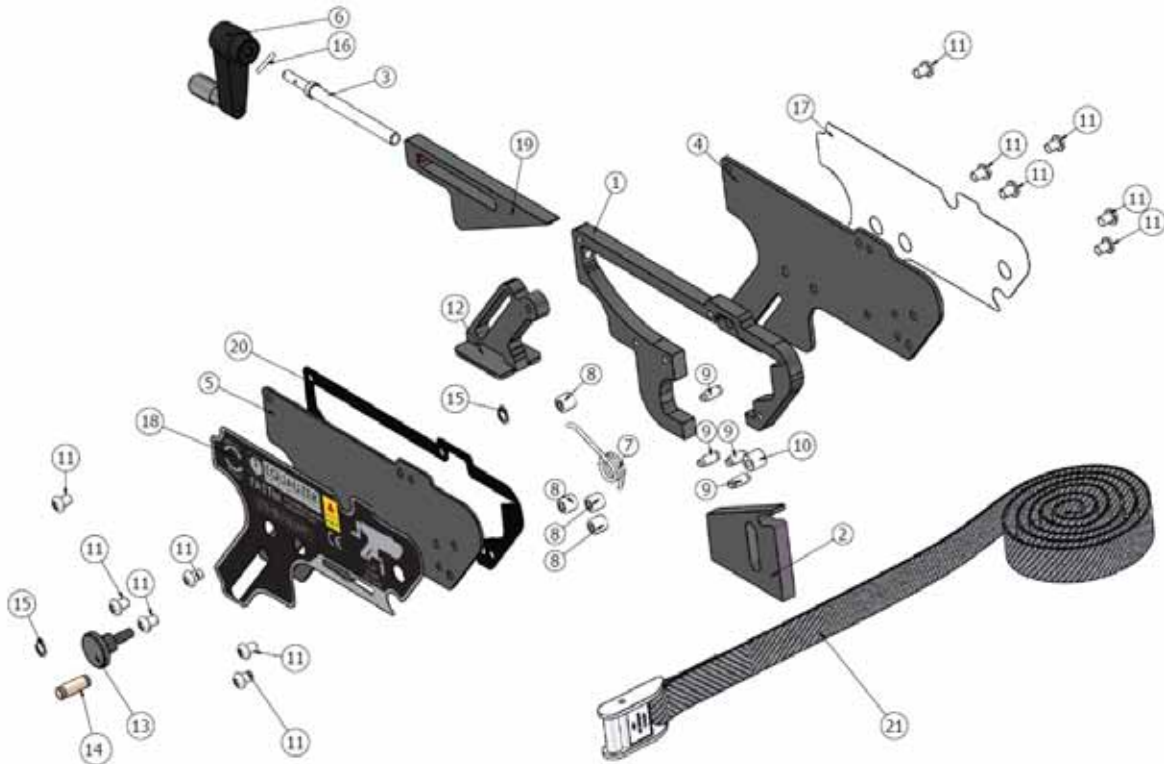
1. Secure the tool upright on a bench.
2. Using a small flat screwdriver, lever out one circlip and unscrew 6 x 6mm hex screws.
3. Remove cover plate and remove any dirt or corrosion from moving parts.
4. Inspect components for wear and damage, replace if necessary! If there is no damage present, then they can be greased and re-assembled by reversing steps 1-4.

Recommended grease –  
 Rocol Sapphire Hi-Load or equivalent good quality hi load bearing grease.



## 5.4 PARTS LIST

NO.	PART NUMBER	DESCRIPTION	QTY.
1	210200-01	BODY FRAME	1
2	210300-01	DRIVEN WEDGE	1
3	210400-01	DRIVE SCREW	1
4	210501-01	BASE PLATE (3mm)	1
5	210500-01	COVER PLATE (2mm)	1
6	210600-01	CRANK HANDLE	1
7	210800-01	TORSION SPRING	1
8	210900-01	NEEDLE BEARING	4
9	211100-01	BEARING SHAFT	4
10	211200-01	SPRING MANDREL	1
11	211300-01	M6 x 8mm SOCKET FL. BT. SCREW	12
12	211800-01	DROP LEG	1
13	230203-01	M6 RELEASE KNOB	1
14	211900-01	LEG PIN 8mm	1
15	212000-01	SPRING RING 8mm	2
16	210700-01	SPRING PIN 2 x 16mm	1
17	070280-01	BODY STICKER LEFT	1
18	070281-01	BODY STICKER RIGHT	1
19	210100-01	DRIVING WEDGE	1
20	211600-01	SPACER SHIM	1
21	220800-01	MINI RATCHET STRAP	1



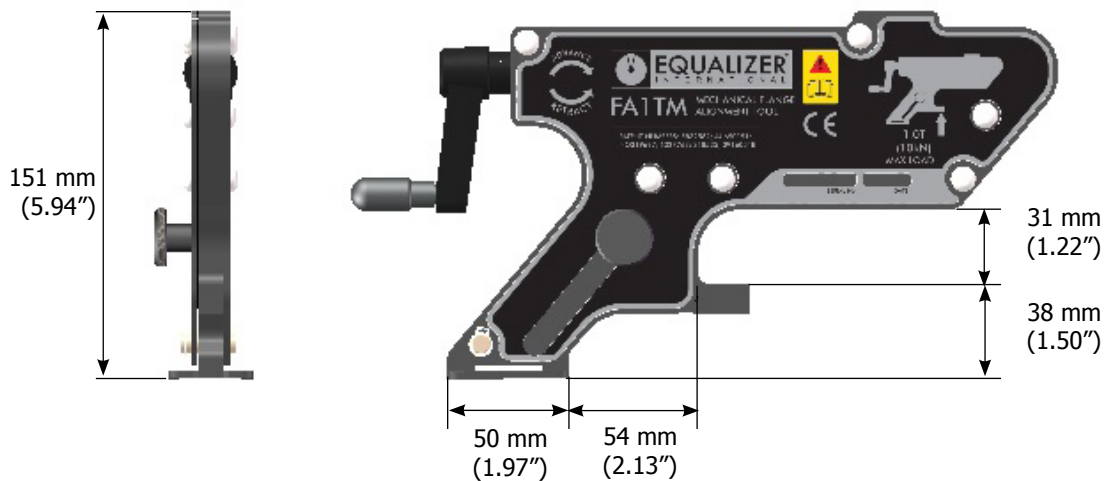
## 5.5 WEIGHTS & DIMENSIONS

### WEIGHTS

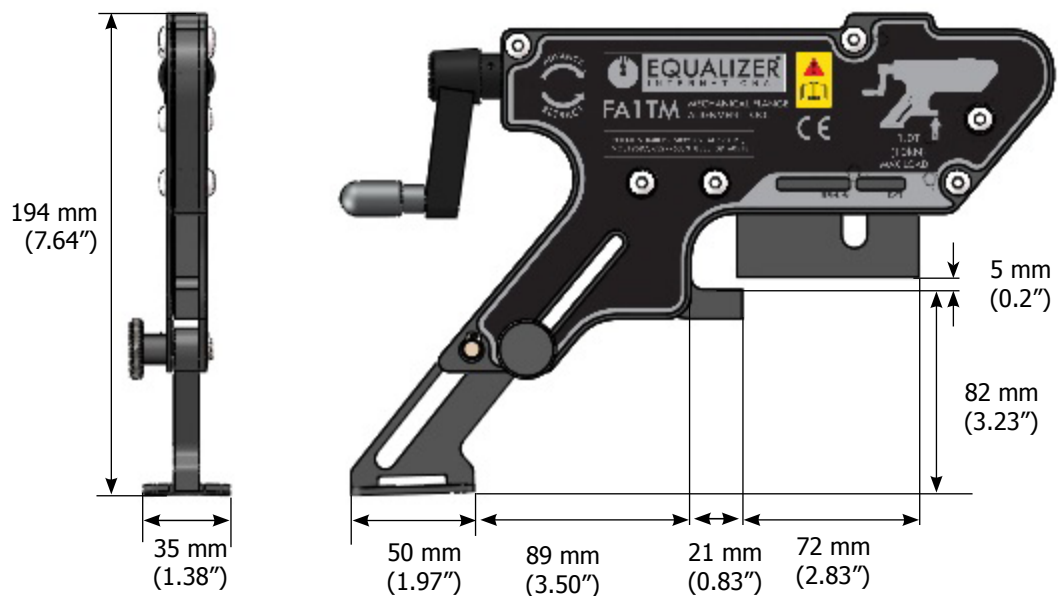
Tool only	= 2.1 kg (4.63 lb)
Ratchet & strap	= 0.2 kg (0.44 lb)
<b>GROSS KIT WEIGHT</b>	<b>= 2.3 kg (5.07 lb)</b>

### DIMENSIONS

#### MINIMUM EXTENSION



#### MAXIMUM EXTENSION



## 5.6 TROUBLESHOOTING

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

There may be something restricting the joining from aligning.

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

The joint may require more than 1.0 T (10 kN) force to align.

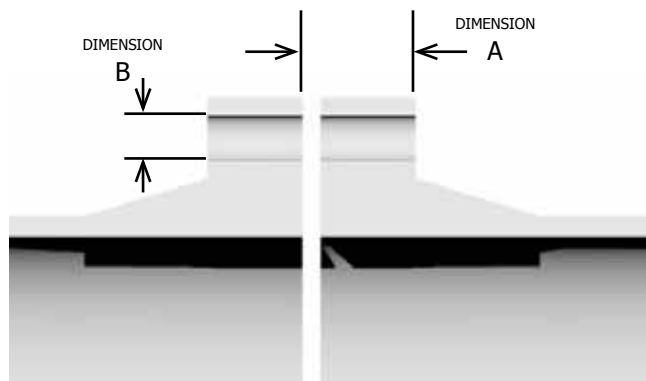
If the joint requires more force than that of the 1.0 T (10kN) tool, attach a second tool or another method of aligning should be adapted.

## 5.7 APPLICATION DIMENSIONS

### MINIMUM AND MAXIMUM FLANGE SIZES

Dimension A: must be between 14 and 82mm (0.55" and 3.23").

Dimension B: bolt-hole diameter must be 16mm (0.63") or greater



# 6. RANGE OF APPLICATION

## 6.1 BS10 FLANGE RANGE OF APPLICATION

CLASS A	NPS		3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"	26"	27"	29"	30"	33"	35"	36"	39"	42"	45"	48"	54"	60"	66"	72"	84"	96"	108"	120"
	TOOL	FA1TM																																								
CLASS D	NPS		4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"	29"	30"	33"	35"	36"	39"	42"	45"	48"	54"	60"	66"	72"	78"	84"	96"	108"	120"		
	TOOL	FA1TM																																								
CLASS E	NPS		1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"	27"	29"	30"	33"	35"	36"	39"	42"	45"	48"				
	TOOL	FA1TM																													FA4TM											
CLASS F	NPS		1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"														
	TOOL	FA1TM																													FA4TM											
CLASS H	NPS		1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"														
	TOOL	FA1TM																													FA4TM											
CLASS J	NPS		1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"														
	TOOL	FA1TM																													FA4TM											
CLASS K	NPS		1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"																	
	TOOL	FA1TM																													FA9TE											
CLASS R	NPS		1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	7"	8"	9"	10"	12"	13"	14"	15"	16"	17"	18"	19"	20"																	
	TOOL	FA1TM																													FA4TM											
CLASS S	NPS		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"																	
	TOOL	FA1TM																													FA9TE											
CLASS T	NPS		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	6"	7"	8"	9"	10"	11"	12"	13"																				
	TOOL	FA1TM																							FA9TE																	

SUITABLE FOR FA1TM TOOL
SUITABLE FOR FA4TM TOOL
SUITABLE FOR FA9TE TOOL
NOT SUITABLE FOR TOOLS

### API6B WELD NECK FLANGE RANGE OF APPLICATION

CLASS 20K	NPS		1 13-16"	2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"
	TOOL	FA4TM											
CLASS 15K	NPS		1 13-16"	2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"
	TOOL	FA4TM											
CLASS 10K	NPS		1 13-16"	2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"
	TOOL	FA4TM											

### API6B WELD NECK FLANGE RANGE OF APPLICATION

CLASS 5K	NPS		2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"	21 1-4"
	TOOL	FA1TM											
CLASS 3K	NPS		2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"	21 1-4"
	TOOL	FA1TM											
CLASS 2K	NPS		2 1-16"	2 9-16"	3 1-8"	4 1-16"	5 1-8"	7 1-16"	9"	11"	13 5-8"	16 3-4"	21 1-4"
	TOOL	FA1TM											

## 6.2 ASME B16.5 FLANGE RANGE OF APPLICATION

CLASS	RANGE OF APPLICATION																			
CLASS 150	NPS	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL								FA1TM											FA4TM
CLASS 300	NPS	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL								FA1TM											FA4TM
CLASS 400	NPS	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL								FA1TM											FA4TM
CLASS 600	NPS	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL								FA1TM											FA4TM
CLASS 900	NPS	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL	FA1TM							FA4TM											
CLASS 1500	NPS	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL	FA1TM							FA4TM											
CLASS 2500	NPS	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
	TOOL	FA1TM							FA4TM											

## ASME B16.47 FLANGE RANGE OF APPLICATION

CLASS	RANGE OF APPLICATION															
CLASS 150	NPS	22"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"		
	TOOL				FA4TM									FA9TE		
CLASS 300	NPS	22"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"		
	TOOL				FA4TM									FA9TE		
CLASS 400	NPS	22"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"		
	TOOL				FA4TM									FA9TE		
CLASS 600	NPS	22"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"		
	TOOL				FA4TM									FA9TE		
CLASS 900	NPS	22"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"		
	TOOL				FA4TM									FA9TE		

## DIN WELD NECK FLANGE RANGE OF APPLICATION

CLASS	RANGE OF APPLICATION																								
CLASS PN16	NPS	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	24"	28"	32"	36"	40"	48"	56"	72"	80"
	TOOL																			FA1TM					
CLASS PN25	NPS	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	24"	28"	32"	36"	40"
	TOOL																								FA4TM
CLASS PN40	NPS	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"									
	TOOL																								FA4TM
CLASS PN64	NPS	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"									
	TOOL																								FA4TM
CLASS PN100	NPS	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"									
	TOOL																								FA9TE
CLASS PN160	NPS	3/8"	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"									
	TOOL																								FA9TE

	SUITABLE FOR FA1TM TOOL
	SUITABLE FOR FA4TM TOOL
	SUITABLE FOR FA9TE TOOL
	NOT SUITABLE FOR TOOLS

### 6.3 SPO FLANGE RANGE OF APPLICATION

CLASS	SPO FLANGE RANGE OF APPLICATION																										
CLASS 150	TOOL	FA41TM																									
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"
CLASS 300	TOOL	FA1TM												FA41TM													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"
CLASS 600	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"
CLASS 900	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"
CLASS 1500	TOOL	FA9TE																									
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"
CLASS 2500	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"										
CLASS 5000	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"										
CLASS 7500	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"										
CLASS 10000	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"										
CLASS 15000	TOOL	FA41TM												FA9TE													
		NPS	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"										

SUITABLE FOR FA1TM TOOL
SUITABLE FOR FA41TM TOOL
SUITABLE FOR FA9TE TOOL
NOT SUITABLE FOR TOOLS