LPHT312

Low Pressure Hot Tapping Machine

OPERATION & MAINTENANCE MANUAL

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Version History

All Enerpac documentation is quality controlled and audited in accordance with **BS EN ISO 9001:2008**; the scope of which covers design, manufacture and repair of in-situ machine tools.

Version No.	Implemented By	Revision Date	Approved By	Approval Date	Comments
1	DRB	13-04-17	DC	13-04-17	1st Issue
2	STH	08/2020	-	-	Enerpac rebrand

Operation & Maintenance Manual Approval

The undersigned acknowledge they have reviewed this Machine Operation & Maintenance Manual and agree with the approach it presents. Changes to this Operation & Maintenance Manual will be coordinated with, and approved by, the undersigned or their designated representatives.

Approver 1

Signature:  **Date:** **13-04-17**

Print Name: **Geoff Bull**

Title: **Operations Manager**

Approver 2

Signature:  **Date:** **13-04-17**

Print Name: **David Cochrane**

Title: **Design Manager**

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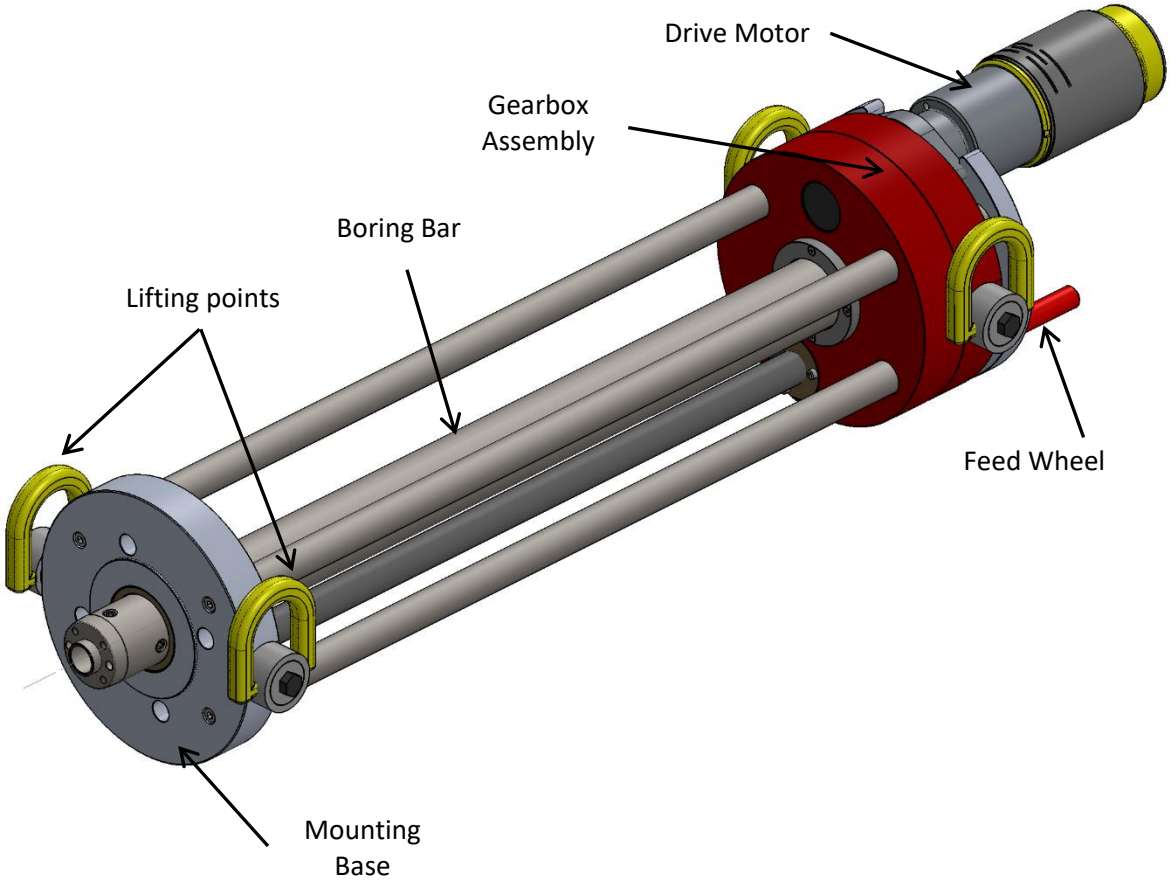
1. Introduction

1.1. Overall Equipment Description

The LPHT312 is a Low Pressure Hot Tapping Machine featuring a Pneumatically powered boring bar, and a manually operated feed for the cutter assembly.



2. Machine Warranty

See Document Pack.

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3. Health and Safety

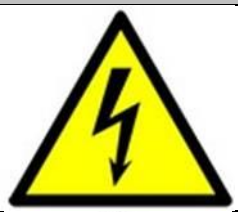
Enerpac has made every effort to ensure that the Information given in this Operation & Maintenance manual, and other publications relating to this machine is correct and understandable. However it is acknowledged that there may be errors or omissions in this publication.

The company also reserves the right not to provide updates, corrections or amendments to this publication but will endeavour to keep its customers up to date with all changes that may affect the machine operation or safety.

3.1. Mandatory Safety Signs (for the purpose of trials at Enerpac)

ISO 7010 SYMBOL	SAFETY DESCRIPTION
	**WEAR EYE PROTECTION**
	**EAR PROTECTION MUST BE WORN**
	**HARD HATS MUST BE WORN**
	**PROTECTIVE GLOVES MUST BE WORN**
	**PROTECTIVE FOOTWEAR MUST BE WORN**
	**OVERALLS MUST BE WORN**
	**MACHINE GUARDS MUST BE USED**

3.2. Machine Hazards Signs

ISO 7010 SYMBOL	HAZARD DESCRIPTION
	**DANGER HIGH VOLTAGE**
	**WARNING MOVING MACHINERY**
	**CAUTION MOVING MACHINERY**
	**WARNING KEEP HANDS CLEAR**

3.3. Safety Procedures

Detailed in this chapter is a list of good Health and Safety practices that Enerpac advise users to adhere to. Due to the nature of portable machine tools, not every eventuality can be catered for and the following is not exhaustive, as such Enerpac strongly advise that the user carries out their own risk assessments based on the machining and environment in which they intend to use the machinery.

3.3.1. Pre-Operational Safety Checks

1. Always read safety signs / labels
2. Ensure no slip / trip hazards are present in workspaces and walkways
3. Locate and ensure you are familiar with the operation of the ON / OFF starter and E-Stop *(if fitted)*
4. Do not leave equipment on top of the machine
5. Ensure each tool is in good condition and securely mounted
6. Secure / Remove loose items
7. Faulty equipment must not be used. **Immediately report any suspect machinery**

3.4. Operational Safety Checks

1. Operator is fully conversant and trained in use of equipment
2. Keep clear of moving machine parts
3. Never leave the machine running unattended
4. Follow correct clamping procedures - keep overhangs as small as possible and check work piece is secure
5. Set the correct speed to suit the tool, the depth of cut and the material
6. Before making adjustments and measurements or before cleaning swarf accumulations switch off and bring the machine to a complete standstill

3.4.1. Housekeeping

1. Switch off the machine
2. Remove milling cutters, drill attachments and tap attachments and store them safely (if applicable)
3. Leave the machine and work area in a safe, clean and tidy state

3.4.2. Potential Hazards

1. Sharp cutters
2. Moving components – hair / clothing entanglement
3. Eye injury
4. Skin irritation
5. Metal splinters and burrs
6. Flying debris

4. Handling

Customers, users and operators of the machines must be aware of the nature of the equipment supplied.

Although inherently robust, the machine is a precision tool and may be damaged by poor handling, tipping and falling, inadequate transport arrangements over e.g. rough terrain, misuse by operators and use outside its design specification.

Such poor handling may result in either broken or damaged parts or disturbance to fine settings resulting in an inability to meet the specified machining tolerances and capabilities.

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5. Machine Specification

The Enerpac LPHT312 Low Pressure Hot Tapping Machine has been designed for accurate in-situ machining of work surfaces, to this end the constituent parts are easily manipulated by hand or crane.

Description	Value	
Boring Depth	762mm Max	
Feed Rate	3.5mm/rev	0.137”/rev
Drive Motor Requirements (Max)	2900L/min	6 Bar
Drive Motor Power	4 Hp	3 Kw
Boring Bar Speed (Max)	38 RPM	
Machine Weight (Without cutter assembly)	75.4 Kg	166.2 Lbs
Designed For General Use		

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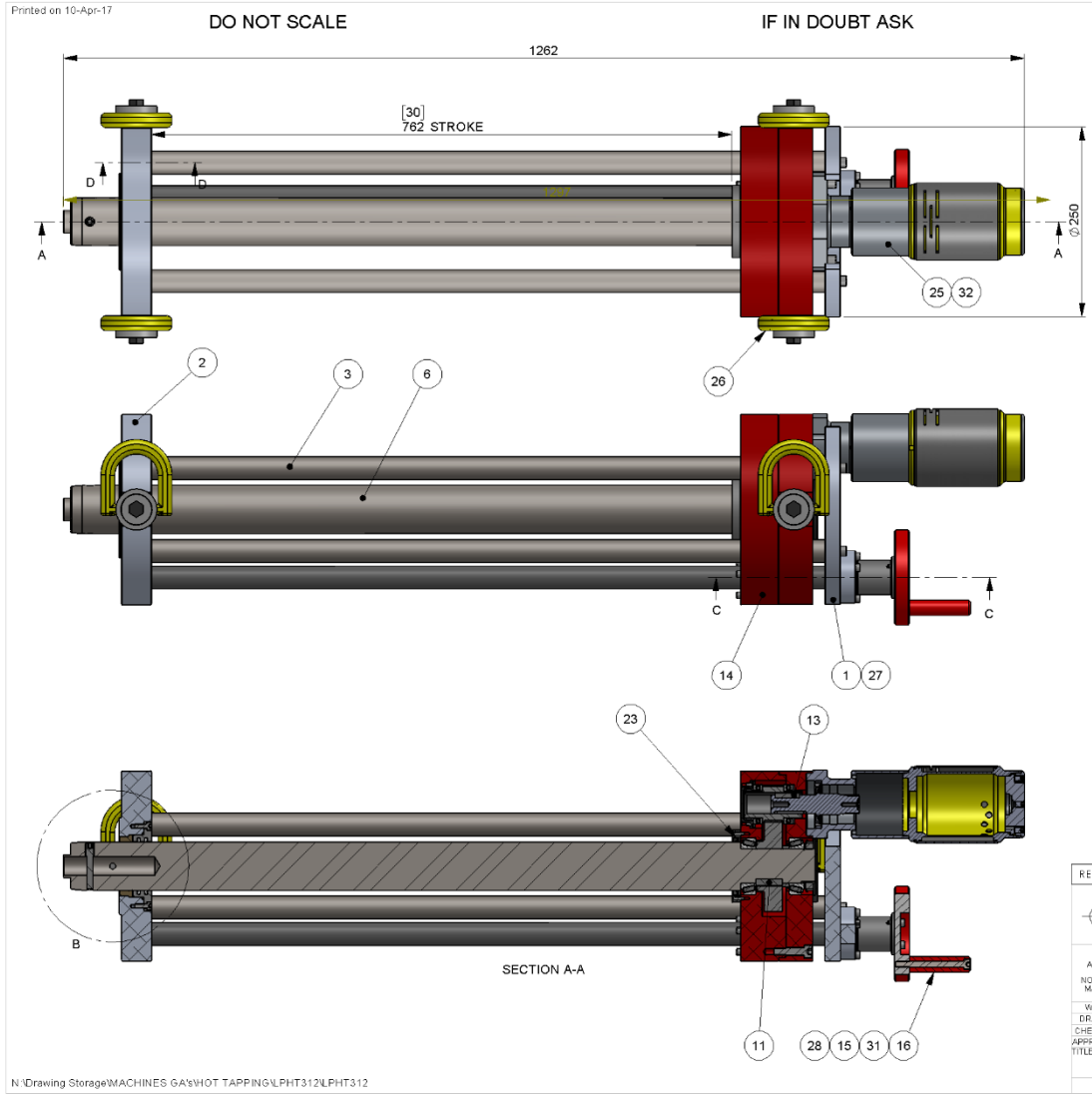
5.1. General Assembly Drawings



ITEM NO	REV.	PART NUMBER	DESCRIPTION	QTY
1		LPHT312-1-003	TOP PLATE	1
2		LPHT312-1-004	BOTTOM PLATE	1
3		LPHT312-1-005	SUPPORT ROD	4
4		LPHT312-1-006	BEARING THRUST CAP	1
5		LPHT312-1-007	FEED SCREW	1
6		LPHT312-1-008	BORING BAR	1
7	A	LPHT312-1-009	SEAL CARTRIDGE	1
8		LPHT312-1-010	BAR SUPPORT BUSH	1
9		LPHT312-1-018	SUPPORT ROD INSERT	8
10		LPHT312-1-019	FEED ENGAGEMENT KNOB	1
11		LPHT312-1-020	DRIVE KEY	1
12		LPHT312-1-021	LOCATION PIN	2
13		LPHT312-1-022	STEPPED DRIVE KEY	1
14		LPHT312-1	GEARBOX ASSEMBLY	1
15	C	HTD 0432	handwheel	1
16	A	HTD 0434	HANDWHEEL KNOB	1
17		ML0107	captive washer	1
18		3205 A-2RS1	DOUBLE ROW ANGULAR CONTACT BEARING	1
19		MB5	LOCKING WASHER	1
20		KM5	LOCK NUT	1
21		6005-2RS	SINGLE ROW DEEP GROOVE BALL BEARING	1
22		R009F 63.5x74.5x4.2	ROTARY SEAL	2
23		24863	RADIAL SHAFT SEAL	1
24		OR3008200	O-RING	1
25		MT30LT0095HCL4F	AIR MOTOR	1
26		RLP-M12-10	ROTATING LIFTING POINT	4
27		M8 x 30	Hex Socket Head - BS EN ISO 4762	8
28		M6 x 16	Hex Socket Head - BS EN ISO 4762	10
29		M6 x 40	Hex Socket Head - BS EN ISO 4762	4
30		M6 x 20	COUNTERSUNK HEX SOCKET SCREW	1
31		M8 x 90	Hex Socket Head	1
32		M12 x 30	Hex Socket Head - BS EN ISO 4762	2

MIRAGE MACHINES
APPROVED FOR MANUFACTURE

REV.	INC.	DESCRIPTION	DATE	DRAWN BY	APPROVED

THIRD ANGLE PROJECTION

WEIGHT	75.440Kg	
DRAWN BY	DC	24-Mar-17
CHECKED BY	DB	04-Apr-17
APPROVED BY	RMS	04-Apr-17

MIRAGE PORTABLE PERFORMANCE

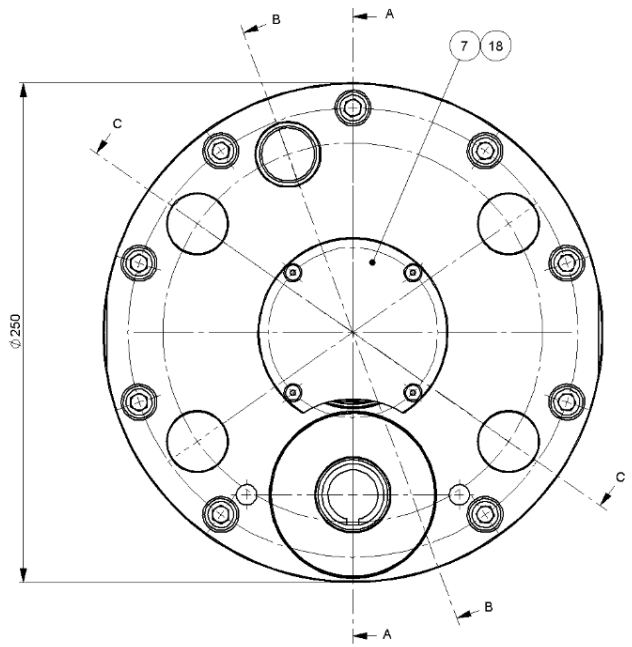
10 ENTERPRISE WAY, JUBILEE PARKWAY, STORES ROAD, DERBY DE21 4BB
TEL (01332) 291767 FAX (01332) 370356
E MAIL info@mirage-machines.co.uk

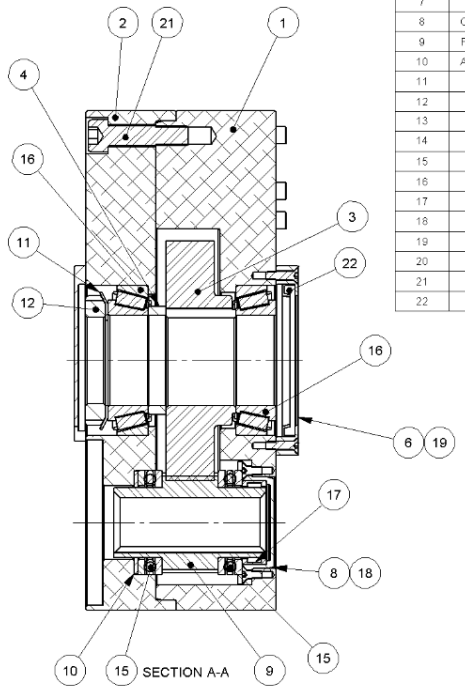
TITLE: LOW PRESSURE PNEUMATIC HOT TAPPING MACHINE
SCALE: 1:5
DWG No: LPHT312
SHEET 1 OF 2
A3

Printed on 29-Mar-17

DO NOT SCALE

IF IN DOUBT ASK





ITEM NO.	REV.	PART NUMBER	DESCRIPTION	QTY
1		LPHT312-1-001	GEAR HOUSING	1
2		LPHT312-1-002	GEAR HOUSING LID	1
3		LPHT312-1-011	52t DRIVE GEAR	1
4		LPHT312-1-012	GEAR SPACER	1
5		LPHT312-1-015	FEED NUT	1
6		LPHT312-1-016	SEAL COVER	1
7		LPHT312-1-017	TOP COVER	1
8	C	HTD0406	GEAR SEAT	1
9	F	HTD0407C	21t DRIVE GEAR	1
10	A	HTD0533	MOTOR GEAR SPACER	1
11		MB9	LOCK WASHER FOR NOTCHED NUT Ø45	1
12		KM9	LOCK NUT M45 x 1.5	1
13		QFM-3034-37-2	Iglidur® Q Flange Bearing	4
14		QSM-3034-20	Iglidur® Q Sleeve Bearing	4
15		51107	THRUST BEARING	2
16		32009	SINGLE ROW TAPER ROLLER BEARING	2
17		HK 3512	NEEDLE ROLLER BEARING	1
18		M4 X 10	Hex Socket CTSK Head - BS EN ISO 10642	6
19		M4 x 16	Hex Socket CTSK Head - BS EN ISO 10642	4
20		M5 x 16	Hex Socket Head - BS EN ISO 4762	3
21		M10 x 40	Hex Socket Head - BS EN ISO 4762	9
22		24863	RADIAL SHAFT SEAL	1

MIRAGE MACHINES

APPROVED FOR MANUFACTURE

REV.	INC.	DESCRIPTION	DATE	DRAWN BY	APPROVED

THIRD ANGLE PROJECTION

MIRAGE PORTABLE PERFORMANCE

WEIGHT	13.163Kg	
DRAWN BY	DC	23-Mar-17
CHECKED BY	DB	27-Mar-17
APPROVED BY	--	

10 ENTERPRISE WAY, JUBILEE PARKWAY, STORES ROAD, DERBY DE21 4BB
TEL (01332) 291767 FAX (01332) 370356
E MAIL info@mirage-machines.co.uk

TITLE: GEARBOX ASSEMBLY

SCALE: 1:2

DWG No: LPHT312-1

A3

SHEET 1 OF 2

N:\Drawing Storage\MACHINES GA's\HOT TAPPING\LPHT312\LPHT312-1

A3 ASSEMBLY (AUTO) - 7-4-2009

Doc: LPHT312 Issue: 001 Issue Date: 10.04.17

6. Installation

6.1. *Machine Set-up*

6.2. *Fitting Cutters & Pilot Drills*

Shown below is data relating to the cutters & pilot drills that are compatible with the LPHT312.

Each cutter has a unique corresponding flange adaptor, and there are three available pilot drills which cover the range of cutters. The correct pilot drill MUST be used with its corresponding cutter. All these cutters & drills are available from Enerpac.

Select the required cutter & pilot drill combination from the list below for your required application.

LPHT312 Standard, Hot Tapping Cutter Data											
Nominal Cutter Size	**Actual Cutter Size**		**Standard Hot Tap Cutters**			**Standard Hot Tap Pilot Drills**			**Flange Adaptors**		
In	**In**	**MM**	**Lbs**	**Kgs**	**Part No**	**Part No**	**Lbs**	**Kgs**	**Part No**	**Lbs**	**Kgs**
3	2.4	61.5	1.1	0.5	LPC-3	LPPD-4	1.1	0.48	150-3FA-3	28.9	13.1
4	3.4	86.9	2.2	1	LPC-4				150-4FA-3	32.8	14.9
6	5.4	137.7	5.5	2.5	LPC-6	LPPD-8	1.3	0.57	150-6FA-3	42.8	19.4
8	7.4	188.5	11.6	5.3	LPC-8				150-8FA-3	67.7	30.7
10	9.4	239.3	18.5	8.4	LPC-10	LPPD-12	1.5	0.67	150-10FA-3	112.2	50.9
12	11.4	290.1	27.6	12.5	LPC-12				150-12FA-3	159.8	72.5

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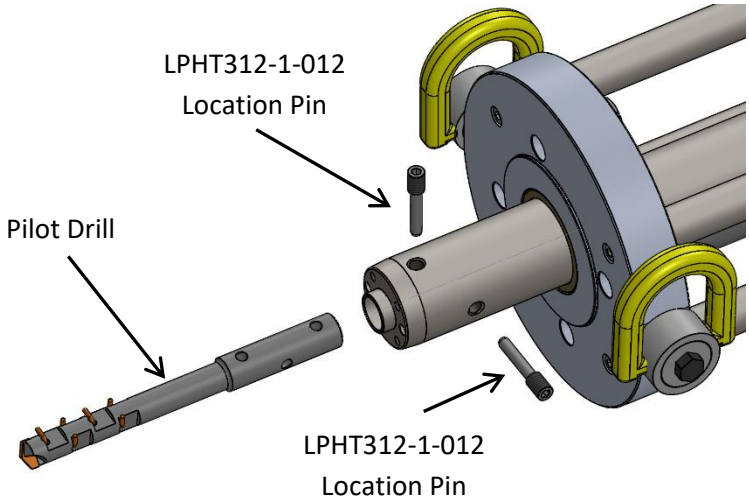
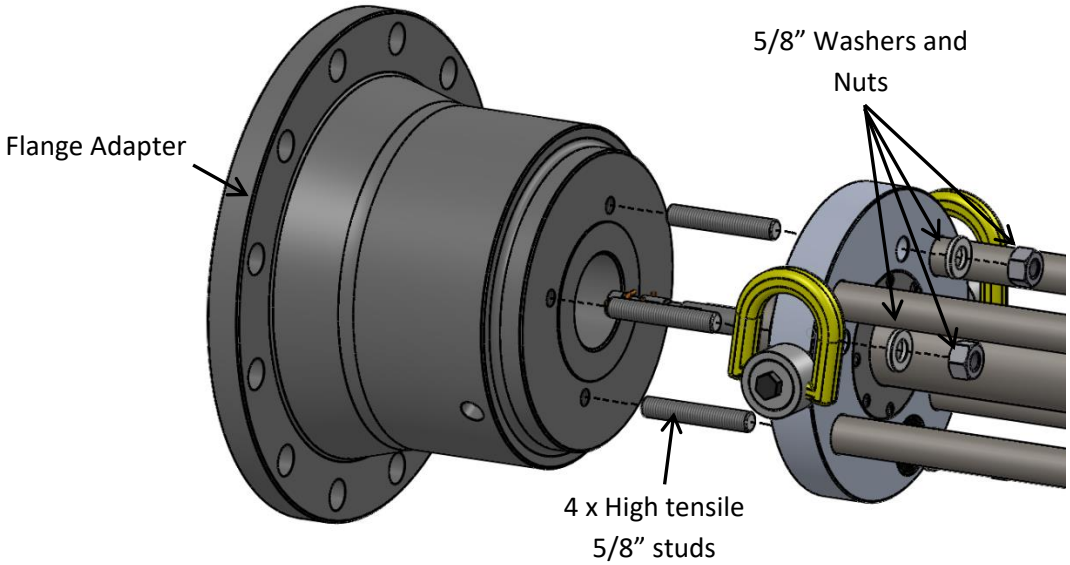
To install the pilot drill, fit the drill into the boring bar and secure with x2 LPHT312-1-021 location pins and tighten them to ensure pilot drill is fixed in place. Note that there are three positions for the location pins in the pilot drill, when using a pilot drill for 3, 6, and 10” cutters the pilot drill must use the closest two locations relative to the drill tip. When using a pilot drill for 4, 8, and 12” cutters, the furthest two positions must be used so that the drill protrudes further out of the boring bar.



A ‘Flange adapter’ is fitted before the cutter itself. This acts as an adapter between the hot tapping machine & the ‘Gate Valve’ as well as housing the cutter assembly. Secure the adaptor to the LPHT machine using four 5/8” studs, washers, and UNC nuts.



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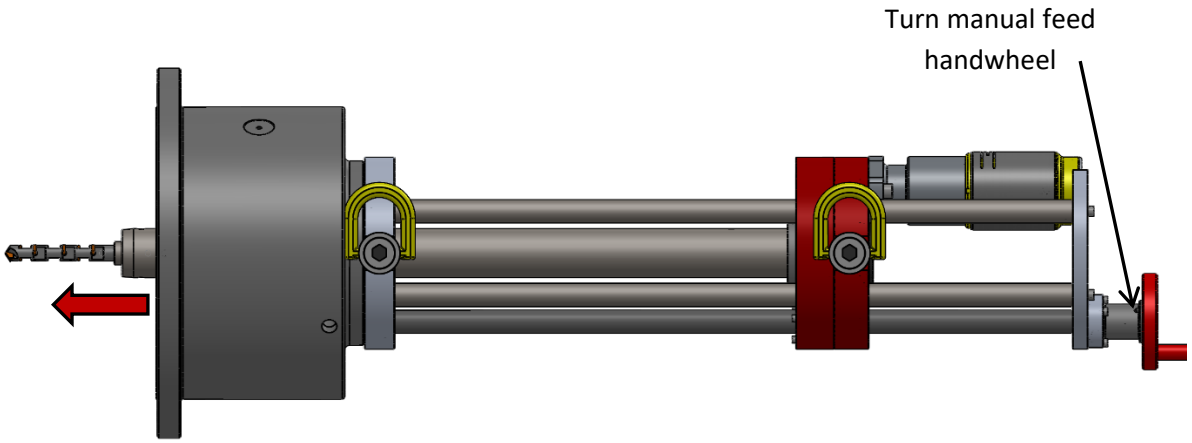
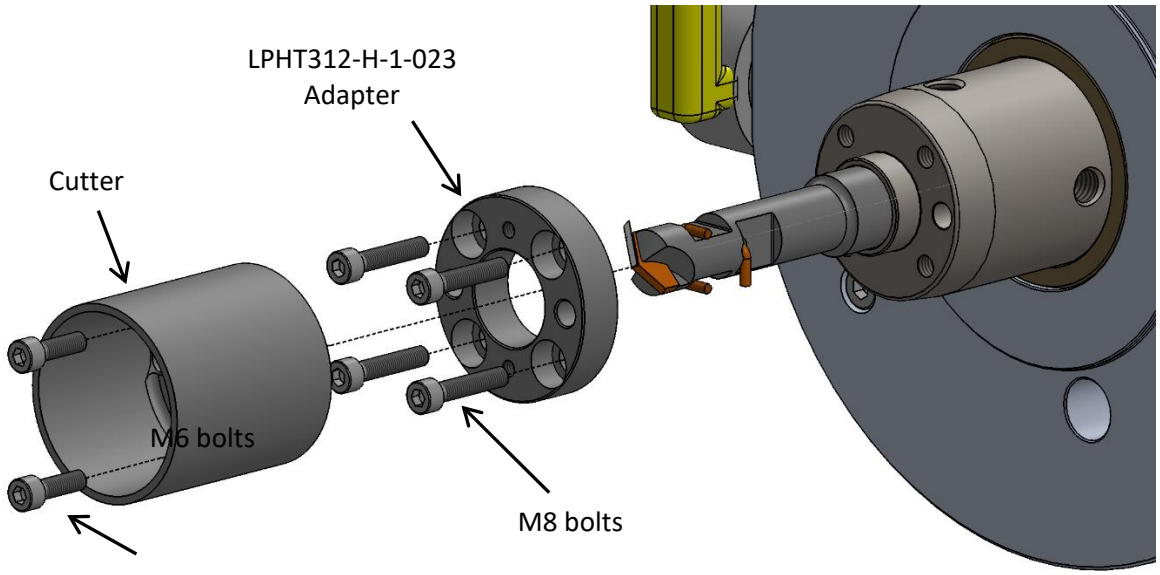
Extend the boring bar by turning the manual handwheel until the end of the bar protrudes from the 'Cutter Housing', this will allow the cutter to be fitted easily.



To install the cutter, locate the cutter onto the central spigot of the boring bar, rotate it until the four holes align and secure it in place with four M8x30 bolts. Note that the 3" cutter requires the LPHT312-H-1-023 adapter between the cutter and the boring bar and is secured to the cutter with two additional M6x25 bolts.



Note: The 'Cutter Housing' is not shown to allow the above image to be viewed easily.

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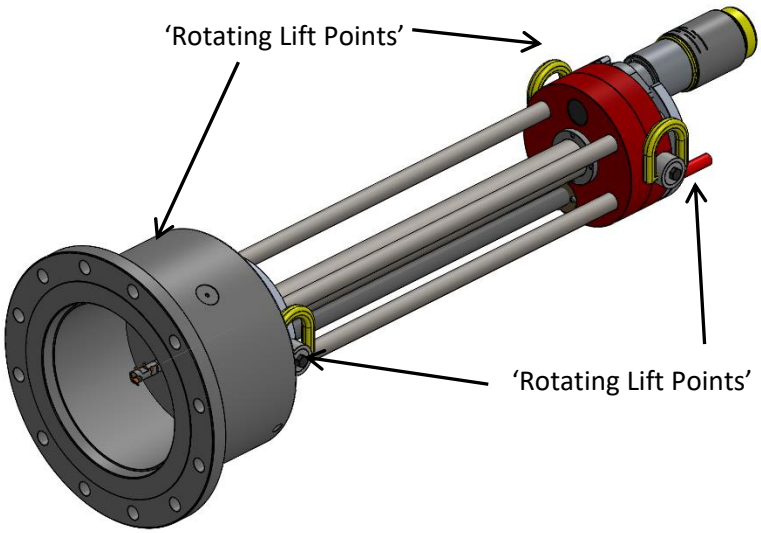
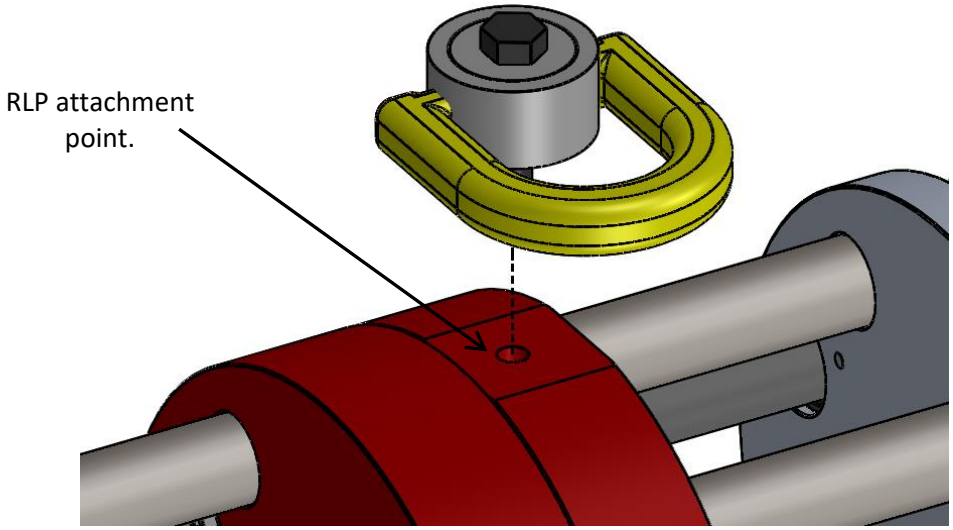
6.3. *Lifting*

The LPHT312 is lifted & installed using a combination of four 'Rotating Lift Points' mounted along the body of the machine as can be seen below.



If not already installed, fit the 'Rotating Lift Points' by screwing them into the machine body.



Tighten the M12 lifting point bolts with a torque wrench to 135Nm (99.5 Lb/ft).

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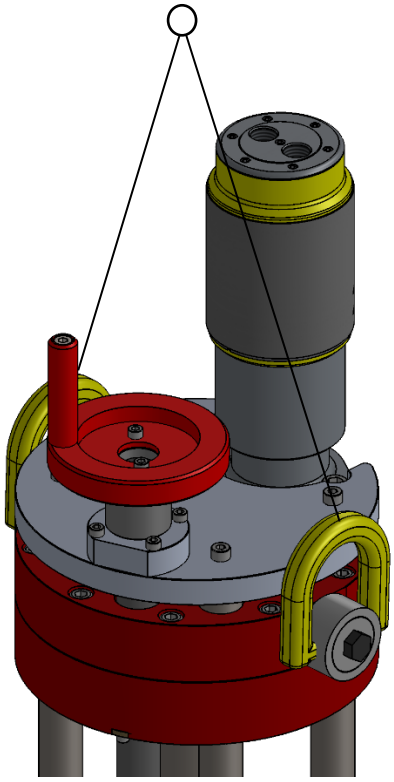
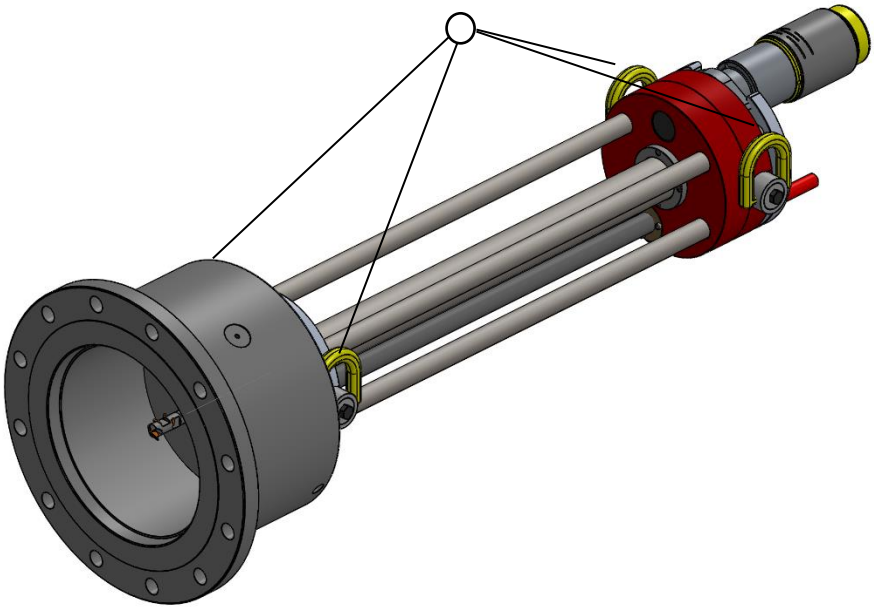


If lifting the machine in a vertical arrangement, with the nose of the machine pointing downwards then only use the rearward mounted lifting points with suitable lifting equipment i.e. overhead crane as shown above.



If lifting the LPHT312 in a horizontal arrangement all four lifting points should be used along with suitable lifting equipment i.e. overhead crane as shown above.

6.4. *Securing to pipeline.*

What follows is a guideline only, all pipeline connecting scenarios cannot be predicted, therefore a job specific mounting procedure should be constructed before attempting to mount the machine.

The LPHT312 is mounted to a live pipeline via a pre-installed 'Gate Valve'. It is secured by a series of high tensile 1" studs & nuts to the cutter housing or 'Adapter Flange'. The 'Adapter Flange' is then secured to the 'Gate Valve' by a similar series of bolts or studs.

Before making any attempt to secure the LPHT312 to a 'Gate Valve', measurements should be taken to predict how far the cutter should be fed until it has completely cut through one side of the pipe wall. Use the 'Hot Tapping Data Sheet' in the back of this manual to record such measurements.

1. Retract the cutter into the 'Cutter Housing' to prevent it clashing with any of the pipeline assembly whilst lifting the hot tapping machine into place.
2. Fit a new sealing element between the 'Cutter Housing' & the 'Gate Valve'.
3. Safely lift & manoeuvre the LPHT machine until the 'Cutter Housing' is roughly aligned with the 'Gate Valve'.
4. Ensure that before securing the LPHT to the pipeline, it is orientated such that the gearbox controls will be easily accessible when the machine is in place.
5. Align the corresponding holes between the 'Cutter Housing' & 'Gate Valve', insert appropriate studs & nuts & tighten equally using a calibrated torque wrench to the correct torque figure.
6. To make sure the cutter has not been trapped, rotate the manual feed handwheel to check the cutter can move freely up & down the cutter housing.

The LPHT is now properly installed & the Motor hoses can now be connected.

BEFORE STARTING THE MACHINE IT IS THE OPERATORS RESPONSIBILITY TO CHECK THAT ALL CLAMPS AND TOOLS ARE TIGHT AND THAT THE WORKING AREA IS CLEAR OF OBSTRUCTIONS AND DEBRIS

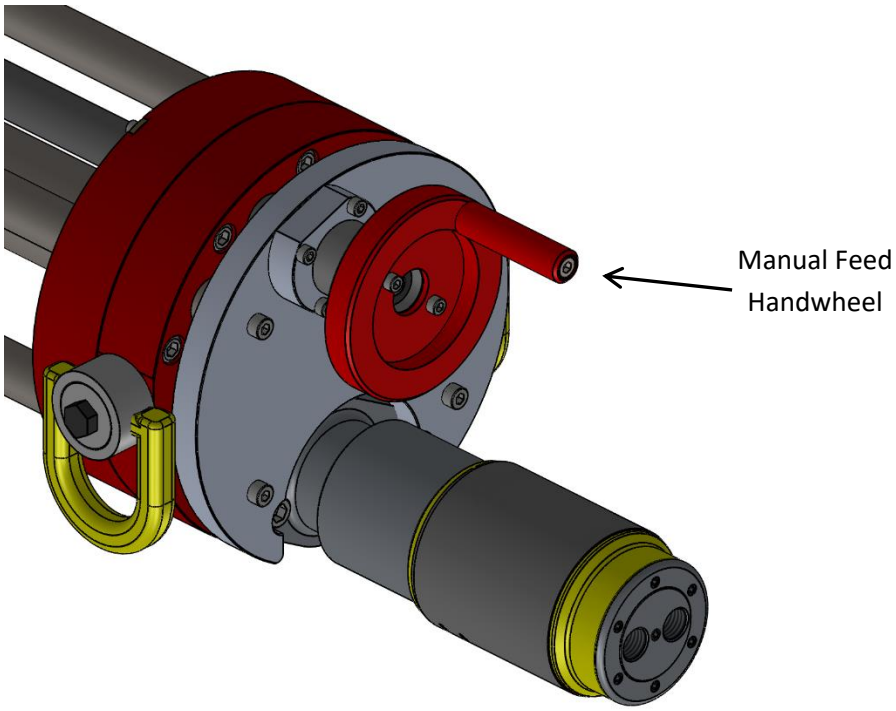
6.4.1. Personnel

As a specialist portable machine the minimum standard for an operator is to be:

- The operator must be trained and conversant with the Enerpac LPHT312
- The operator to be able to identify the correct and incorrect use of static or portable machines
- Comply with all local and internationally recognised safe use of powered machines

7. Machine Operation

1. To position the cutter & pilot drill assembly prior to cutting, turn the manual feed handwheel with the motor turned off & the 'Gate Valve' open until the pilot drill stops when it hits the pipe. Turn the manual feed handwheel the opposite direction five turns to allow a gap between the pilot drill & pipe.
2. Start the cutter rotation by engaging the pneumatic motor, the cutter will now be rotating but not feeding towards the pipe.
3. Use the pre-cut data that should have been recorded on the 'Hot Tapping Data Sheet' at the back of this manual as a guide for how far the cutter needs to be advanced.
4. To start feeding the cutter towards the pipe, begin turning the manual feed handwheel



5. Using the pre-cut data which should have been recorded on the 'Hot Tapping Data Sheet' at the back of this manual, continue to feed the cutter into the pipeline until it has made a complete cut through one side of the pipe.
6. Stop rotating the manual feed handwheel and turn the pneumatic motor off.
7. Retract the cutter by turning the manual feed handwheel in the opposite direction. The pipeline 'coupon' will be retained by the pilot drill, this can be recovered later when the machine is removed from the pipeline.

8. Machine Maintenance

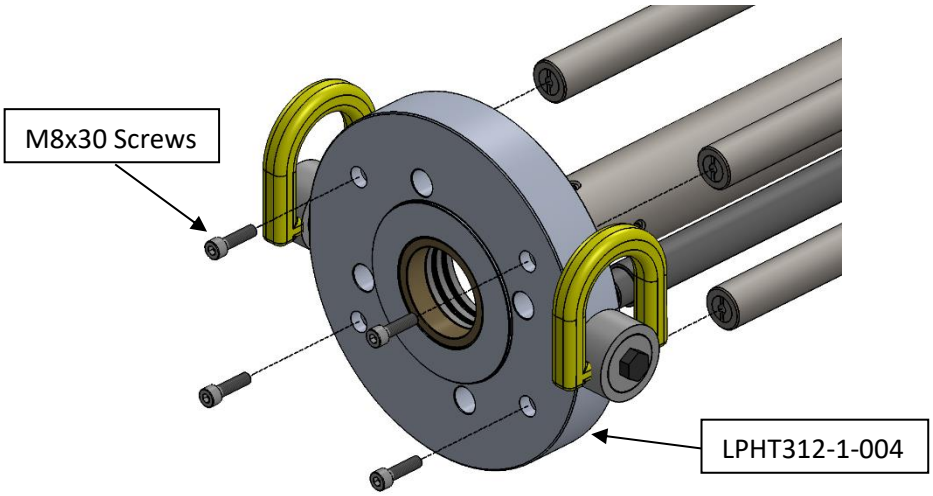
General wear and tear items should be replaced with like for like components as per the machine general assembly drawings detailed in this manual. Failure to do so may result in a machine that is not fit for purpose and is outside the design intent it was supplied for. Items that require specific maintenance regimes and products will be detailed here in.

General Maintenance Schedule		
Time Period	**Action**	**Recommended Lubricant**
After every use	Clean all cutting debris from machine. Pay particular attention to lead screws, pivots, sealing, sliding & rotating faces.	General water displacing, cleaning oil.
As required	Replace cutting tool/cutting tool inserts.	N/A
Every 10 hours	Apply a small amount of low viscosity oil to all lead screws, pivots, sliding & rotating faces.	Mineral based SAE 10 oil.
	Check all securing nuts & bolts are tight.	N/A
Every 100 hours	Check for backlash in lead screw/lead screw nut & correct if necessary.	N/A
Before long term storage (12 months minimum)	Protect machine, components & accessories from corrosion. Store all machine components securely in original packing box.	General, oil based, rust inhibitor.

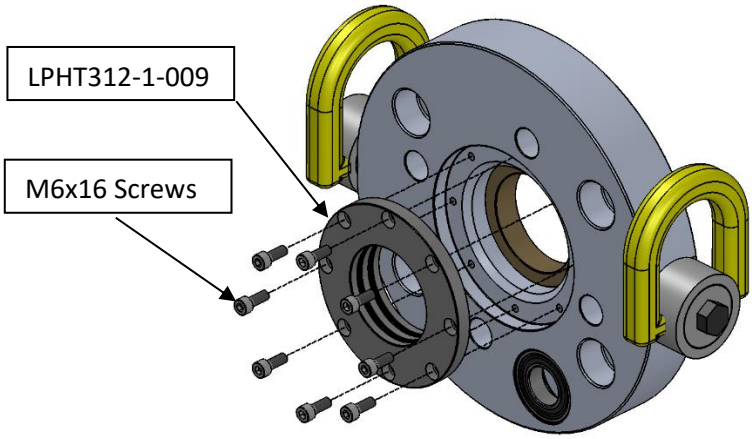
8.1. *Replacing seals*

If low pressure is detected the seals located within the LPHT312-1-004 bottom plate may need replacing. The procedure for achieving this is as follows.

1. Unscrew the four M8x30 screws located within the LPHT312-1-004 bottom plate and remove the bottom plate assembly from the LPHT machine.



2. Unscrew the eight M6x16 screws which secure the LPHT312-1-009 seal cartridge to the LPHT312-1-004 bottom plate.



3. Remove and replace the two R009F 63.5x74.5x4.2 rotary seals and single OR3008200 O-ring. The pressure seals are best installed warm and can be soaked in warm water prior to fitting. They are gently formed into a kidney shape and then eased into the groove and can be pushed around and greased lightly.

4. Re-assemble the LPHT312-1-004 bottom plate by following the reverse of the above instructions.

9. Troubleshooting Guide

Symptom	Possible cause	Action
The machine will not rotate	1. Hydraulic/Pneumatic supply not available	Check supply
	2. Hydraulic/Pneumatic supply is below the minimum required to operate the machine	Check supply
	3. Drive motor faulty	Remove motor and check operation
	4. Damage to drive gear train	Remove motor and check free rotation
	5. Faulty valve or emergency shut off operational	Check supply to motor
The machine does not traverse	1. The feed control valve is not correctly set	Check position
	2. Drive gear problem	Remove and check drive assembly operation
	3. Depth of cut too deep	Remove cut and check rotation

10. Appendices

10.1. *Hot Tapping Data Sheet*

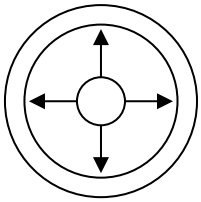
Customer Details……Contact Number…….
Contact Details……Date / Time…….

Tap Details.	*Pipe Details.*
Tap Size……....	Pipe Size……..
Flange Rating……..	Wall Thickness……
Orientation……	Material……..
Branch wall Thickness……	Product Type……...
Valve Type……	Pipe Pressure…….
Bore Details……..	Temperature……

Flow rate-……Customer Signature……
Recommended Flow rates, Gas 20mph; 30fps; 10m/s. Liquids 10mph; 15fps; 5m/s.

Tapping Machine Operational Checks.
Tapping adapter bolts secure……..Y/N
Cutter holder screws secure……Y/N
Cutter retaining screws secure……...Y/N
Pilot drill / retaining screws secure….Y/N

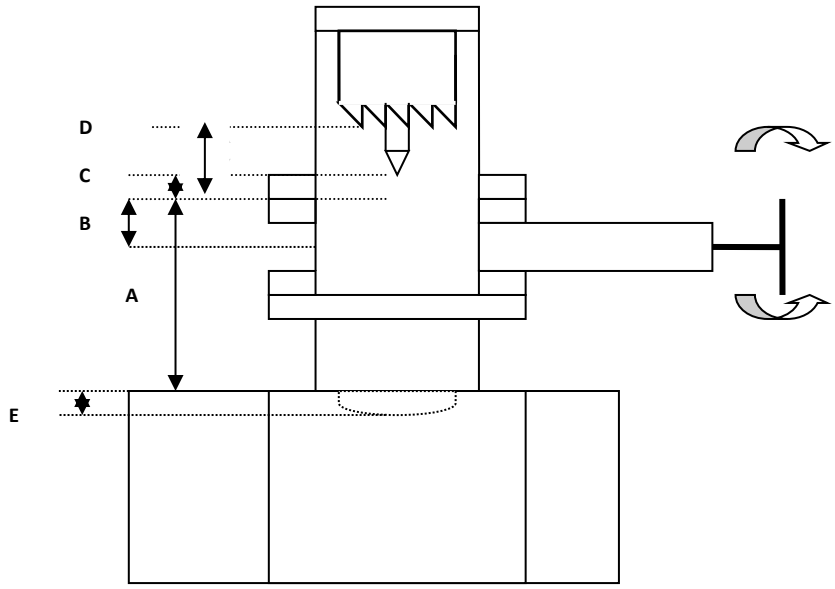
Boring Bar Alignment Check.



Check Boring bar is central to Hot Tapping Adapter Y/N

Hot Tapping operation Dimensions.

A, Flange to pipe =……..
B, Top valve to gate =……
C, Pilot drill to flange =……
D, Cutter to flange =……
E, Coupon cut depth =……



Hot Tapping Cutting Distances.

Pilot Drill to pipe, **A+C** =……
Cutter to Pipe, **A+D** =……
Total Cut Distance, **A+D+E** =……..
*(**E**=Ref Coupon Distance Chart).*

Valve Details.

Valve Flange to Gate **B**=……
Number of turns to close / open …….

Technician Signature……Customer Signature……
Date…… Date……

10.2. *Recommended torque settings for fasteners*

Thread Ø	Tensile Strength kN	lbs	Torque Setting Nm	in - lbs
M3	6.54	1470	2.1	19
M4	11.4	2560	4.6	41
M5	18.5	4160	9.5	85
M6	26.1	5870	16	140
M8	47.6	10700	39	350
M10	75.4	17000	77	680
M12	110	24700	135	1200
M14	150	33700	215	1900
M16	204	45900	330	2900
M20	306	68800	650	5750
M22	374	83950	875	7725
M24	441	99100	1100	9700
M30	701	158000	2250	19900
M32	860	193500	3050	27000
M36	1020	229000	3850	34100

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10.3. *General Notes*
