

OPERATION & MAINTENANCE MANUAL

Enerpac LMR2000 / LMR2000-H Lightweight Milling Rail

Document Number: L4780

Document Revision: A

Document Revision Date: 17 AUG 2023

Document Language: English EN (Original Instructions)

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
3	DRB	03/09/2018	DMS	03/09/2018	Added optional extras section
4	STH	08/2020	-	-	Enerpac rebrand
A	SV	17/08/2023	-	-	New document number added

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:

02/12/2015

Print Name:

Carl Clements

Title:

Operations Manager

Approver 2

Signature:



Date:

02/12/2015

Print Name:

David Cochrane

Title:

Managing Director

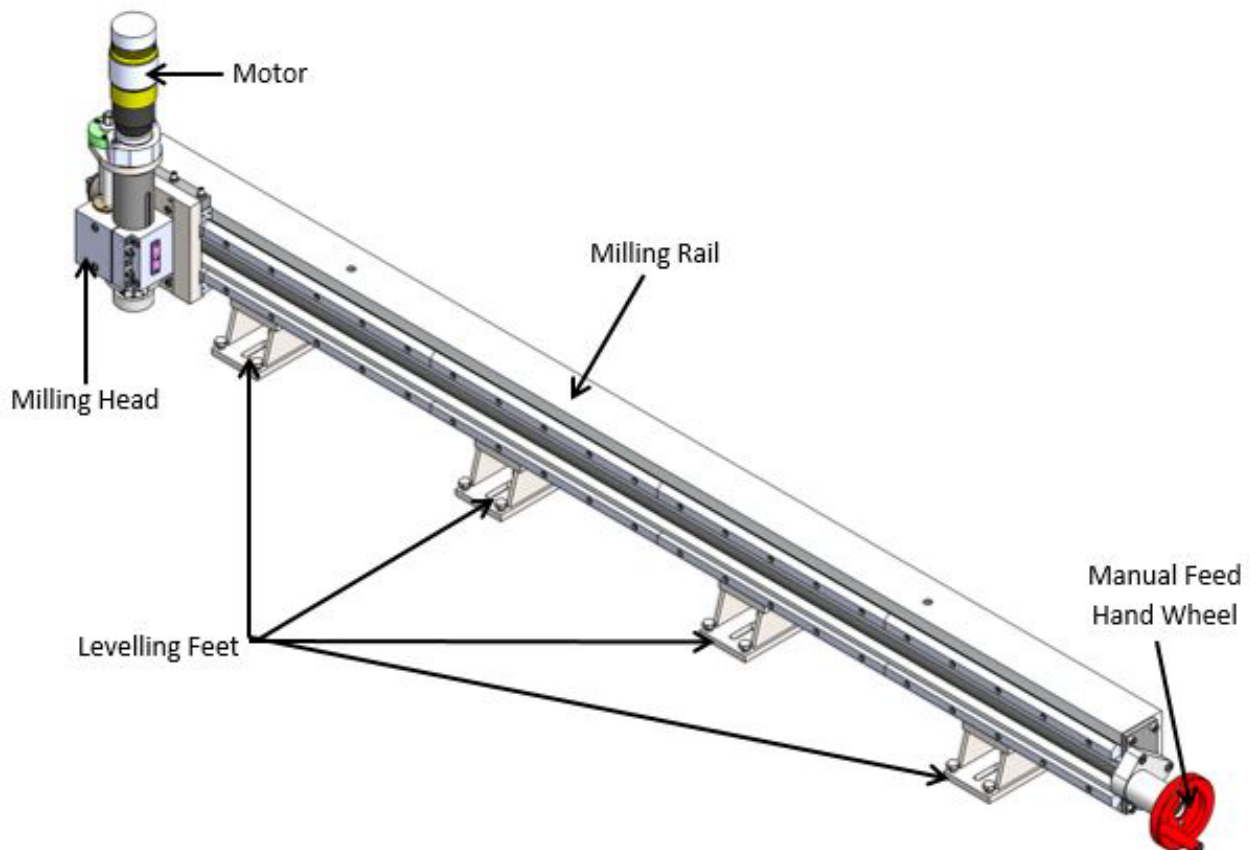
1. Introduction

1.1. Overall Equipment Description

The LMR2000 is a lightweight (119kg operational weight), 2 axis, pneumatic or hydraulically powered milling machine. It has 2015mm of travel along the X-axis & 95mm along the Y-axis.

The LMR2000 can be supplied with any of the following optional extras.

- Heat exchanger mounting plate (LMR2000-6).
- 3 speed milling head with ISO 30 spindle (LMR2000-2).
- Wedge levelling feet (LMR2000-3).
- Pneumatic or hydraulic automatic feed kit (LMR2000-4/LMR2000-8).
- Pneumatic or hydraulic milling head with ISO 40 spindle (LMR2000-5/LMR2000-7).
- 8-16mm End mill & collet set (LMR2000-11).



2. Machine Warranty

Supplied in document pack.

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.

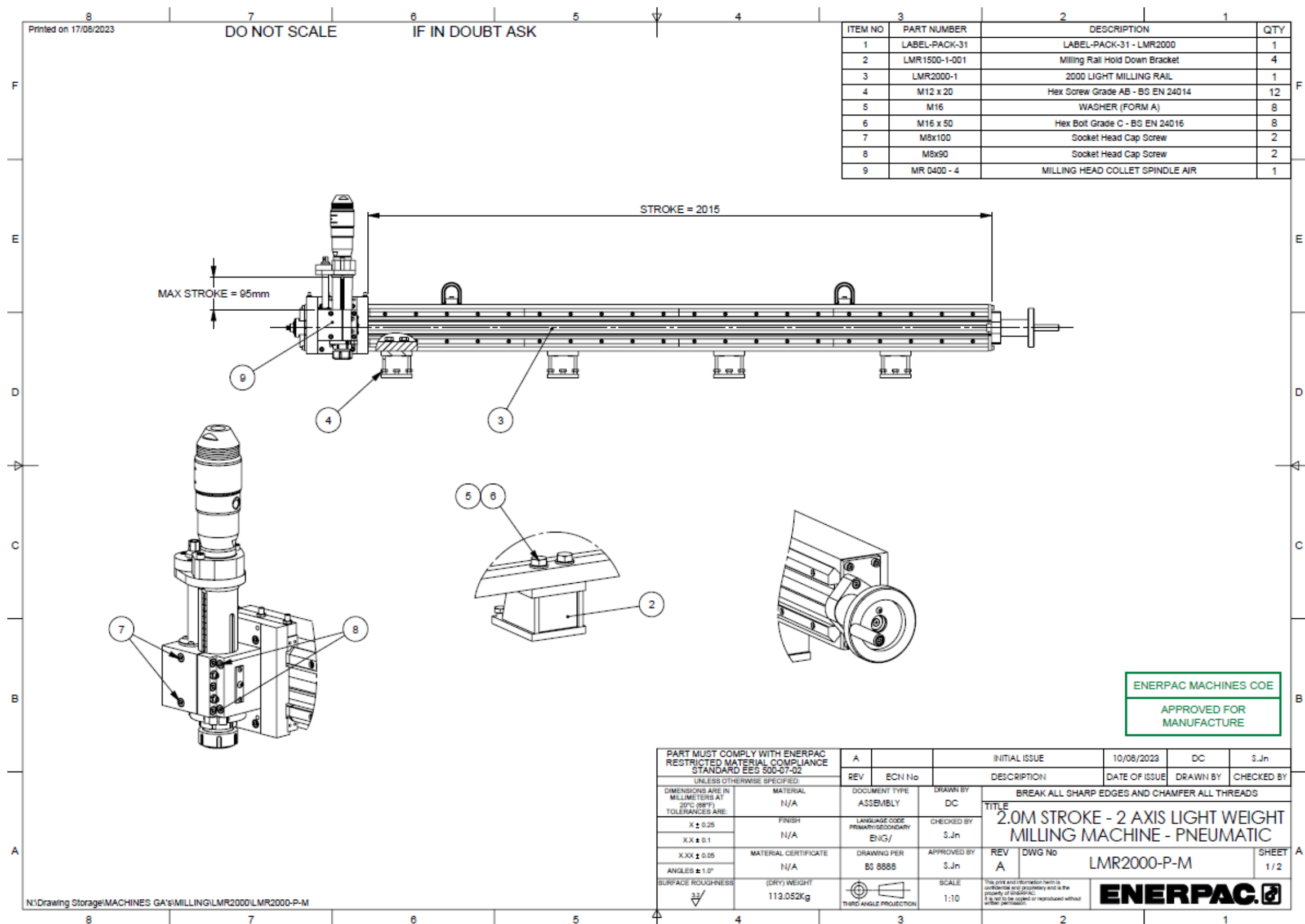
Such poor handling may result in either broken or damaged parts or disturbance to fine settings resulting in an inability to meet the specified machining tolerances and capabilities.

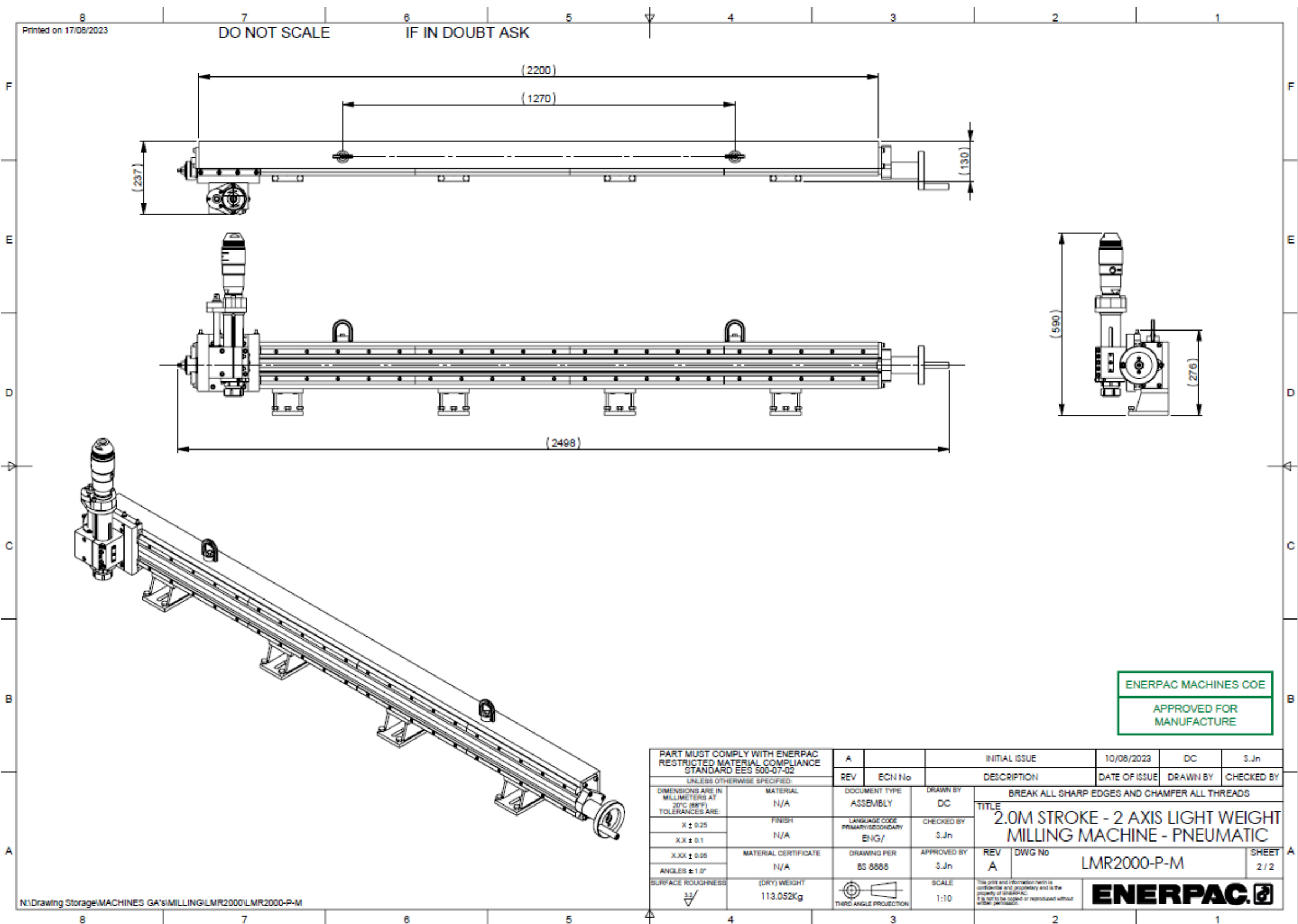
5. Machine Specification

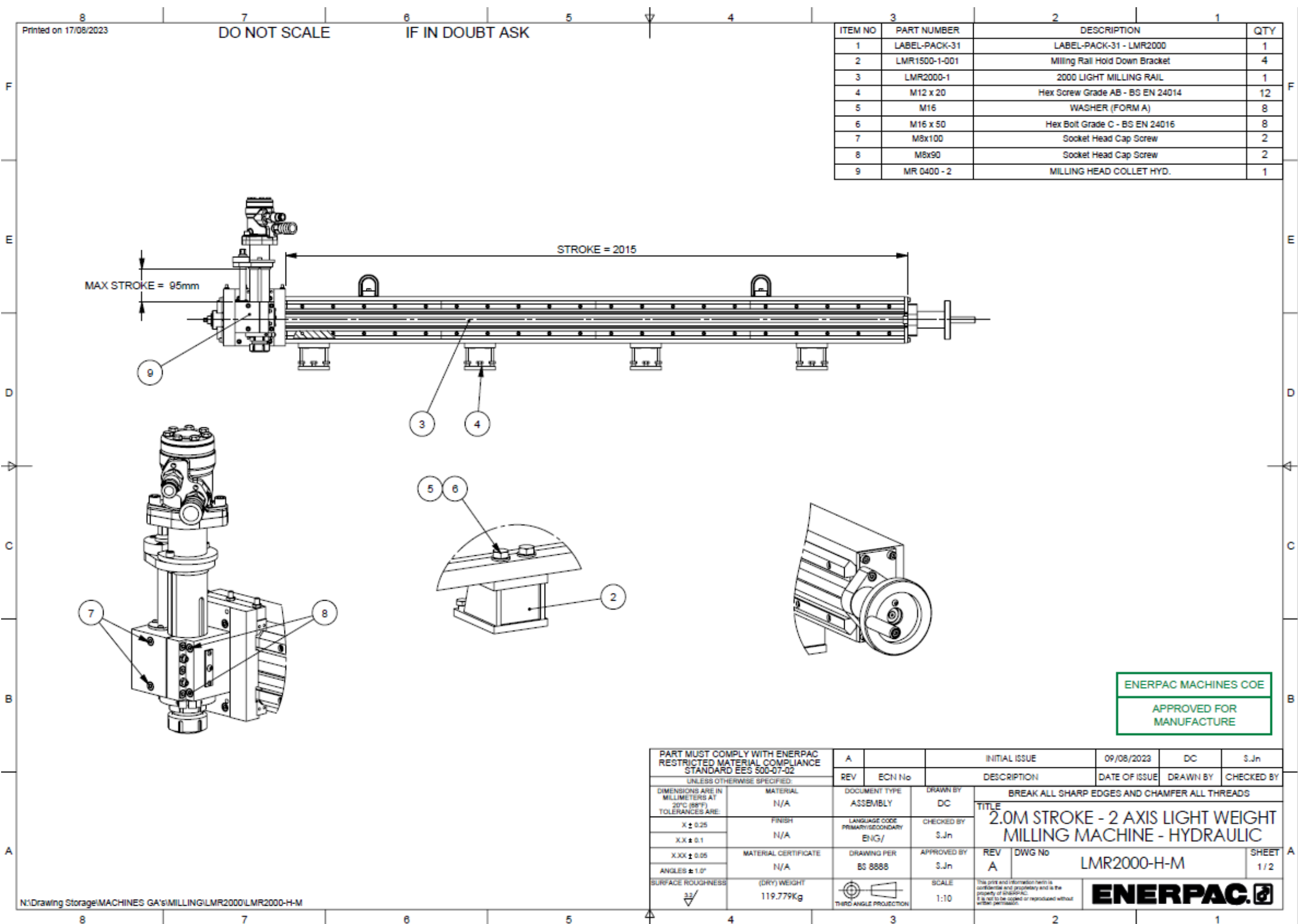
The Enerpac LMR2000 Machine has been modularly designed for accurate in-situ machining of work surfaces, to this end the constituent parts are easily manipulated by hand or crane.

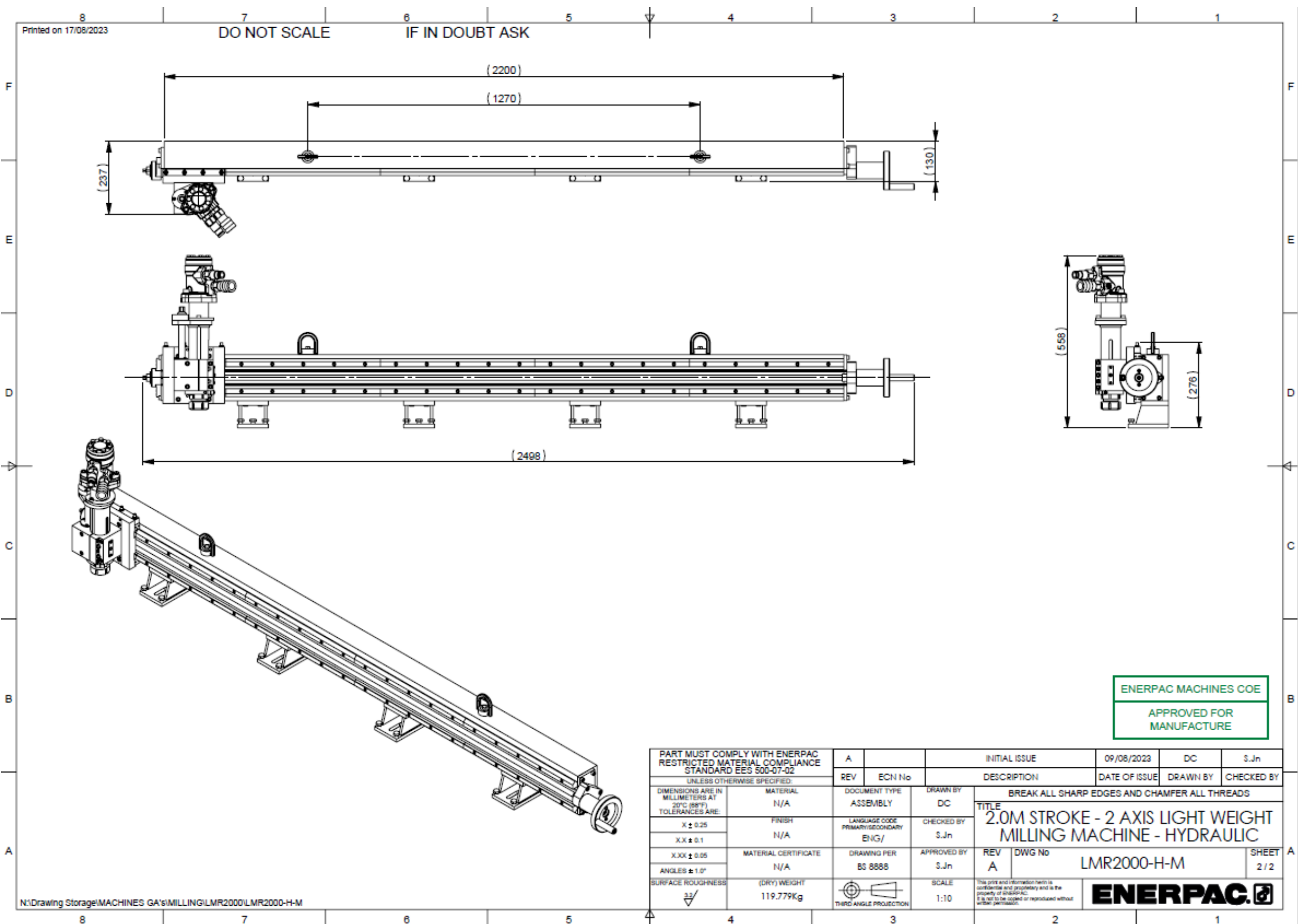
Description	Value	
LMR2000		
X-Axis Max Stroke	2015mm	79.33"
Y-Axis Max Stroke	95mm	3.74"
Milling Head Height Adjustment on Carriage Plate	75mm	2.95"
Max Cutter dia (ER40 Collet Spindle)	25mm	0.984"
Max Cutter dia (Optional ISO 30 Spindle)	80mm	3.15"
Feed Rate (Manual Hand Wheel)	5mm per rev	0.197" per rev
Machine Operational Weight	119kg	262lbs
Hydraulically Powered (Milling Head & Auto Feed).		
Hydraulic flow required for milling head	50L/min	13.21 gal/min
Hydraulic pressure required for milling head	80-100 bar	1160-1450 psi
Hydraulic Power of Milling Head	3.73 kW	5 hp
Max Spindle Speed	630 R.P.M	
Auto Feed Hydraulic Flow Required (Optional extra).	20L/min	5.28 gal/min
Auto Feed Hydraulic Pressure Required (Optional extra).	80-100 bar	1160-1450 psi
Auto Feed Hydraulic Power (Optional extra).	2.4 kW	3.2 hp
Auto Feed Rate (Optional extra).	105mm/min	4.13"/min
Pneumatically Powered (Milling Head & Auto Feed).		
Pneumatic flow required for milling head	1800L/min	63.6 CFM
Pneumatic pressure required for milling head	6 bar	87 psi
Pneumatic Power of Milling Head	1.7 kW	2.27 hp
Max Cutter Speed	655 R.P.M	
Auto Feed Pneumatic Flow Required (Optional extra).	2000L/min	70.6 CFM
Auto Feed Pneumatic Pressure Required (Optional extra).	6 bar	87 psi
Auto Feed Pneumatic Power (Optional extra).	0.8 kW	1.1 hp
Auto Feed Rate (Optional extra).	26.5mm/min	1.04"/min
Designed For General Use		

5.1. General Assembly Drawings







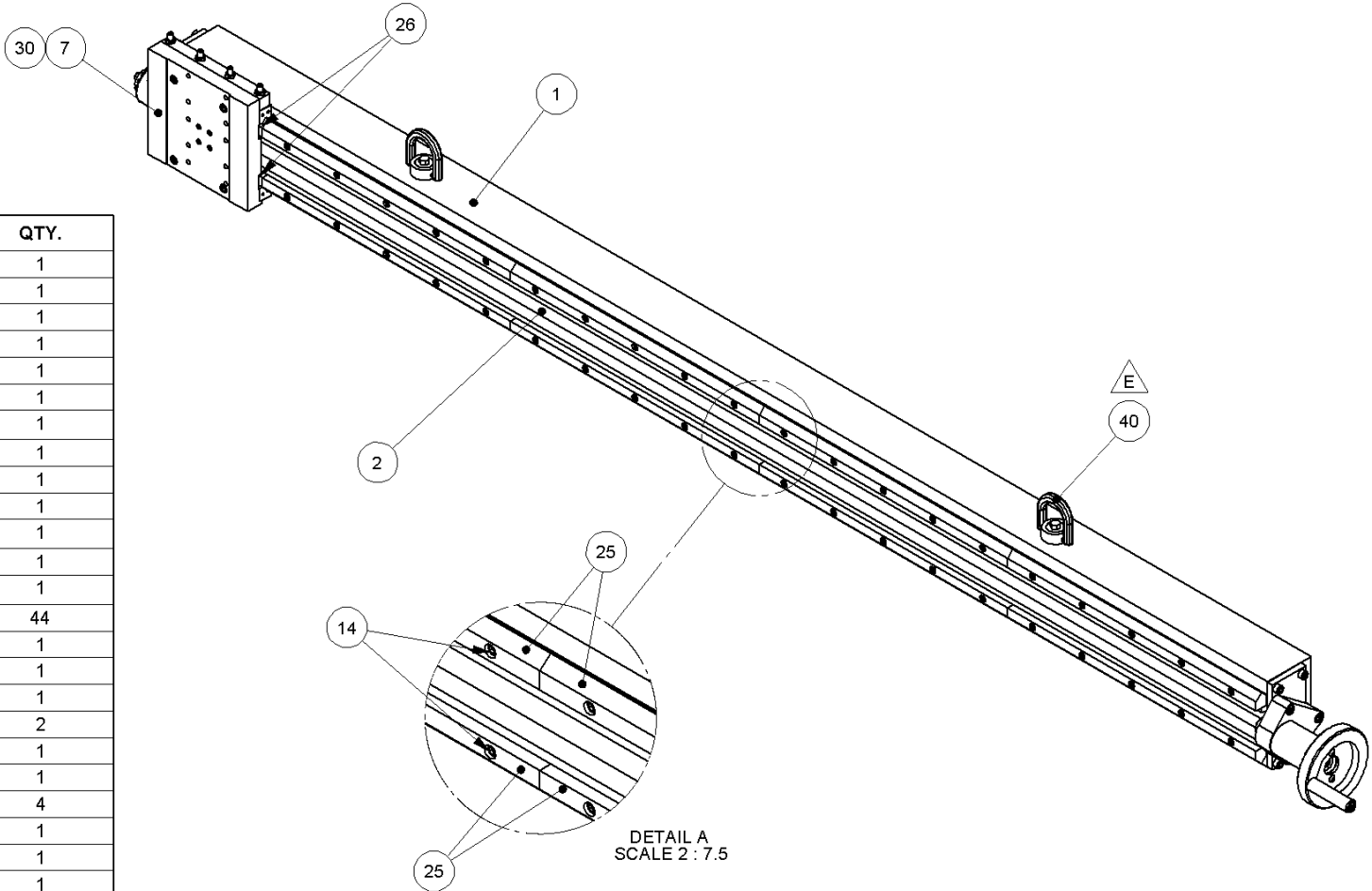


Printed on 02/12/2015

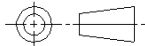
DO NOT SCALE

IF IN DOUBT ASK

ITEM NO.	REV.	PART NUMBER	DESCRIPTION	QTY.
1	C	LMR2000-1-001	LMR 2.0M MILLING RAIL	1
2		LMR2000-1-002	LEADSCREW	1
3		LMR2000-1-003	GEARBOX MOUNT PLATE	1
4		LMR2000-1-004	BEARING MOUNT PLATE	1
5		LMR2000-1-005	LEADSCREW SEAL INNER RING	1
6		LMR2000-1-010	RAIL PUSHER	1
7	A	LMR2000-1-009	MR0400-2 Carriage Plate	1
8	B	LMR2000-1-008	DRIVE SLEEVE	1
9		LMR1000-1-003	BEARING HOUSING	1
10	A	LMR1000-1-004	DRIVE HOUSING	1
11	A	ML0103	bearing cap	1
12	A	ML 0106	LEADSCREW SEAL RING OUTER	1
13		ML0107	captive washer	1
14		MMI8388A	modified M8 button head screw	44
15	C	HTD 0432	handwheel	1
16	A	HTD 0434	HANDWHEEL KNOB	1
17		MR2000-1-001	GRUB SCREW	1
18		Ø6 x 24	SPRING PIN	2
19		D1300 0520	INTERNAL CIRCLIP	1
20		CPS12x18x0.5	PRECISION SHIM	1
21		M4 x 30	SOCKET HEAD CAP SCREW	4
22		3205 A-2RS1	DOUBLE ROW ANGULAR CONTACT BEARING	1
23		MB5	lockwasher	1
24		KM5	locknut	1
25		LWRPV 9 500	Vee Rail 9 Series	8
26		LWRPV 9 200	Vee Rail 9 Series	2
27		AMF253025	Flanged Oilite Bush	1
28		LWRPM 9 200	'M' RAIL GUIDE	2
29		503-165-373-14	BALLSCREW NUT	1
30		M8 x 35	Socket Head Cap Screw	4
31		M8 x 90	Socket Head Cap Screw	1
32		M8 x 25	SOCKET HEAD CAP SCREW	8
33		M8 x 1.25 x 25	socket head cap screw	3
34		M8 x 35	Hex socket flat set screw	4
35		M8	Hex Jam Nut	4
36		M8 x 20	Hex Socket Button Head	4
37		M6 x 12	Hex Socket Button Head - BS EN ISO 7380	2
38		M6 X 12	Hex Socket CTSK Head	1
39		M8 x 30	Hex Socket Head - BS EN ISO 4762	3
40		RLP-M10-10	ROTATING LIFTING POINT	4



E	N/A	4x M10 RLP's ADDED.	17/12/2014	SR	BC
D	2618	Replaced 16_5B1_SSV ballscrew nut with 503-165-373-14 ballscrew nut, and M5 x 25 bolts replaced with M4 x 30	17/12/2014	DRB	SR
C	N/A	MILLING RAIL RE-DESIGNED, REDUCTION BOX REMOVED ETC.	24/09/2013	SR	DC
REV.	INC.	DESCRIPTION	DATE	DRAWN BY	APPROVED



THIRD ANGLE PROJECTION

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WEIGHT	86.054kg
DRAWN BY	DC
CHECKED BY	RS
APPROVED BY	--
TITLE	2000 LIGHT MILLING RAIL

2000 LIGHT MILLING RAIL

SCALE : 1:7.5



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

DWG No

LMR2000-1

SHEET 1 OF 3

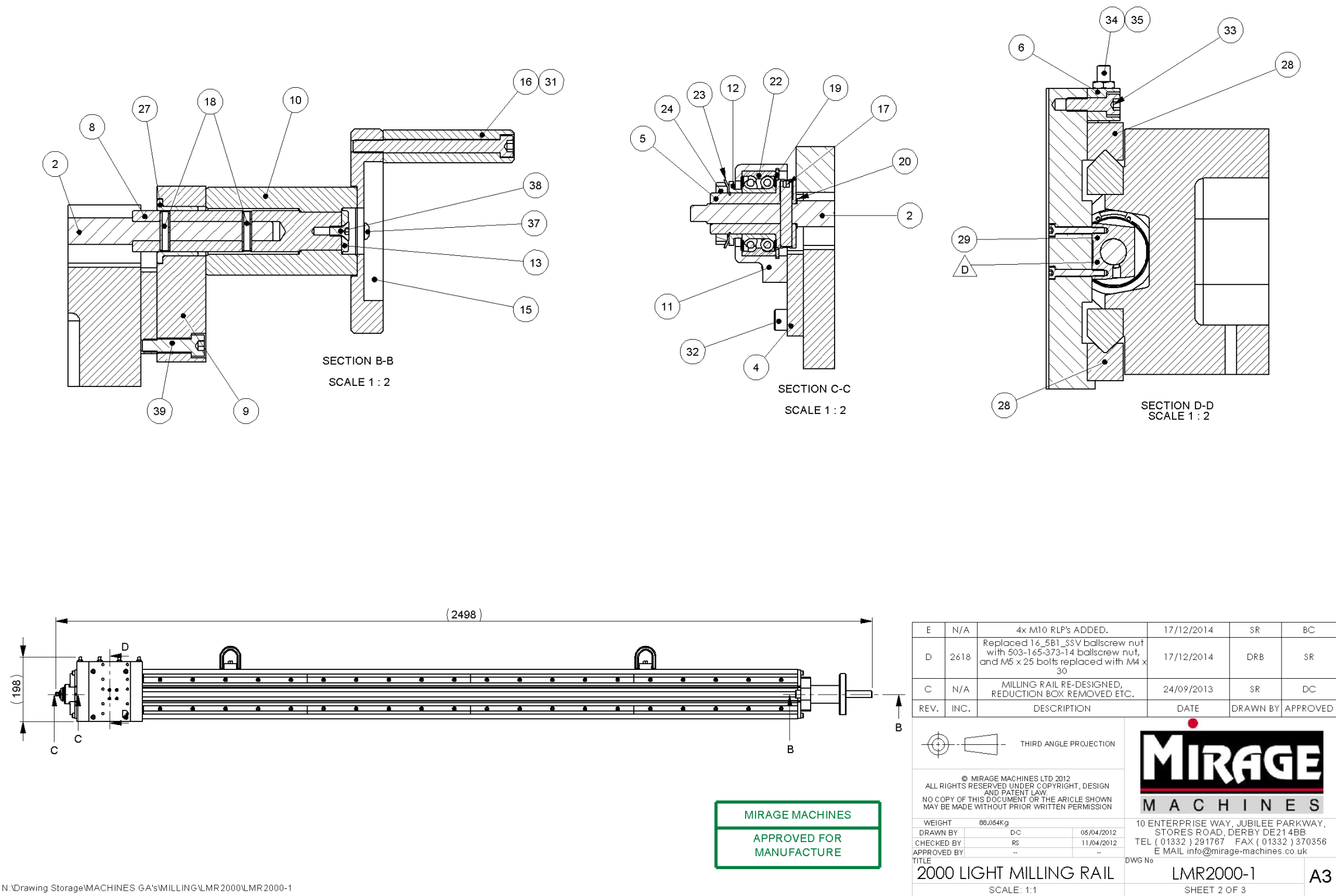
A3

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A3 ASSEMBLY (AUTO) - 7-4-2009

Printed on 02/12/2015

DO NOT SCALE

IF IN DOUBT ASK

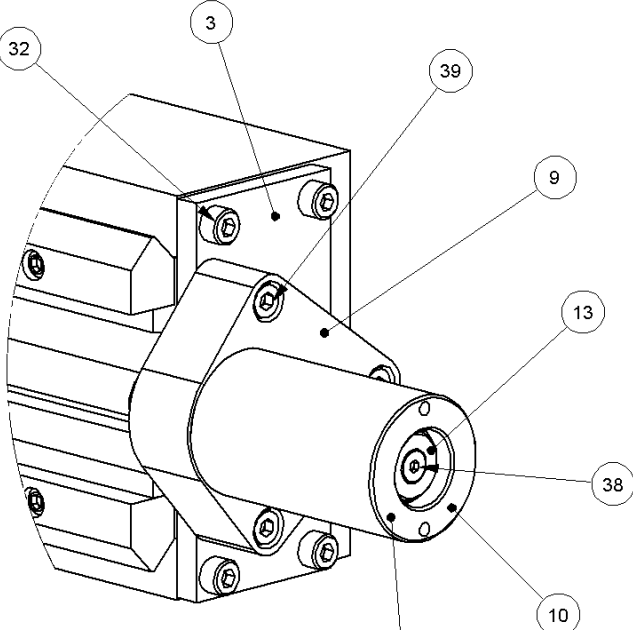
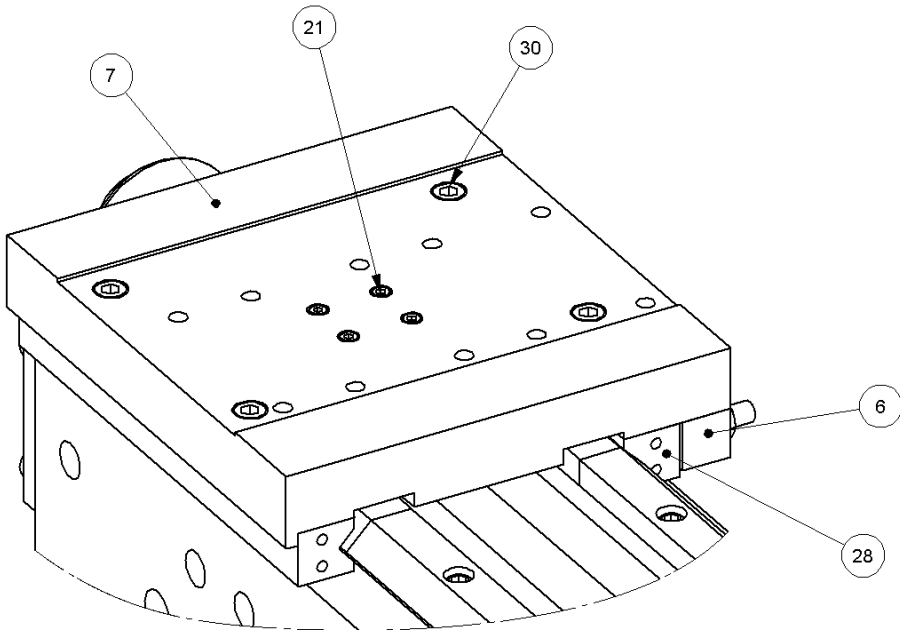


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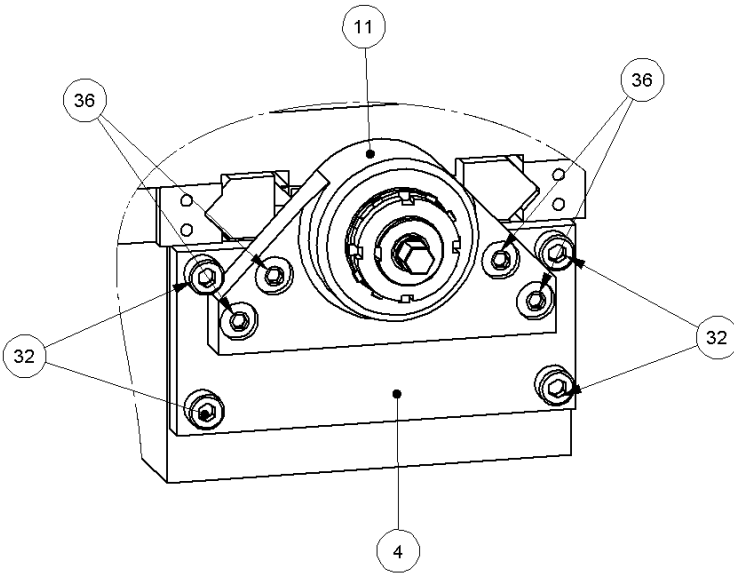
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DO NOT SCALE

IF IN DOUBT ASK



NOTE: HANDWHEEL NOT SHOWN FOR CLARITY



E	N/A	4x M10 RLP's ADDED.	17/12/2014	SR	BC
D	2618	Replaced 16_5B1_SSV ballscrew nut with 503-165-373-14 ballscrew nut, and M5 x 25 bolts replaced with M4 x 30	17/12/2014	DRB	SR
C	N/A	MILLING RAIL RE-DESIGNED, REDUCTION BOX REMOVED ETC.	24/09/2013	SR	DC
REV.	INC.	DESCRIPTION	DATE	DRAWN BY	APPROVED



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WEIGHT 88.054Kg
DRAWN BY DC 05/04/2012
CHECKED BY RS 11/04/2012
APPROVED BY --
TITLE

2000 LIGHT MILLING RAIL
SCALE: 1:2



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

DWG No LMR2000-1
SHEET 3 OF 3

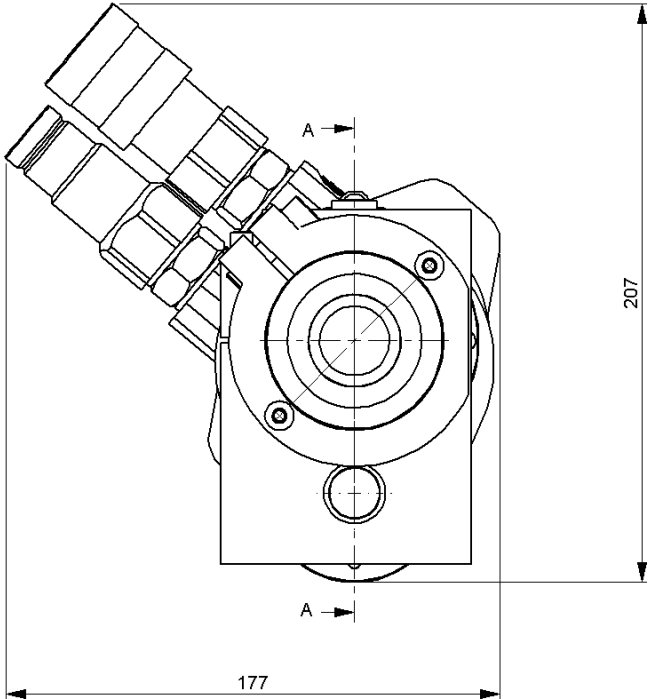
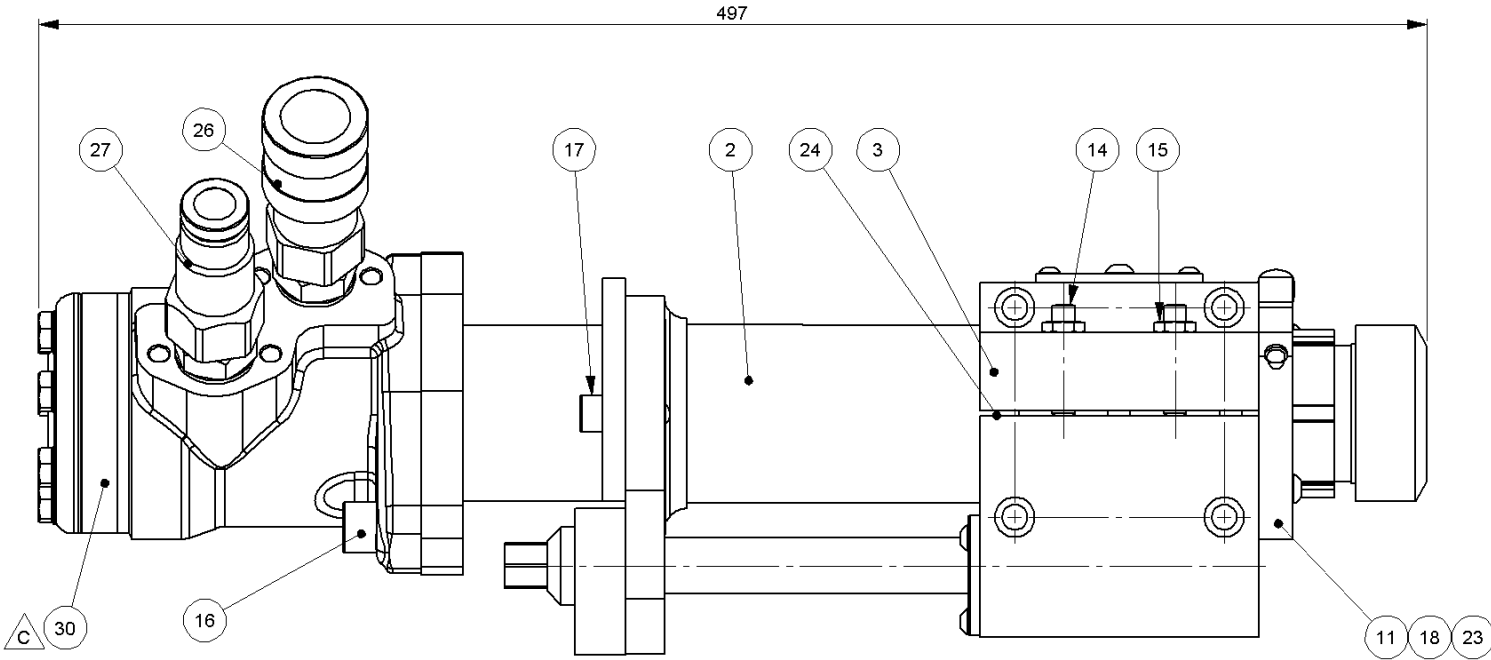
MIRAGE MACHINES
APPROVED FOR
MANUFACTURE

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A3 ASSEMBLY (AUTO) - 7-4-2009

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DO NOT SCALE

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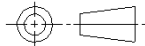


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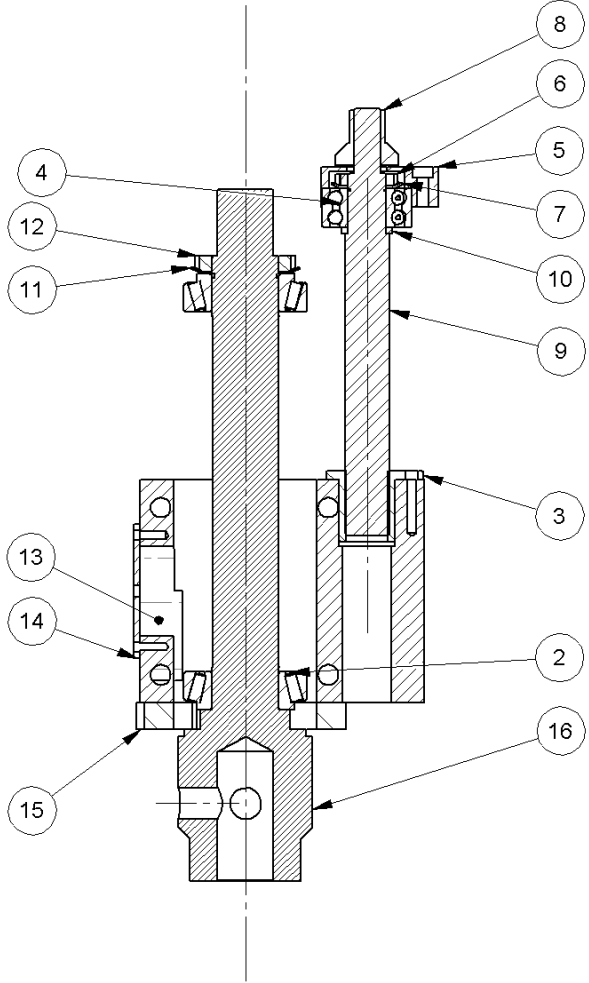
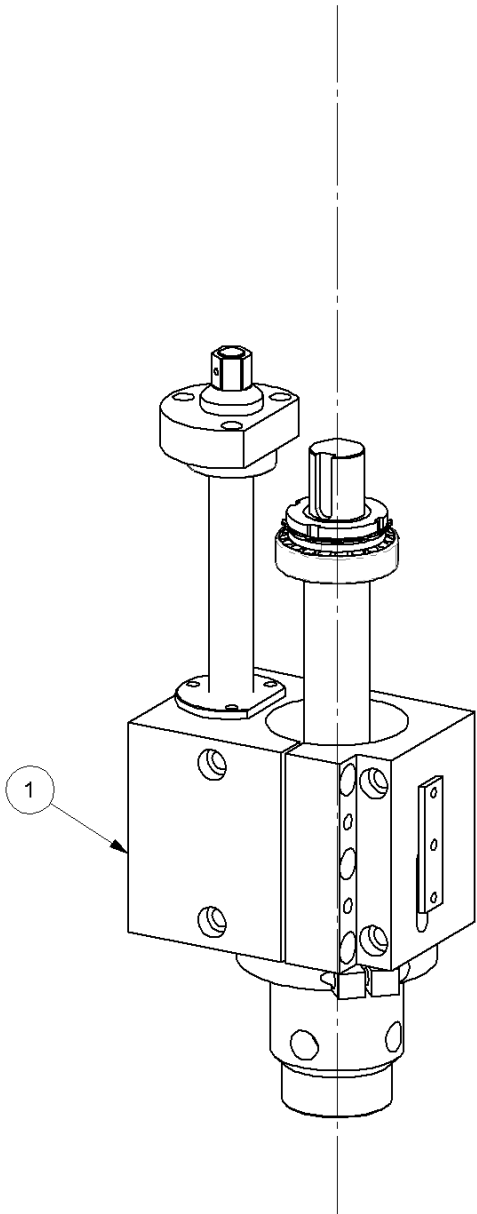
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1	A	MR2106	LEADSCREW DIAL	1	18		M8 x 30	Hex Socket Head - BS EN ISO 4762	1
2		MR 0401	SPINDLE FABRICATION	1	19		M5 x 25	Hex Socket Head St St	3
3		MR 0402	HUB	1	20		M4 x 12	Hex Socket Button Head	2
4	A	MR 0403	FEED NUT	1	21		M6 X 12	Hex Socket Button Head	1
5		MR 0404	BEARING CAP	1	22		M5 X 12	Hex Socket Button Head	3
6	B	MR 0405	FEED SCREW	1	23		M6 x 20	Hex Socket Button Head - BS EN ISO 7380	2
7		MR 0406	BEARING SPACER	1	24		M8 x 40	Hex Socket Head - BS EN ISO 4762	3
8	A	MR 0409	SPINDLE KEY	1	25	A	MR 0419 A	HYDRAULIC MOTOR COUPLING	1
9	A	MR 0410	SPINDLE KEY PLATE	1	26		1/2" QRCOUPLING-FEMALE	1/2" QUICK RELEASE COUPLING FEMALE	1
10	B	MR 0420 B	HYDRAULIC DRIVE COUPLING	1	27		1/2" QRCOUPLING-MALE	1/2" QUICK RELEASE COUPLING MALE	1
11		MR 0421	MR 400 SPINDLE CLAMP	1	28		32006	TAPER ROLLER BEARING	2
12	D	MR 0422	ER40 TAPER DRIVE SHAFT	1	29		3203-A-2RS	Double Row Angular Contact Brg	1
13		MR 0423	LABYRINTH SEAL	1	30		151-0312	OMP 100 Hydraulic motor with keyed shaft	1
14		M8 x 40	Socket Set Screw Flat Point	2	31		KM3	LOCKNUT	1
15		M8 THIN NUT	Hex Thin Nut Grade AB	2	32		MB3	LOCKWASHER	1
16		M12 x 30	Hex Socket Head	2	33		MB6	LOCKWASHER	1
17		M8x20	Hex Socket Head - BS EN ISO 4762	2	34		KM6	LOCKNUT	1
					35		ETM - 21794 E	ER SPRING COLLET	1
					36		ETM 00040 B	ER TOP CLAMPING NUT	1

N:\Drawing Storage\MACHINES GA's\MILLING\MR400\MR 0400-2

A3 ASSEMBLY (AUTO) - 7-4-2009

C	N/A	HYDRAULIC MOTOR WAS OMP160.	17/11/2014	SR	BC												
B		UPGRADED TO NEW DRAWING SHEET	17/10/2011	DC	PW												
A		DRIVE SHAFT CHANGE WAS MR407 NOW MR422 WITH ER-40 TAPER	9.11.07	CWD	GRS												
REV., INC.		DESCRIPTION	DATE	DRAWN BY	APPROVED												
 THIRD ANGLE PROJECTION © MIRAGE MACHINES LTD 2007 ALL RIGHTS RESERVED UNDER COPYRIGHT, DESIGN AND PATENT LAW. NO COPY OF THIS DOCUMENT OR THE ARTICLE SHOWN MAY BE MADE WITHOUT PRIOR WRITTEN PERMISSION <table><tr><td>WEIGHT</td><td>16.831kg</td></tr><tr><td>DRAWN BY</td><td>CWD</td><td>22.11.07</td></tr><tr><td>CHECKED BY</td><td>GRS</td><td>22.11.07</td></tr><tr><td>APPROVED BY</td><td>GRS</td><td>22.11.07</td></tr></table> MILLING HEAD HYDRAULIC SCALE: 1:2			WEIGHT	16.831kg	DRAWN BY	CWD	22.11.07	CHECKED BY	GRS	22.11.07	APPROVED BY	GRS	22.11.07	 10 ENTERPRISE WAY, JUBILEE PARKWAY, STORES ROAD, DERBY DE21 4BB TEL (01332) 291767 FAX (01332) 370356 E MAIL info@mirage-machines.co.uk DWG No MR0400-2 SHEET 1 OF 2			A3
WEIGHT	16.831kg																
DRAWN BY	CWD	22.11.07															
CHECKED BY	GRS	22.11.07															
APPROVED BY	GRS	22.11.07															

IF IN DOUBT ASK



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	MR 0402 (hub)		1
2	32006 taper roller brg	Metric design	2
3	MR 0403 (feed nut)		1
4	3203-2RS	D-Row Ang cont ball brg	1
5	MR 0404 (bearing cap)		1
6	KM3 locknut		1
7	MB3 lockwasher		1
8	MR 2106 (leadscrew dial)		1
9	MR 0405 (feedscrew)		1
10	MR 0406 (bearing spacer)		1
11	MB6 lockwasher		1
12	KM6 locknut		1
13	MR 0409 (spindle key)		1
14	MR 0410 (spindle key plate)		1
15	MR 0421 (mr 400 spindle clamp)		1
16	MR 0407C (omp400 drive shaft)		1

approved

DATE

REV

OPERATION	DATE	APPROVED
OP 10.		
OP 20.		
OP 30.		
OP 40.		
OP 50.		
OP 60.		
OP 70.		
OP 80. INSPECT		

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
M/C SURFACE FINISH 3.2 um
TOLERANCES U.O.S.
GENERAL ±0.25
1 DEC PLACE ±0.1
2 DEC PLACE ±0.05

NAME

SIGNATURE

DATE

DRAWN

CHK'D

APRVD

FINISH

MATERIAL

WEIGHT

JNA

JA

02/07/08

N/A

N/A

3rd ANGLE
PROJECTION
U.O.S.



DEBUR AND
BREAK SHARP
EDGES

MIRAGE MACHINES

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



TITLE:
MILLING HEAD (GRAVATOM)
DWG NO.
MR 0400 - 4 (BOM)

SCALE:1:2.5

SHEET 1 OF 1

PROGRAMME No.

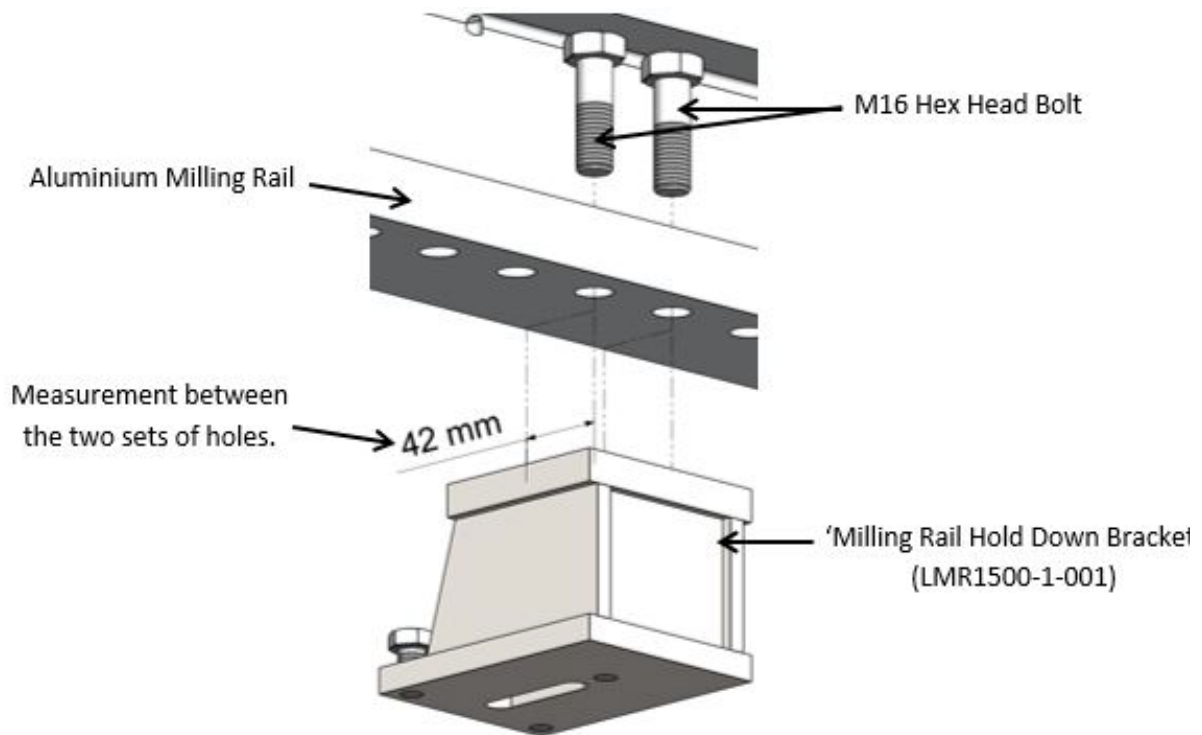
A3

PMD 23 Issue 1 10.8.04

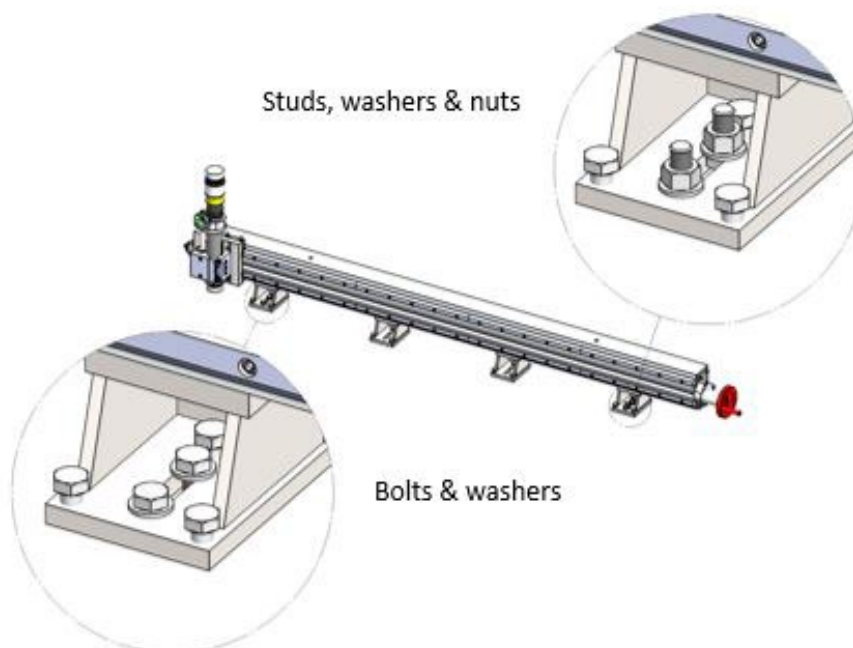
6. Installation

6.1. Mounting Brackets

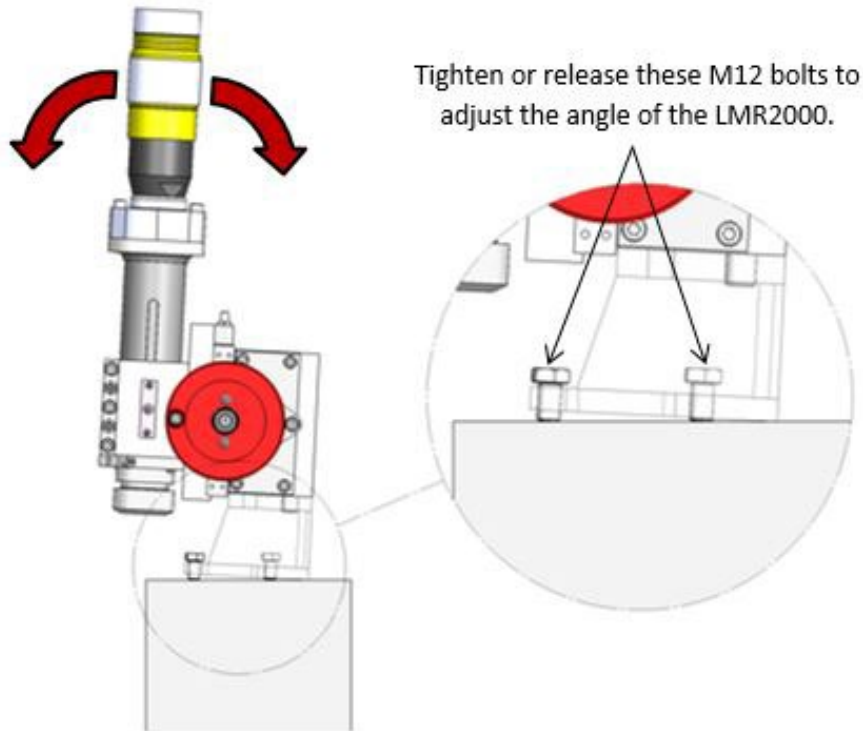
The LMR2000, in standard configuration, is secured via four 'Milling Rail Hold Down Brackets' (LMR1500-1-001). The 'Hold Down Bracket' has two, optional sets of holes to fix to the aluminium rail & a slot for fixing to the work piece.



Threaded holes are required in the work piece to hold the LMR2000 down via appropriate bolts or studs, washers & nuts through the slot provided. Two bolts or studs should be used for each Hold Down Bracket as shown below.

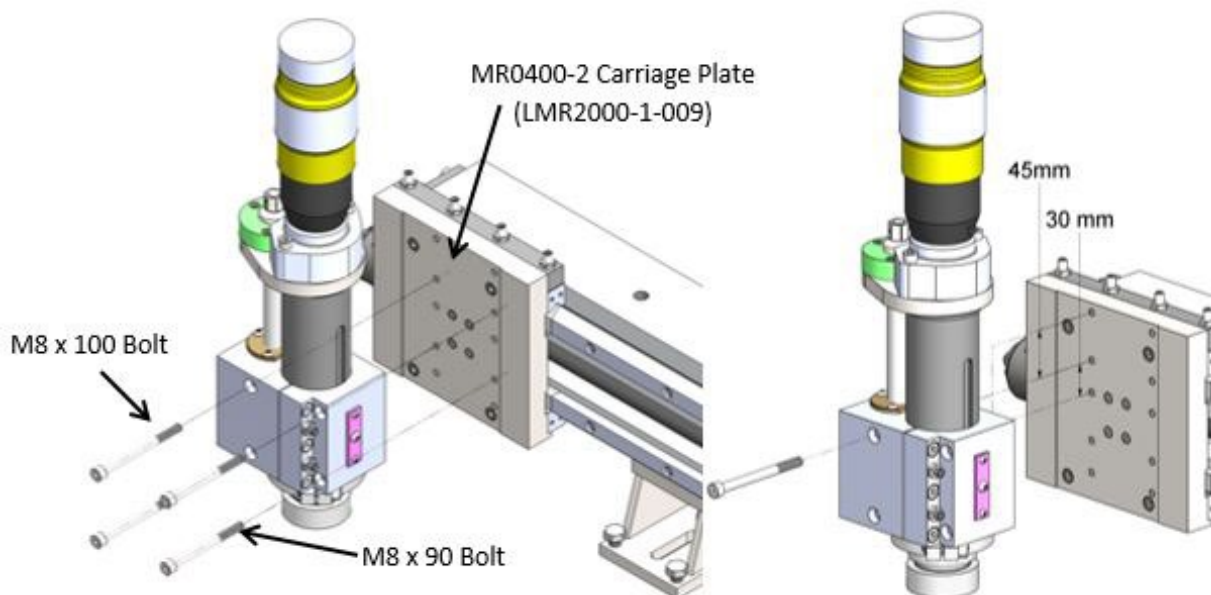


To correct or adjust the angle of the LMR2000 relative to the work piece, the three M12 bolts located in the base of the 'Milling Rail Hold Down' Bracket can be adjusted. Ensure any securing bolts or studs are slack enough to allow adjustment first, re-secure when adjustments have been made.



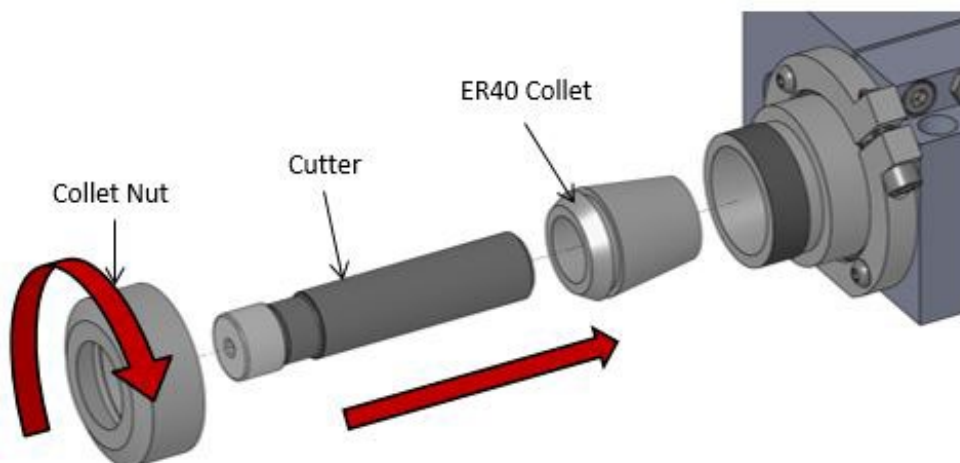
6.2. *Milling Head*

The 'Milling Head' (MR 0400), whether in pneumatic or hydraulic configuration, is secured to the LMR2000 via four M8 bolts. It can be secured at three available heights depending on which set of holes are chosen on the 'MR0400-2 Carriage Plate' (LMR2000-1-009), these heights are 45 & 30mm apart giving an overall height adjustment of 75mm.



6.3. Fitting Cutters

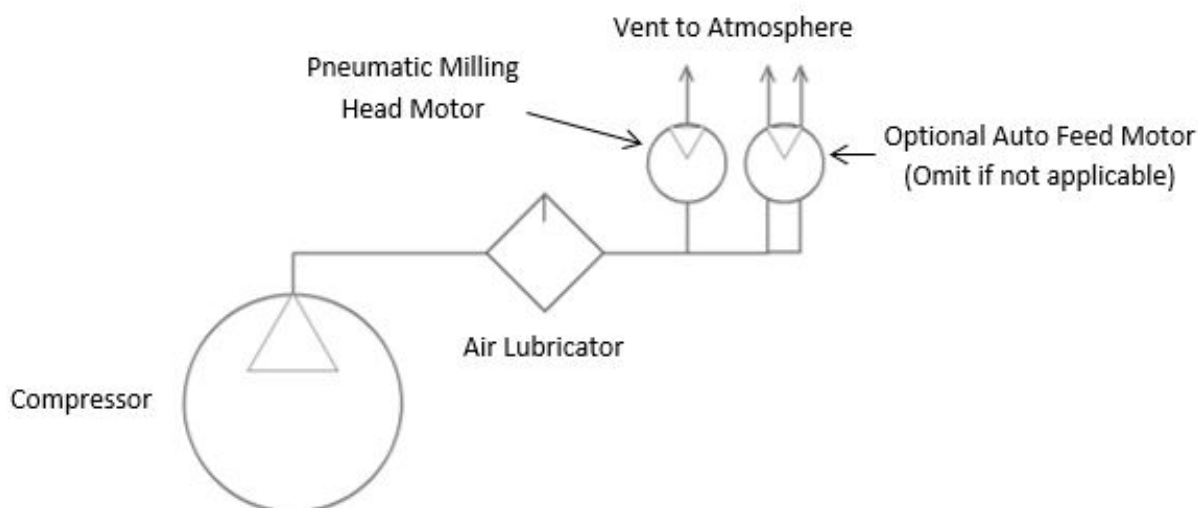
In standard configuration the Milling Head (MR 0400) supplied with the LMR2000 is compatible with ER40 type collets. These allow quick & easy tool changing. Release & secure the 'Collet Nut' using a C-Hook Spanner.



6.4. Service & Supplies

6.4.1. For Pneumatic Machines

In pneumatic configuration a single hose goes from the air lubricator to the motor, the air then vents to the atmosphere.



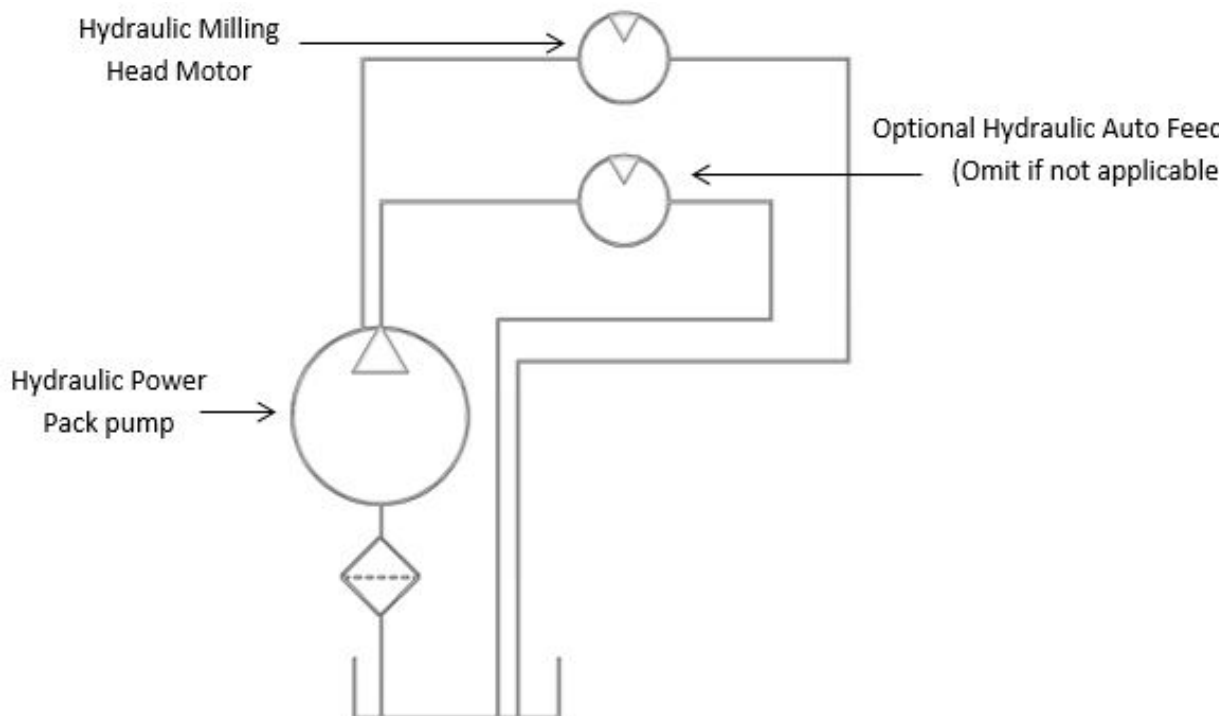
Pneumatic circuit schematic diagram for LMR2000 shown with optional auto feed motor

The recommended pneumatic pressure required to operate the LMR2000 effectively is 6 bar (87 psi). If using the optional 'Pneumatic LMR Auto Feed Kit' (LMR2000-4) then this will also require a pneumatic pressure of 6 bar (87 psi).

The recommended pneumatic flow rate required to operate the 'MR 0400-4 Milling Head' effectively is 1800 litres per minute (63.6 CFM). If using the optional 'Pneumatic LMR Auto Feed Kit' (LMR2000-4) then this will also require a flow rate of 2000 litres per minute (70.6 CFM).

6.4.2. For Hydraulic Machines

In hydraulic configuration, a single hose goes from hydraulic power pack to the milling head motor, another hose then returns from the motor back to the power pack tank.



Hydraulic circuit schematic diagram for LMR2000 shown with optional auto feed motor

The recommended hydraulic pressure required to operate the LMR2000 effectively is 80-100 bar (1160-1450 psi). If using the optional 'Hydraulic LMR Auto Feed Kit' (LMR2000-8) then this will also require a pneumatic pressure of 80-100 bar (1160-1450 psi).

The recommended hydraulic flow rate required to operate the 'MR 0400-2 Milling Head' effectively is 50 litres per minute (13.2 gal/min). If using the optional 'Hydraulic LMR Auto Feed Kit' (LMR2000-8) this will require a flow rate of 20 litres per minute (5.3 gal/min).

6.5. Personnel

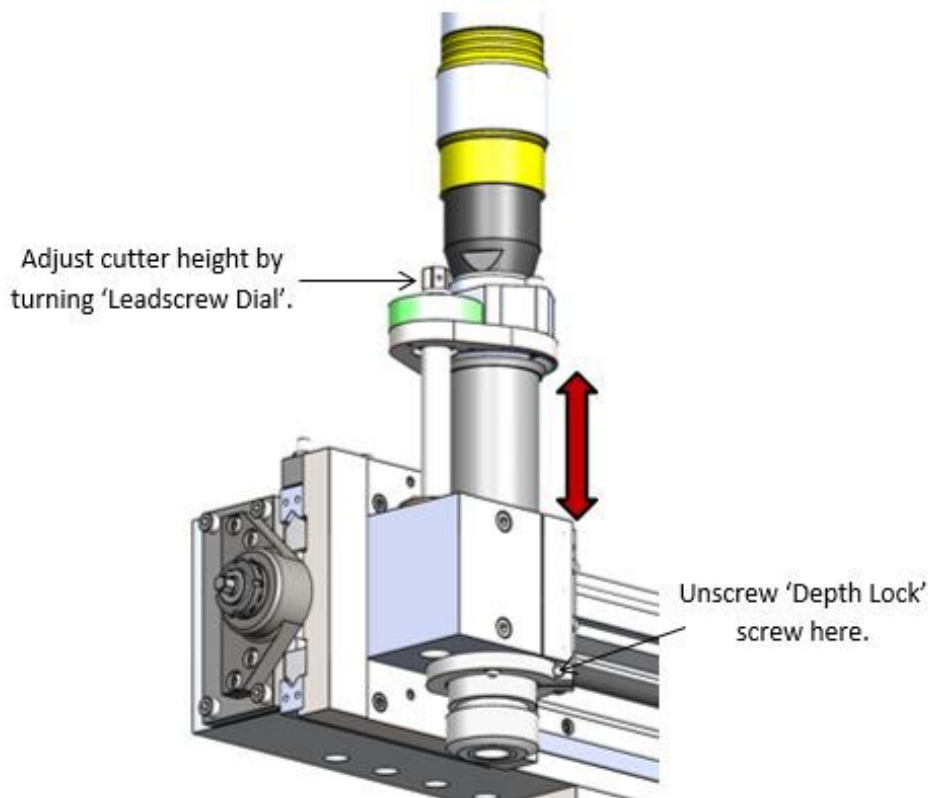
As a specialist portable machine the minimum standard for an operator is to be:

- The operator must be trained and conversant with the Enerpac LMR2000.
- 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

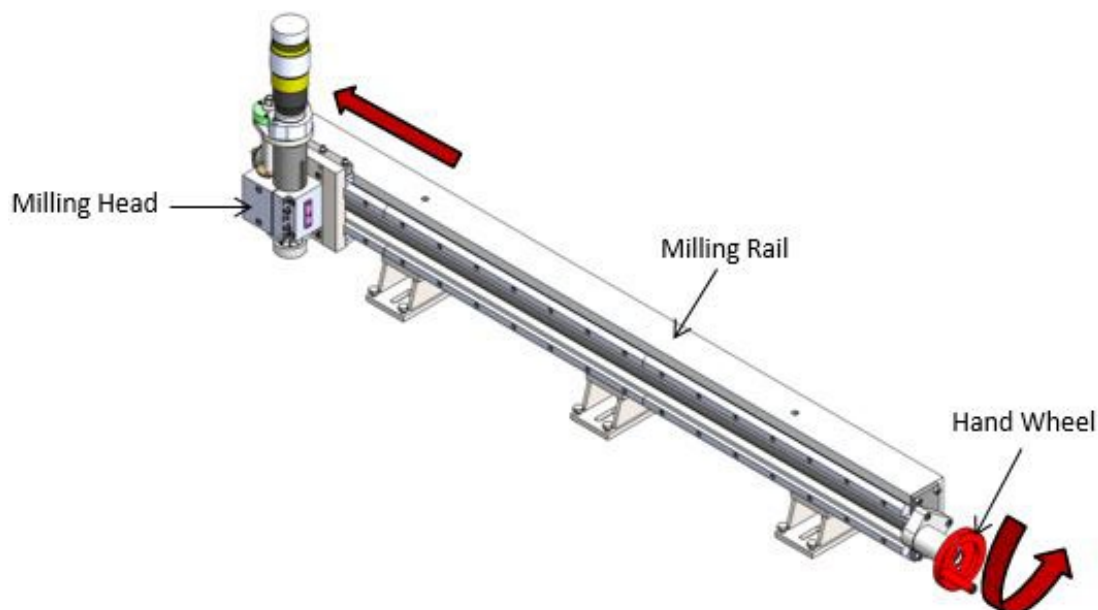
7. Machine Operation

Prior to operation ensure that the correct cutter is properly installed, the machine is properly secured to the work piece & the hoses are correctly routed & fitted.

Set the height of the cutter by releasing the 'Depth Lock' on the Milling Head & adjusting, as necessary by turning the 'lead Screw Dial'.



Adjust the Milling Heads position on the Milling Rail by turning the Hand Wheel as shown below. For each revolution of the Hand Wheel the Milling Head will move 5mm.



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.

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.

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
Poor surface finish on the face	1. Machine out of balance	Check balance
	2. Machine base incorrectly installed	Check installation
	3. Machine installation bolts not tightened	Check bolts
	4. Tool inserts worn or damaged	Check tool & replace
	5. Depth of cut too deep	Reduce depth of cut
	6. Too much play in tool post gib strip or carriage	Adjust tool post & carriage
	7. Too much play in main hub bearings	Adjust bearing dampers
	8. Worn drive motor	Check motor
	9. Poorly adjusted surfacing arm	Check and adjust
	10. General poor machine condition	Refer to Enerpac

10. Appendices

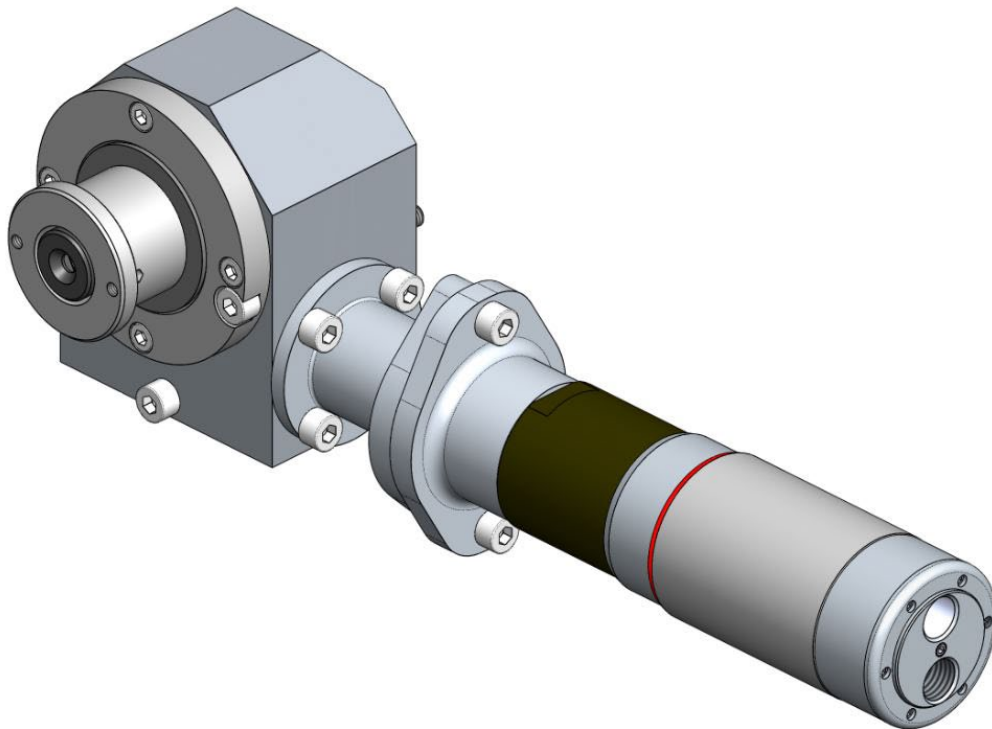
10.1. *Optional Extras*

LMR2000-4 Auto-Feed

As an optional extra the LMR2000-4 Auto Feed Module can be attached to the LMR1000 machine.

To fit the LMR2000-4 onto the LMR1000;

- Remove the M6x12 countersunk screw from inside the HTD 0432 handwheel, as well as the three M8x30 screws from the LMR1000-1-003 bearing housing. This should allow for the entire handwheel assembly to be removed.
- Using the same M8x30 screws, mount the LMR2000-4 over the now exposed LMR2000-1-008 Drive sleeve ensuring that the hex drive matches up with the inside of the autofeed unit.
- Secure the captive washer to the drive sleeve using the M6x12 countersunk screw



To engage the auto feed, press the KW 020 Feed Engagement Knob down until it locks into position. The feed rate is then controlled by the feed motor rotational speed.

10.2. Recommended torque settings for fasteners

Thread Ø	Tensile Strength		Torque Setting	
	kN	lbs	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

10.3. General Notes

[illegible]