



Project Spindle Carriage For CNC
Title **cnc_milling_carriage_v1.SLDASM**
Designer Vladimir Tyrkin
File CARRIAGE_BOM.xlsx
Date 17 December 2022

Project Link [GitHub](#)
Project Number **000**
Drawn by Vladimir Tyrkin

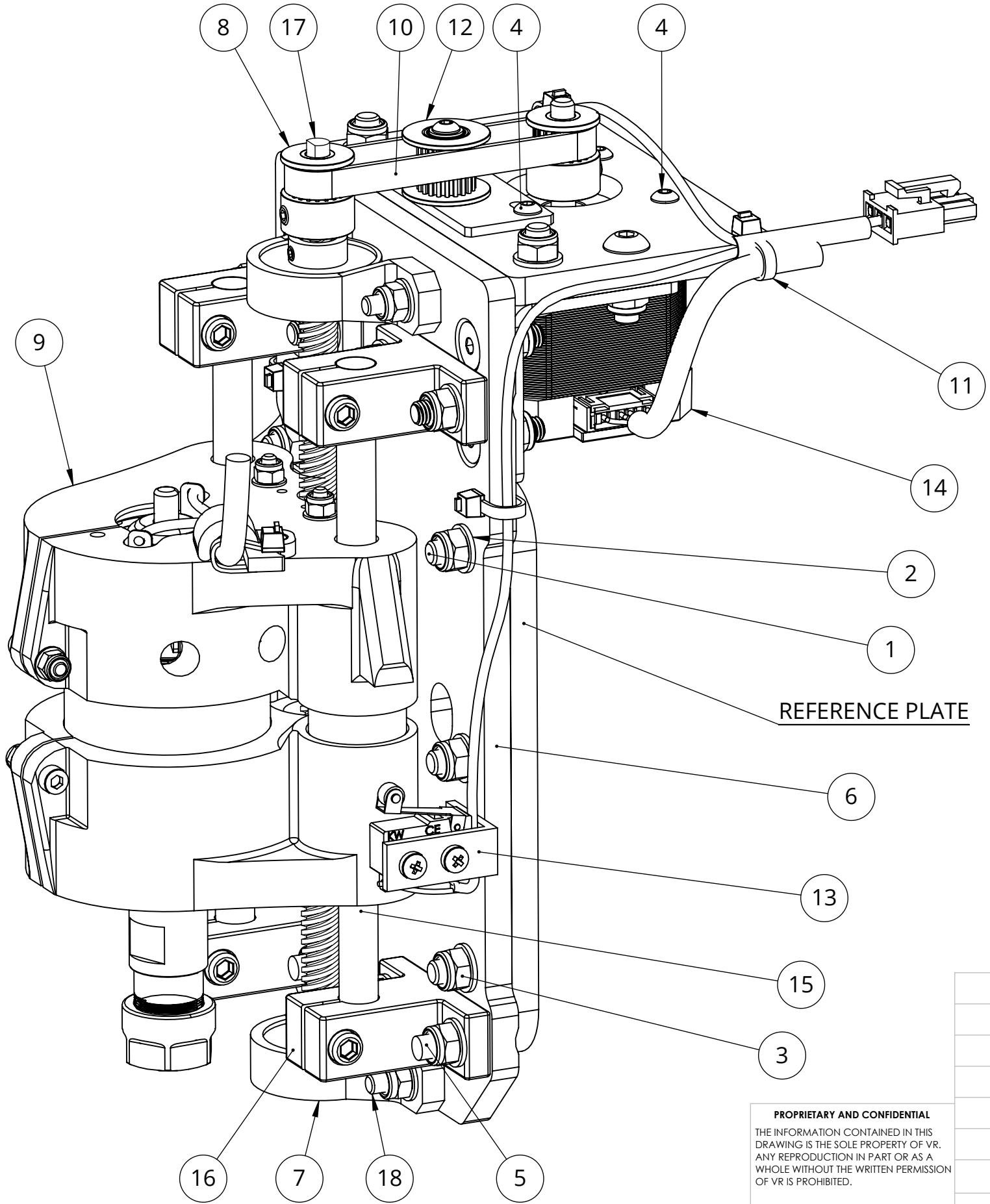
Rev. 1

Dwg.	Item No.	Qty	Scem	Description	Material	Manufacturer	Part Number	Manufacturer Link	Weight	Total Weight
001		2		Linear Motion Shaft	52100 Alloy Steel	McMaster-Carr	5033N132	McMaster-Carr	58.89	117.78
						McMaster-Carr	4920N11	McMaster-Carr		
					CHINA	none		Aliexpress		
002	1	1		Lead Screw	AISI 1020	CHINA	none	Aliexpress	62.17	62.17
				Note: must be pair to item 2						
011		1		Stepper Base	Polycarbonate (PC)	McMaster-Carr	8574K281	McMaster-Carr	37.88	37.88
				Files: Drawings/parts for cnc.DWG & Drawings/parts for cnc.CDR						
012		1		Vertical Plate	Polycarbonate (PC)	McMaster-Carr	8574K281	McMaster-Carr	120.14	120.14
				Files: Drawings/parts for cnc.DWG & Drawings/parts for cnc.CDR						
025	2			ThreadedRodMotor	AISI 1035 Steel (SS)	McMaster-Carr	94595A215	McMaster-Carr	4.7	9.4
031	1			TensionerBasePlate	6061 Alloy	McMaster-Carr	9146T14-9146T141	McMaster-Carr	4.5	4.5
032	1			Standoff threaded round spacer	6063-T6	CHINA	none	Aliexpress	0.48	0.48
081	2			SensorMount	6063-T6	McMaster-Carr	4630T135	McMaster-Carr	2.19	4.38
None	2			Corner Bracket 40x40L	AISI 1035 Steel (SS)	Soberizavod	H49	Soberizavod	49	98
None	4			SK8 SC8UU LINEAR RAIL ORIGINAL	Multimaterial	CHINA	none	Aliexpress	25	100
None	2			Pillow Block	Multimaterial	CHINA	none	Aliexpress	37	74
None	2			Limit Switch	Multimaterial	DIGIKEY	none	DIGIKEY	1.6	3.2
None	1			Nema 17HS4401 Stepper Motor	Multimaterial	CHINA	none	Aliexpress	315	315
None	5			Cable tie 3 mm width	Nylon 101	McMaster-Carr	7130K31	McMaster-Carr	0.16	0.8
None	1			Belt	Rubber	CHINA	none	Aliexpress	1.34	1.34
None	1			Heat shrink tube	Rubber	McMaster-Carr	7496K85	McMaster-Carr	0.12	0.12
None	1			Power cable 9Amp max.	Wire	McMaster-Carr	9700T61	McMaster-Carr	7.93	7.93
None	1			DC 775 Motor	Multimaterial	CHINA	none	Aliexpress	314	314
None	2			2GT 20Teeth Pulley	Multimaterial	CHINA	none	Aliexpress	5.11	10.22
None	1			ER11 collet	Multimaterial	CHINA	none	Aliexpress	49	49
None	1			Pulley 20T W10 B5 With Teeth	Multimaterial	CHINA	none	Aliexpress	10	10
None	4			LM8UU Lineare bearing	Multimaterial	CHINA	none	Aliexpress	16	64
None	1			Cable Top End Sensor (230mm)	Multimaterial	McMaster-Carr	9697T1	McMaster-Carr	3.05	3.05
None	1			Cable Bottom End Sensor (290mm)	Multimaterial	McMaster-Carr	9697T1	McMaster-Carr	2.29	2.29
None	1			3 CIRCUIT RECEPTACLE MOLEX	Multimaterial	MOUSER	none	Mouser	1	1
None	2	1		Movement Nut	Brass	CHINA	none	Aliexpress	11.5	11.5
				Note: must be pair to item 1						
										Total weight 1422.2

3D printed parts

021		1		Bottom motor cover	PET-G	McMaster-Carr	3462N1	McMaster-Carr	93	93
				File: FilesForPrint/Bottom motor cover.STL						
022		1		Top motor cover	PET-G	McMaster-Carr	3462N1	McMaster-Carr	87.98	87.98
				File: FilesForPrint/Top motor cover.STL						
024		2		Spacer	PET-G	McMaster-Carr	3462N1	McMaster-Carr	5.97	11.94
				File: FilesForPrint/Spacer.STL						
026		1		Cable holder	PET-G	McMaster-Carr	3462N1	McMaster-Carr	1.21	1.21
				File: FilesForPrint/WiresHolder.STL						
										Total weight 194.13

Dwg.	Item No.	Qty	Scem	Description	Material	Manufacturer	Part Number	Manufacturer Link	Weight	Total Weight
Screws										
None		1		Self Tap. Cross recessed Screw 2.6x10mm	AISI 304	CHINA	none	Aliexpress	0.23	0.23
None		6		M3 NYLOC DIN 985	AISI 304	CHINA	none	Aliexpress	0.65	3.9
None		4		M4 NYLOC DIN 985	AISI 304	McMaster-Carr	none	McMaster-Carr	1.29	5.16
None		22		M5 NYLOC DIN 985	AISI 304	McMaster-Carr	none	McMaster-Carr	1.6	35.2
None		6		Low Profile Hex Screw M5x30	AISI 1035 Steel (SS)	CHINA	none	Aliexpress	3.63	21.78
						McMaster-Carr	none	McMaster-Carr		
None		4		Rounded Head Thread-Forming Screw M3x20mm	18-8 Stainless Steel	McMaster-Carr	99461A947	McMaster-Carr	0.73	2.92
None		1		M5x20 DIN 7991, ISO 10642	18-8 Stainless Steel	McMaster-Carr	92125A214	McMaster-Carr	3.162	3.162
None		4		M5x16 DIN 7991, ISO 10642	18-8 Stainless Steel	McMaster-Carr	92125A212	McMaster-Carr	2.65	10.6
None		4		ISO 4762 M4 x 20 - 20N	18-8 Stainless Steel	McMaster-Carr	91292A121	McMaster-Carr	2.65	10.6
None		17		Washer DIN 125 - A 5.3	Zinc Plated Steel	McMaster-Carr	none	McMaster-Carr	0.44	7.48
None		4		Washer DIN 125 - A 4.3	Zinc Plated Steel	McMaster-Carr	none	McMaster-Carr	0.3	1.2
None		7		Washer DIN 125 - A 3.2	Zinc Plated Steel	McMaster-Carr	91166A210	McMaster-Carr	0.12	0.84
None		2		ISO 4762 M3 x 16 - 16N	18-8 Stainless Steel	McMaster-Carr	none	McMaster-Carr	1.16	2.32
None		2		ISO 7380 - M3 x 10 - 10N	316 Stainless Steel	McMaster-Carr	90943A113	McMaster-Carr	0.7	1.4
None		4		ISO 7380 - M5 x 16 - 16N	18-8 Stainless Steel	McMaster-Carr	92095A212	McMaster-Carr	2.9	11.6
None		3		ISO 7380 - M3 x 8 - 8N	18-8 Stainless Steel	McMaster-Carr	92095A181	McMaster-Carr	0.6	1.8
None		3		ISO 7046-1 - M3 x 8 - Z - 8N	18-8 Stainless Steel	McMaster-Carr	92010A118	McMaster-Carr	0.47	1.41
None		4		ISO 7046-1 - M3 x 10 - Z - 10N	18-8 Stainless Steel	McMaster-Carr	For DIN 965: 92010A120	McMaster-Carr	0.53	2.12
None		4		DIN EN ISO 7045 - M3 x 10 - Z - 10N	Zinc-Plated Steel	McMaster-Carr	92005A120	McMaster-Carr	1.27	5.08
None		4		ISO 7046-1 - M5 x 20 - Z - 20N	Zinc-Plated Steel	McMaster-Carr	For DIN 965: 91420A328	McMaster-Carr	2.86	11.44
							Total weight			140.24

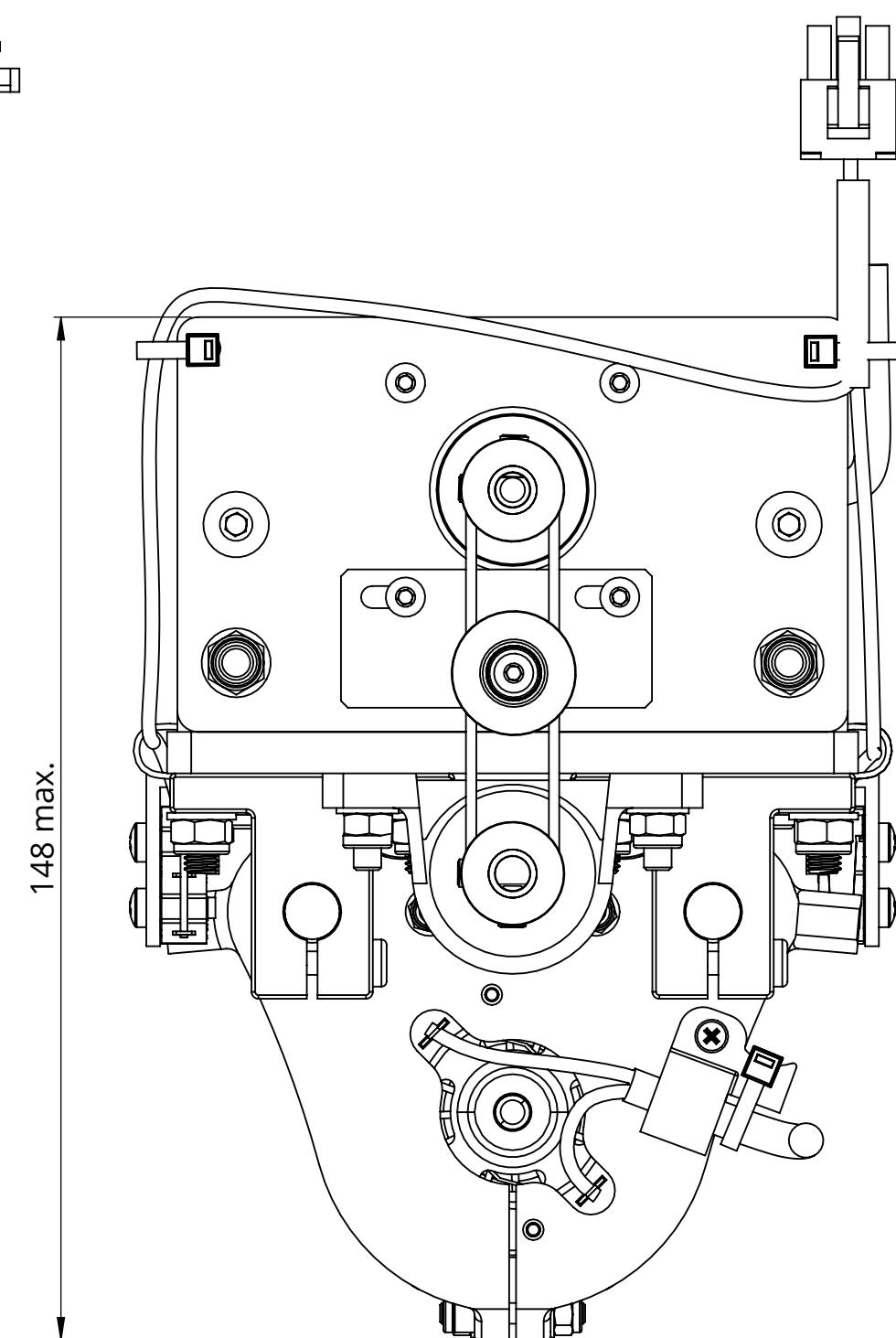
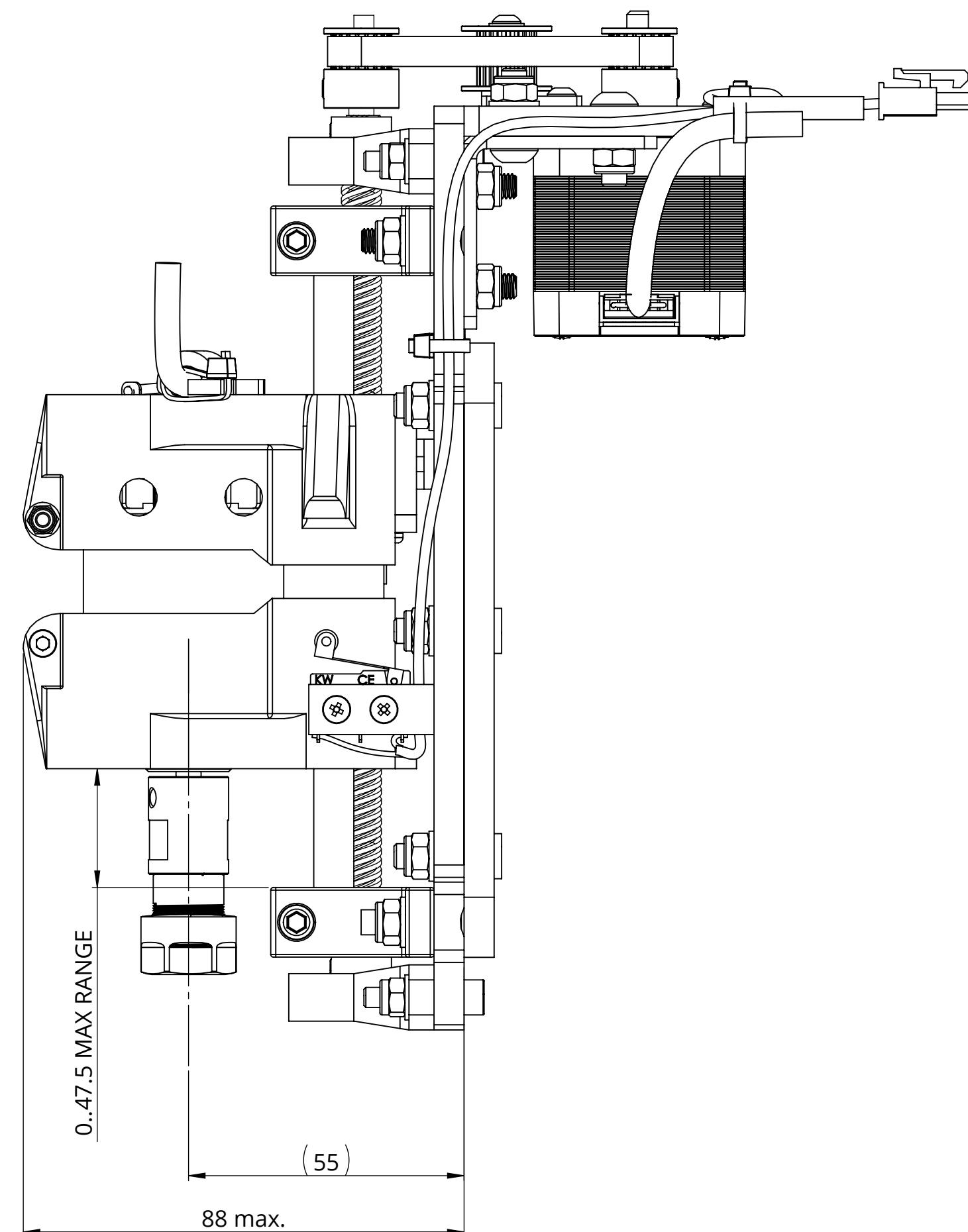
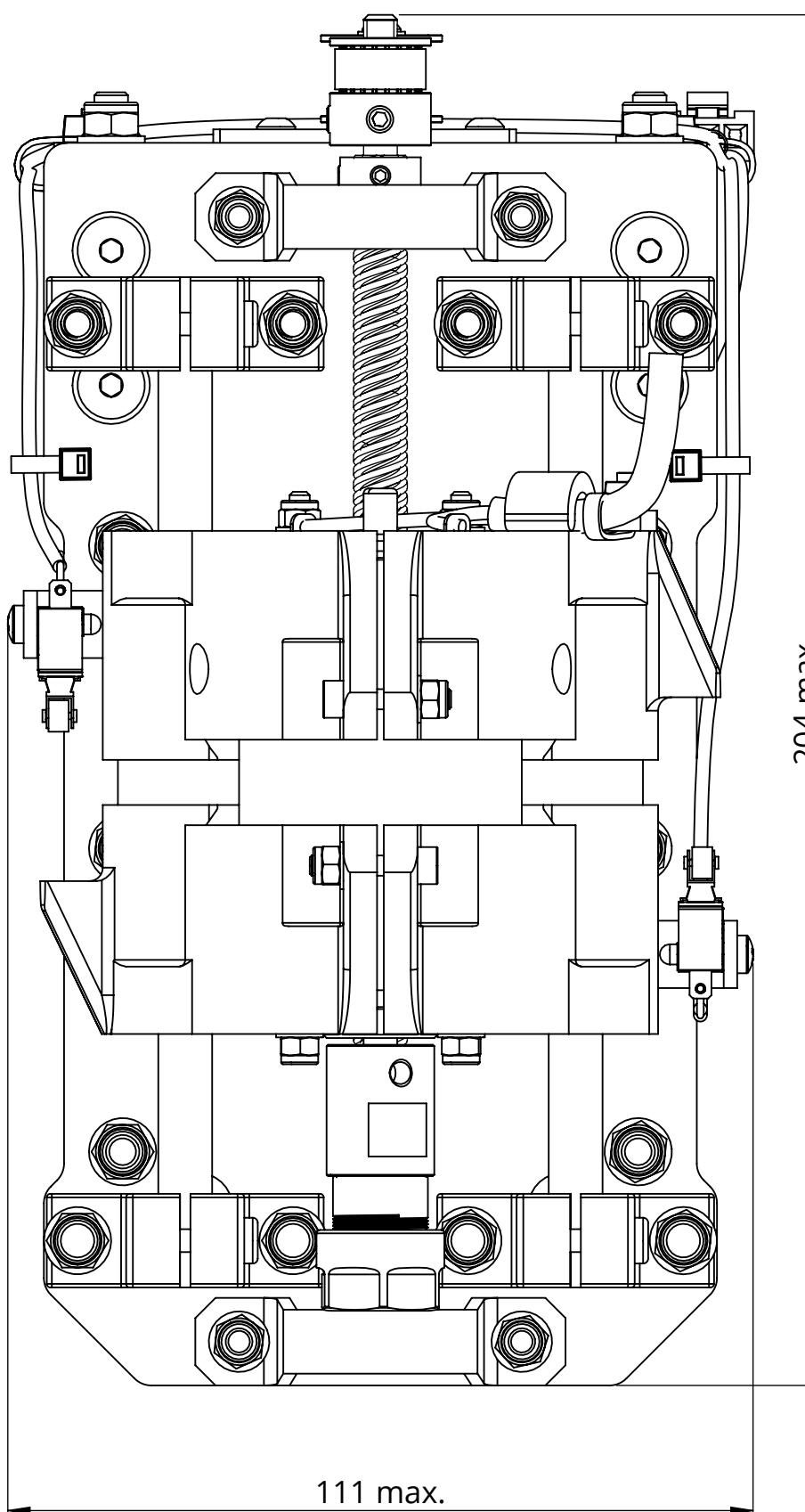


ITEM NO.	PART NUMBER	DWG. NO.	QTY.
1	Low Profile Hex Screw M5x30	None	6
2	Washer DIN 125 - A 5.3		12
3	M5 NYLOC DIN 985	None	12
4	ISO 7380 - M3 x 10 - 10N		4
5	ISO 7046-1 - M3 x 10 - Z - 10N		8
6	CarriageBase	010	1
7	Pillow Block	No	1
8	2GT 20Teeth Pulley	None	1
9	Motor assembly	020	1
10	Belt	None	1
11	Cable tie 3 mm width	None	4
12	Tensioner	030	1
13	SensorsAssembly	040	1
14	Stepper Assembly	050	1
15	Linear Motion Shaft	001	2
16	SK8 SC8UU LINEAR RAIL ORIGINAL	No	2
17	Lead Screw	002	1
18	ISO 4762 M4 x 20 - 20N		2

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BREAK ALL SHARP EDGES		DRAWN	
DIMENSIONS ARE IN MILLIMETERS		CHECKED	
TOLERANCES:		ENG APPR.	
FRACTIONAL \pm		MFG APPR.	
ANGULAR: MACH \pm BEND \pm		Q.A.	
TWO PLACE DECIMAL \pm		COMMENTS:	
THREE PLACE DECIMAL \pm		Vladimir Tyrkin	
INTERPRET GEOMETRIC		veres.pcb@gmail.com	
TOLERANCING PER:			
MATERIAL			
Multimaterial			
NEXT ASSY	USED ON	FINISH	REV
		None	
APPLICATION		SCALE: 1:1 WEIGHT: 1658.47 SHEET 1 OF 4	
DO NOT SCALE DRAWING			

VR
TITLE:
**CNC Milling
Carriage**
SIZE **B** DWG. NO. **000** REV
SCALE: 1:1 WEIGHT: 1658.47 SHEET 1 OF 4

D



VIEW A

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETRES	DRAWN		
		TOLERANCES:			
		FRACTIONAL ±			
		ANGULAR: MACH ± BEND ±			
		TWO PLACE DECIMAL ±			
		THREE PLACE DECIMAL ±			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		Multimaterial			
	NEXT ASSY	USED ON	FINISH	None	
	APPLICATION	DO NOT SCALE DRAWING			

VR VR

TITLE: CNC Milling Carriage

SIZE DWG. NO. REV

C 000

Vladimir Tyrkin veres.pcb@gmail.com

SCALE: 1:1 WEIGHT: 1658.47 SHEET 2 OF 4

A

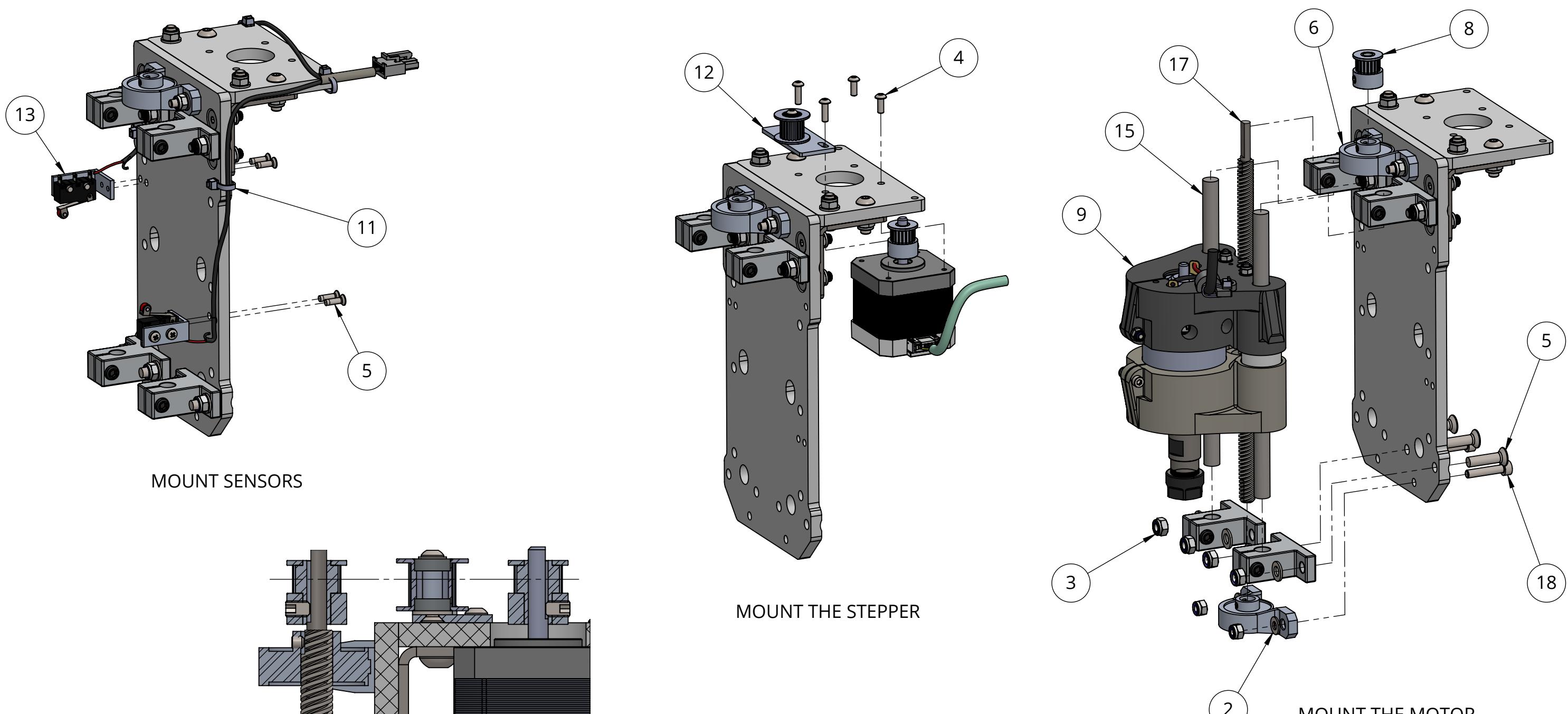
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4

3

2

1



A LEAD SCREW ASSEMBLY. SCALE 1 : 1

NOTE:

ASSEMBLY PROCEDURE:

1. MOUNT SENSORS AND FIX CABLES BY THE TIES ITEM 11.
2. SCREW STEPPER AND TENSIONEER TOGETHER.
3. PRE-ASSEMBLE LEAD SCREW 17 AND MOTOR ASSEMBLY 9. FIX LEAD SCREW IN PILLOW BLOCK 6 AS SHOWN. ASSEMBLY THE REST COMPONENTS.

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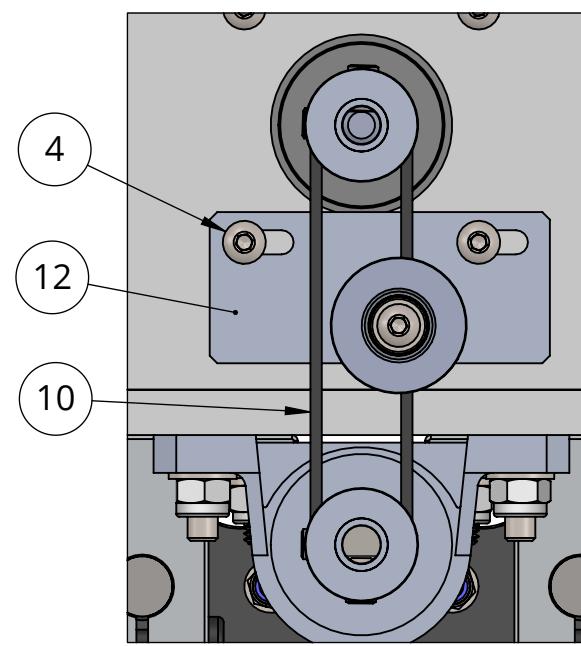
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		DRAWN	VR	VR
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.			REV
B	000			
SCALE: 1:2	WEIGHT: 1658.47	SHEET 3 OF 4		

4

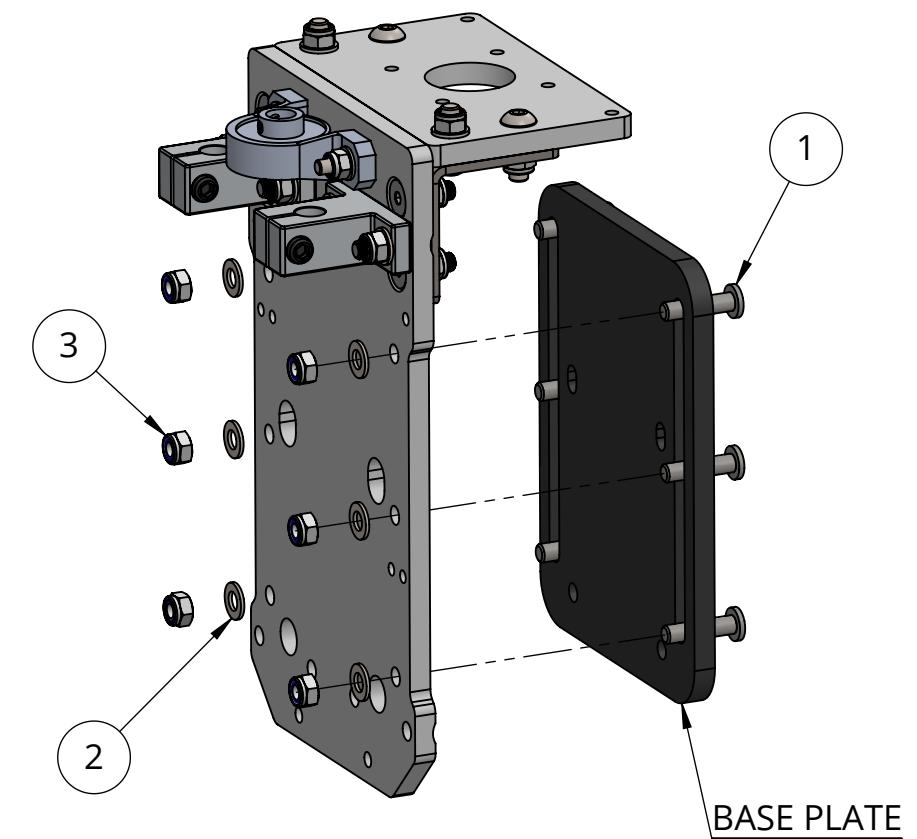
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2

1



SETTING THE BELT. SCALE 1 : 1



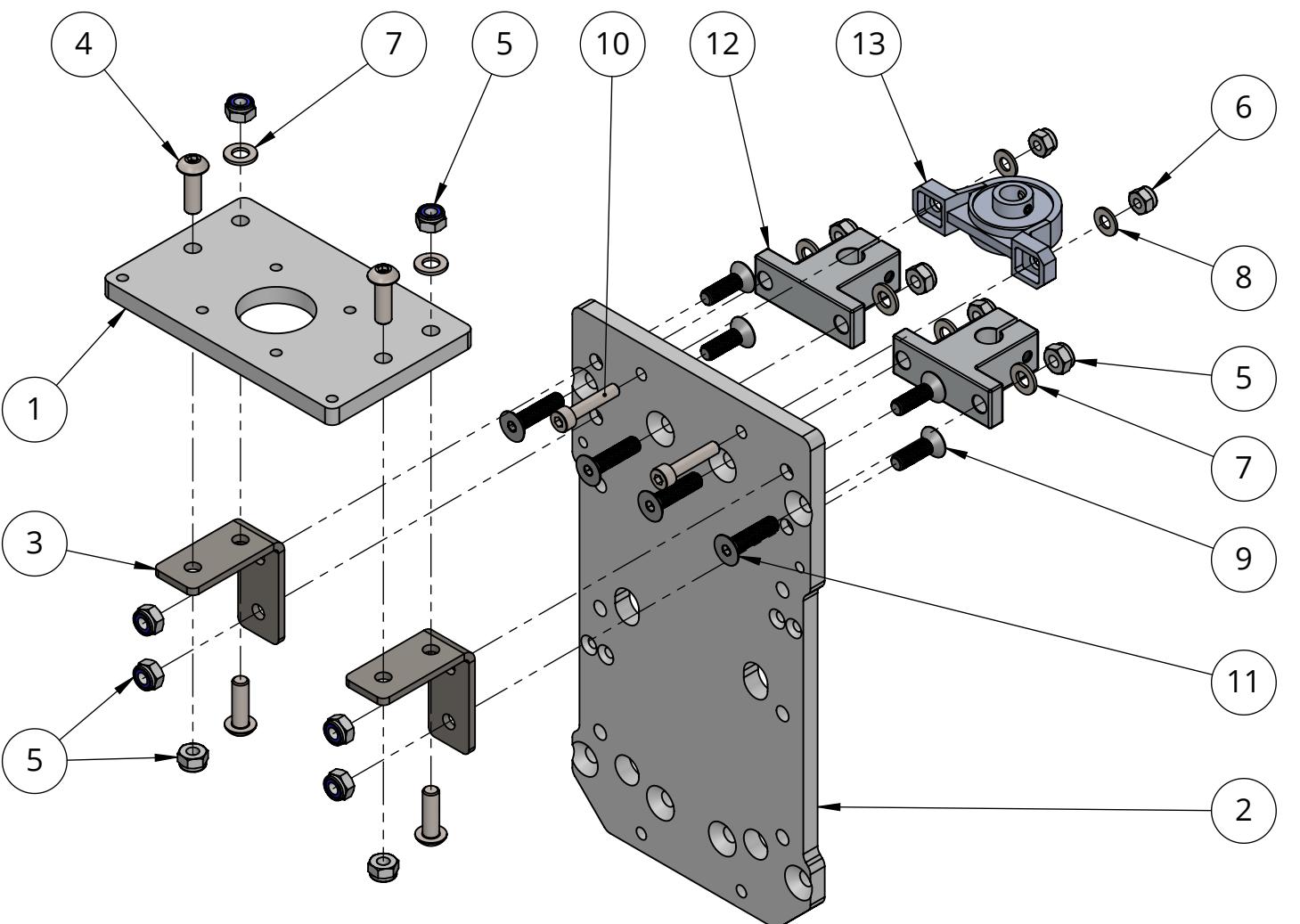
MOUNT TO THE CNC

NOTE:

1. ASSEMBLY PROCEDURE:
4. REDUSE SCREWS 4, SET THE BELT 10 AND MOVE THE TENSIONER AS SHOWN FOR STRETCH THE BELT.
5. MOUNT ALL CARRIAGE ASSEMBLY TO CNC BASE PLATE.
2. FOR MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.			REV
B	000			
SCALE: 1:2	WEIGHT: 1658.47	SHEET 4 OF 4		



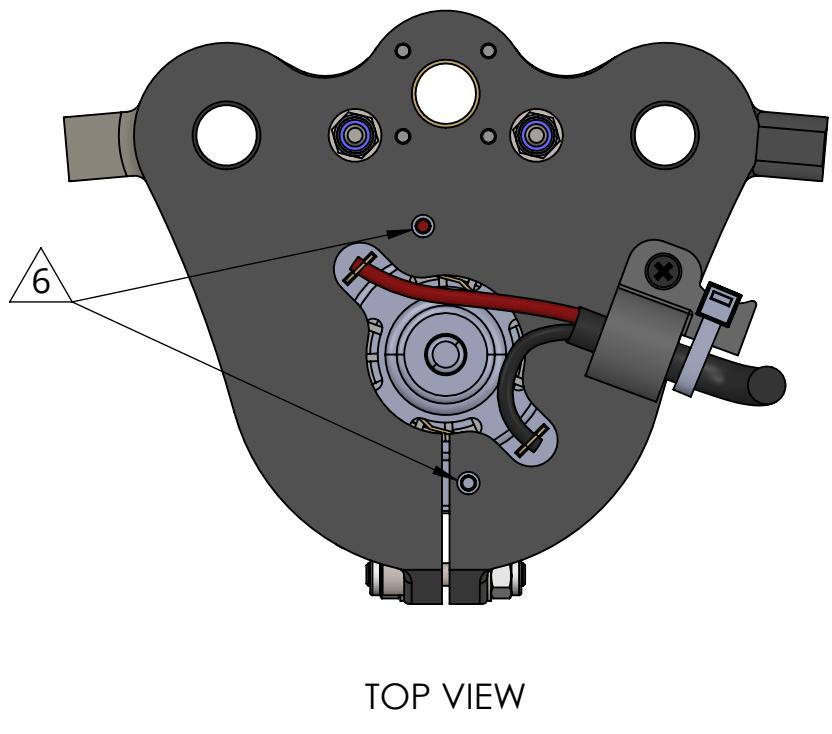
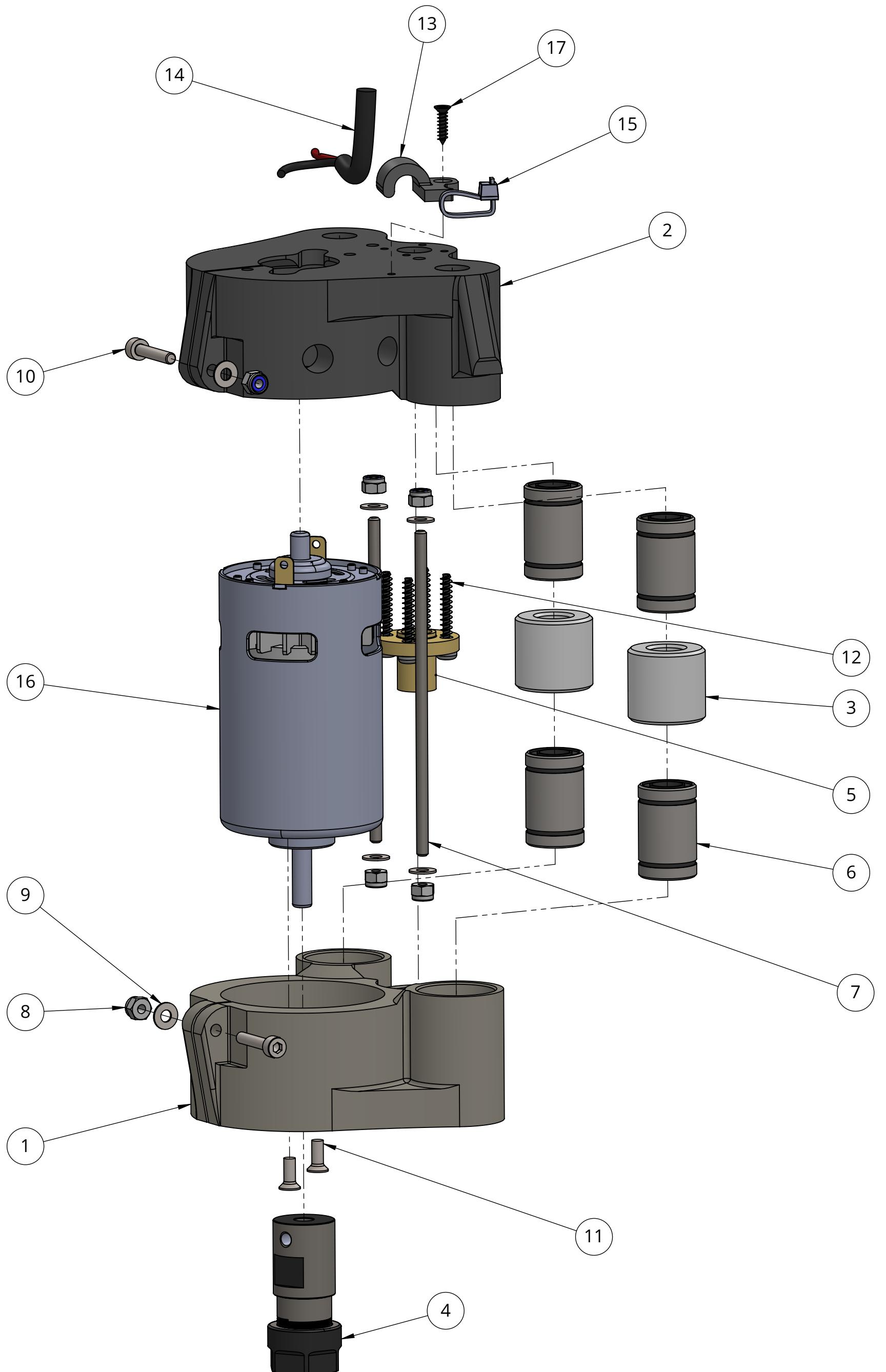
ITEM NO.	PART NUMBER	DWG. NO.	QTY.
1	Stepper Base	011	1
2	Vertical Plate	012	1
3	Corner Bracket 40x40L	No	2
4	ISO 7380 - M5 x 16 - 16N		4
5	M5 NYLOC DIN 985	None	12
6	M4 NYLOC DIN 985	None	2
7	Washer DIN 125 - A 5.3		6
8	Washer DIN 125 - A 4.3		2
9	M5x16 DIN 7991, ISO 10642	No	4
10	ISO 4762 M4 x 20 - 20N		2
11	M5x20 DIN 7991, ISO 10642	No	1
12	SK8 SC8UU LINEAR RAIL ORIGINAL	No	2
13	Pillow Block	No	1

NOTE:

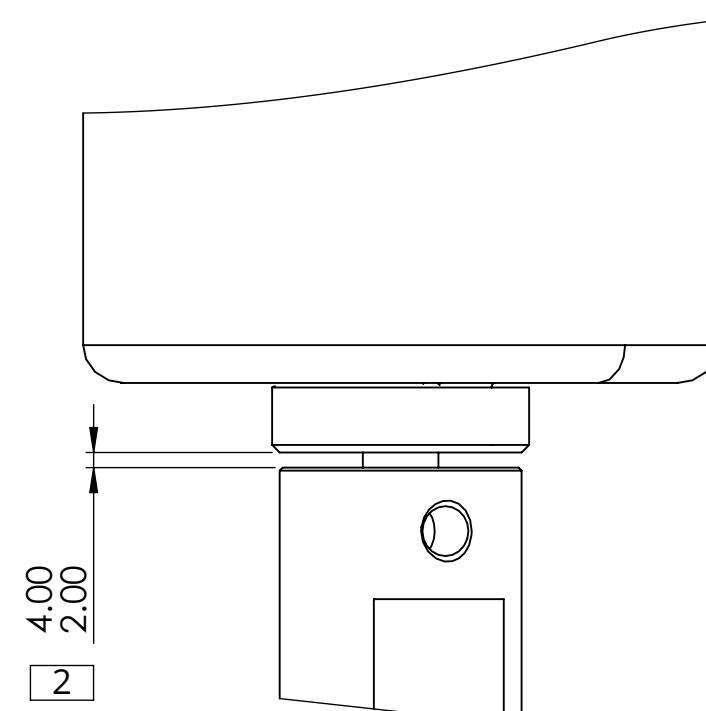
1. ASSEMBLE PILLOW BLOCK 13 AND ASSOCIATED COMPONENTS FIRST.
2. SET SCREWS 9 & 11 AT HOLES AT ITEM 2 AND PRE-ASSEMBLE ITEMS 5, 7 & 12.
3. PRE-ASSEMBLE ITEMS 1, 3, 4, 5 & 7. ASSEMBLY THE REST COMPONENTS.
4. FOR MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

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		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.	REV		
B	010			
SCALE: 1:2 WEIGHT: 368.87 SHEET 1 OF 1				



ITEM NO.	PART NUMBER	DWG. NO.	QTY.
1	Bottom motor cover	021	1
2	Top motor cover	022	1
3	Spacer	024	2
4	ER11 collet	None	1
5	Movement Nut	None	1
6	LM8UU Lineare bearing	None	4
7	ThreadedRodMotor	025	2
8	M3 NYLOC DIN 985	None	6
9	Washer DIN 125 - A 3.2		6
10	ISO 4762 M3 x 16 - 16N		2
11	ISO 7046-1 - M3 x 8 - Z - 8N		2
12	Rounded Head Thread-Forming Screw M3x20mm	None	4
13	Cable Holder	026	1
14	Power cable 9Amp max.	None	1
15	Cable tie 3 mm width	None	1
16	DC 775 Motor	None	1
17	Self Tap. Cross recessed Screw 2.6x10mm	None	1



FRONT VIEW
SCALE 2 : 1

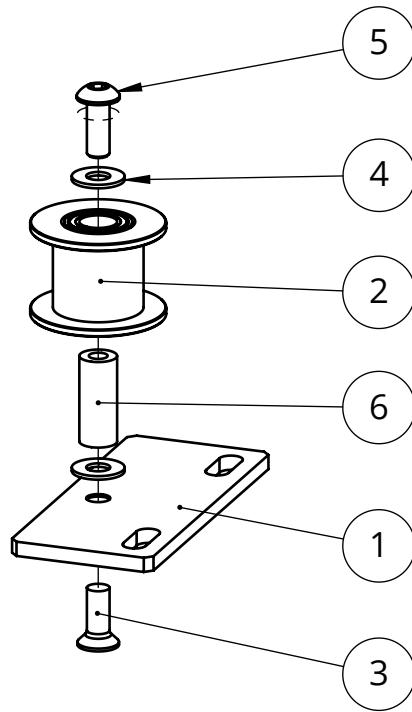
NOTES:

- ASSEMBLY PROCEDURE:
 - PRE-ASSEMBLE Top motor cover 2 AND Movement Nut 5 WITH SCREWS FIRST.
 - PRE-ASEMBLE ITEM 4 AND 16 AS SHOWN.
 - PRE-ASSEMBLE ITEMS 1, 16 & 11. SET TWO ITEMS 6 & TO THE Bottom motor cover 1.
 - SET THE REST ITEMS 6 TO THE Top motor cover 2 AND CONNECT TO PREVIOUS PREASSEMBLY.
 - SET ITEM 7 AND SCREW IT WITH 8 & 9.
 - SOLDER POWER CABLE 14 TO MOTOR PINS. +12V PIN OF THE MOTOR IS MARKED BY A RED DOT ON IT CASE. POLARITY IS AVAILABLE TO CHECK THRU HOLES AS SHOWN. FIX CABLE BY ITEMS , 17, 15.
 - ASSEMBLE THE REST COMPONENTS.
- FOR MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

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		DIMENSIONS ARE IN MILLIMETRES	DRAWN		
		TOLERANCING PER:		CHECKED	
		FRACTIONAL ±		ENG APPR.	
		ANGULAR: MACH ± BEND ±		MFG APPR.	
		TWO PLACE DECIMAL ±			
		THREE PLACE DECIMAL ±			
		INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.	
		MATERIAL		COMMENTS:	
		Multimaterial			
NEXT ASSY	USED ON	FINISH	None		
		APPLICATION	DO NOT SCALE DRAWING	Vladimir Tyrkin veres.pcb@gmail.com	REV
					C 020
				SCALE: 1:1	WEIGHT: 607.22
					SHEET 1 OF 1

2



B

1

ITEM NO.	PART NUMBER	DWG. NO.	QTY.
1	TensionerBasePlate	031	1
2	GT2 Idler Pulley, Configurable	None	1
3	ISO 7046-1 - M3 x 8 - Z - 8N		1
4	Washer DIN 125 - A 3.2		2
5	ISO 7380 - M3 x 8 - 8N		1
6	Standoff threaded round spacer	032	1

B

NOTE:

1. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.
2. TIGHTEN SCREWS TO A TORQUE OF 1.1 TO 1.4 Nm.

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		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL Multimaterial		NAME	DATE
		DRAWN			
		CHECKED			
		ENG APPR.			
		MFG APPR.			
		Q.A.			
		COMMENTS:			
NEXT ASSY	USED ON	Vladimir Tyrkin veres.pcb@gmail.com			
APPLICATION	DO NOT SCALE DRAWING				

2

1

VR

Tensioner

TITLE:

SIZE	DWG. NO.	REV
A	030	
SCALE: 1:1	WEIGHT: 9.406	SHEET 1 OF 1

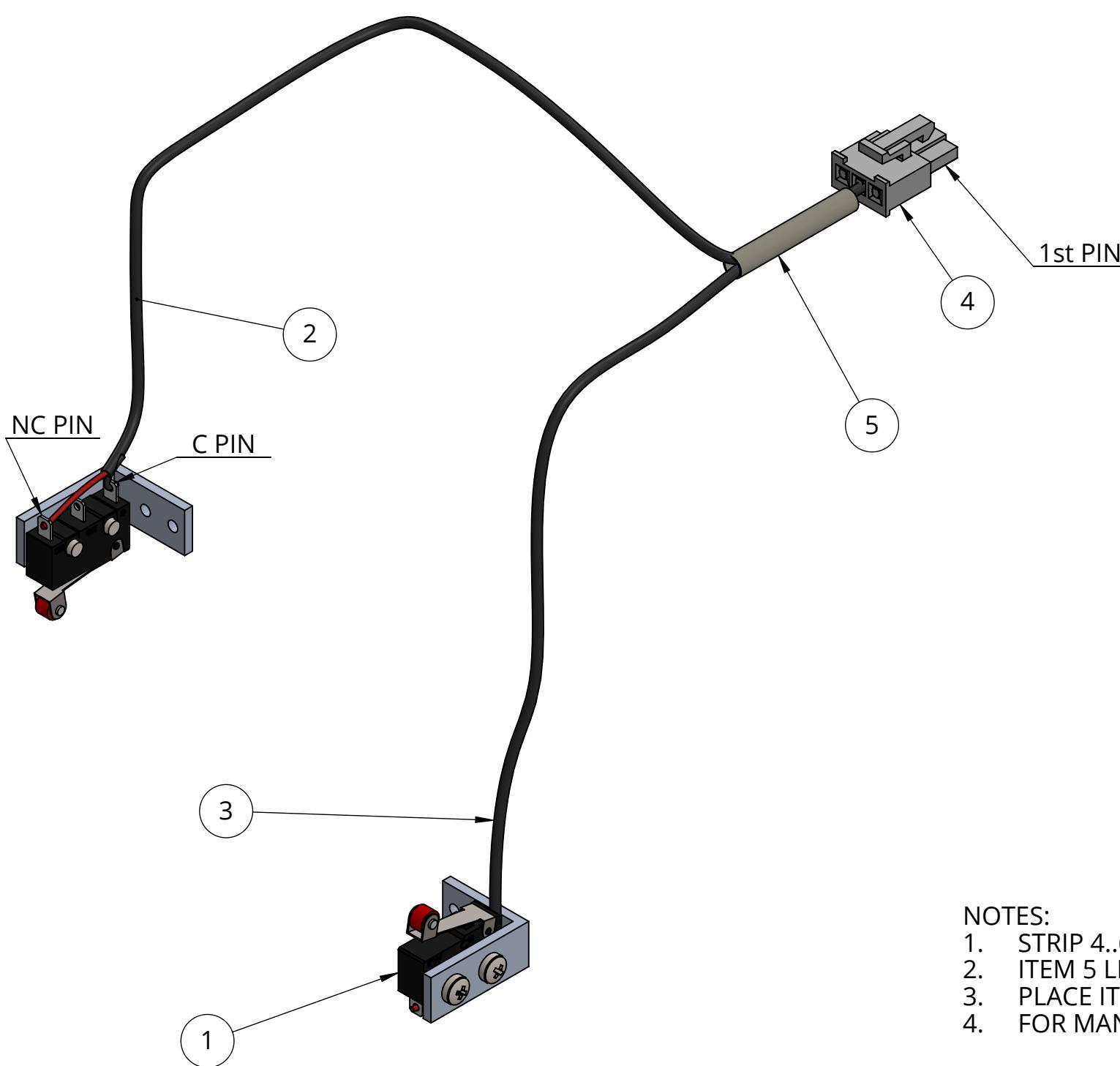
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3

2

1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	End Sensor Module	DWG. NO.: 080	2
2	Cable Top End Sensor	GPT Cable 24 AWG McMaster-Carr P/N 9697T1	1
3	Cable Bottom End Sensor	GPT Cable 24 AWG McMaster-Carr P/N 9697T1	1
4	3 CIRCUIT RECEPTACLE MOLEX	MOLEX P/N 39014031	1
5	Heat shrink tube	McMaster-Carr P/N 7496K85	1

WIRING CHART				
MOLEX CONN.	CABLE	WIRE	LIMIT SWITCH	NET NAME
1	BOTTOM END SENSOR	RED	NC	Z- OUT
		BLACK	C	GND
2	TOP END SENSOR	BLACK	C	GND
		RED	NC	Z+ OUT

NOTES:

1. STRIP 4..6 mm AND TIN EACH SIDE OF WIRE.
2. ITEM 5 LENGTH IS 30..35 mm. ITEM 2 LENGTH IS 220 ±10mm. ITEM 3 LENGTH IS 280 ±10mm.
3. PLACE ITEM 5 NEAR ITEM 4.
4. FOR MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

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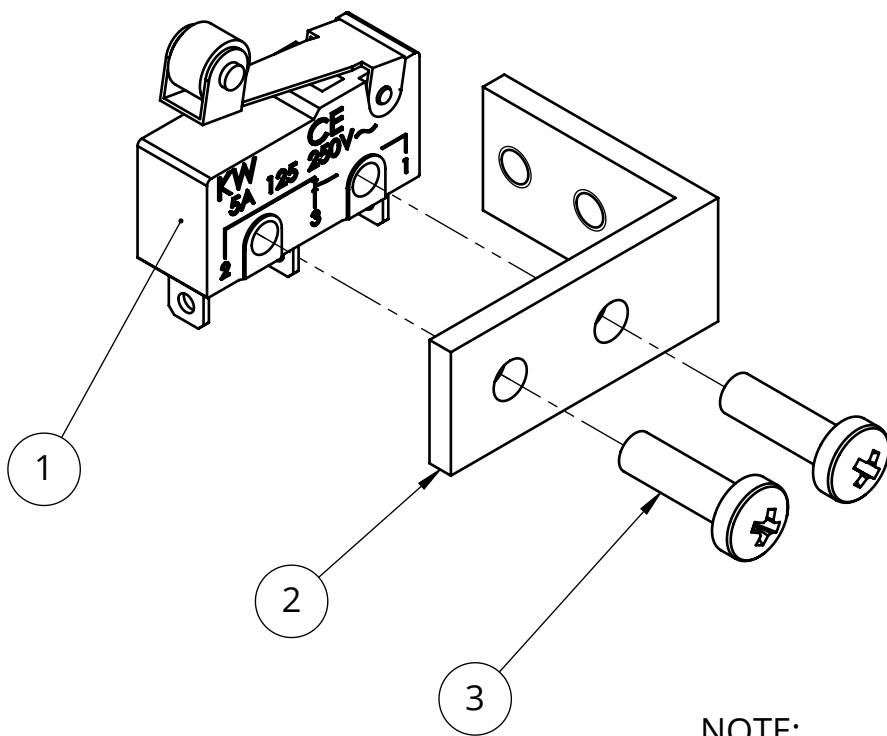
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			DRAWN		
			CHECKED		TITLE: Sensors Assembly
			ENG APPR.		
			MFG APPR.		
			Q.A.		
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:		
		MATERIAL Multimaterial	Vladimir Tyrkin		SIZE DWG. NO. B 040 REV
		FINISH None	veres.pcb@gmail.com		
		APPLICATION	DO NOT SCALE DRAWING		
				SCALE: 1:1 WEIGHT: 0.00 SHEET 1 OF 1	

4

3

2

1



ITEM NO.	PART NUMBER	DWG. NO.	QTY.
1	Limit Switch	No	1
2	SensorMount	081	1
3	DIN EN ISO 7045 - M3 x 10 - Z - 10N		2

NOTE:

1. LIMIT SWITCH OMRON SSG-01L2T-5 DIGIKEY P/N SSG-01L2T-5-ND.
2. TIGHTEN THE SCREWS TO A TORQUE OF 0.25 TO 0.3 Nm.
3. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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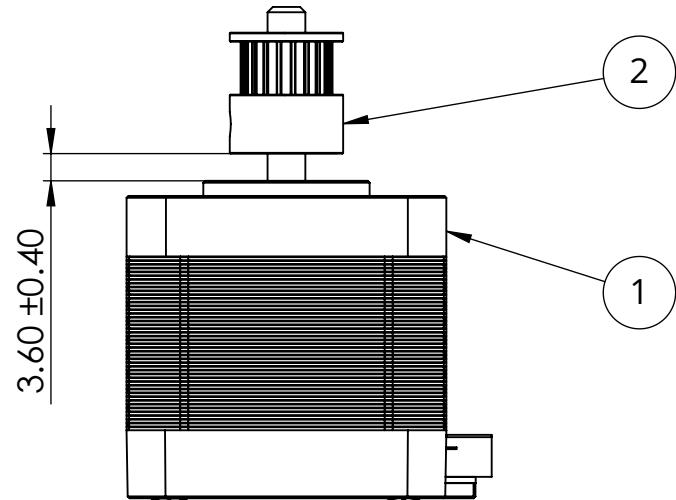
		UNLESS OTHERWISE SPECIFIED:			
		BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS			
TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±				DRAWN	
				CHECKED	
				ENG APPR.	
				MFG APPR.	
				Q.A.	
		INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:	
		MATERIAL Multimaterial			
NEXT ASSY	USED ON				
		FINISH No			
APPLICATION		DO NOT SCALE DRAWING			

VR	VR	
TITLE: End Sensor Module		
SIZE A	DWG. NO. 080	REV
Vladimir Tyrkin veres.pcb@gmail.com		
SCALE: 2:1	WEIGHT: 3.72	SHEET 1 OF 1

2

1

ITEM NO.	PART NUMBER	QTY.
1	Nema 17HS4401 Stepper Motor	1
2	2GT 20Teeth Pulley	1



NOTE:

1. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		BREAK ALL SHARP EDGES	DRAWN		
		DIMENSIONS ARE IN MILLIMETERS	CHECKED		
		TOLERANCES:	ENG APPR.		
		FRACTIONAL ±	MFG APPR.		
		ANGULAR: MACH ± BEND ±	Q.A.		
		TWO PLACE DECIMAL ±	COMMENTS:		
		THREE PLACE DECIMAL ±			
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		Multimaterial			
NEXT ASSY	USED ON	FINISH			
		No			
APPLICATION		DO NOT SCALE DRAWING			

VR

VR

TITLE:

Stepper Assembly

SIZE	DWG. NO.	REV
A	050	
SCALE: 1:1	WEIGHT: 286.75	SHEET 1 OF 1

2

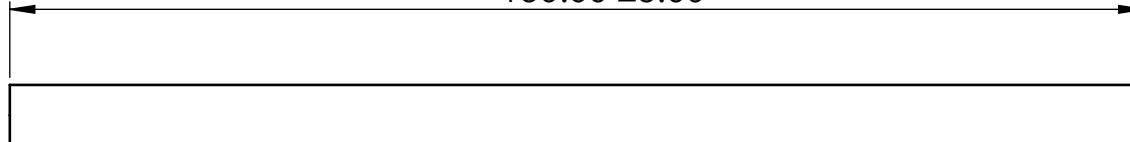
1

B

B

150.00 ±3.00

(Ø 8.00)



NOTE:

1. MATERIAL: POLISHED 52100 ALLOY STEEL SHAFT, MCMASTER-CARR P/N: 5033N132.
2. PROTECT SHAFT FROM SCRATCHES, NICKS, BURRS OR ANY OTHER DAMAGE.
3. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED:	
		BREAK ALL SHARP EDGES	
		DIMENSIONS ARE IN MILLIMETERS	
		TOLERANCES:	
		FRACTIONAL ±	
		ANGULAR: MACH ± BEND ±	
		TWO PLACE DECIMAL ±	
		THREE PLACE DECIMAL ±	
		INTERPRET GEOMETRIC	
		TOLERANCING PER:	
		MATERIAL	
		52100 Alloy Steel	
NEXT ASSY	USED ON	FINISH	No
APPLICATION		DO NOT SCALE DRAWING	

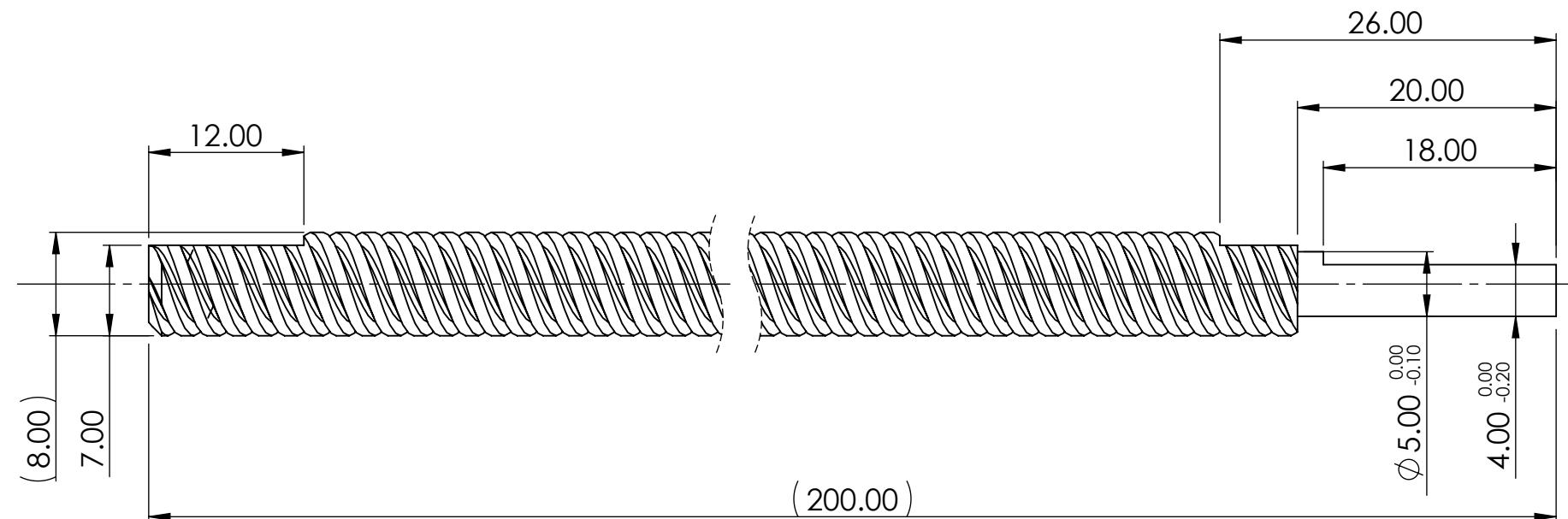
NAME: DATE:
DRAWN: CHECKED: ENG APPR.: MFG APPR.: Q.A.
TITLE: COMMENTS:
Vladimir Tyrkin
veres.pcb@gmail.com

VR

VR

Linear Motion
Shaft

SIZE	DWG. NO.	REV
A	001	
SCALE: 1:1		WEIGHT: 58.89
SHEET 1 OF 1		



NOTE:

1. GENERAL TOLERANCE DIN ISO 2768-m.
2. ALL EDGES 0.1..0.3MM MAX RADIUS OR CHAMFER.
3. AREAS WHERE MATERIAL HAS BEEN REMOVED SHALL HAVE SMOOTH TRANSITIONS AND BE FREE OF SCRATCHES, GRIND MARKS, AND BURRS. SCRATCHES AND DENTS ARE NOT ACCEPTABLE AT THE THREAD.
4. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

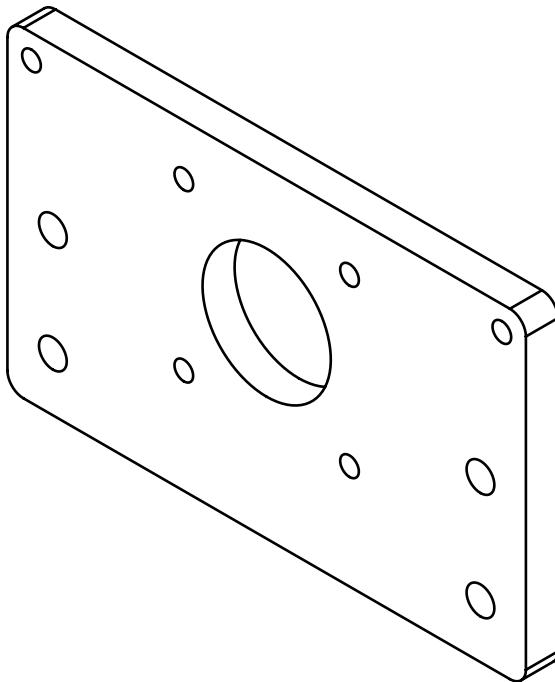
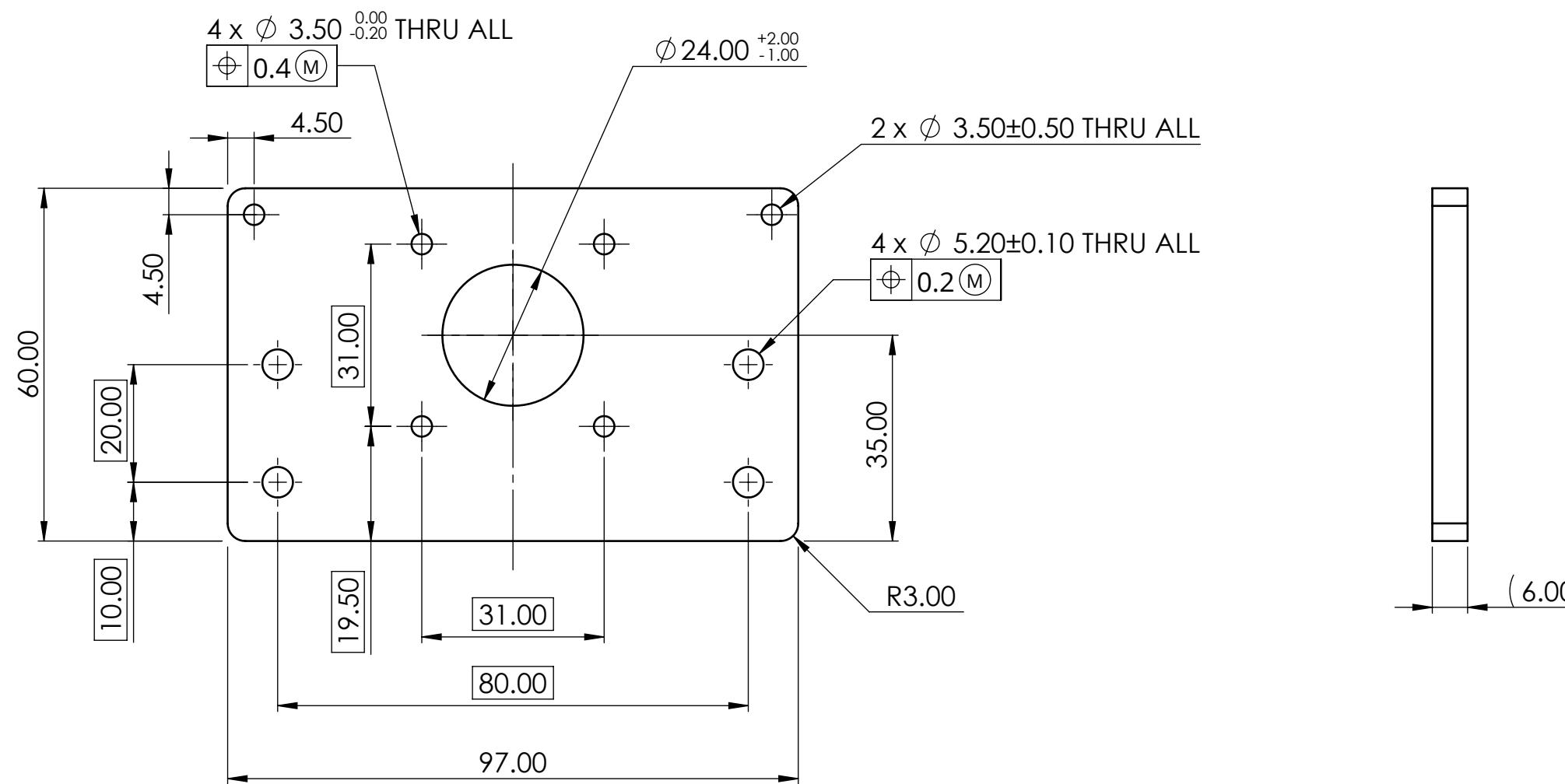
<p>PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF VR. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF VR IS PROHIBITED.</p>			UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER:	DRAWN	NAME	DATE	<p>VR TITLE: Lead Screw</p>	
			MATERIAL	CHECKED				
			AISI 1020	ENG APPR.				
	NEXT ASSY	USED ON	FINISH	MFG APPR.				
			None	Q.A.				
	APPLICATION		DO NOT SCALE DRAWING	COMMENTS: Vladimir Tyrkin veres.pcb@gmail.com				
				SIZE	DWG. NO.	REV		
				A	002			
				SCALE: 2:1	WEIGHT: 62.17	SHEET 1 OF 1		

4

3

2

1



NOTE:

1. MATERIAL: POLYCARBONATE PLASTIC SHEET. MCMASTER-CARR P/N: 8574K281.
2. GENERAL TOLERANCE DIN ISO 2768-mK.
3. FOR MORE INFORMATION SEE CAD FILE: Stepper Base.SLDPRT.
4. PRODUCTION FILE: parts for cnc.DWG.
5. FOR MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF.

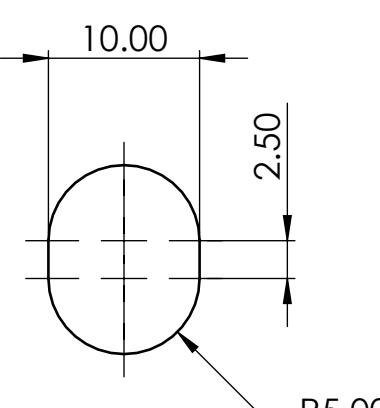
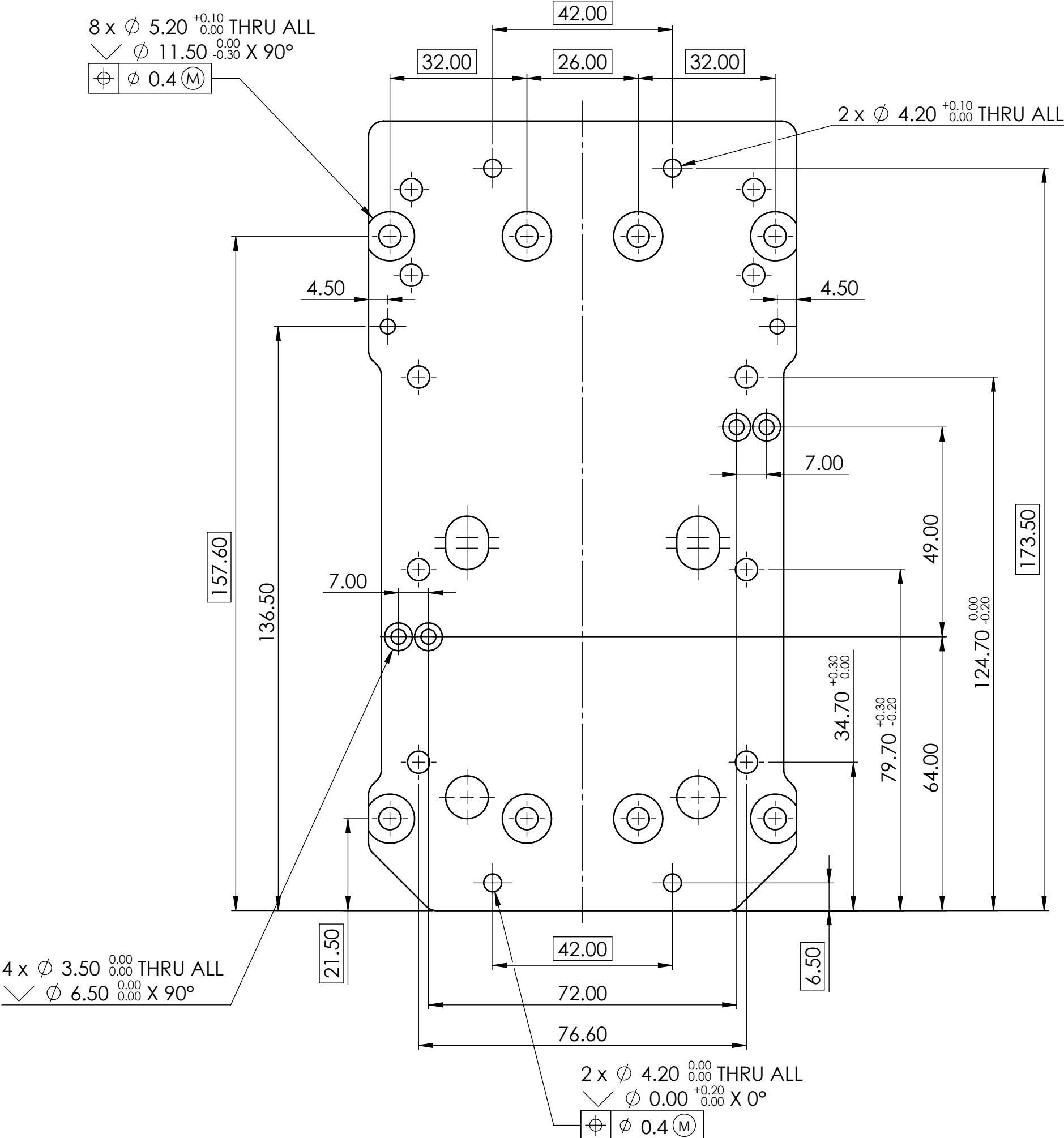
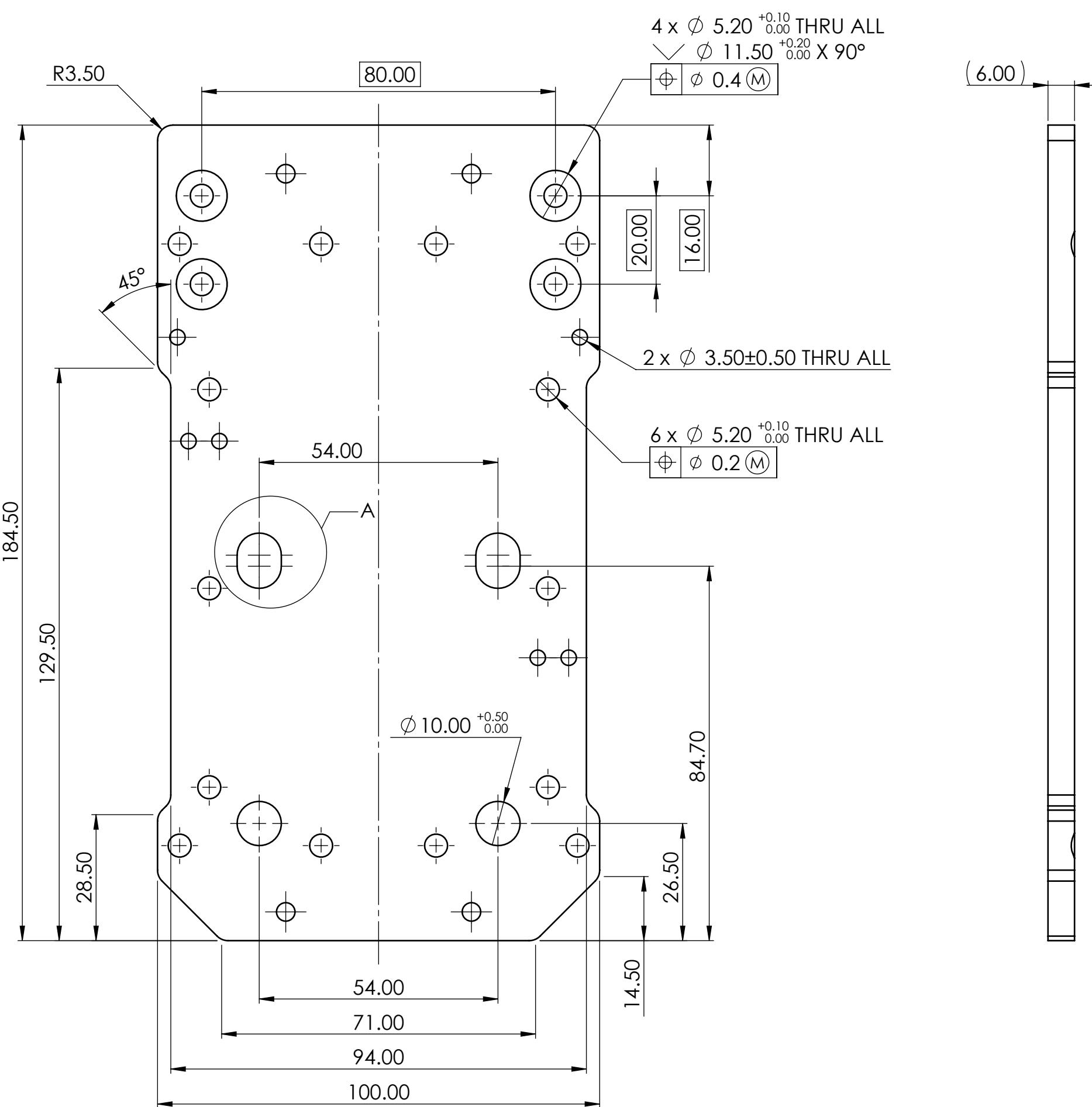
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		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL \pm ANGULAR: MACH \pm BEND \pm TWO PLACE DECIMAL \pm THREE PLACE DECIMAL \pm	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.		REV	
B	011			
SCALE: 1:1	WEIGHT: 37.88	SHEET 1 OF 1		

VR

TITLE:

Stepper Base



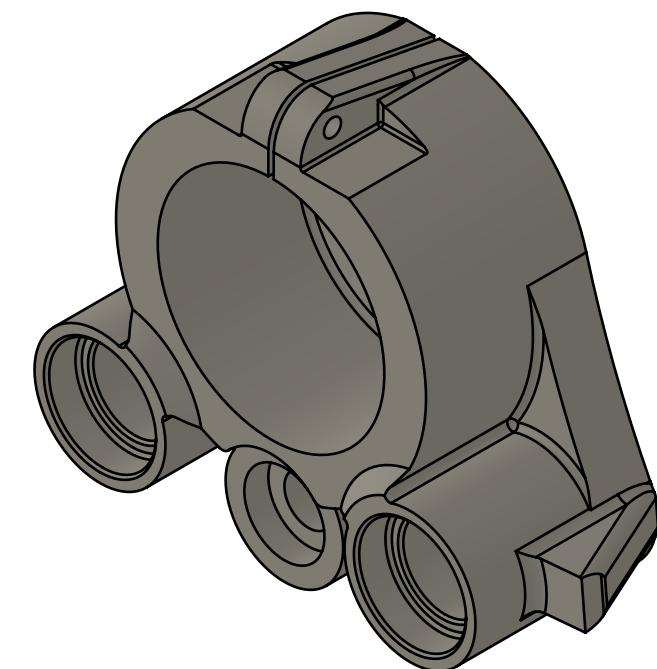
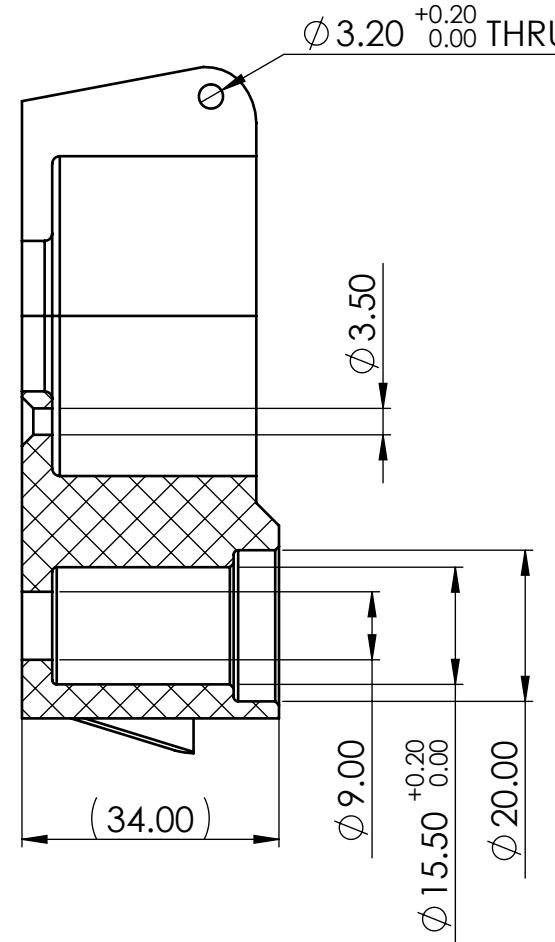
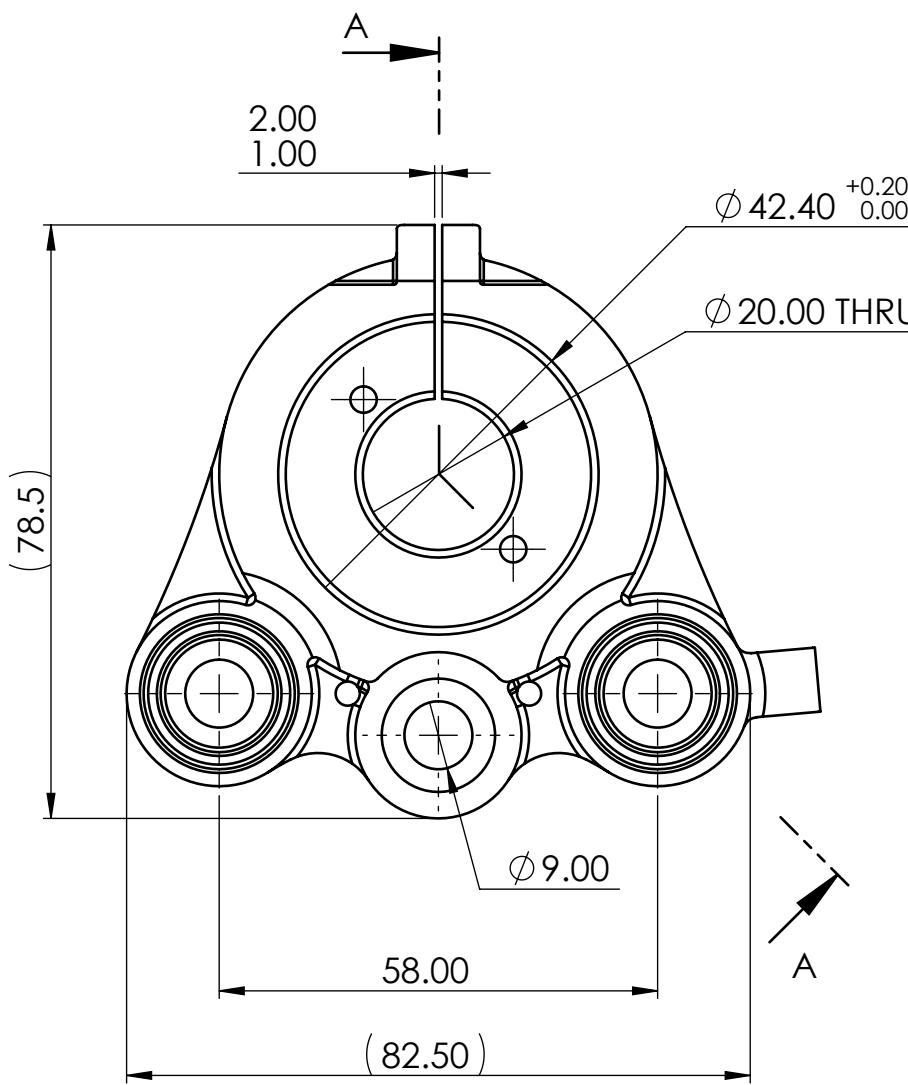
DETAIL A
SCALE 2 : 1
2 PLACES

NOTE:

1. MATERIAL: POLYCARBONATE PLASTIC SHEET, MCMASTER-CARR P/N: 8574K282.
2. GENERAL TOLERANCE DIN ISO 2768-mK.
3. FOR MORE INFORMATION SEE CAD FILE: Vertical Plate.SLDPRT.
4. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETRES	DRAWN	NAME	DATE
		FRACTIONAL + ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	CHECKED		
		MATERIAL Polycarbonate (PC)	ENG APPR.		
		FINISH As machined	MFG APPR.		
		APPLICATION DO NOT SCALE DRAWING	Q.A.		
			COMMENTS:		
			VR	Vertical Plate	REV
				Vladimir Tyrkin	
				veres.pcb@gmail.com	
				SCALE: 1:1	WEIGHT: 120.14
					SHEET 1 OF 1



SECTION A-A

NOTES:

- MINIMALLY DIMENSIONED DRAWING. FOR MORE DIMENSIONS SEE CAD FILE: Bottom motor cover.sldprt.
- MATERIAL: PETG 3D PRINTER FILAMENT MCMASTER-CARR P/N: 3462N1. ALTERNATE: ABS PLASTIC P/N: 1317N538-1317N327.
- INFILL: 100%. NOZZLE: 0.4mm.
- GENERAL TOLERANCE DIN ISO 2768-c.
- FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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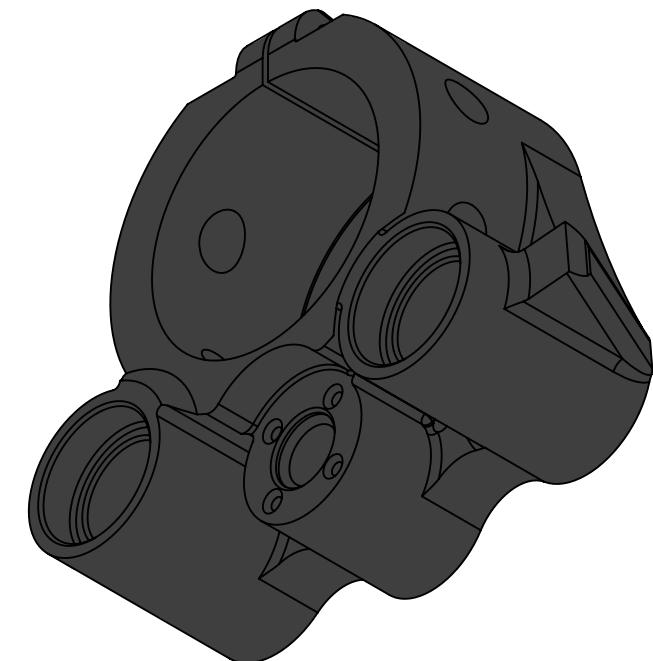
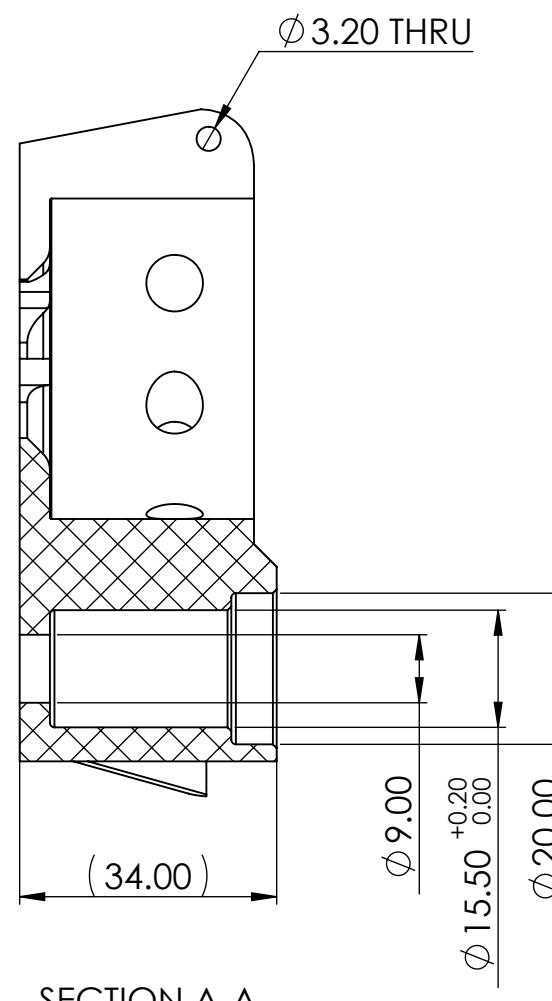
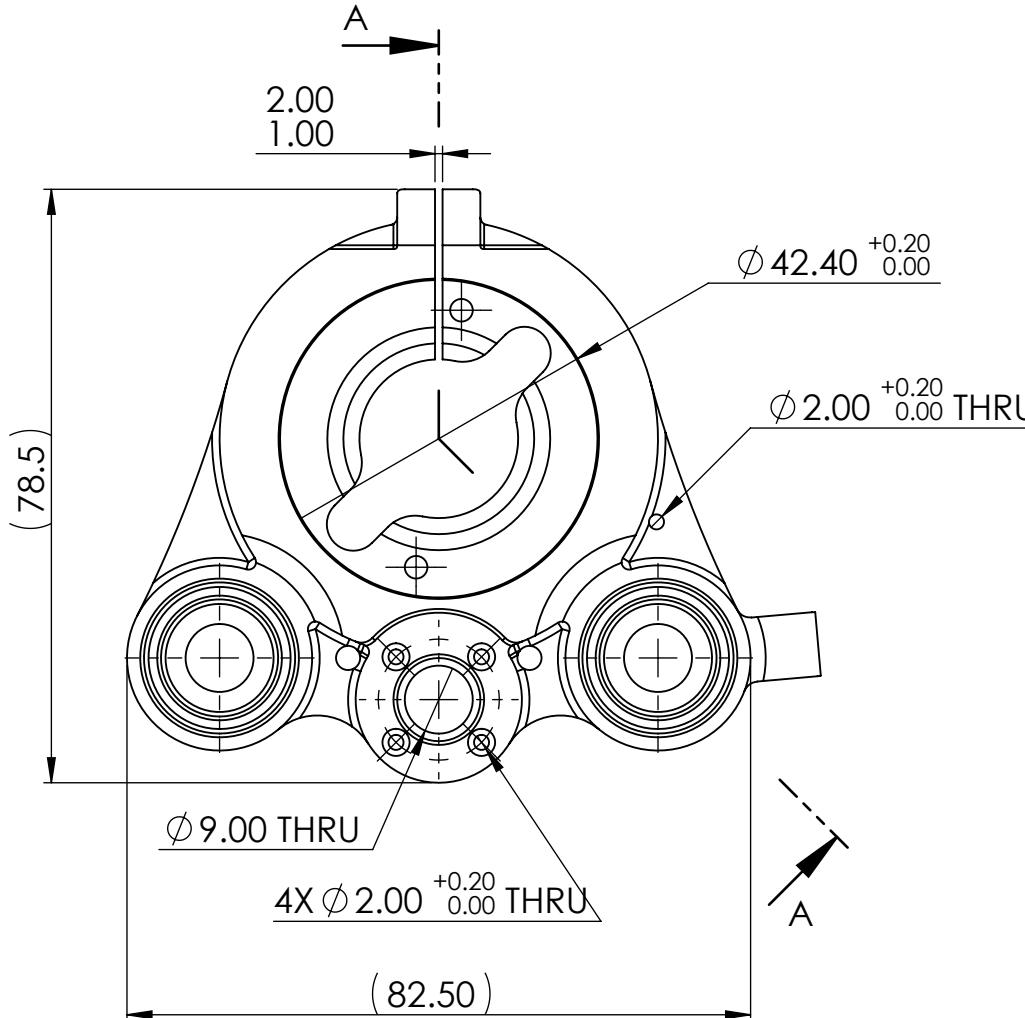
		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	NAME	DATE
		DRAWN	VR	VR
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		verespcb@gmail.com		
SIZE	DWG. NO.		REV	
B	021			
SCALE: 1:1	WEIGHT: 93.84	SHEET 1 OF 1		

4

3

2

1



A

- NOTES:
- MINIMALLY DIMENSIONED DRAWING. FOR MORE DIMENSIONS SEE CAD FILE: Top motor cover.sldprt.
 - MATERIAL: PETG 3D PRINTER FILAMENT MCMASTER-CARR P/N: 3462N1. ALTERNATE: ABS PLASTIC P/N: 1317N538-1317N327.
 - INFILL: 100%. NOZZLE: 0.4mm.
 - GENERAL TOLERANCE DIN ISO 2768-c.
 - FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	NAME	DATE
		DRAWN	VR	VR
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.			REV
B	022			
SCALE: 1:1	WEIGHT: 88.94	SHEET 1 OF 1		

4

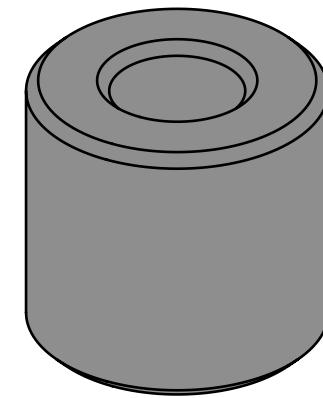
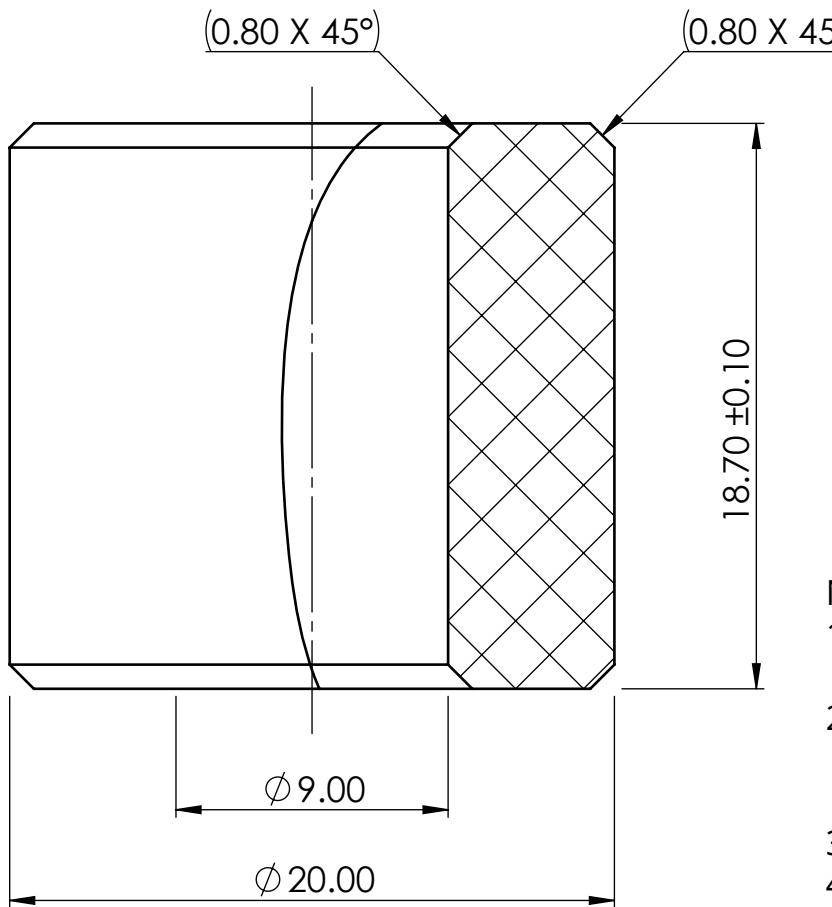
3

2

1

B

A



NOTES:

1. MINIMALLY DIMENSIONED DRAWING. FOR MORE DIMENSIONS SEE CAD FILE: Spacer.sldprt.
2. MATERIAL: PETG 3D PRINTER FILAMENT MCMASTER-CARR P/N: 3462N1. ALTERNATE: ABS PLASTIC P/N: 1317N538-1317N327.
3. INFILL: 100%. NOZZLE: 0.4mm.
4. GENERAL TOLERANCE DIN ISO 2768-c.
5. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED:		DRAWN CHECKED ENG APPR. MFG APPR. Q.A.	NAME DATE TITLE: COMMENTS:		
		BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL PET-G					
NEXT ASSY		FINISH As machined					
APPLICATION		DO NOT SCALE DRAWING					

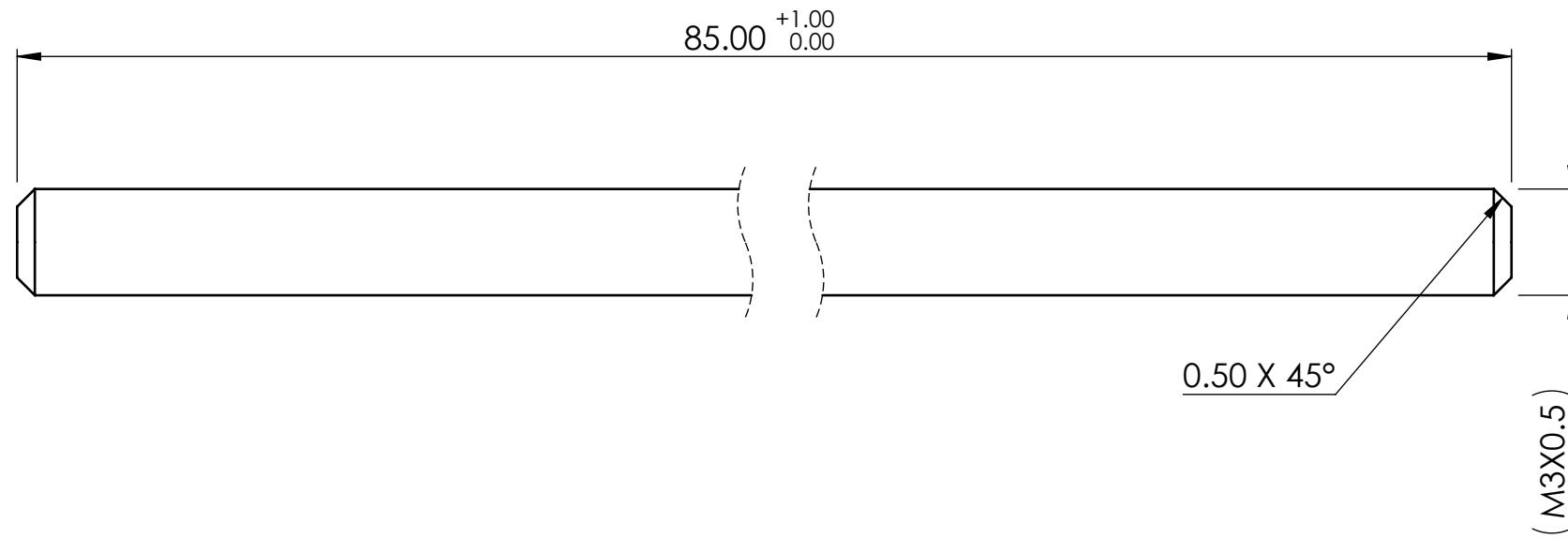
VR

VR

TITLE:

**Spacer for lineare
bearings**

SIZE	DWG. NO.	REV
A	024	
SCALE: 4:1	WEIGHT: 5.97	SHEET 1 OF 1



NOTE:

1. GENERAL TOLERANCE DIN ISO 2768-m.
2. MATERIAL: Zinc-Plated Steel, MCMASTER-CARR P/N: 94595A215.
3. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED:		DRAWN CHECKED ENG APPR. MFG APPR. Q.A.	NAME _____ DATE _____ COMMENTS: Vladimir Tyrkin veres.pcb@gmail.com		
		BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL \pm ANGULAR: MACH \pm BEND \pm TWO PLACE DECIMAL \pm THREE PLACE DECIMAL \pm					
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL AISI 1035 Steel (SS)					
NEXT ASSY		FINISH As machined					
USED ON		APPLICATION					
		DO NOT SCALE DRAWING					

VR

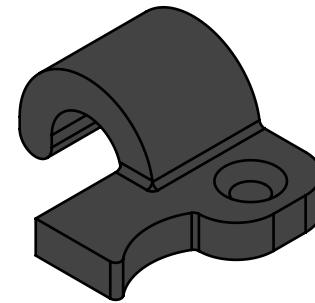
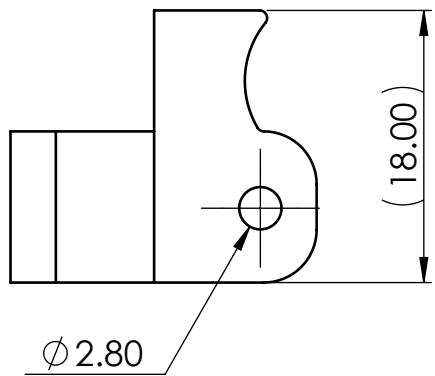
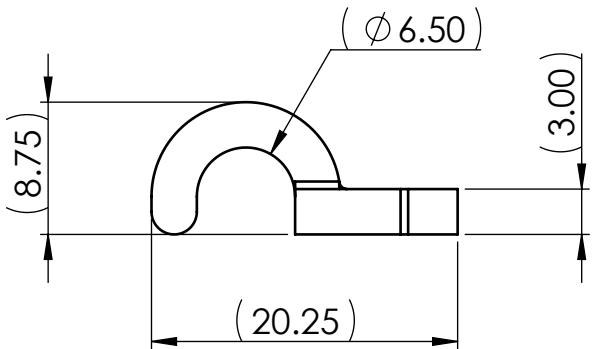
VR

Threaded Rod

SIZE	DWG. NO.	REV
A	025	
SCALE: 5:1	WEIGHT: 4.70	SHEET 1 OF 1

2

1



NOTES:

1. MINIMALLY DIMENSIONED DRAWING. FOR MORE DIMENSIONS SEE CAD FILE: CableHolder.sldprt.
2. MATERIAL: PETG 3D PRINTER FILAMENT MCMASTER-CARR P/N: 3462N1. ALTERNATE: ABS PLASTIC P/N: 1317N538-1317N327.
3. INFILL: 100%. NOZZLE: 0.4mm.
4. GENERAL TOLERANCE DIN ISO 2768-c.
5. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER:	DRAWN	NAME	DATE
		MATERIAL	CHECKED		
		PET-G	ENG APPR.		
		FINISH	MFG APPR.		
		None	Q.A.		
NEXT ASSY	USED ON	COMMENTS:			
		Vladimir Tyrkin veres.pcb@gmail.com			
APPLICATION	DO NOT SCALE DRAWING				

VR

VR

Cable holder

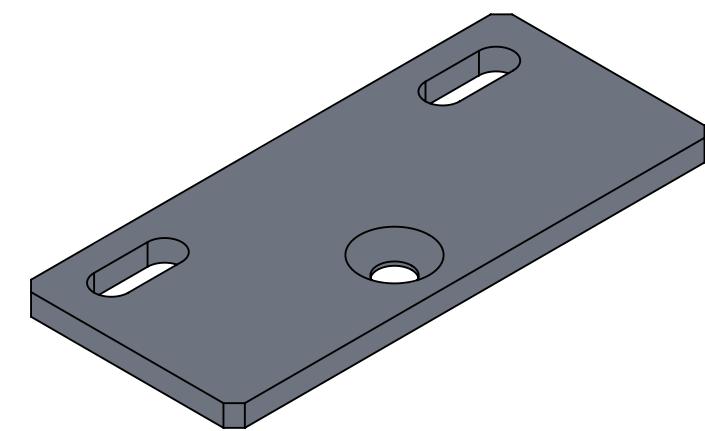
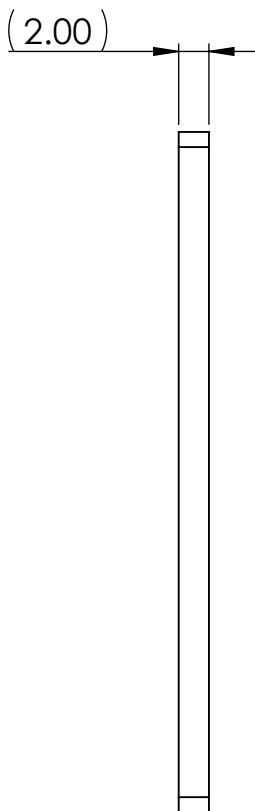
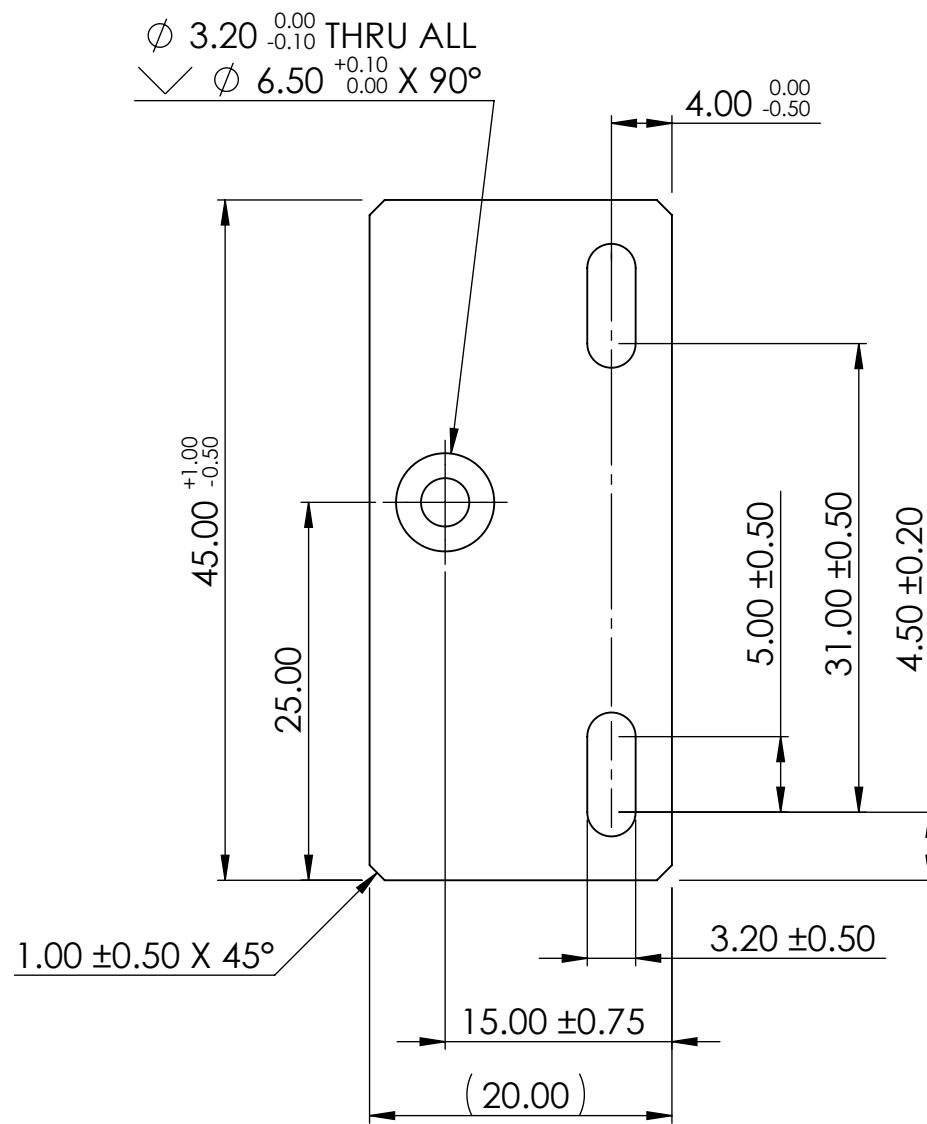
SIZE	DWG. NO.	REV
A	026	
SCALE: 2:1	WEIGHT: 1.21	SHEET 1 OF 1

2

1

B

A



NOTE:

1. GENERAL TOLERANCE DIN ISO 2768-m.
2. FOR MORE INFORMATION SEE CAD FILE: TensionerBasePlate.SLDPRT.
3. MATERIAL: ALUMINUM BAR MCMASTER-CARR P/N:9146T14.
4. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

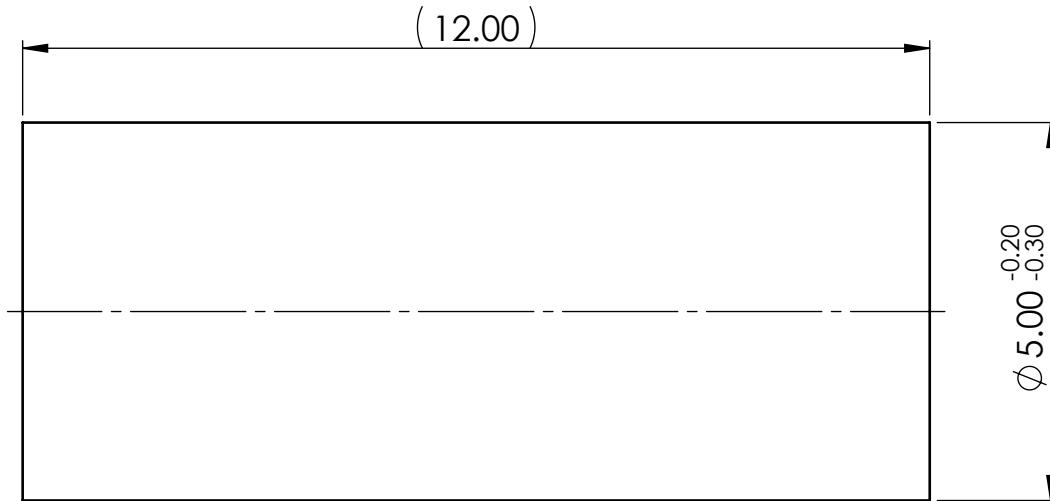
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		UNLESS OTHERWISE SPECIFIED: BREAK ALL SHARP EDGES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONAL \pm ANGULAR: MACH \pm BEND \pm TWO PLACE DECIMAL \pm THREE PLACE DECIMAL \pm	NAME	DATE
		DRAWN		
		CHECKED		
		ENG APPR.		
		MFG APPR.		
		Q.A.		
		COMMENTS:		
		Vladimir Tyrkin		
		veres.pcb@gmail.com		
SIZE	DWG. NO.		REV	
B	031			
SCALE: 2:1	WEIGHT: 4.50	SHEET 1 OF 1		

VR

VR

Tensioner Base
Plate



NOTES:

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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		BREAK ALL SHARP EDGES	DRAWN		
		DIMENSIONS ARE IN MILLIMETERS	CHECKED		
		TOLERANCES:	ENG APPR.		
		FRACTIONAL ±	MFG APPR.		
		ANGULAR: MACH ± BEND ±	Q.A.		
		TWO PLACE DECIMAL ±	COMMENTS:		
		THREE PLACE DECIMAL ±	Vladimir Tyrkin veres.pcb@gmail.com		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL			
		6063-T6			
NEXT ASSY	USED ON	FINISH			
		None			
APPLICATION		DO NOT SCALE DRAWING			

VR

VR

TITLE:

Standoff threaded
round spacer

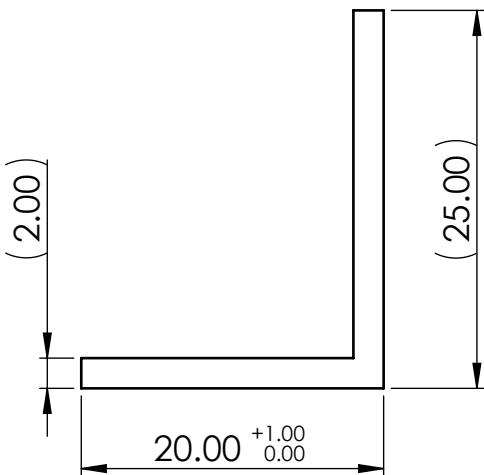
SIZE	DWG. NO.	REV
A	032	
SCALE: 10:1		WEIGHT: 0.48
SHEET 1 OF 1		

2

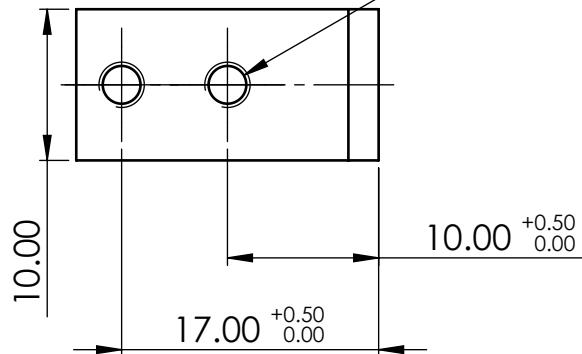
1

B

B



$2 \times \emptyset 2.50$ THRU ALL
 $M3 \times 0.5 - 6H$ THRU ALL



NOTE:

1. MATERIAL: ALUMINUM 90 DEGREE ANGLE MCMASTER-CARR P/N:4630T135.
2. GENERAL TOLERANCE DIN ISO 2768-m.
3. FOR MORE INFORMATION SEE CAD FILE: SensorMount.SLDPRT.
4. FOR MATERIALS AND MANUFACTURING LINKS REFER TO CARRIAGE_BOM.PDF

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UNLESS OTHERWISE SPECIFIED:
 BREAK ALL SHARP EDGES
 DIMENSIONS ARE IN MILLIMETERS
 TOLERANCES:
 FRACTIONAL ±
 ANGULAR: MACH ± BEND ±
 TWO PLACE DECIMAL ±
 THREE PLACE DECIMAL ±
 INTERPRET GEOMETRIC TOLERANCING PER:

	NAME	DATE
DRAWN		
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

COMMENTS:

VR
 TITLE:

VR

Sensor Mount

SIZE	DWG. NO.	REV
A	081	
SCALE: 2:1 WEIGHT: 2.19 SHEET 1 OF 1		

2

1

