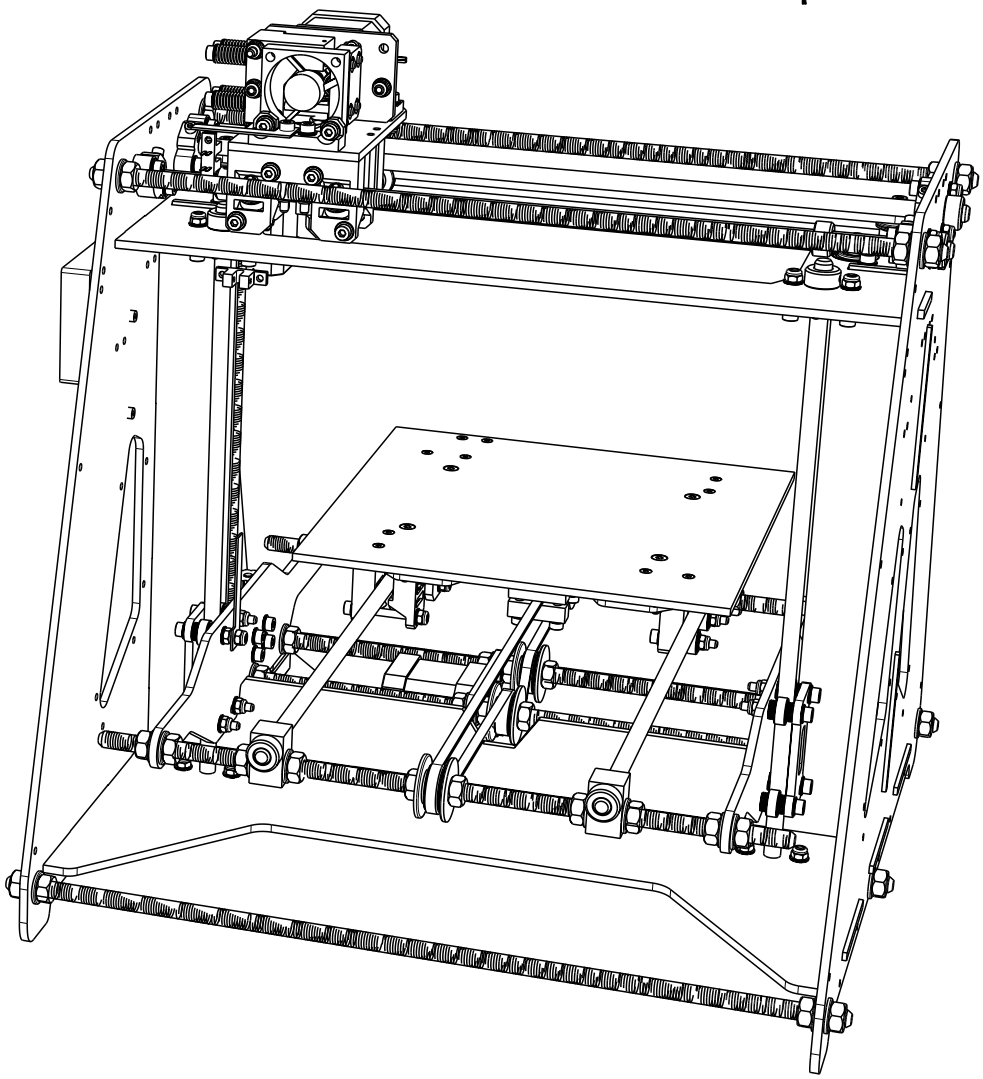
ORCA v0.30 - ASSEMBLY MANUAL

manual version: 0.1
date: 21 September 2011



Brought to you by
www.mendel-parts.com

(this manual is still under construction)

GUBBELS ENGINEERING			Client: **The World**	Project: **Orca v0.30**
			Title: **Orca v0.30 Assembly Manual v0.1**	
Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	1 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

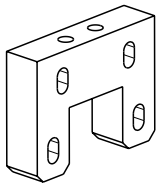
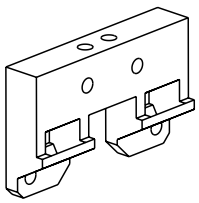
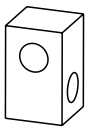
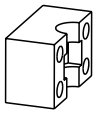
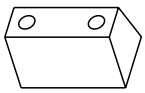
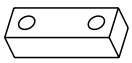
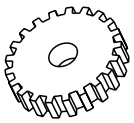
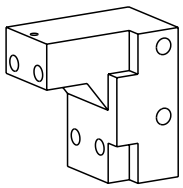
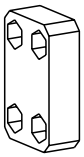
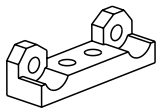
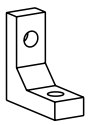
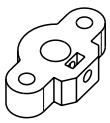
INDEX

	Description	Page	CAD Ref
BOM 1	1xxx - Printed Plastic Parts	3	
BOM 2	2xxx - Sheet Material	4	
BOM 3	3xxx - Hardware	5	
BOM 4	456xxx - Others	6	
INFO 1	General Info	7	
PREP 1	Preparation	8	
STEP 1	Bottom Assembly	9	0060
STEP 2	Top Assembly	10	0090
STEP 3	Frame Assembly	11	0092
STEP 4	Motors Pre-Assembly	12	0320
STEP 5	Y-Side Right Pre-Assembly	13	0085
STEP 6	Y-Side Left Pre-Assembly	14	0086
STEP 7	YZ Frame Assembly	15	0300
STEP 8	Y-Frog Pre-Assembly	16	0095
STEP 9	Fitting Y-frog assy on YZ frame	17	0100
STEP 10	Fitting & levelling the YZ frame	18	0200
STEP 11	Fitting Z-Belt & Z-Motor	19	0210
STEP 12	Printbed Pre-Assembly	20	0260
STEP 13	Fitting Printbed	21	0280
STEP 14	X-Carriage Assembly	22	0140
STEP 15	Fitting X-Carriage	23	0150
STEP 16	Extruder Pre-Assembly	24	0160
STEP 17	Hotend Pre-Assembly	25	
STEP 18	Fitting Extruder & Hotend	26	0170
STEP 19	Fitting GEN6 Electronics	27	0180
STEP 20	Cabling	28	
STEP 21	Firmware updating & settings	29	
STEP 22	Printer Software & 1st print	30	
	Software Advanced: SkeinForge	31	
	Maintenance	32	
	Issue Solving	33	
	Upgrades / Future	34	
	Part Nr Codes	35	
	A-Z Index	37	

Status: **PRELIMINARY**	Scale: **3:50**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	2 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

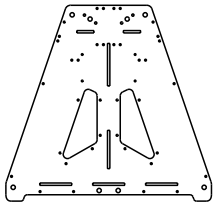
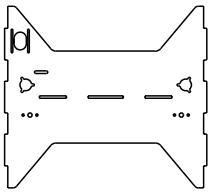
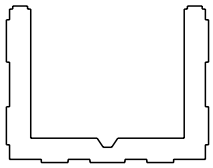
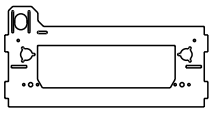
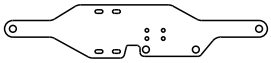
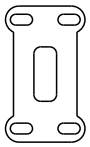
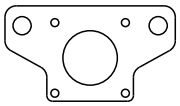
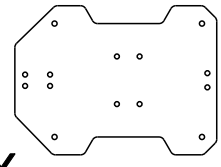
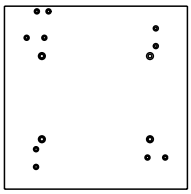
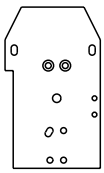
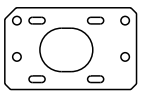
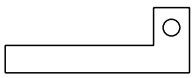
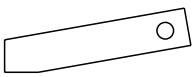
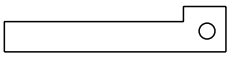
1XXX - PRINTED PLASTIC PARTS

 2x	 4x	 4x	 4x
1010 CARRIAGE-180	1030 CARRIAGE-360	1050 Y-ROD-HOLDER	1070 DRIVEN-Z-NUT-TRAP
 2x	 2x	 2x	3x
1080 Y-BELT-CLAMP-TOP	1090 Y-BELT-CLAMP-BTTM	1210 Z-BELT-PULLEY	1230 MOTOR-BELT-PULLEY
 1x	 1x	 1x	 2x
1610 DRIVEN-HOLDER	1630 IDLER-HOLDER	1650 EXTR-FAN-SUPPORT	1670 EXTRUDER-CORNER
OPTIONAL 2x	OPTIONAL  8x		
1410 MOTOR-ADJUST-KNOB	1810 AXLE-HOLDER		

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**	
Tolerances: E	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet 3 of 38	Size A4	Drawing number: ORCA-030	Revision A
Date: **21-09-2011**				

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

2XXX - SHEET MATERIAL

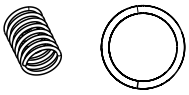
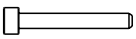
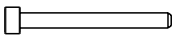
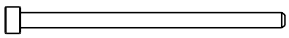
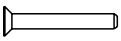
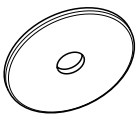
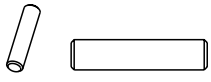
 2x ④	 1x ④	 1x ④	 1x ④
2010 SIDE-PLATE	2030 BOTTOM-PLATE	2050 MID-PLATE	2070 TOP-PLATE
 2x ④	 2x ④	 1x ④	 1x ④
2210 Y-SIDE-FRAME	2230 Y-SIDE-SUPPORT	2250 Y-MOTOR-PLATE	2270 Y-FROG
 1x ④	 1x ④	 1x ④	
2290 PRINTBED	2410 EXTRUDER-BASE	2430 EXTR-MOTOR-PLATE	
4x ③			
2810 Z-BEARING-SUPPORT			
 1x ①	 1x ①	 1x ①	
2910 X-OPTO-FLAG	2930 Y-OPTO-FLAG	2950 Z-OPTO-FLAG	

④ = 4mm ③ = 3mm ① = 1mm

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **21-09-2011**	4 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

3XXX HARDWARE

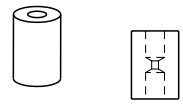
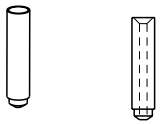
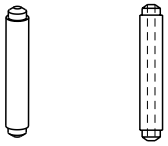
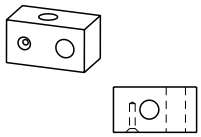
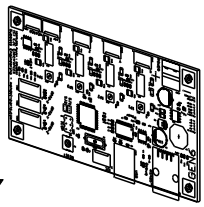
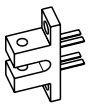
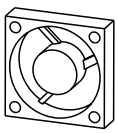
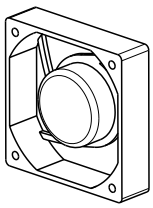
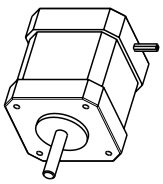
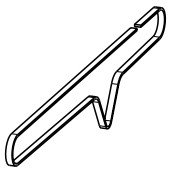
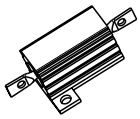
6x	5x	4x	2x
3010 M8-THREADED-ROD-330mm	3020 M8-THREADED-ROD-400mm	3050 SMOOTH-ROD-330mm	3060 SMOOTH-ROD-400mm
33x (V)	8x (W)	4x SCALE 1:1	4x SCALE 1:1 
3110 624-BEARING	3120 608-BEARING	3210 SPRING-EXTR-28x9	3220 SPRING-BED-26x11
24x (16x) (A)	4x (B)	15x (C)	26x (10x) (D)
3410 M3x8-SOCKET-CAP-SCREW	3420 M3x20-SOCKET-CAP-SCREW	3430 M4x16-SOCKET-CAP-SCREW	3440 M4x20-SOCKET-CAP-SCREW
26x (E) 	26x (F) 	4x (H) 	
3450 M4x30-SOCKET-CAP-SCREW	3460 M4x40-SOCKET-CAP-SCREW	3470 M4x70-SOCKET-CAP-SCREW	
10x (K)	6x (L) 	39x (31x) (M)	112x (96x) (N)
3480 M3x12-COUNTERSUNK-CAP-SCREW	3490 M4x30-COUNTERSUNK-CAP-SCREW	3510 M3-NUT	3520 M4-NYLOCK-NUT
336x (304x) (O)	23x (P)	66x (Q)	64x (R)
3530 M4-WASHER	3540 MUDGUARD-WASHER-4x20	3550 M8-NUT	3560 M8-WASHER
8x (S)	4x (T) 	18x (U)	
3570 MUDGUARD-WASHER-8x30	3580 MUDGUARD-WASHER-8x40	3590 ADJUSTING-RING-8x16x8	
1x (I) SCALE 1:1	3x (J) SCALE 1:1		
3710 SET-SCREW-3x4	3720 SET-SCREW-3x6		
1x	1x  SCALE 1:1	4x	
3810 BRASS-INSERT	3830 IDLER-AXLE-18mm	3920 M6-BRASS-LOW-NUT	

THIS LIST INCLUDES BOLTS,NUTS ETC FOR OPTIONAL AXLEHOLDERS (8x)
BUT IS EXCLUDING SPARES, SMALL AMOUNTS (0x) IS FOR WITHOUT AXLEHOLDERS

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **21-09-2011**	5 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

456XXX HOTEND, ELECTRONICS ETC

 1x	 1x	 1x	 1x
4010 HE9B-PEEK-CORE	4030 HE9B-BRASS-TOP	4050 HE9B-BRASS-BOTTOM	4070 HE9B-HEATER-BLOCK
1x			
4090 HE9B-NOZZLE			
 1x	 3x	 1x	 1x
5010 GEN6-PCB	5060 OPTO-TCST2103	5080 COOLING-FAN-40x40	5090 COOLING-FAN-60x60
 4x	1x	 1x	1x
6010 MOTOR-NEMA17	6030 X-BELT-840mm	6040 Y-BELT-840mm	6050 Z-BELT-840mm
 4x	2x		
6080 HEATERBLOCK-1R5	6120 PTFE-STRAIN-RELIEF		

NOT IN LIST YET:
- HIGHTEMP EXTRUDER CABLING ON 4W MOLEX
- FERRULES 0.5mm² (2x) en 1.0mm² (4x)
- HIGHTEMP HEATSHRINK 2.4mm²
- THERMISTOR G550
- HEAT RESISTOR
- SILICON SEALANT
- POWER SUPPLY 12V 60W FOR GEN6
- POWER SUPPLY 12-22V 90W FOR HEATED BED (14V=PLA 22V=ABS)
- EXTENSION CABLE FOR FAN 40x40
- CABLING FOR HEATED BED
- KAPTON TAPE
- CPU COOLING PASTE (REMOVED, NOT USED ANYMORE)

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **21-09-2011**	6 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

SCALE 3:5

General Info

dimensions
mass
xyz directions
filament?
ABS / PLA
safety risk

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **21-09-2011**	7 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

Preparation

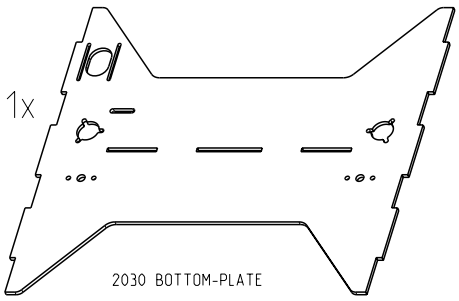
Tools, skills etc required
Cleaning/drilling parts

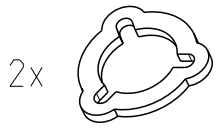
Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **24-09-2011**	8 of 38	A4	ORCA-030	A

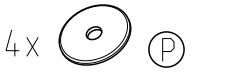
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS.BELTS.HEATERBLOCKS

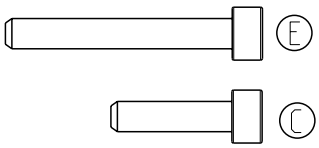
STEP 1 - BOTTOM ASSEMBLY

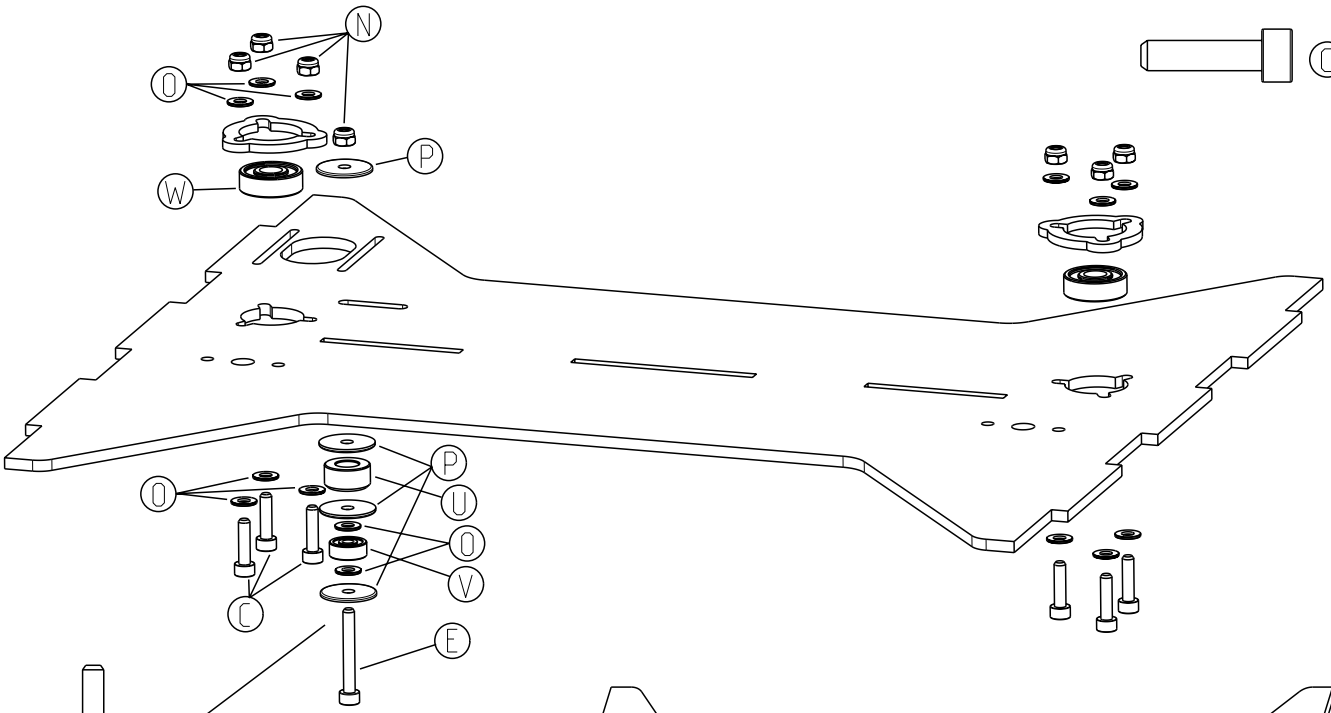


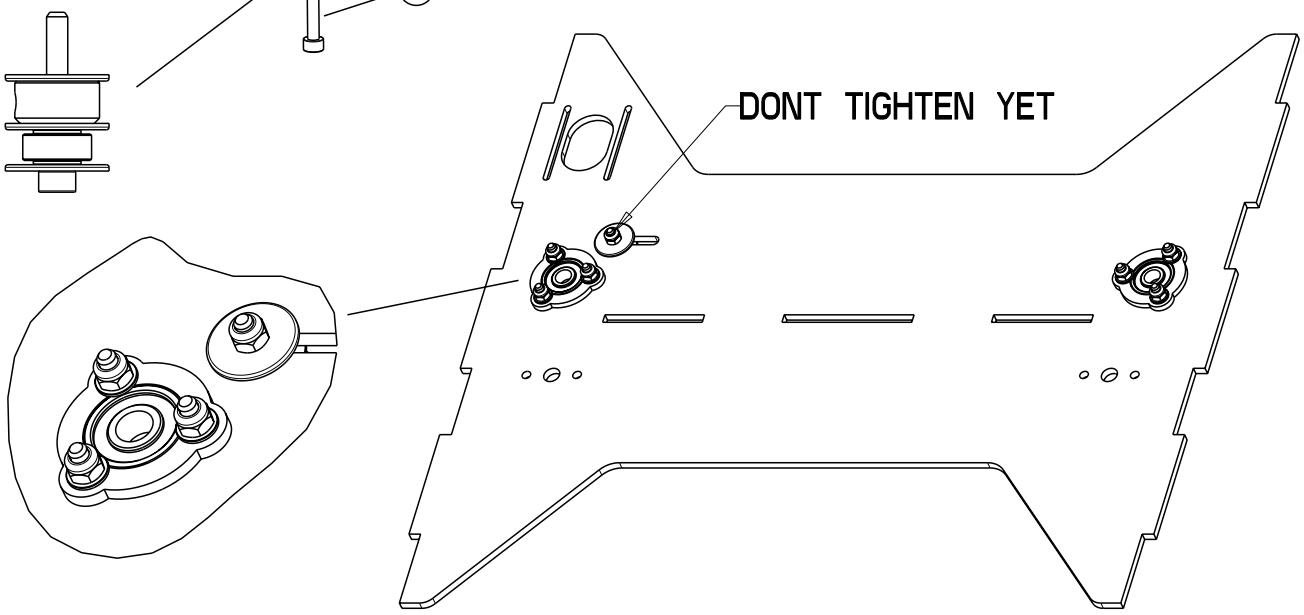




SCALE 1:1





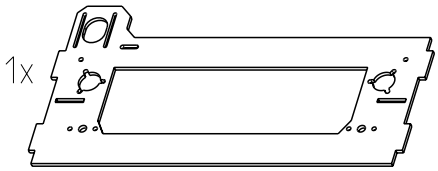


Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **9** of **38**	Size **A4**	Drawing number: **ORCA-030** / Revision **A**
Date: **19-09-2011**			

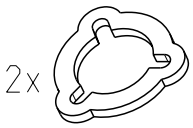
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS.BELTS.HEATERBLOCKS

STEP 2 - TOP ASSEMBLY



2070 TOP-PLATE



2810 Z-BEARING-SUPPORT

3120 608-BEARING

3110 624-BEARING

3590 ADJUSTING-RING-8x16x8

3450 M4x30-SOCKET-CAP-SCREW

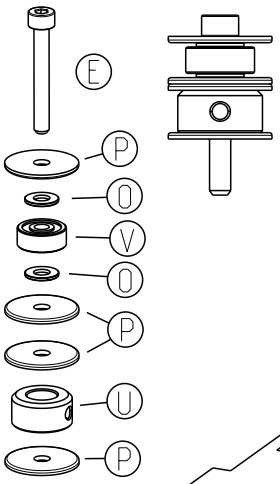
3430 M4x16-SOCKET-CAP-SCREW

3540 MUDGUARD-WASHER-4x20

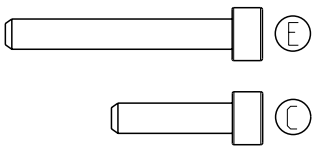
3530 M4-WASHER

3520 M4-NYLOCK-NUT

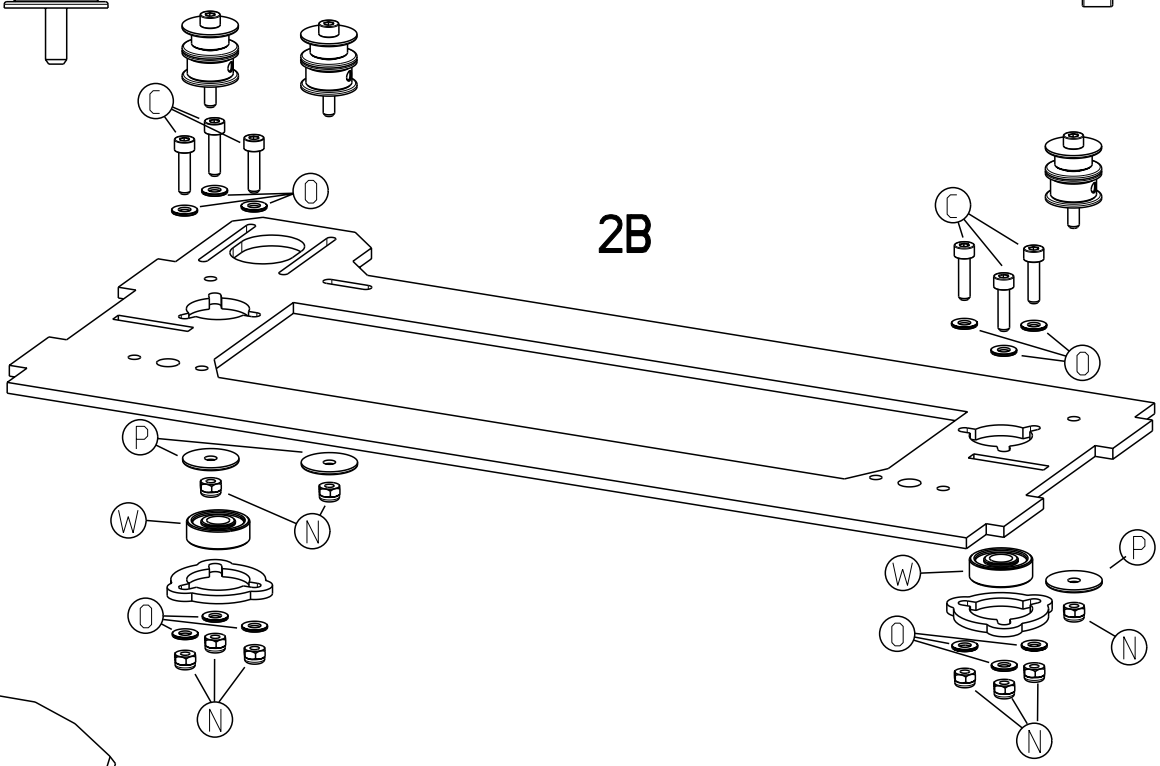
2A - 3x

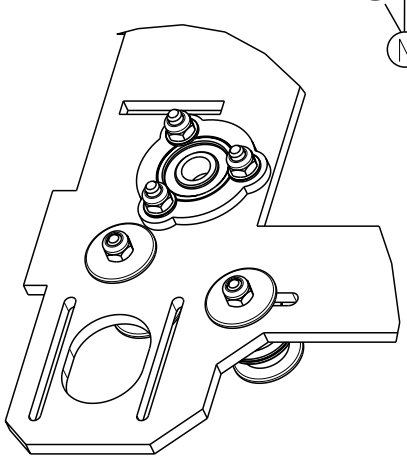


SCALE 1:1



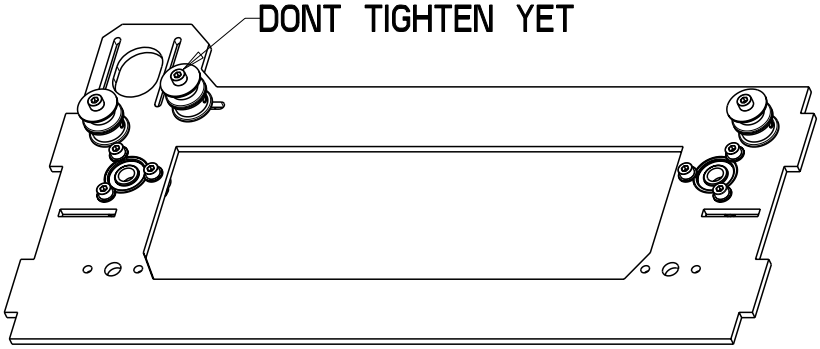
2B





BOTTOM VIEW

DONT TIGHTEN YET



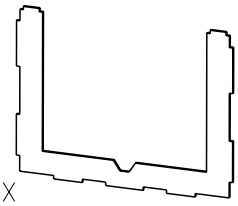
Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **19-09-2011**	10 of 38	A4	ORCA-030 / A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

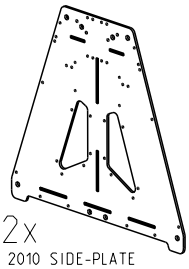
XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 3 - FRAME ASSEMBLY

5x
3020 M8-THREADED-ROD-400mm



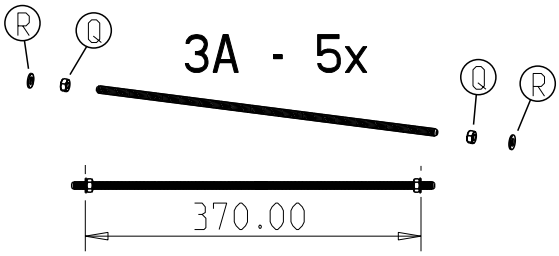
1x
2050 MID-PLATE

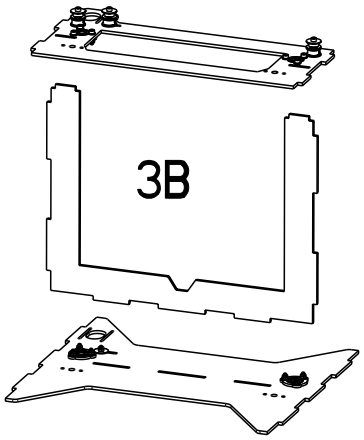


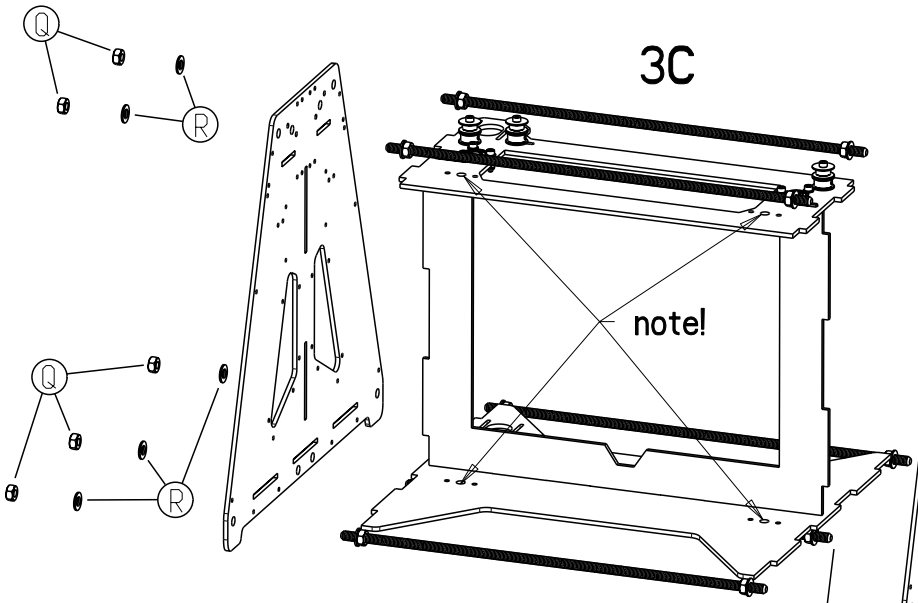
2x
2010 SIDE-PLATE

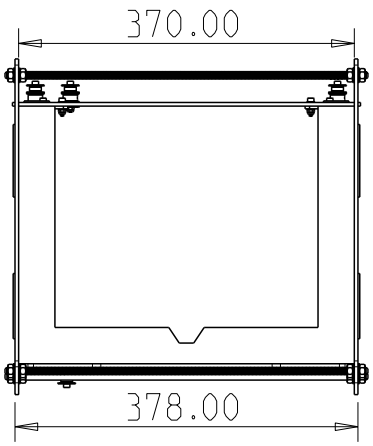
20x Ⓡ
3560 M8-WASHER

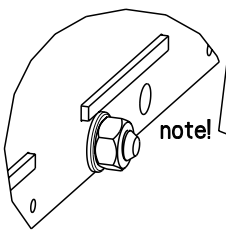
20x Ⓠ
3550 M8-NUT

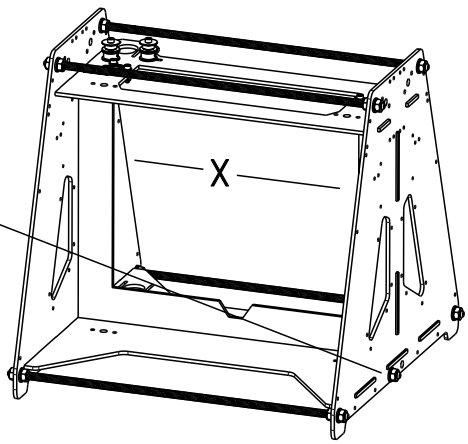












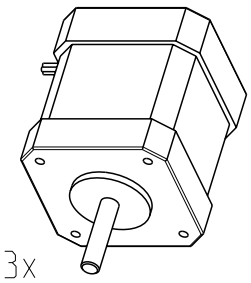
slowly and equally tighten the frame
until there is zero play in X-direction

Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**
Tolerances: Ⓔ	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **11** of **38**	Size **A4**	Drawing number: **ORCA-030** Revision **A**
Date: **19-09-2011**			

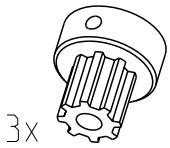
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS.BELTS.HEATERBLOCKS

STEP 4 - MOTORS PRE-ASSEMBLY



3X
6010 MOTOR-NEMA17



3X
1230 MOTOR-BELT-PULLEY

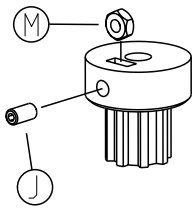
3X (M)
3510 M3-NUT

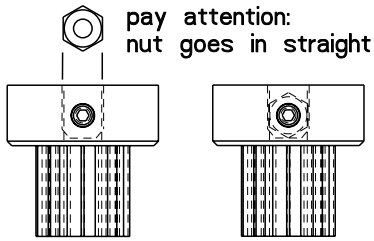
3X (J)
3720 SET-SCREW-3x6

OPTIONALLY (but recommended):
first file a flat area on the motor shaft
but protect inner from swarfs with tape.
(motor=magnetic)

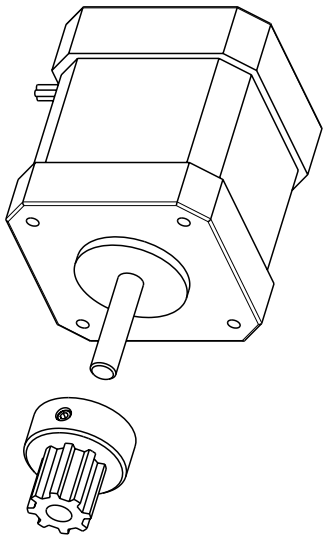
SCALE 1:1

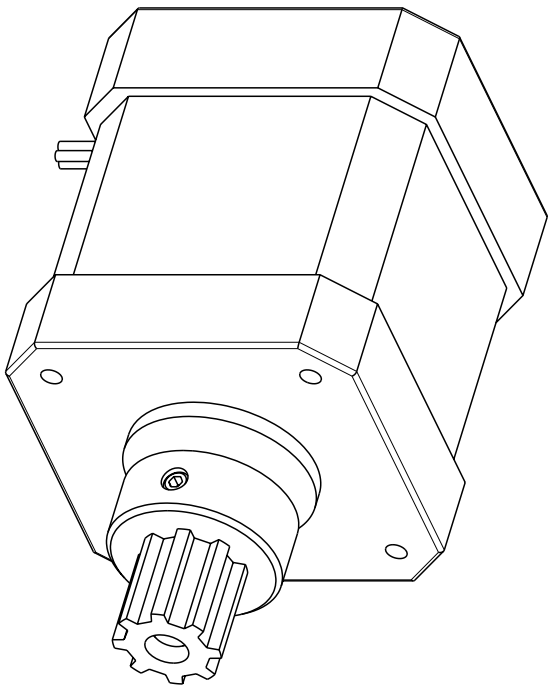
4A - 3x

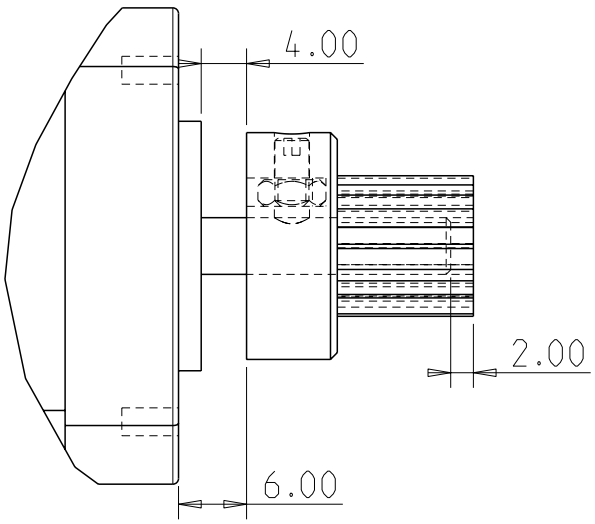




4B - 3x







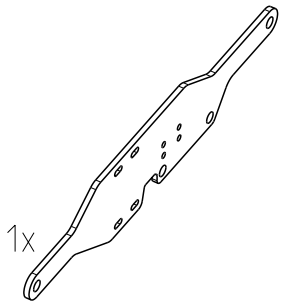
OPTIONALLY (but recommended):
fit a pulley or manual adjust knob on the other side.
on one motor, for manual adjusting (for Z motor)

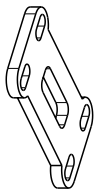
Status: **PRELIMINARY**	Scale: **7:10**	American projection	Material:	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **19-09-2011**	12 of 38	A4	ORCA-030	A

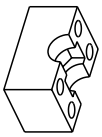
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

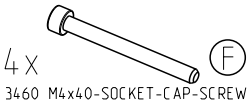
STEP 5 - Y-SIDE RIGHT PRE-ASSEMBLY

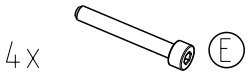

1x
2210 Y-SIDE-FRAME


1x
2230 Y-SIDE-SUPPORT


2x
1070 DRIVEN-Z-NUT-TRAP

4x (V)
3110 624-BEARING


4x (F)
3460 M4x40-SOCKET-CAP-SCREW

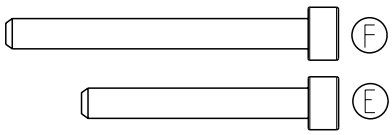

4x (E)
3450 M4x30-SOCKET-CAP-SCREW

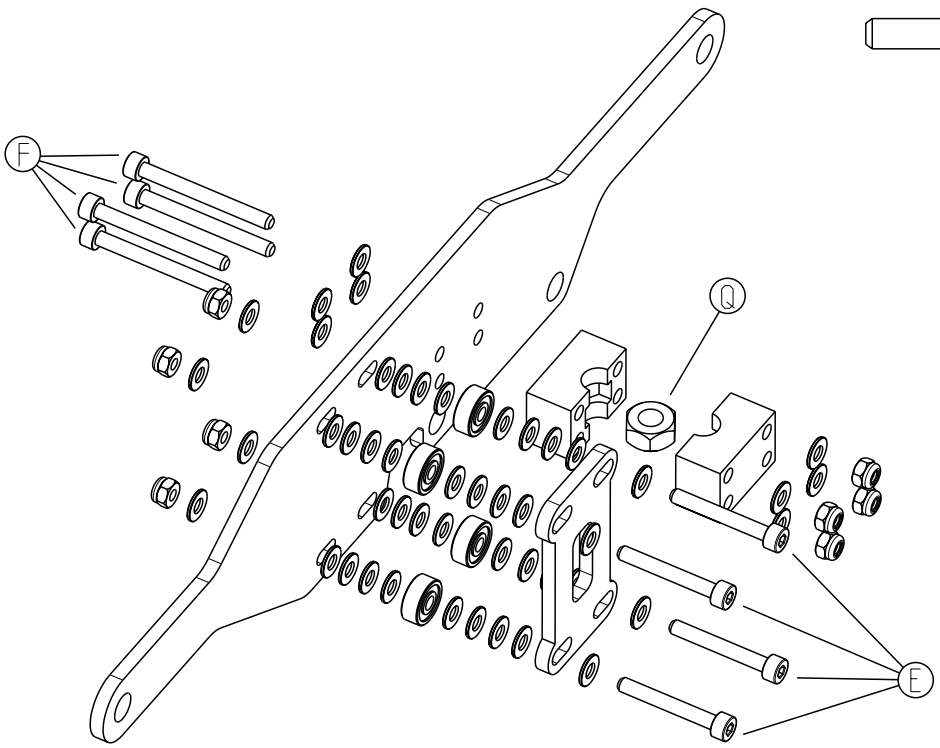
48x (O)
3530 M4-WASHER

8x (N)
3520 M4-NYLOCK-NUT

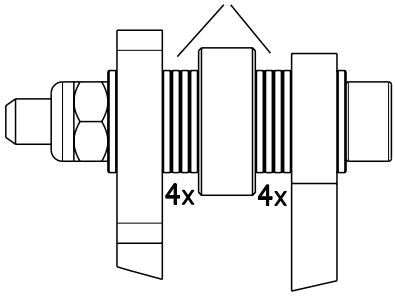
1x (Q)
3550 M8-NUT

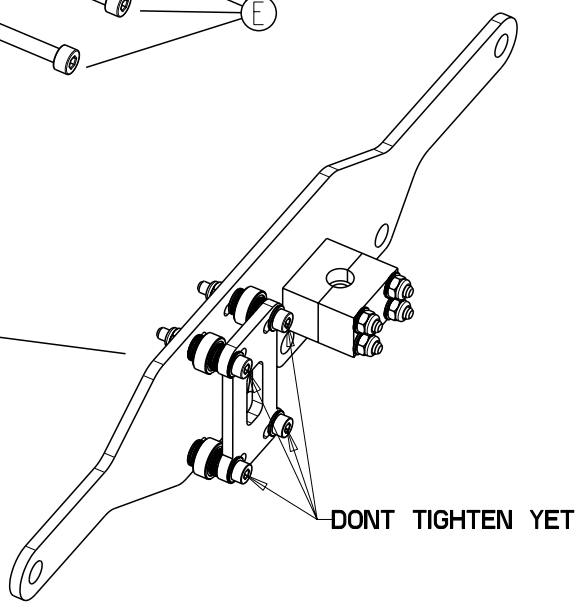
SCALE 1:1





pay attention:
nr of washers



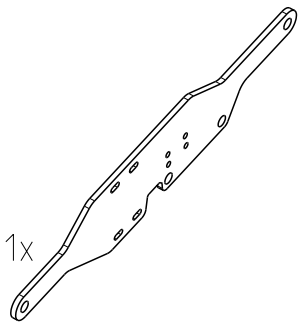


Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	13 of 38	A4	ORCA-030	A

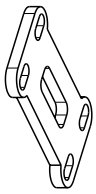
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS.BELTS.HEATERBLOCKS

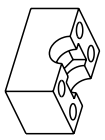
STEP 6 - Y-SIDE LEFT PRE-ASSEMBLY



1x
2210 Y-SIDE-FRAME

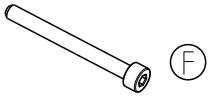


1x
2230 Y-SIDE-SUPPORT

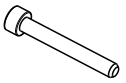


2x
1070 DRIVEN-Z-NUT-TRAP

4x (V)
3110 624-BEARING



4x (F)
3460 M4x40-SOCKET-CAP-SCREW



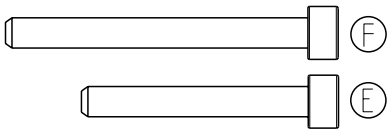
4x (E)
3450 M4x30-SOCKET-CAP-SCREW

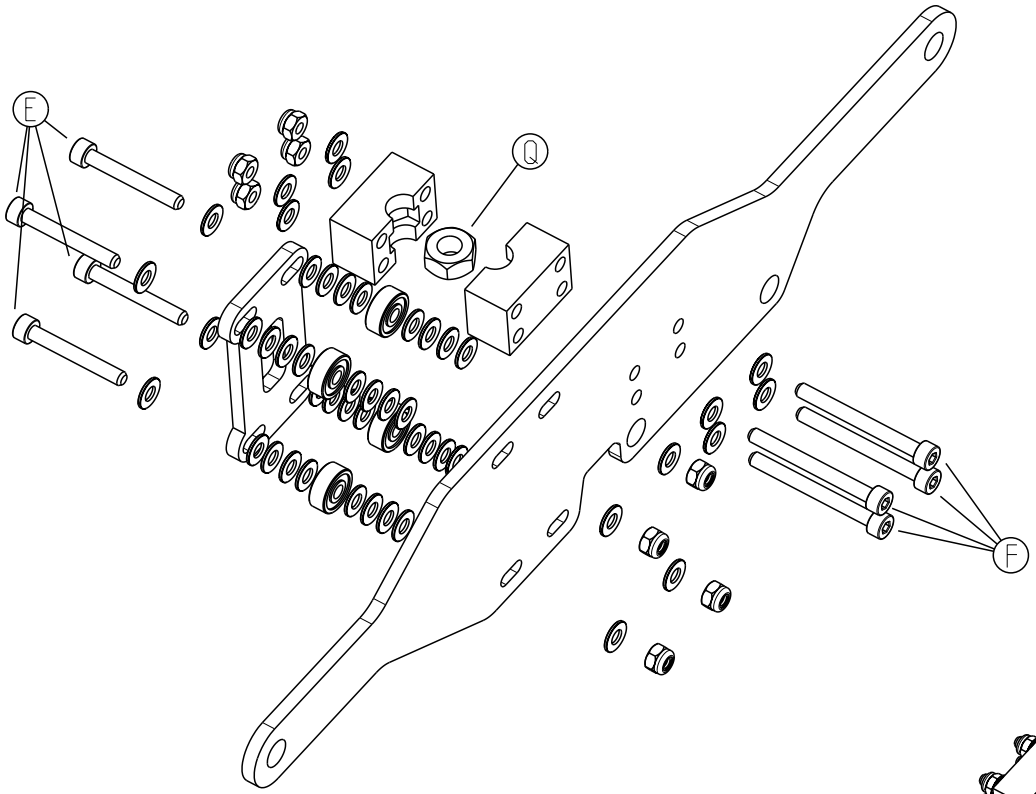
48x (O)
3530 M4-WASHER

8x (N)
3520 M4-NYLOCK-NUT

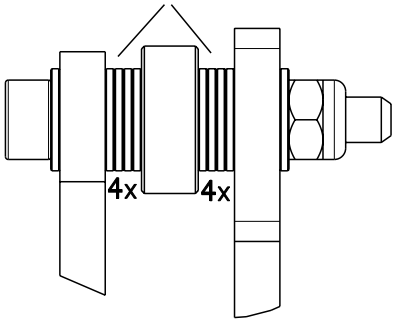
1x (Q)
3550 M8-NUT

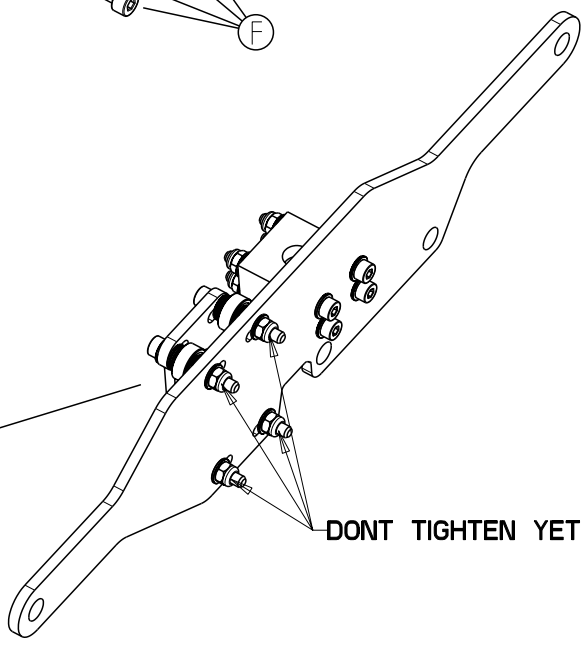
SCALE 1:1





pay attention:
nr of washers



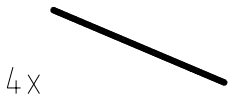


Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **14** of **38**	Size **A4**	Drawing number: **ORCA-030** / Revision **A**
Date: **20-09-2011**			

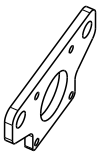
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

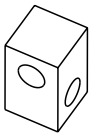
STEP 7 - YZ FRAME ASSEMBLY



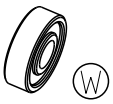
4X
3010 M8-THREADED-ROD-330mm



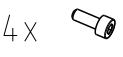
1X
2250 Y-MOTOR-PLATE



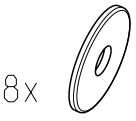
4X
1050 Y-ROD-HOLDER



4X (W)
3120 608-BEARING



4X (A)
3410 M3x8-SOCKET-CAP-SCREW

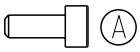


8X (S)
3570 MUDGUARD-WASHER-8x30

36X (R)
3560 M8-WASHER

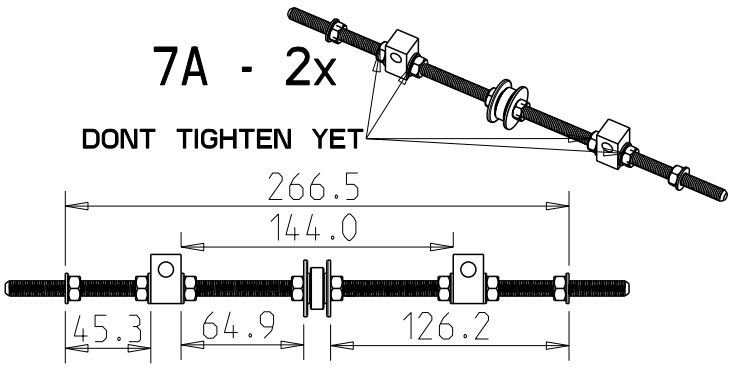
34X (Q)
3550 M8-NUT

SCALE 1:1

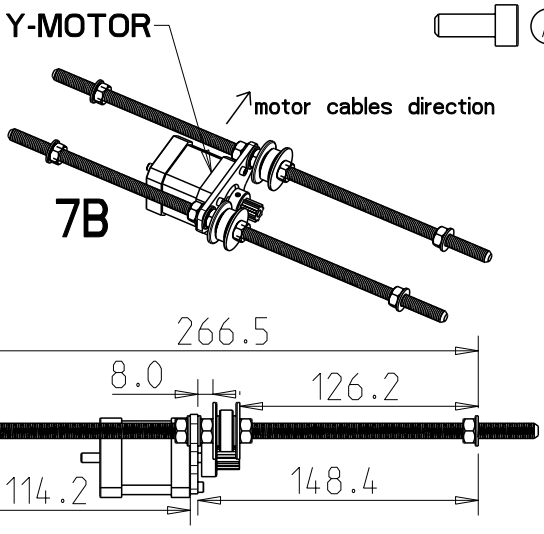


7A - 2x

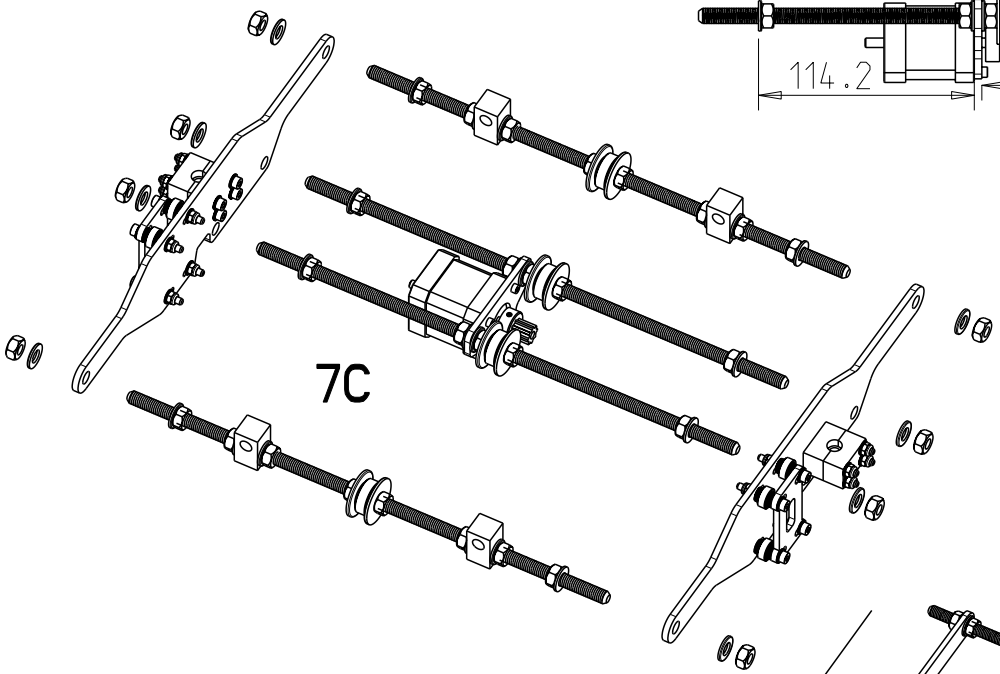
DONT TIGHTEN YET



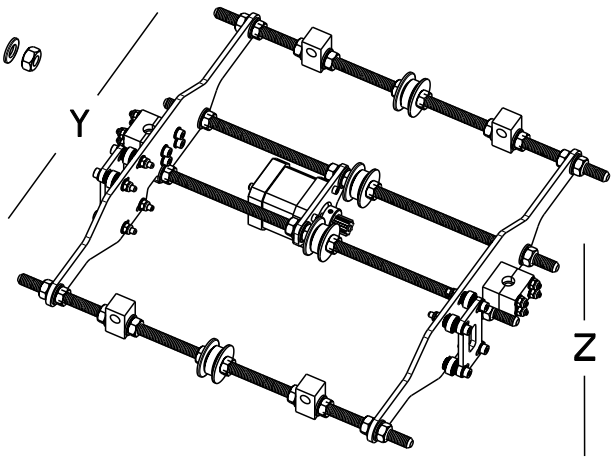
7B



7C



easiest is to use a flat table
and hold the model straight
by pushing it against the table

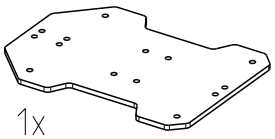


Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	15 of 38	A4	ORCA-030	A

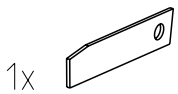
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

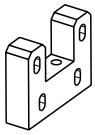
STEP 8 - Y-FROG PRE-ASSEMBLY



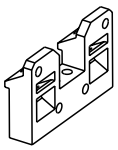
1x
2270 Y-FROG



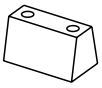
1x
2930 Y-OPTO-FLAG



1x
1010 CARRIAGE-180



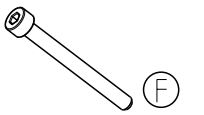
2x
1030 CARRIAGE-360



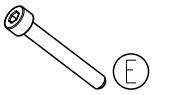
2x
1080 Y-BELT-CLAMP-TOP

2x
1090 Y-BELT-CLAMP-BTTM

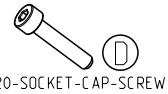
10x (V)
3110 624-BEARING



8x (F)
3460 M4x40-SOCKET-CAP-SCREW



10x (E)
3450 M4x30-SOCKET-CAP-SCREW

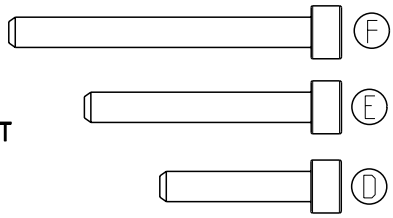


4x (D)
3440 M4x20-SOCKET-CAP-SCREW

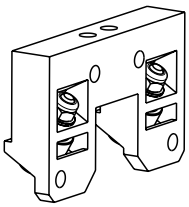
76x (O)
3530 M4-WASHER

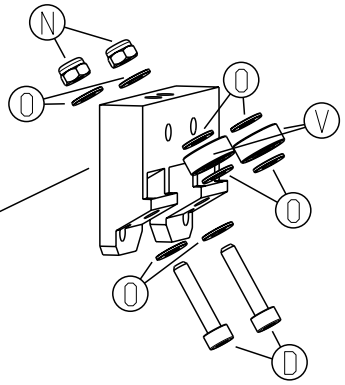
22x (N)
3520 M4-NYLOCK-NUT

SCALE 1:1



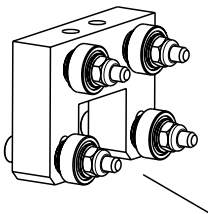
8A - 2x

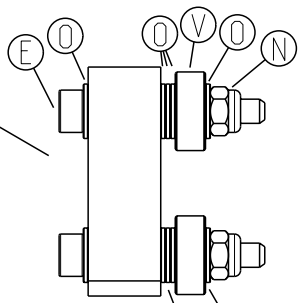




8B

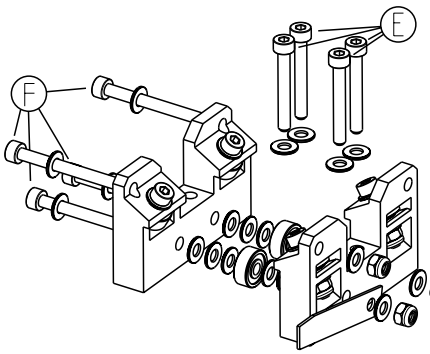
DONT TIGHTEN YET

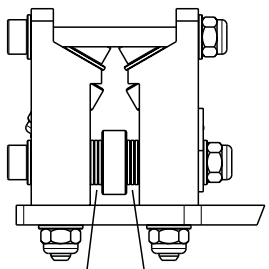




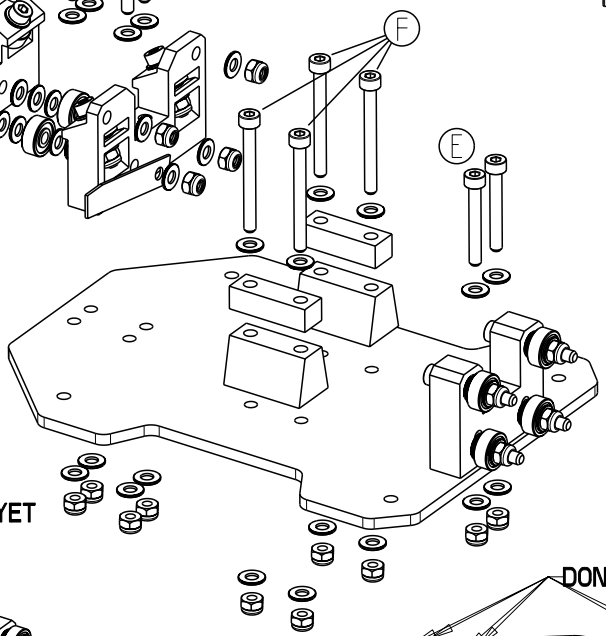
3x 1x
nr of washers

8C

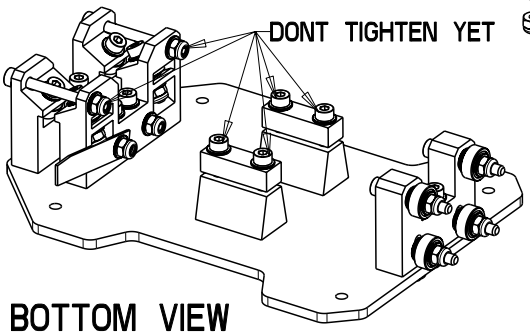




3x 3x
nr of washers

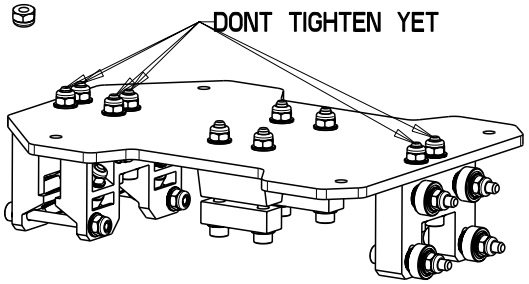


DONT TIGHTEN YET



BOTTOM VIEW

DONT TIGHTEN YET



Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **20-09-2011**	16 of 38	A4	ORCA-030 / A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 9 - FITTING Y-FROG ON YZ FRAME

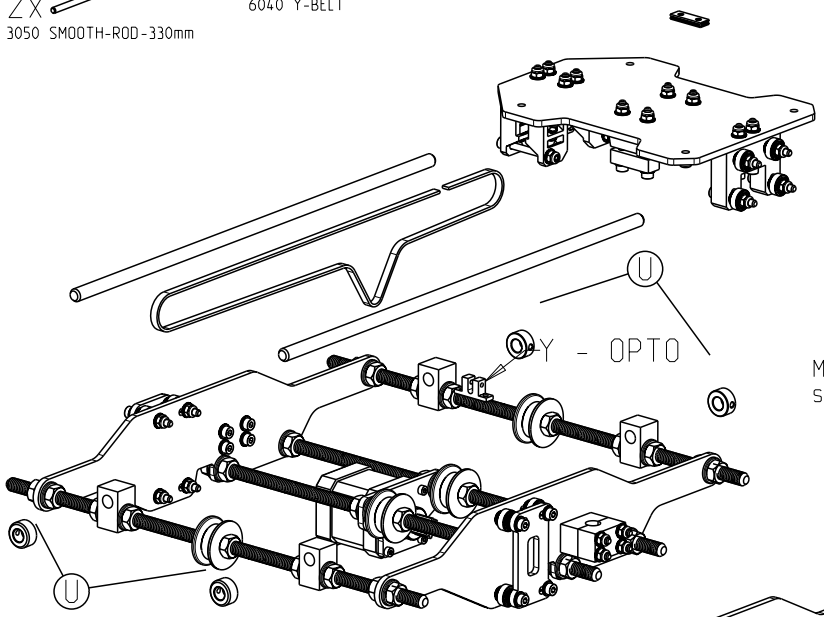
2x 3050 SMOOTH-ROD-330mm

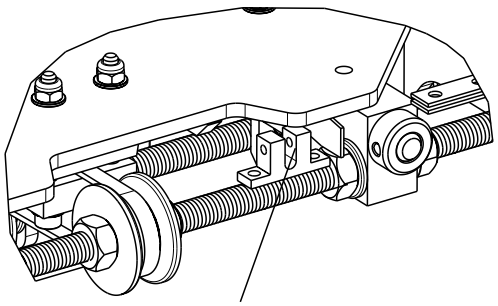
1x 6040 Y-BELT

4x 3590 ADJUSTING-RING-8x16x8 (U)

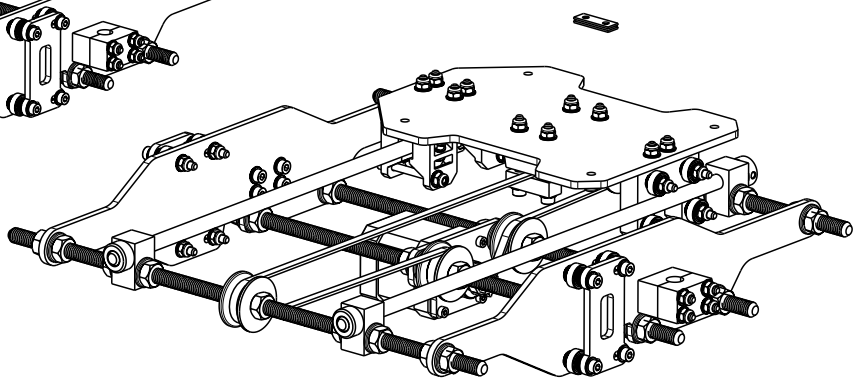
1x 5060 OPTO-TCST2103

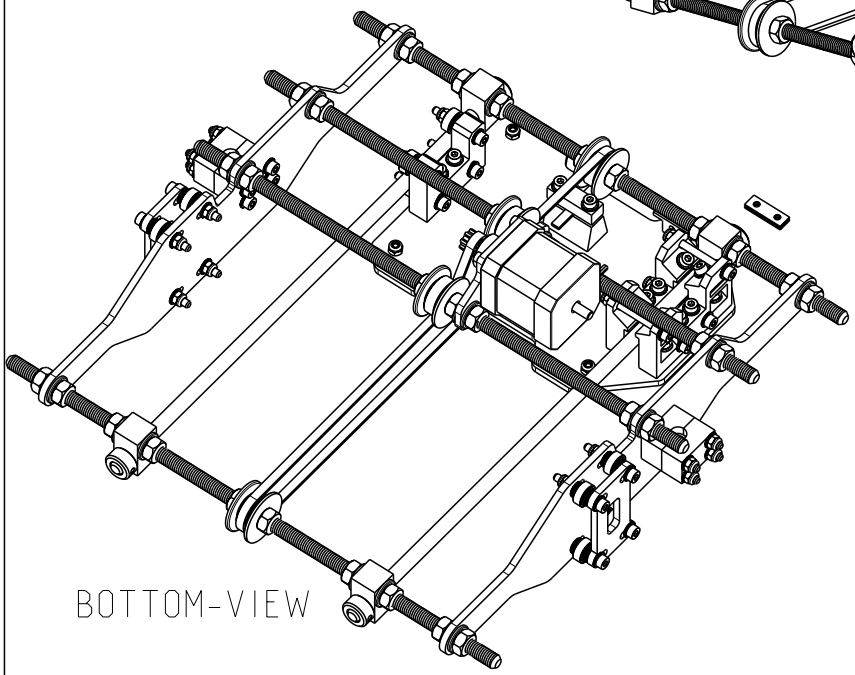
Our optos come pre-fitted
on cables with 5w Molex housing
here use one with 80cm cable length
Fit it on threaded rod with cable-ties

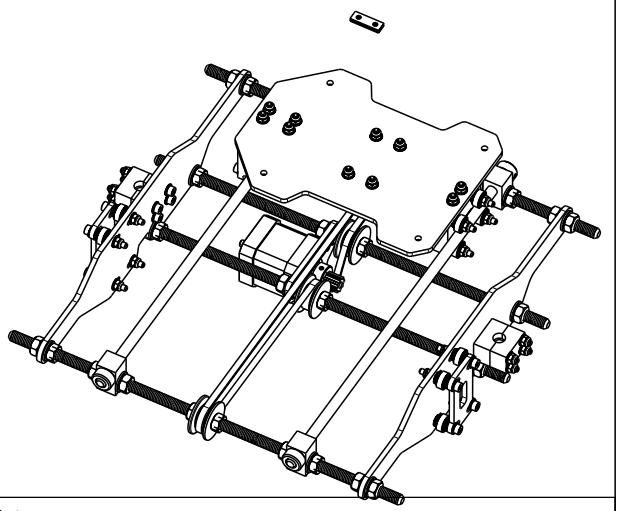




Make sure the Y-OPTO-FLAG on the Y-Frog
slides in the Y-opto-sensor by bending the flag







Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **17** of **38**	Size **A4**	Drawing number: **ORCA-030** Revision **A**
Date: **20-09-2011**			

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 10 - FITTING & LEVELLING YZ FRAME

2x
3050 SMOOTH-ROD-330mm

2x
3010 M8-THREADED-ROD-330mm

2x
1210 Z-BELT-PULLEY

4x (U)
3590 ADJUSTING-RING-8x16x8

8x (R)
3560 M8-WASHER

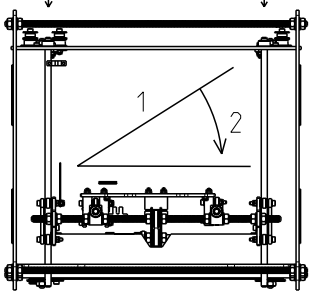
1x
2950 Z-OPTO-FLAG

10x (Q)
3550 M8-NUT

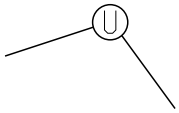
1x (N)
3520 M4-NYLOCK-NUT

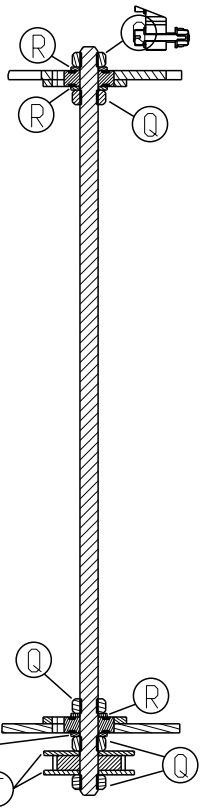
1x
5060 OPTO-TCST2103

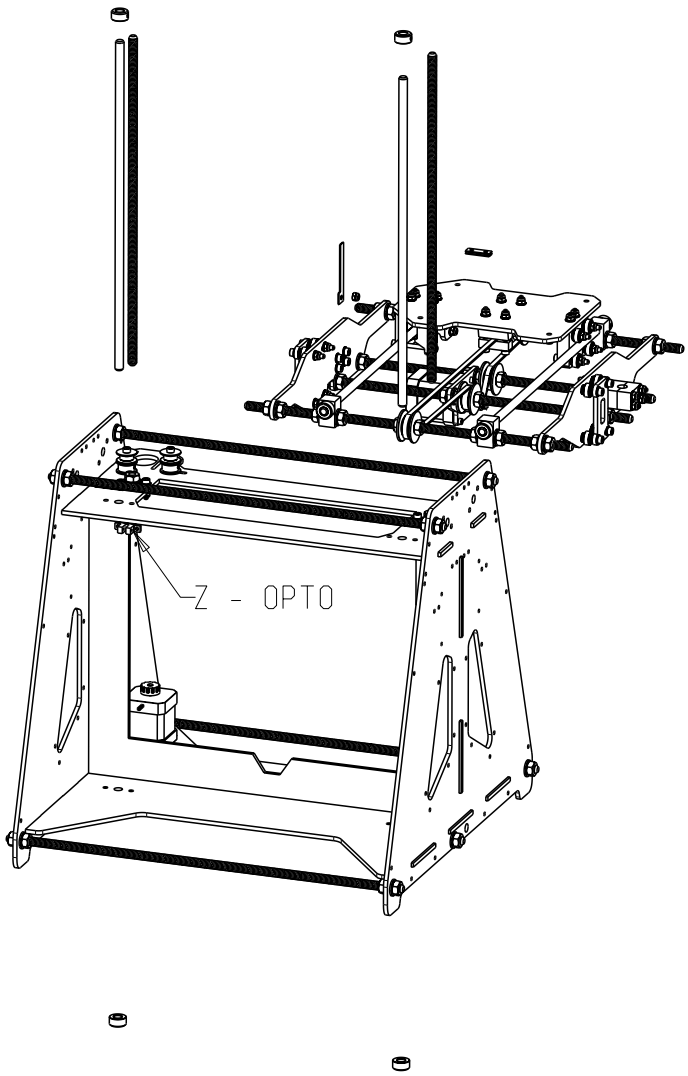
4x (T)
3580 MUDGUARD-WASHER-8x40



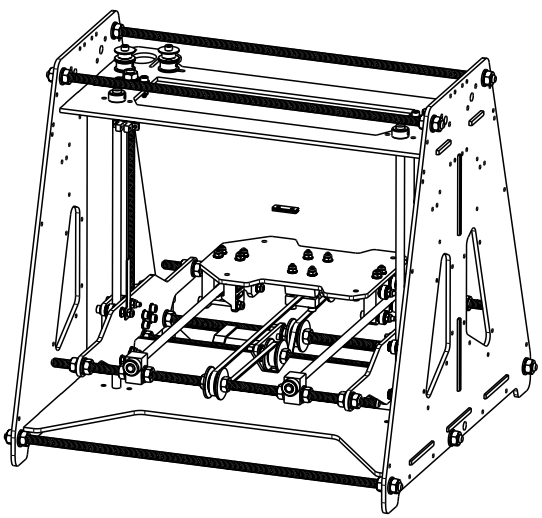
Our optos come pre-fitted
on cables with 5w Molex housing
here use one with 40cm cable length
Fit it on smooth rod with cable-ties







Make sure the Z-OPTO-FLAG on the YZ Frame
slides in the Z-opto-sensor by bending the flag
Its easier to do this after fitting/levelling



Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **20-09-2011**	18 of 38	A4	ORCA-030 / A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

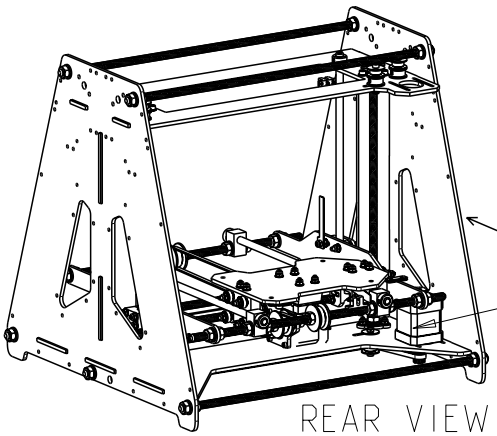
XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 11 FITTING Z-BELT & Z-MOTOR

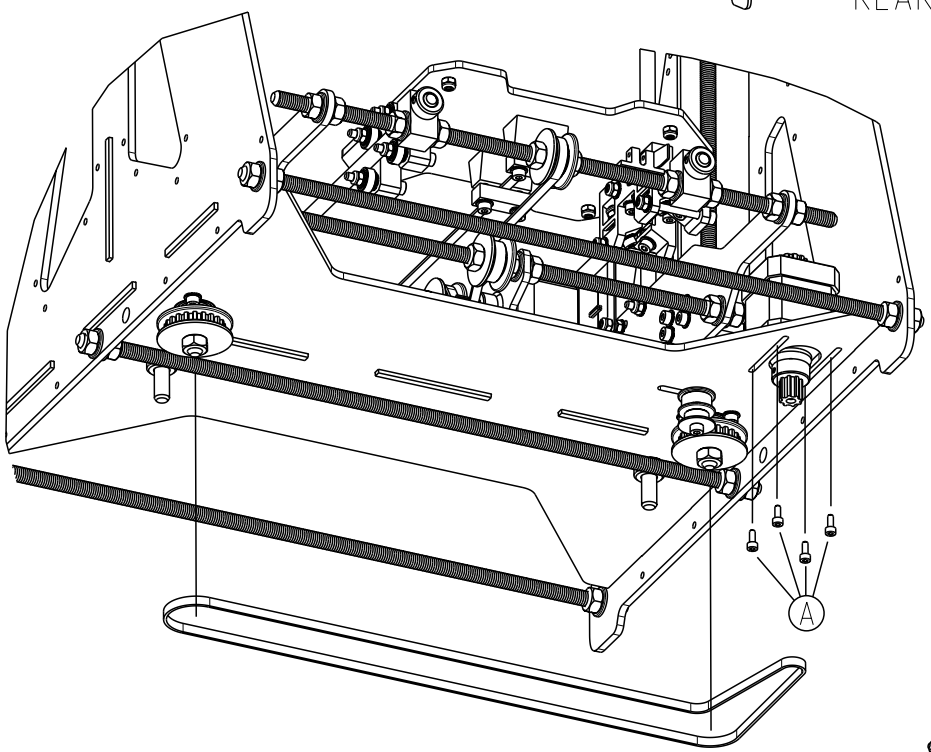
1x
6050 Z-BELT

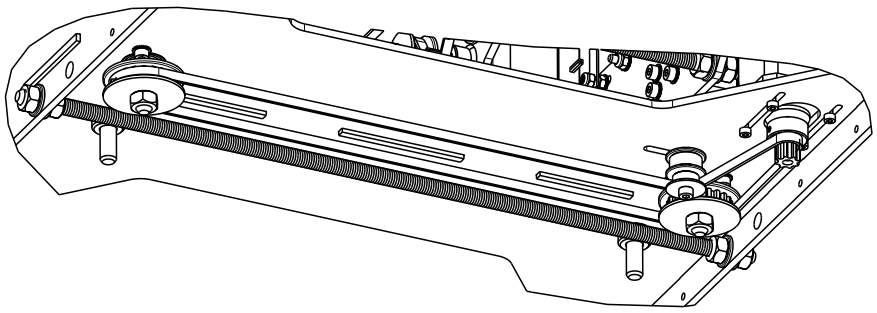
4x Ⓐ
3410 M3x8-SOCKET-CAP-SCREW

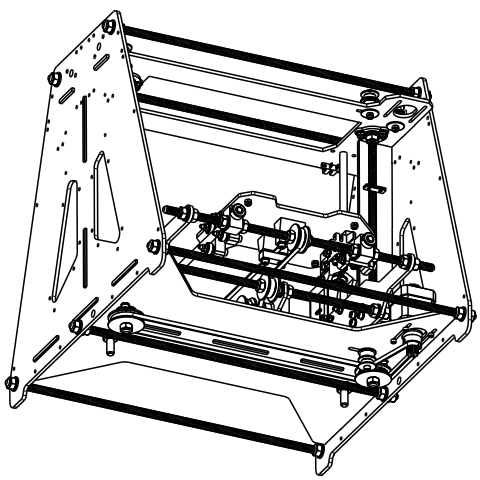
SCALE 1:1
Ⓐ



REAR VIEW





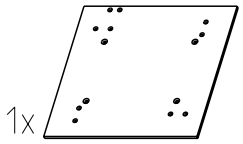


Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**
Tolerances: Ⓔ	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **19** of **38**	Size **A4**	Drawing number: **ORCA-030** Revision **A**
Date: **20-09-2011**			

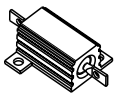
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 12 - PRINTBED PRE-ASSEMBLY

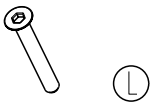


1x 2290 PRINTBED



4x 6080 HEATERBLOCK 1R5

2x 6120 PTFE-STRAIN-RELIEF-8x24x1mm

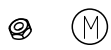


4x (L) 3490 M4x30-COUNTERSUNK-CAP-SCREW

10x (K) 3480 M3x12-COUNTERSUNK-CAP-SCREW

4x (O) 3530 M4-WASHER

8x (N) 3520 M4-NYLOCK-NUT

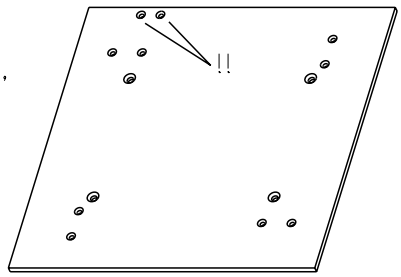


12x (M) 3510 M3-NUT

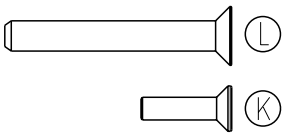
ALL HOLES NEED TO BE COUNTERSUNK
PAY ATTENTION TO DIRECTION

M4x30 COUNTERSUNK CAP SCREWS
MUST HAVE THREAD ON FULL LENGTH

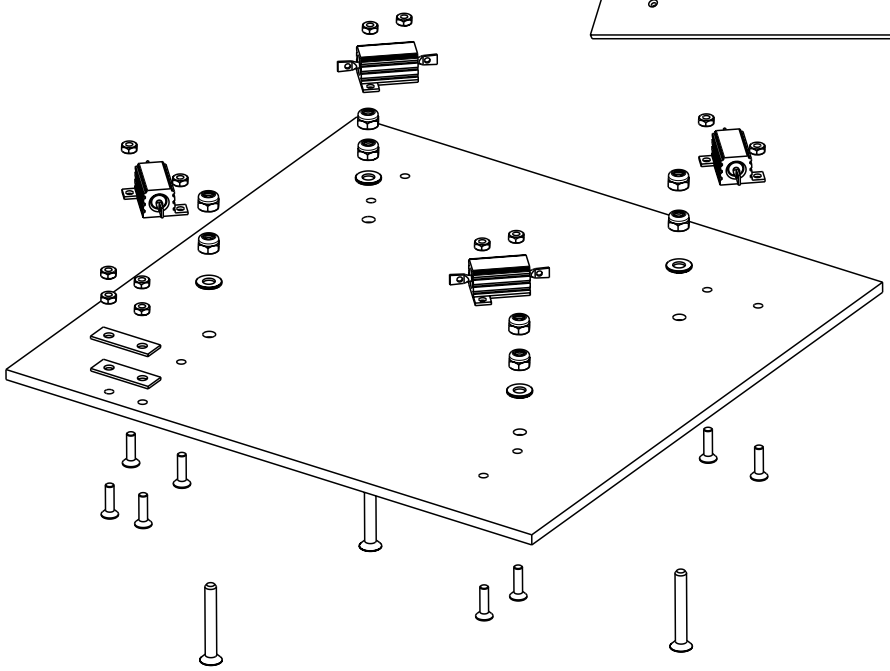
TOPVIEW WHILE DRILLING



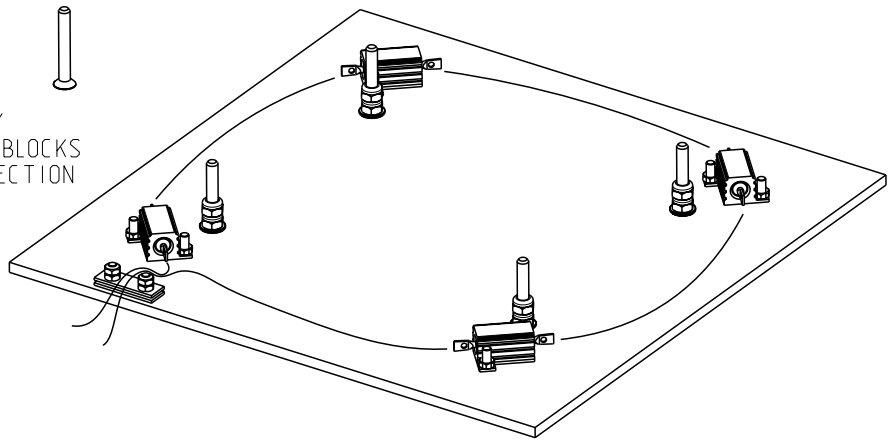
SCALE 1:1



MAKE SURE HOLES ARE COUNTERSUNK
DEEP ENOUGH, SO NOTHING STICKS OUT,
BETTER LITTLE BIT TOO DEEP
THEN DAMAGING THE NOZZLE



THIS IS GOOD TIME FOR SOLDERING
CABLES BETWEEN HEATERBLOCKS
I LIKE TO SOLDER THE POWER SUPPLY
CABLE DIRECT TO FIRST TWO HEATERBLOCKS
THAT WAY THERE IS NO EXTRA CONNECTION



Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	20 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 13 - FITTING PRINTBED

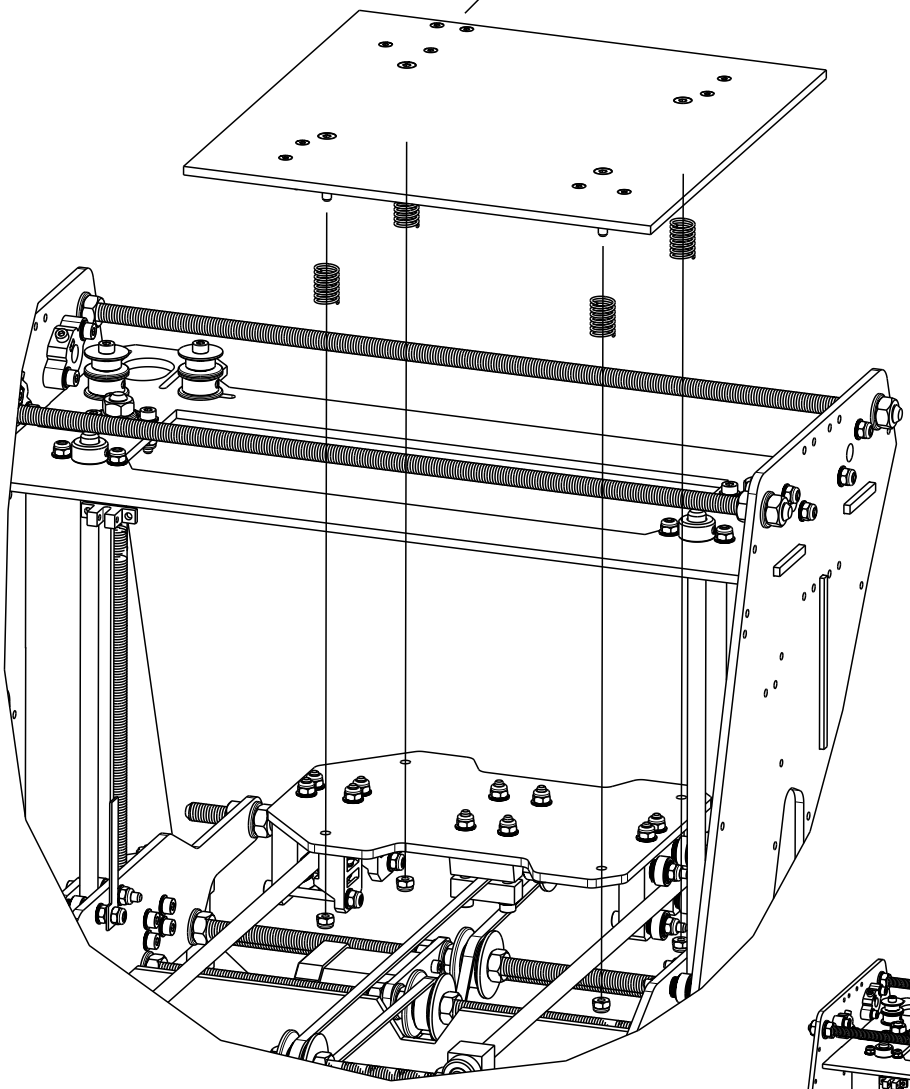
SCALE 1:1

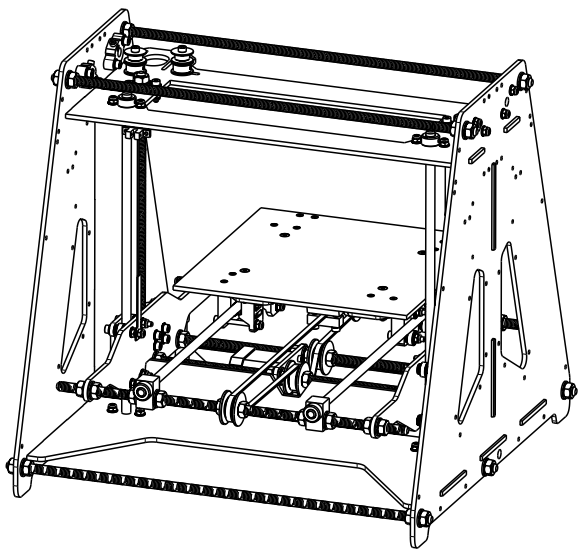
4X 3220 SPRING-BED-26x11

4X 3520 M4-NYLOCK-NUT

3220 SPRING-BED-26x11

HEATED BED CABLES DIRECTION





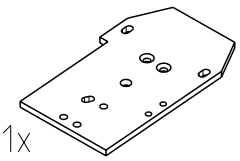
PRECISE LEVELLING OF PRINTBED WILL BE DONE LATER WITH HOTEND ALIGNMENT AND Z-OPTO FINETUNING

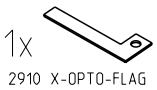
Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**
Tolerances:	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet **21** of **38**	Size **A4**	Drawing number: **ORCA-030** Revision **A**
Date: **20-09-2011**			

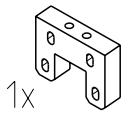
© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

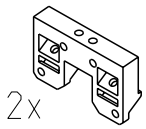
XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 14 - X-CARRIAGE ASSEMBLY

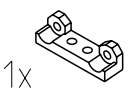

1x 2410 EXTRUDER-BASE

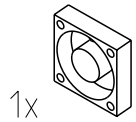

1x 2910 X-OPTO-FLAG

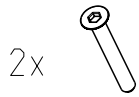

1x 1010 CARRIAGE-180

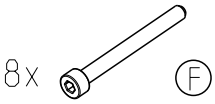

2x 1030 CARRIAGE-360

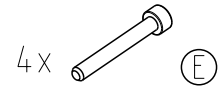
10x (V) 3110 624-BEARING

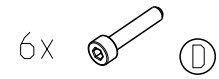

1x 1650 EXTR-FAN-SUPPORT


1x 5080 COOLING-FAN-40x40


2x (L) 3490 M4x30-COUNTERSUNK-CAP-SCREW


8x (F) 3460 M4x40-SOCKET-CAP-SCREW


4x (E) 3450 M4x30-SOCKET-CAP-SCREW

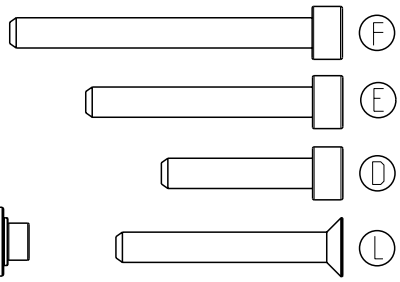

6x (D) 3440 M4x20-SOCKET-CAP-SCREW

74x (O) 3530 M4-WASHER

20x (N) 3520 M4-NYLOCK-NUT

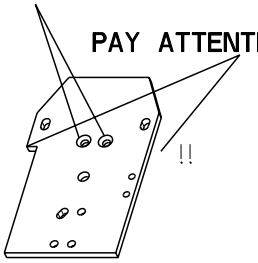
4x (P) 3540 MUDGUARD-WASHER-4x20

SCALE 1:1



THESE HOLES NEED TO BE COUNTERSUNK

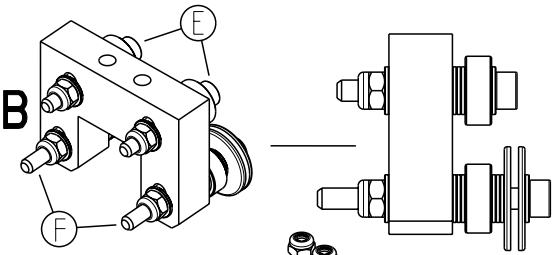
PAY ATTENTION TO DIRECTION



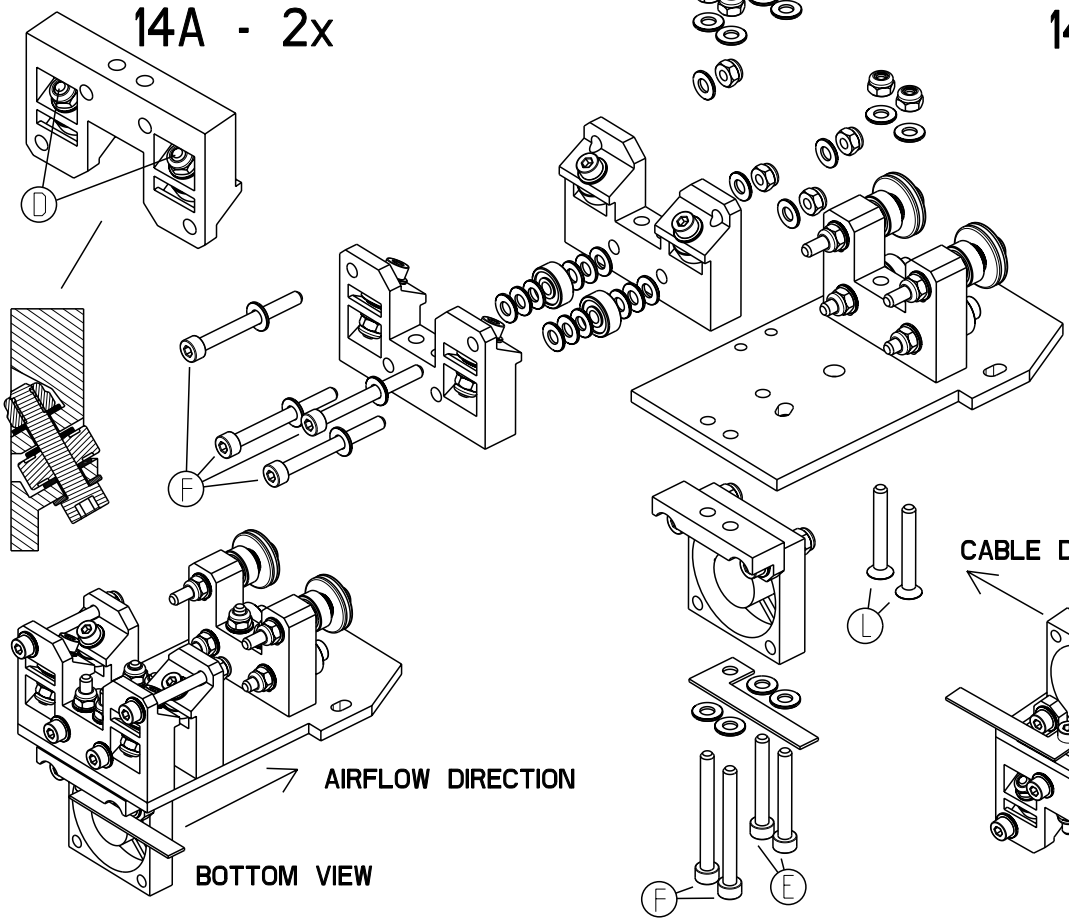
TOPVIEW WHILE DRILLING

M4x30 COUNTERSUNK CAP SCREWS MUST HAVE THREAD ON FULL LENGTH

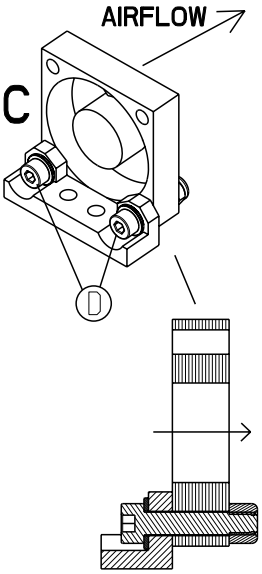
14B



14A - 2x

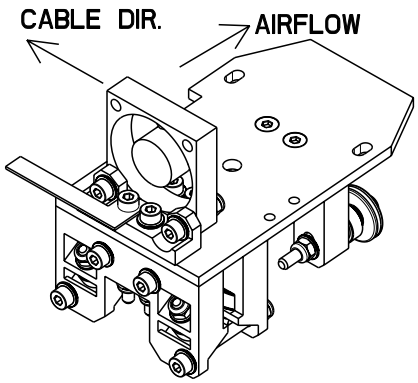


14C



AIRFLOW DIRECTION

BOTTOM VIEW



Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:
Tolerances: (E)	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **20-09-2011**	**22** of **38**	**A4**	**ORCA-030** / **A**

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 15 - FITTING X-CARRIAGE

4X
6080 HEATERBLOCK 1R5

4X (L)
3490 M4x30-COUNTERSUNK-CAP-SCREW

4X (O)
3530 M4-WASHER

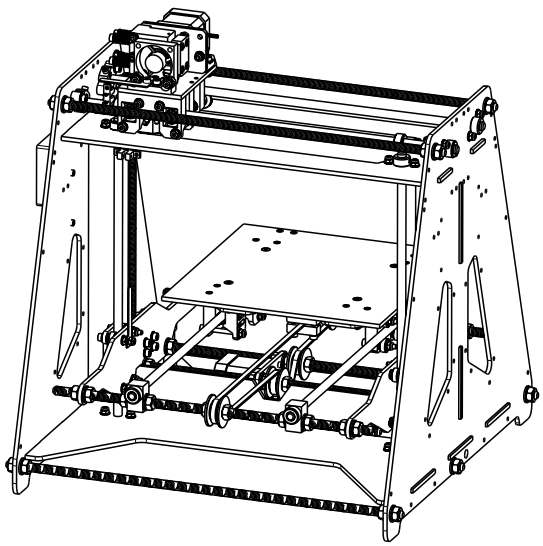
1X
2290 PRINTBED

2X
6120 PTFE-STRAIN-RELIEF-8x24x1mm

10X (K)
3480 M3x12-COUNTERSUNK-CAP-SCREW

8X (N)
3520 M4-NYLOCK-NUT

12X (M)
3510 M3-NUT



Status: **PRELIMINARY**	Scale: **3:50**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	23 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES
0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 16 - EXTRUDER PRE-ASSEMBLY

4 X
6080 HEATERBLOCK 1R5

4 X (L)
3490 M4x30-COUNTERSUNK-CAP-SCREW

4 X (O)
3530 M4-WASHER

1X
2290 PRINTBED

2 X
6120 PTFE-STRAIN-RELIEF-8x24x1mm

10 X (K)
3480 M3x12-COUNTERSUNK-CAP-SCREW

8 X (N)
3520 M4-NYLOCK-NUT

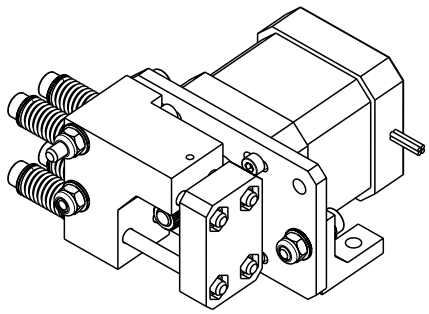
12 X (M)
3510 M3-NUT

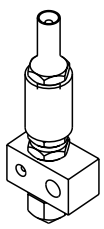
(L)

(K)

16A

16B





Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material:	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	**24** of **38**	**A4**	**ORCA-030**	**A**

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES

0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 17 - HOTEND PRE-ASSEMBLY

4X (U) 3590 ADJUSTING-RING-8x16x8

1X 5060 OPTO-TCST2103

1X 6040 Y-BELT

2X 3050 SMOOTH-ROD-330mm

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	25 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

XXXX PART NRS CODES

0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS,BELTS,HEATERBLOCKS

STEP 18 - FITTING EXTRUDER & HOTEND

4X
6080 HEATERBLOCK 1R5

4X (L)
3490 M4x30-COUNTERSUNK-CAP-SCREW

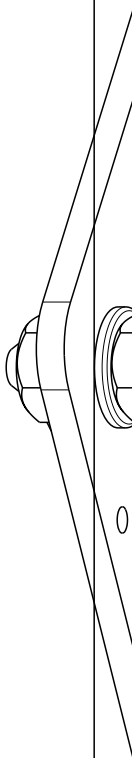
4X (O)
3530 M4-WASHER

1X
2290 PRINTBED

2X
6120 PTFE-STRAIN-RELIEF-8x24x1mm

10X (K)
3480 M3x12-COUNTERSUNK-CAP-SCREW

8X (N)
3520 M4-NYLOCK-NUT



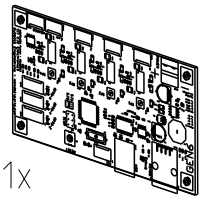
Status: **PRELIMINARY**	Scale: **3:50**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **20-09-2011**	26 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

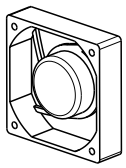
XXXX PART NRS CODES

0XXX UNUSED - FOR CAD ONLY
1XXX PRINTED PLASTIC PARTS
2XXX ALUMINIUM SHEET MATERIAL
3XXX HARDWARE
4XXX HOTEND
5XXX ELECTRONICS
6XXX MOTORS.BELTS.HEATERBLOCKS

STEP 19 - FITTING ELECTRONICS



1x
5010 GEN6-PCB

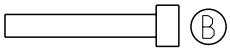


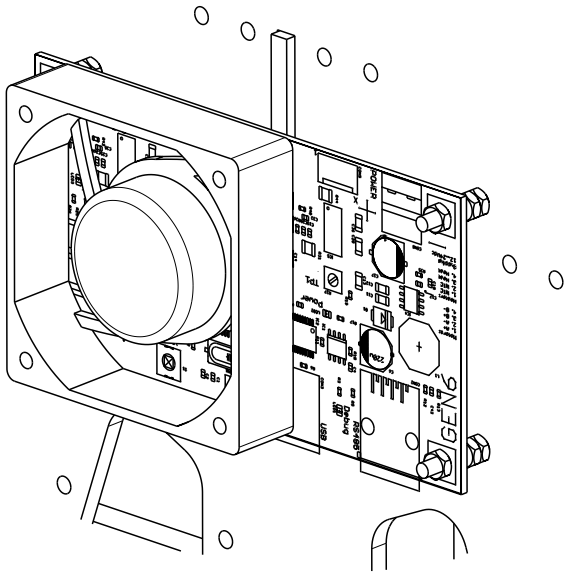
1x
5090 COOLING-FAN-60x60

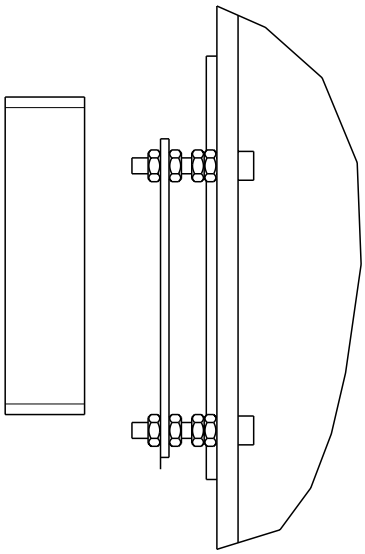
4x Ⓑ
3420 M3x20-SOCKET-CAP-SCREW

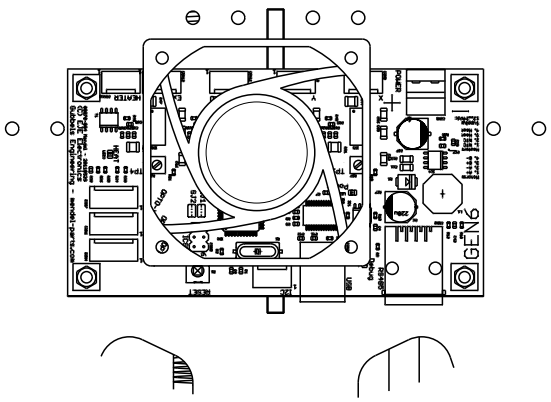
16x Ⓜ
3510 M3-NUT

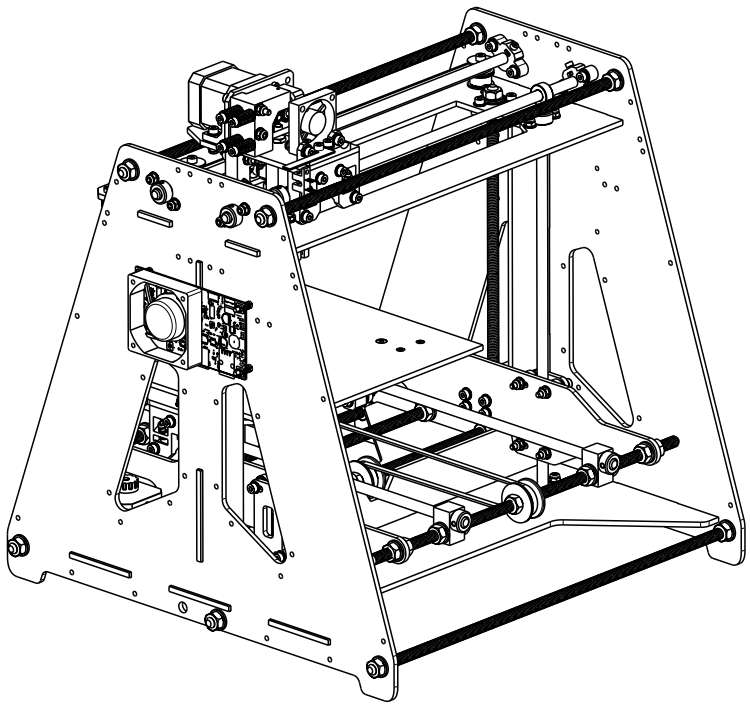
SCALE 1:1











Status: **PRELIMINARY**	Scale: **1:2**	American projection	Material: **PDF**
Tolerances: Ⓔ	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **20-09-2011**	27 of 38	A4	ORCA-030 / A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

STEP 20 - CABLING

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	28 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

FIRMWARE - UPDATING & SETTINGS

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	29 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

PRINTER SOFTWARE & FIRST PRINT

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	30 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

PRINTER SOFTWARE ADVANCED - SKEINFORGE

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	31 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

MAINTENANCE

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	32 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

ISSUE SOLVING

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	33 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

UPGRADES - FUTURE

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	34 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

PART NUMBER CODES - 1

		PART-NAME	QUANTITY
1xxx	1010	CARRIAGE-180	2
	1030		
	1050		
	1070		
	1080		
	1090		
	1210		
	1230		
	1410		
	1610		
	1630		
	1650		
	1670		
	1810		
2xxx	2010		
	2030		
	2050		
	2070		
	2210		
	2230		
	2250		
	2270		
	2290		
	2410		
	2430		
	2810		
	2910		
	2930		
	2950		
3xxx	3010		
	3020		
	3050		
	3060		
	3110		
	3120		
	3210		
	3220		
	3410		
	3420		
	3430		
	3440		
	3450		
	3460		
	3470		

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**
Tolerances: Ⓔ	Units: **mm**		
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number: / Revision
Date: **24-09-2011**	35 of 38	A4	ORCA-030 / A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

PART NUMBER CODES - 2

		PART-NAME	QUANTITY
	3480		
	3490		
	3510		
	3520		
	3530		
	3540		
	3550		
	3560		
	3570		
	3580		
	3590		
	3710		
	3720		
	3810		
	3830		
	3920		
4xxx	4010		
	4030		
	4050		
	4070		
	4090		
5xxx	5010		
	5060		
	5080		
	5090		
6xxx	6010		
	6030		
	6040		
	6050		
	6080		
	6120		

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: Ⓔ	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **24-09-2011**	36 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

A-Z INDEX - 1

	PART-NAME	PAGES	PART-NR-CODE	QUANTITY
A	ADJUSTING-RING-8x16x8		3590	18
	AXLE-HOLDER (optional)		1810	8
B	BEARING-608		3120	8
	BEARING-624		3110	33
	BOTTOM-PLATE		2030	1
	BRASS-INSERT		3810	1
C	CARRIAGE-180		1010	2
	CARRIAGE-360		1030	4
	COOLING-FAN-40x40		5080	1
	COOLING-FAN-60x60		5090	1
D	DRIVEN-HOLDER		1610	1
	DRIVEN-Z-NUT-TRAP		1070	4
E	EXTR-FAN-SUPPORT		1650	1
	EXTR-MOTOR-PLATE		2430	1
	EXTRUDER-BASE		2410	1
	EXTRUDER-CORNER		1670	2
F				
G	GEN6-PCB	6,	5010	1
H	HE9B-BRASS-BOTTOM		4050	1
	HE9B-BRASS-TOP		4030	1
	HE9B-HEATERBLOCK		4070	1
	HE9B-NOZZLE		4090	1
	HE9B-PEEK-CORE		4010	1
	HEATERBLOCK-1R5		6080	4
I	IDLER-AXLE-18mm		3830	1
	IDLER-HOLDER		1630	1
JKL				
M	M3x8-SOCKET-CAP-SCREW		3410	24
	M3x12-COUNTERSUNK-CAP-SCREW		3480	10
	M3x20-SOCKET-CAP-SCREW		3420	4
	M3-NUT		3510	39
	M4x16-SOCKET-CAP-SCREW		3430	15
	M4x20-SOCKET-CAP-SCREW		3440	26
	M4x30-COUNTERSUNK-CAP-SCREW		3490	6
	M4x30-SOCKET-CAP-SCREW		3450	26
	M4x40-SOCKET-CAP-SCREW		3460	26
	M4x70-SOCKET-CAP-SCREW		3470	4
	M4-NYLOCK-NUT		3520	112
	M4-WASHER		3530	336
	M6-BRASS-LOW-NUT		3920	4

Status: **PRELIMINARY**	Scale: 1:25	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **23-09-2011**	37 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com

A-Z INDEX - 2

	PART-NAME	PAGES	PART-NR-CODE	QUANTITY
M	M8-NUT		3550	66
	M8-WASHER		3560	64
	MID-PLATE		2050	1
	MOTOR-ADJUST-KNOB		1410	2
	MOTOR-BELT-PULLEY		1230	3
	MOTOR-NEMA17		6010	4
	MUDGUARD-WASHER-4x20		3540	23
	MUDGUARD-WASHER-8x30		3570	8
	MUDGUARD-WASHER-8x40		3580	4
N				
O	OPTO-TCST2103		5060	3
P	PRINTBED		2290	1
	PTFE-STRAIN-RELIEF		6120	2
QR				
S	SET-SCREW-3x4		3710	1
	SET-SCREW-3x6		3720	3
	SIDE-PLATE		2010	2
	SMOOTH-ROD-330mm		3050	4
	SMOOTH-ROD-400mm		3060	2
	SPRING-BED-26X11		3220	4
	SPRING-EXTR-28X9		3210	4
T	THREADED-ROD-M8-330mm		3010	6
	THREADED-ROD-M8-400mm		3020	5
	TOP-PLATE		2070	1
UVW				
X	X-BELT		6030	1
	X-OPTO-FLAG		2910	1
Y	Y-BELT		6040	1
	Y-BELT-CLAMP-BTTM		1090	2
	Y-BELT-CLAMP-TOP		1080	2
	Y-FROG		2270	1
	Y-MOTOR-PLATE		2250	1
	Y-OPTO-FLAG		2930	1
	Y-ROD-HOLDER		1050	4
	Y-SIDE-FRAME		2210	2
	Y-SIDE-SUPPORT		2230	2
Z	Z-BEARING-SUPPORT		2810	4
	Z-BELT		6050	1
	Z-BELT-PULLEY		1210	2
	Z-OPTO-FLAG		2950	1

Status: **PRELIMINARY**	Scale: **1:25**	American projection	Material: **PDF**	
Tolerances: (E)	Units: **mm**			
Drawn by: **Camiel Gubbels**	Sheet	Size	Drawing number:	Revision
Date: **24-09-2011**	38 of 38	A4	ORCA-030	A

© Drawing Copyright All Rights Reserved Gubbels Engineering Eindhoven The Netherlands +31 40 2026749 www.mendel-parts.com