



# FANGAXIS High Force Lifting Jacks & Guided Rack Axis



**Planetary Lift**

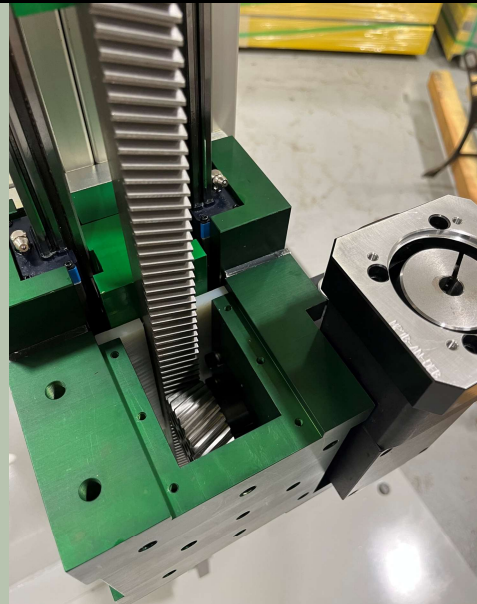
**Ball Screw Lift**



**NEPTUNE  
TRITON**

**Standard Rack Axis**

**Heavy Rack Axis**



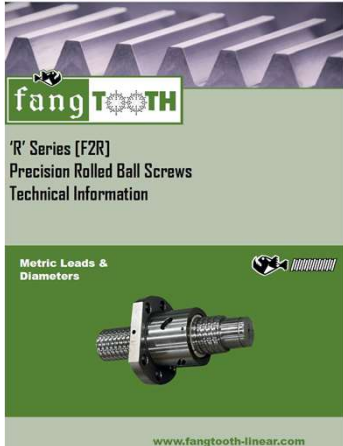
**fangOPEN  
fangMAX**



Other Products



Linear Actuators | Ball Screws | Gearboxes | Lifts | Systems



Ball Screw Assemblies And Linear Actuators



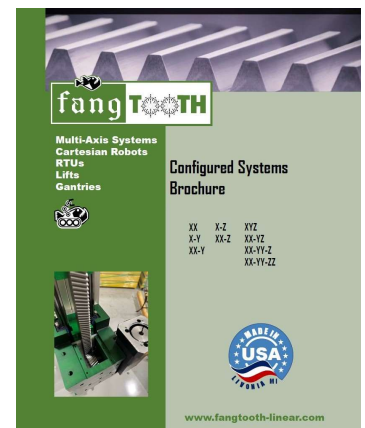
Servo & Industrial Gearboxes

Fangtooth will tackle any solution by making a custom to fit your exact requirement



CALL TODAY

Multi-Axis Systems



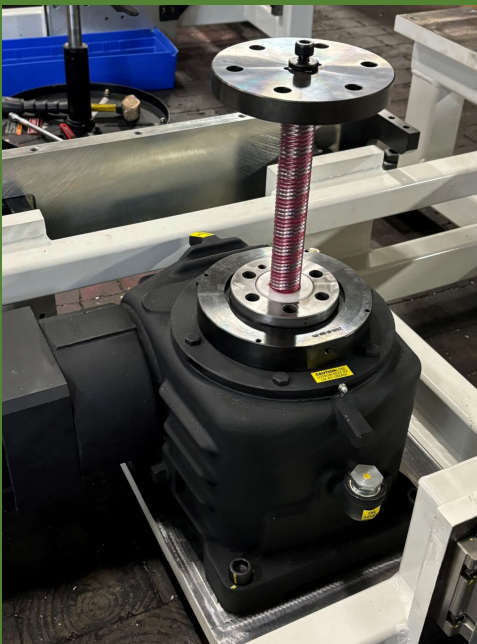


**fang** **TOOTH**

# High Force Lifting Jacks

**NEPTUNE**  
**TRITON**

**Planetary Lift**  
**Ball Screw Lift**



[www.fangtooth-linear.com](http://www.fangtooth-linear.com)



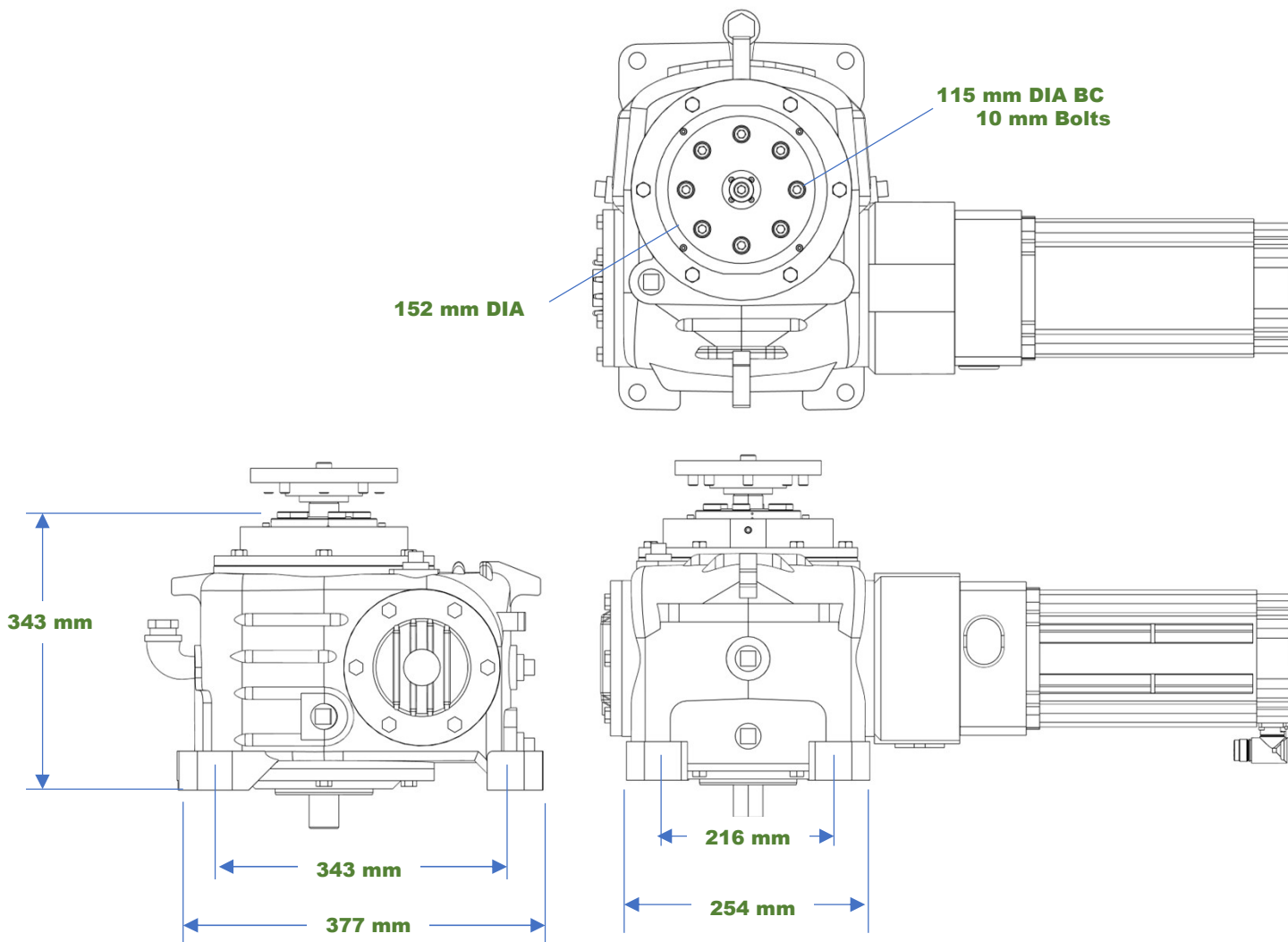
## NEPTUNE Planetary Lift

Max Speed is dependent on Mounting Configuration and Length.  
Please Call Application Engineering for Advice.



### Size 3020-085 MAX LIFTING CAPACITY 8.5 Tons

	Travel / Turn	Jack Efficiency
5:1 Gear Ratio	4.000 mm	87.40 %
10:1 Gear Ratio	2.000 mm	81.88 %
20:1 Gear Ratio	1.000 mm	74.52 %
30:1 Gear Ratio	0.667 mm	71.76 %
40:1 Gear Ratio	0.500 mm	64.40 %
50:1 Gear Ratio	0.400 mm	61.64 %





## NEPTUNE Planetary Lift

Max Speed is dependent on Mounting Configuration and Length.  
Please Call Application Engineering for Advice.

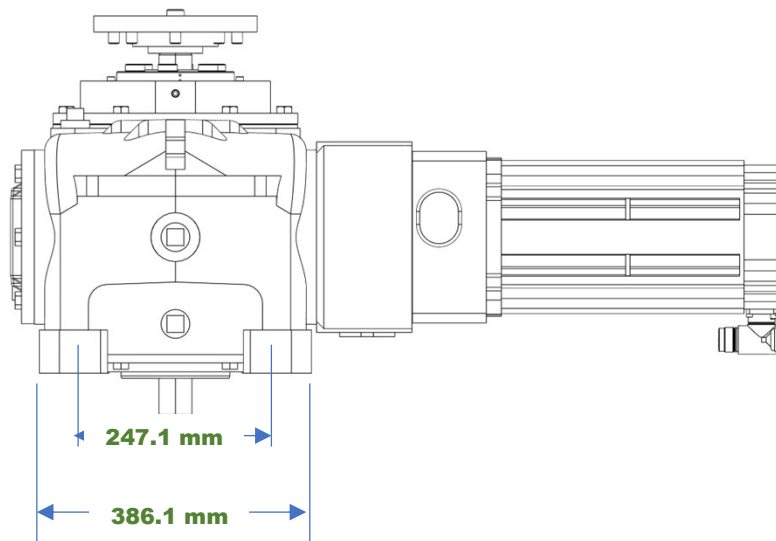
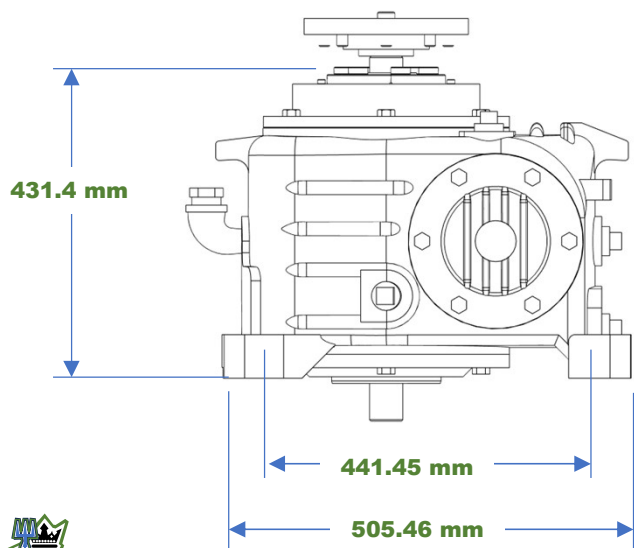


### Size 3915-110 MAX LIFTING CAPACITY 11.0 Tons

	Travel / Turn	Jack Efficiency
5:1 Gear Ratio	3.000 mm	87.40 %
10:1 Gear Ratio	1.500 mm	81.88 %
20:1 Gear Ratio	0.750 mm	74.52 %
30:1 Gear Ratio	0.50 mm	71.76 %
40:1 Gear Ratio	0.375 mm	64.40 %
50:1 Gear Ratio	0.300 mm	61.64 %
60:1 Gear Ratio	0.250 mm	58.89 %

152 mm DIA

115 mm DIA BC  
12 mm Bolts





## NEPTUNE Planetary Lift

Max Speed is dependent on Mounting Configuration and Length.  
Please Call Application Engineering for Advice.

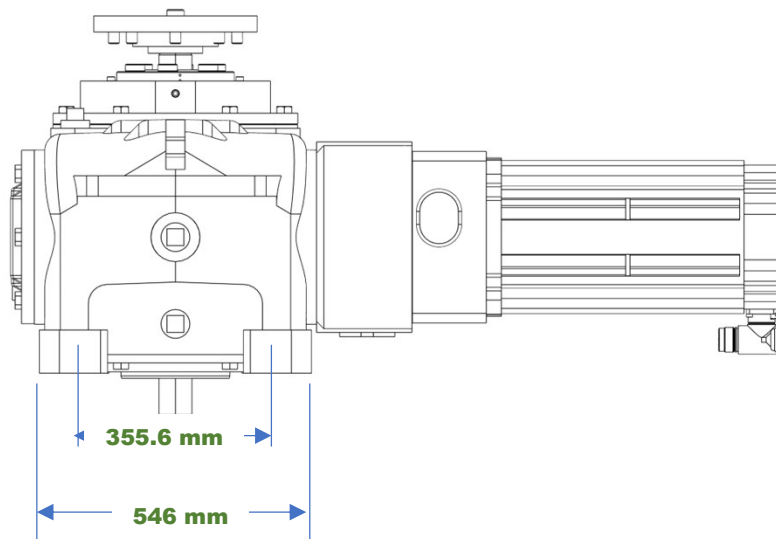
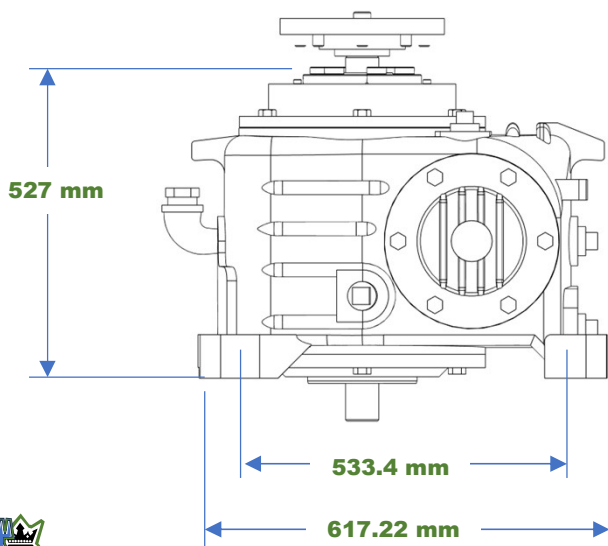


### Size 4818-190 MAX LIFTING CAPACITY 19.0 Tons

	Travel / Turn	Jack Efficiency
5:1 Gear Ratio	3.600 mm	87.40 %
10:1 Gear Ratio	1.800 mm	81.88 %
20:1 Gear Ratio	0.900 mm	74.52 %
30:1 Gear Ratio	0.600 mm	71.76 %
40:1 Gear Ratio	0.450 mm	64.40 %
50:1 Gear Ratio	0.360 mm	61.64 %
60:1 Gear Ratio	0.300 mm	58.89 %

152 mm DIA

115 mm DIA BC  
12 mm Bolts



## fang OPEN Standard Axis



Series	FANGO2504 – 400#		FANGO2508 – 800#	
Pinion Pitch dia.	55.174	mm	98.68	mm
Travel per rev	173.334	mm	310.00	mm
Pinion Inertia	1.79	kgcm <sup>2</sup>	26.27	kgcm <sup>2</sup>
Efficiency	92%			
Max Lifting Force	423.769	lbs	802.568	lbs
Max Input Torque*	370.000	Nm	5133.000	inlb
Repeatability	0.070 mm			
Pinion Box Weight	11.000	kg	13.000	kg
Rack Weight	4.400	kg/m	6.000	kg/m
Rail Weight	3.200	kg/m	3.200	kg/m
Base Clamp Weight	3.048	kg	3.048	kg



## fang MAX Heavy Axis



### FANGX2560 – FANGX2562 – FANGW2522 / (Mod 3 Rack)

Pinion Pitch dia.	70.030	mm	2.7570	in
Travel per rev	220.000	mm	8.6614	in
Pinion Inertia	4.64	kgcm <sup>2</sup>	1.5856	lbin <sup>2</sup>
Efficiency	92%			
Max Lifting Force	11120.000	N	2500.0000	lbs
Max Input Torque*	580.000	Nm	5133.0000	inlb
Repeatability	0.030	mm	0.0012	in
Pinion Box Weight	14.000	kg	30.865	lb
Rack Weight	6.000	kg/m	4.032	lb/ft
Rail Weight	3.200	kg/m	2.150	lb/ft
Base Clamp Weight	3.048	kg	6.720	lb





fang

**OPEN**

**Standard Axis**

400# SERIES FANGO2504

800# SERIES FANGO2508

**SIZE 25 PROFILED RAIL**

**HELICAL RACK**

400# - [55.17mm DIA PINION MOD 2]

800# - [96.68mm DIA PINION MOD 3]

BOSCH REXROTH

THK

HIWIN

IKO

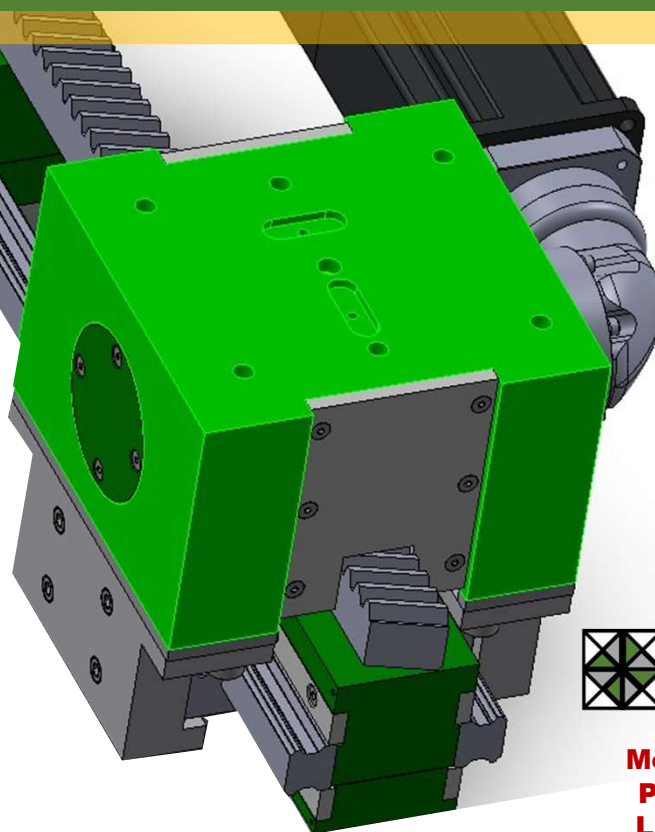
INA

NSK

THOMSON

EWELLIX (SKF)

**Your Rail Preference**



**FANGTOOTH**  
Carbide Alloy  
Tooth Grip  
Hardness 2<sup>nd</sup>  
To Diamond  
Mounts & Aligns  
Profiled Rail for  
Linear Bearings

**GUIDED RACK DRIVEN AXIS  
TRANSFERS, LIFTS & GANTRIES**

**LONGER STRONGER & FASTER**

- than Belt Drives & Ball Screws

- ideal for welding applications

**Multiple Heads on 1 Axis**

**Extremely Long Lengths**

**Safe Vertical Hold**

**High Precision, Force & Speed**

**"CAN" + Cantilevered Loads**

[www.fang2th.com](http://www.fang2th.com)





## INTRODUCTION

<b>Features</b> .....	<b>4</b>
<b>Construction</b> .....	<b>5</b>
<b>Axis Configurations</b> .....	<b>6</b>

## ORDERING CODES – APPLICATION EXAMPLES

<b>Ordering</b> .....	<b>7</b>
<b>Application Examples</b> .....	<b>8 - 9 - 10</b>
<b>System Setups</b> .....	<b>11</b>
<b>Rack Kit Length Diagrams</b> .....	<b>12</b>

## SPECIFICATIONS

<b>Dimensions FANGmax</b> .....	<b>13</b>
<b>Dimensions FANGclamp</b> .....	<b>14</b>
<b>Gearbox Technical Data</b> .....	<b>15 - 16 - 17</b>
<b>Runner Block Specifications</b> ...	<b>18</b>
<b>Motion Profiles for Design</b> .....	<b>19</b>
<b>Input Torque Charts</b> .....	<b>20 - 24</b>

Fangtooth Inc builds heavy duty guided gear rack actuators and cartesian pick N place systems based on a unique linear profiled rail mounting technique using a fangtooth clamp.

Fangtooth Specializes in high precision moves which are **LONGER STRONGER & FASTER** - than Belt Drives & Ball Screws - ideal for welding applications as there are no plastic parts – large Aerospace envelopes – Lifts & Elevators – Warehousing – 7<sup>th</sup> Axis Robot Moves – Long Axis with multiple independent heads, etc.

Series	FANGO2504 – 400#		FANGO2508 – 800#	
Pinion Pitch dia.	55.174	mm	98.68	mm
Travel per rev	173.334	mm	310.00	mm
Pinion Inertia	1.79	kgcm <sup>2</sup>	26.27	kgcm <sup>2</sup>
Efficiency	92%			
Max Lifting Force	423.769	lbs	802.568	lbs
Max Input Torque*	370.000	Nm	5133.000	inlb
Repeatability	0.070 mm			
Pinion Box Weight	11.000	kg	13.000	kg
Rack Weight	4.400	kg/m	6.000	kg/m
Rail Weight	3.200	kg/m	3.200	kg/m
Base Clamp Weight	3.048	kg	3.048	kg

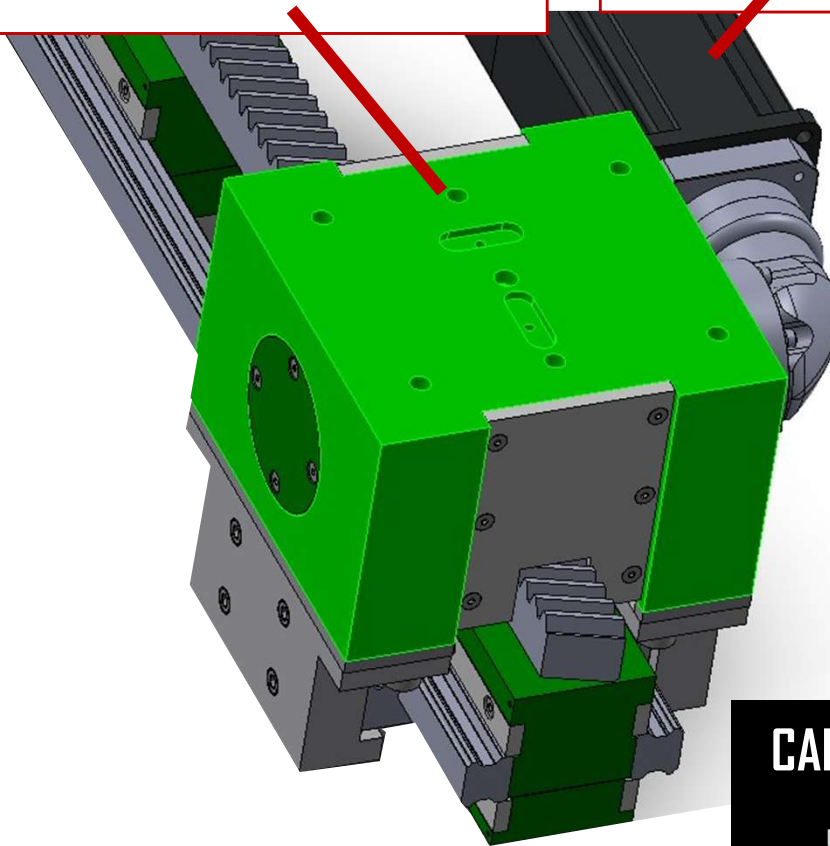


FANG02504  
FANG02508

Figure 1.0

[000] Pre-Engineered Pinion Drive with a sealed pinion built for low backlash, precision and lubrication ports.

[050] Ready Mounted Planetary Servo Gearboxes that will mount the motor of your choice.



### CAPABILITIES

Up to 5 m/s

Up to 70 microns  
repeatability  
(Std. 100 microns)

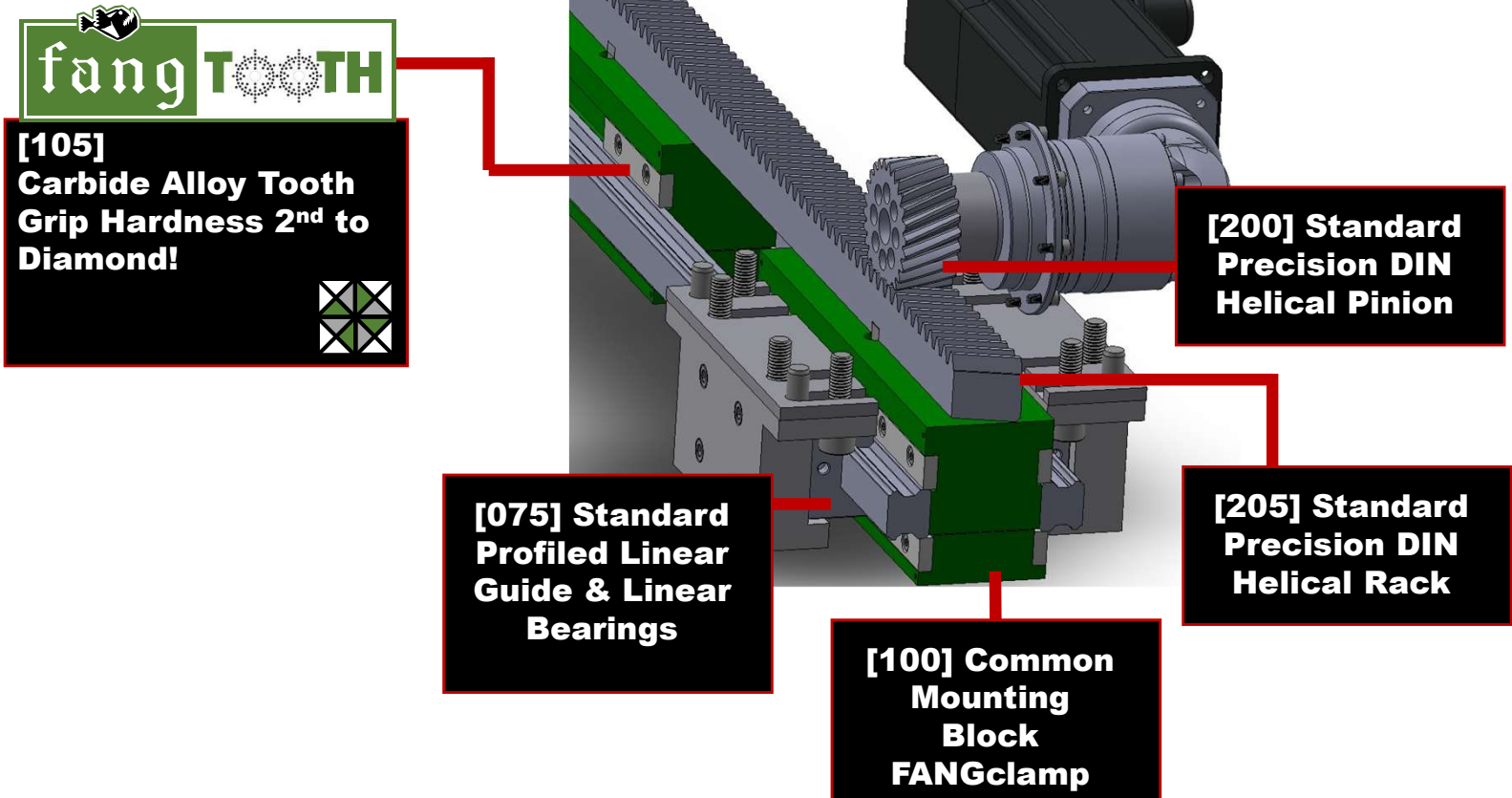
Single Axis Up to  
800 lbs lift forces

The base of the FANGaxis is a common mounting block called a FANGclamp [100] that uses a Fangtooth™ [105] which has a coating (hardness 2<sup>nd</sup> to diamond) to clamp and align the reference edge of the linear rail [075]. This also mounts a standard precision DIN helical gear rack [205] to create an actuated linear guide system

## INFINITE CONFIGURATIONS

- Fangtooth™ FANGaxis can be specified with many input configurations.
- Single or Dual Rails & Single or Dual Racks.
- Additional Runner Blocks (Guide Cars) can be added easily on each axis
- Synchronize Axis Electrically or Mechanically for Gantries, Elevators, Lifts, etc.

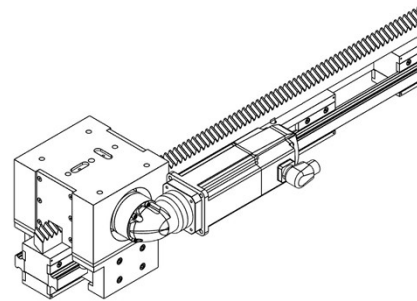
FANG2504 Figure 2.0



Series	FANGO2504 – 400#		FANGO2508 – 800#	
Pinion Pitch dia.	55.174	mm	98.68	mm
Travel per rev	173.334	mm	310.00	mm
Pinion Inertia	1.79	kgcm <sup>2</sup>	26.27	kgcm <sup>2</sup>
Efficiency	92%			
Max Lifting Force	423.769	lbs	802.568	lbs
Max Input Torque*	370.000	Nm	5133.000	inlb
Repeatability	0.070 mm			
Pinion Box Weight	11.000	kg	13.000	kg
Rack Weight	4.400	kg/m	6.000	kg/m
Rail Weight	3.200	kg/m	3.200	kg/m
Base Clamp Weight	3.048	kg	3.048	kg

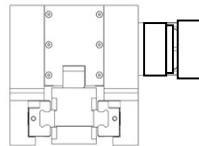


**FANGopen**  
**FANGO-2504 – 400#**  
**FANGO-2508 – 800#**  
 (Size 25 Rail / Clamp 60mm Wide)



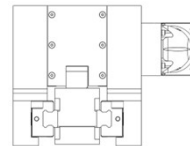
## INPUT OPTIONS

**P1 – 06PL (400#)**  
**P1 – 09PL (800#)**



**Robot Mount Planetary Connection  
 Inline Gearbox**

**P1 – 06PR (400#)**  
**P1 – 09PR (800#)**



**Robot Mount Planetary Connection  
 Right Angle Gearbox**

# HOW TO ORDER FANG<sup>open</sup> STANDARD AXIS

## FANGO2504 and FANGO2508

**OPEN**

**FANG<sup>open</sup>: FANGO2504P1BB-06PL010-1000RXGX/MS2N04**

**2560: 2500# Max Thrust Force per Pinion**

**Size 25 Rail**

**4 = 400 lb load rating**

**"24" = 2 Rack Flip**

**Input Style – See Page "06"**

**P1 – Planetary Gearbox is the only current option.**

**Special Servo Worm May Be Possible.**

**Linear Brand**

- TB = THK Ball Rail
- HB = Hiwin Ball Rail
- BB = Bosch Ball Rail
- KB = IKO Ball Rail
- NB = NSK Ball Rail
- EB = Ewellix Ball Rail

**Gearbox:**

- 06PL – Size 6 Inline Planetary
- 06PR – Size 6 Right Angle Planetary
- 09PL – Size 8 Inline Planetary
- 09PR – Size 8 Right Angle Planetary

**Ratio:**

003 – 3:1	025 – 25:1
004 – 4:1	030 – 30:1
005 – 5:1	035 – 35:1
006 – 6:1	040 – 40:1
007 – 7:1	050 – 50:1
008 – 8:1	060 – 60:1
009 – 9:1	070 – 70:1
010 – 10:1	080 – 80:1
012 – 12:1	090 – 90:1
015 – 15:1	100 – 100:1
020 – 20:1	150 – 150:1

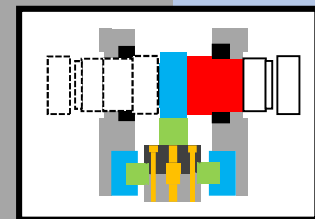
**Additional Options:**

- FFG – Fangtooth Finger Guards
- BLW – Bellows
- TDC – Thin Dense Chrome Protection

**Overall Length**

**Servo Motor PN**

**R X G X**



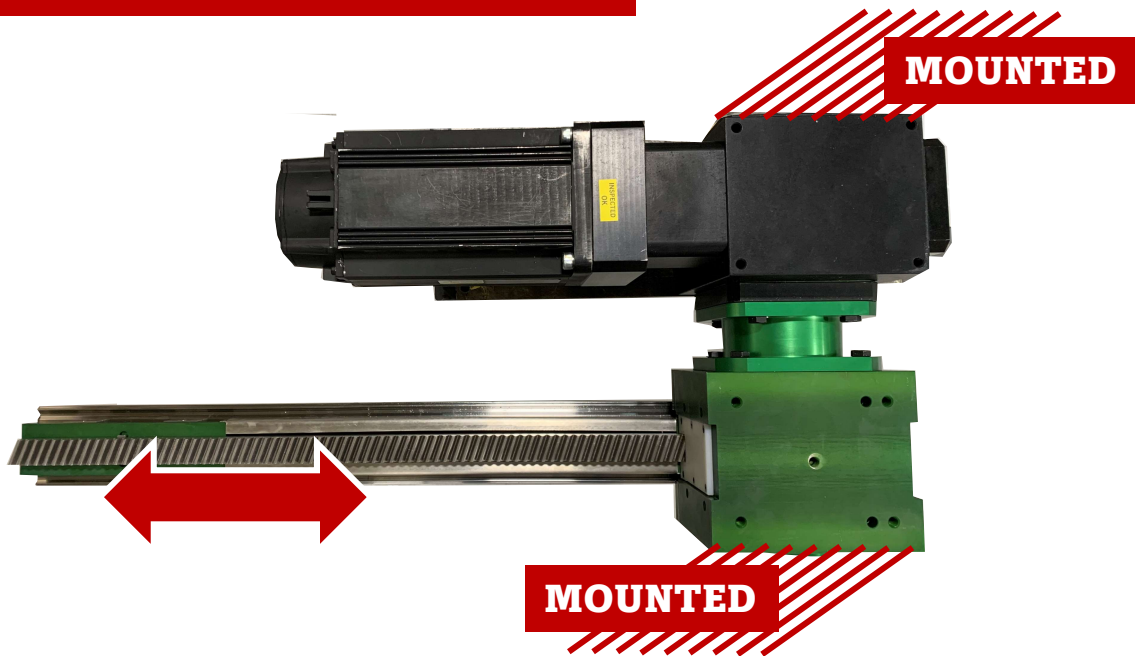
**RAIL POSITIONS**

- (i) 1<sup>st</sup> Character  
R = Rail on Left  
X = No Rail on Left
- (ii) 2<sup>nd</sup> Character  
R = Rail on Right  
X = No Rail on Right

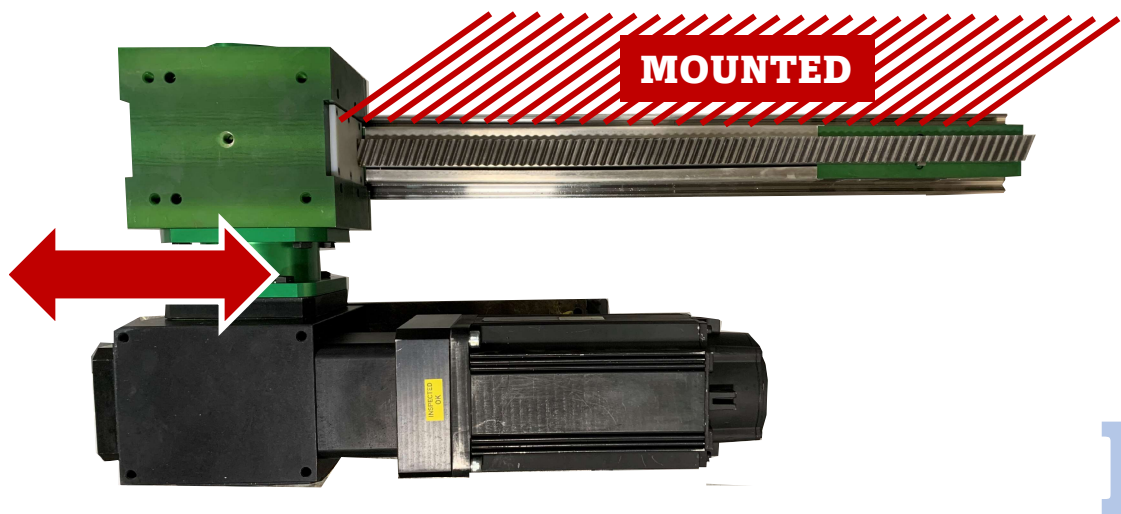
**INPUT POSITIONS**

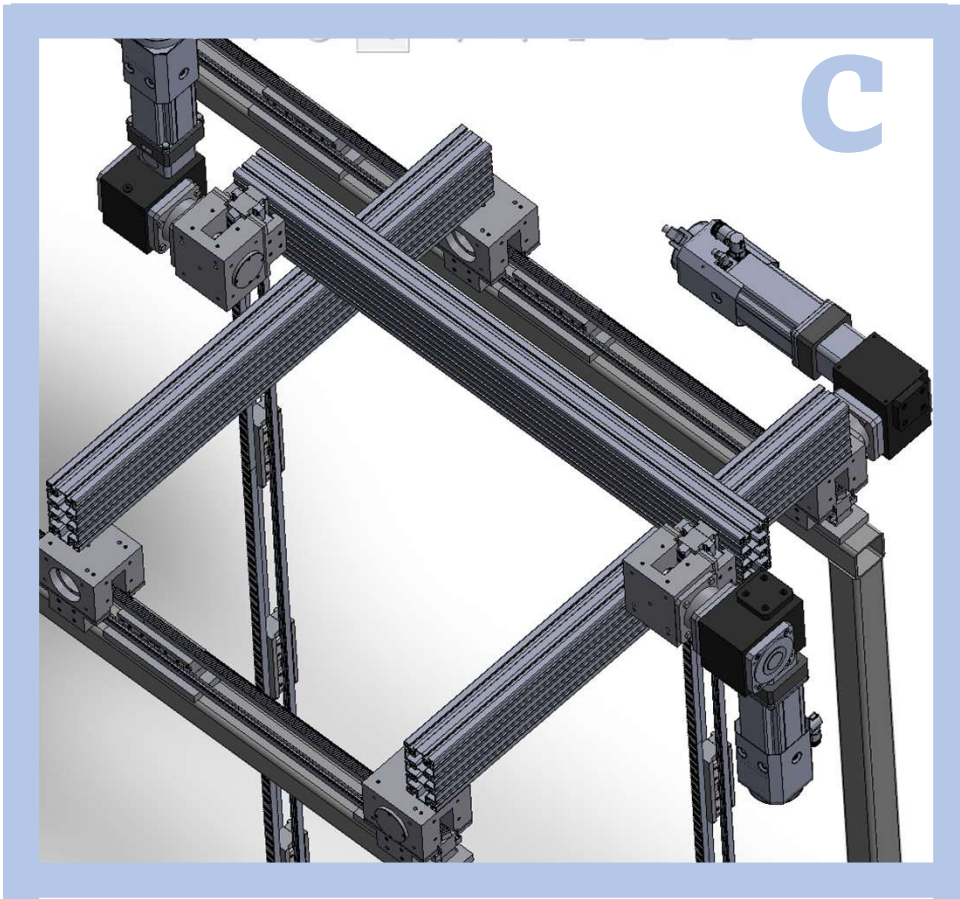
- (i) 3<sup>rd</sup> Character  
G = Gearbox on Left  
X = Nothing no Left
- (ii) 4<sup>th</sup> Character  
G = Gearbox on Right  
X = Nothing no Right

## FIXED PINION – GUIDE CARS RACK – RAIL SHUTTLES



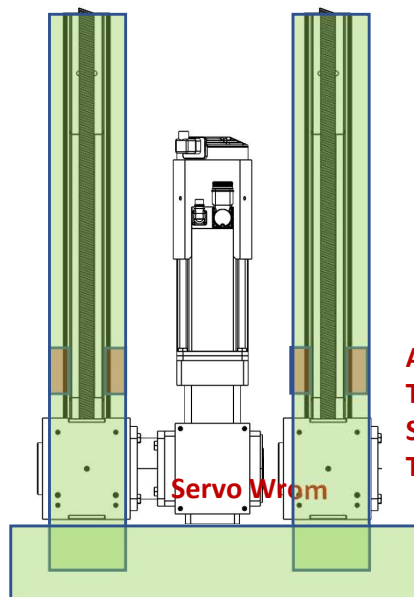
## FIXED RACK – RAIL PINION – GEARBOX SHUTTLES





**INFINITE GANTRY  
COMBINATIONS**

## CANTILEVERED LIFTS

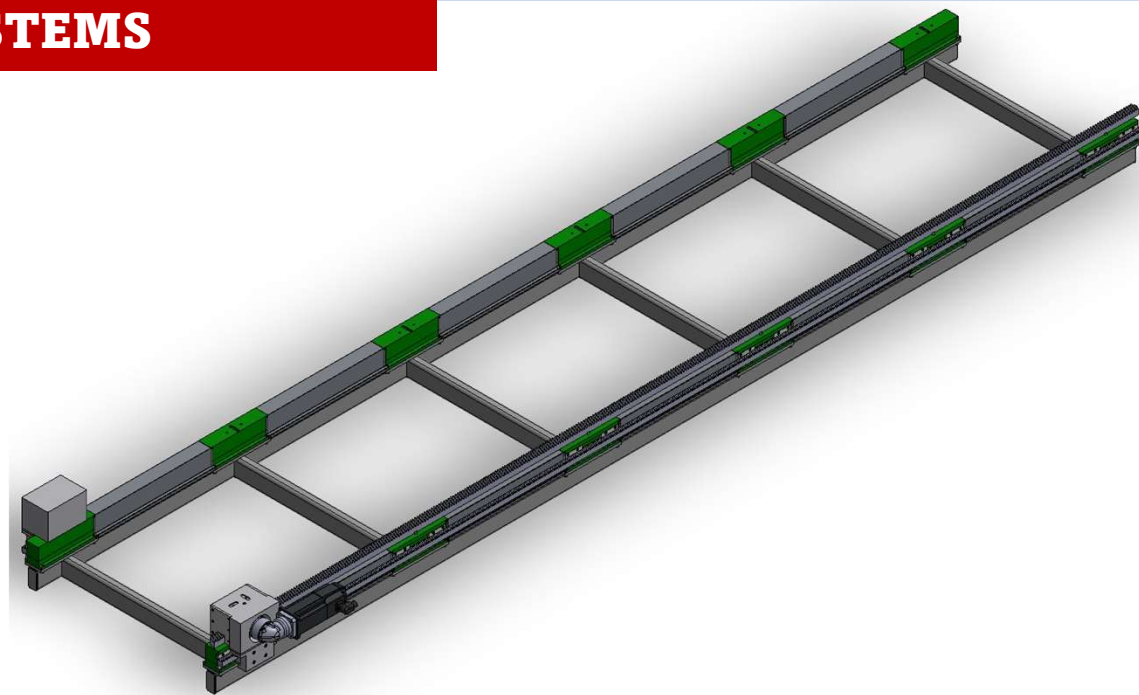


Additional Runner Block  
To create 4 rail 8 bearing  
Size 25 per-mounted system  
To support cantilevered load

Pre-Engineered Post Supports

D

## DUAL HORIZONTAL SYSTEMS



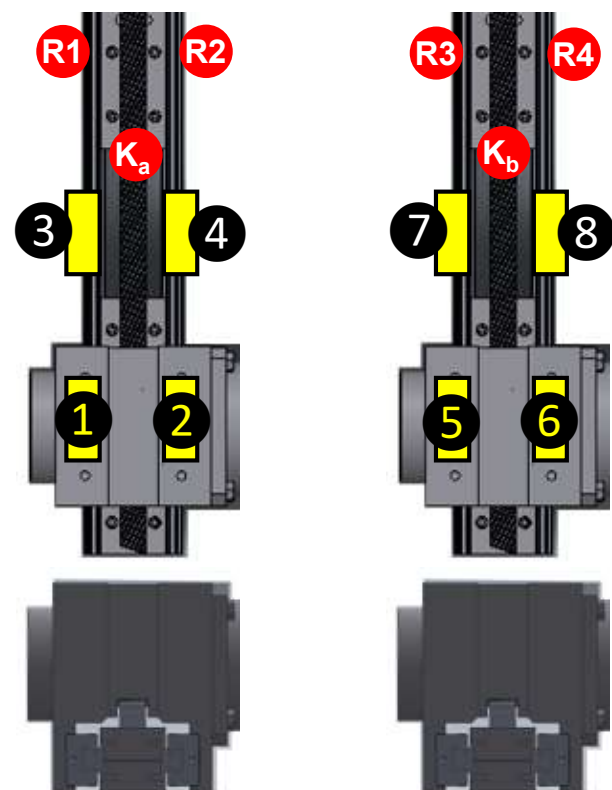
E



Fangtooth Inc FANGaxis offers flexibility in the system set up that optimizes the system performance while allowing you to control costs.

Each Axis can be set up with one or two rails which should be dictated by your loading requirements. In many cases a single axis with two rails can handle significant offset loads. A double wide configuration with 4 rails can handle even more.

Additionally, you can add as many runner blocks per rail to add a great deal of load capacity especially in vertical application with cantilevered loads.

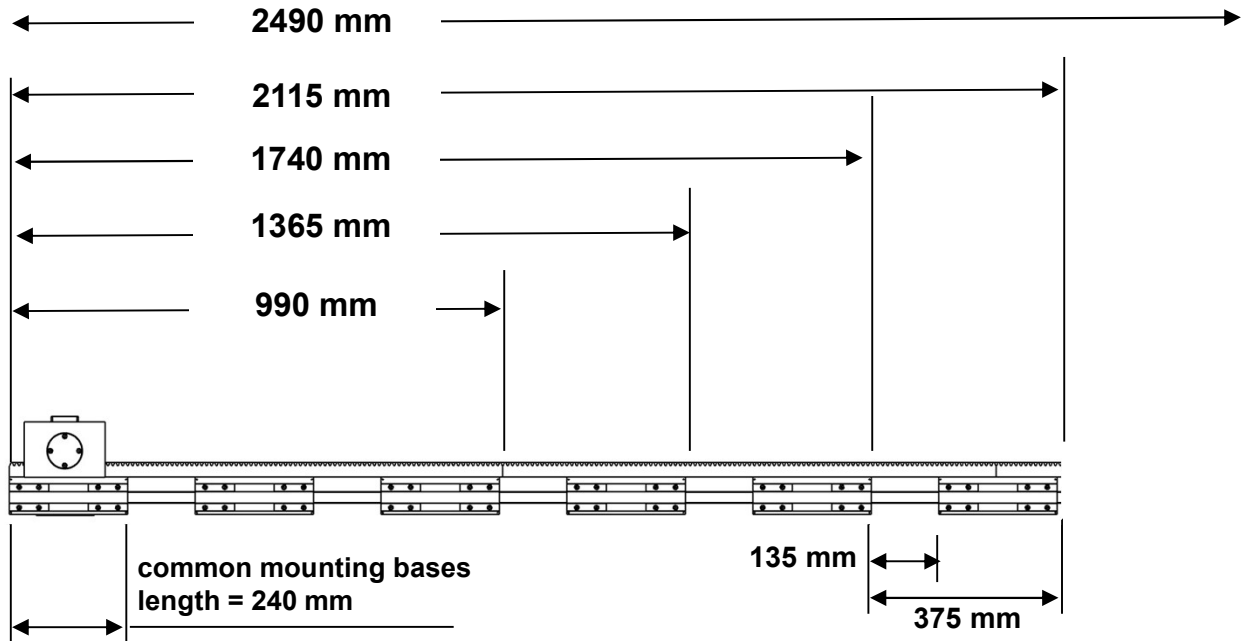


<u>Configuration</u>	<u># Guide Rails</u>	<u># Guide Cars</u>	<u># Racks</u>
a. 1X1-01RX -uses:	1 R1	1 1	1 K <sub>a</sub>
b. 1X2-01RX -uses:	1 R1	2 1 3	1 K <sub>a</sub>
c. 2X2-01RR -uses:	2 R1 R2	2 1 2	1 K <sub>a</sub>
d. 2X4-01RR -uses:	2 R1 R2	4 1 2 3 4	1 K <sub>a</sub>
e. 2X2-02RR -uses:	2 R1 R4	2 1 6	2 K <sub>a</sub> K <sub>b</sub>
f. 2X4-02RR -uses:	2 R1 R4	4 1 6 3 8	1 K <sub>a</sub> K <sub>b</sub>
g. 4X4-02RR -uses:	4 R1 R3 R2 R4	4 1 2 5 6	2 K <sub>a</sub> K <sub>b</sub>
h. 4X8-02RR -uses:	4 R1 R3 R2 R4	8 1 2 3 4 6 5 7 8	2 K <sub>a</sub> K <sub>b</sub>

- (a) For Lengths at 750mm or below – Two Mounting Bases
- (b) For Lengths at 1000mm or below – Three Mounting Bases
- (c) For Lengths Above 1000mm – One Mounting Base for Every 375mm
- (d) Minimum Standard Length 480 mm

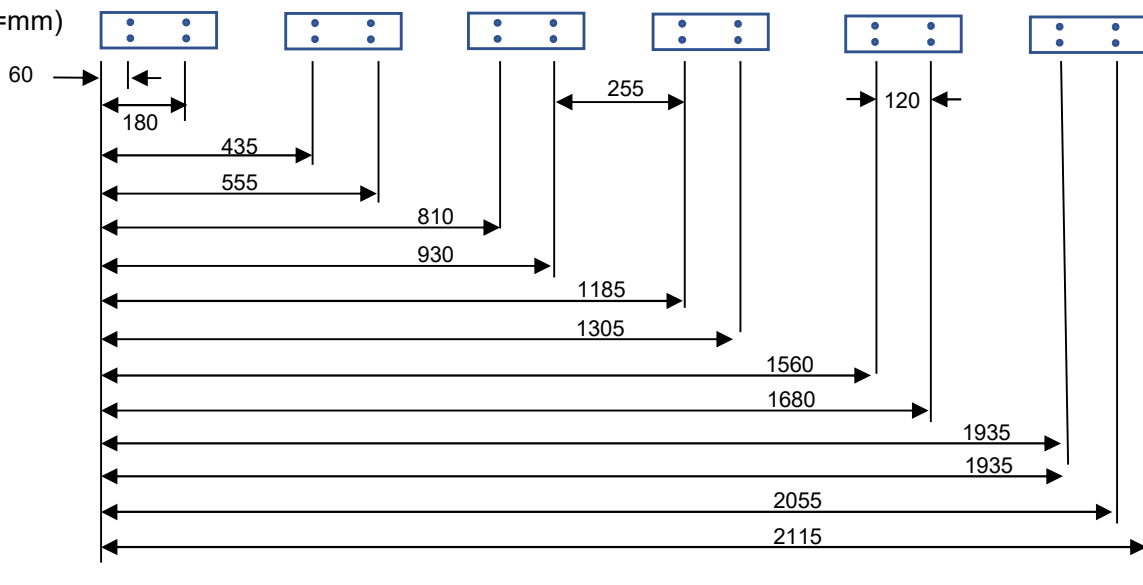
**STANDARD LENGTHS:** Custom Lengths, Shorter and Longer Lengths are available.  
**The Fangtooth System is Designed for Infinite Length.**

**Standard Uses  
 375 mm Length  
 Increments  
 Spacing  
 Between Bases  
 is 135 mm**

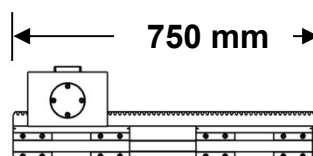
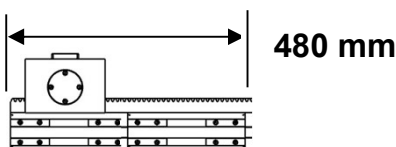


## Base Mounting Holes M8

(units=mm)

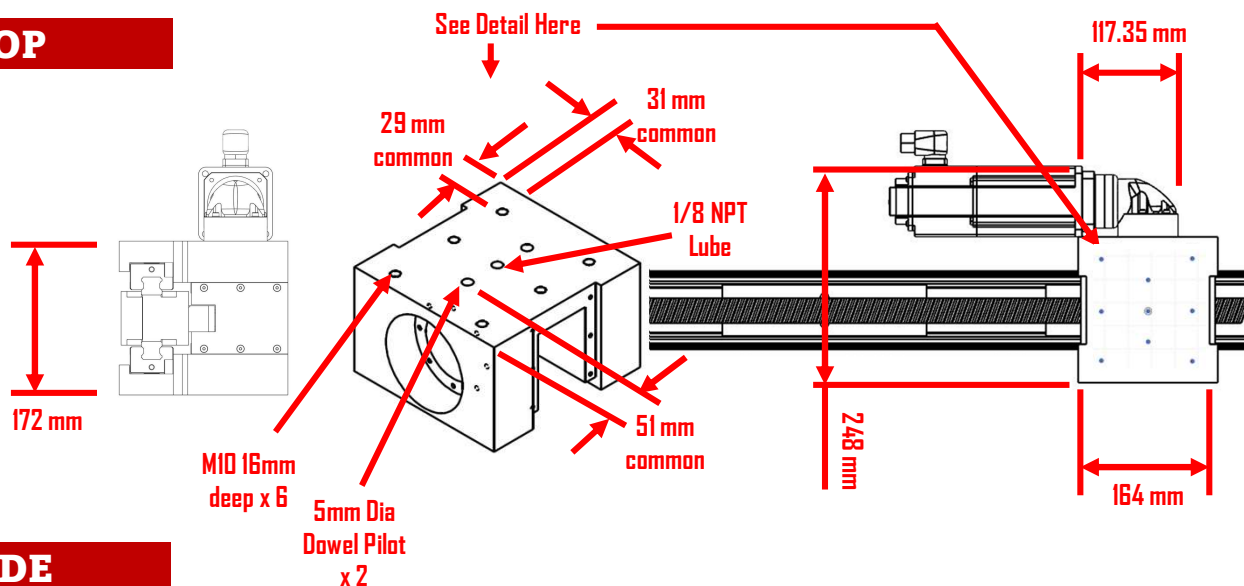


**2 x Clamp  
 Bases**

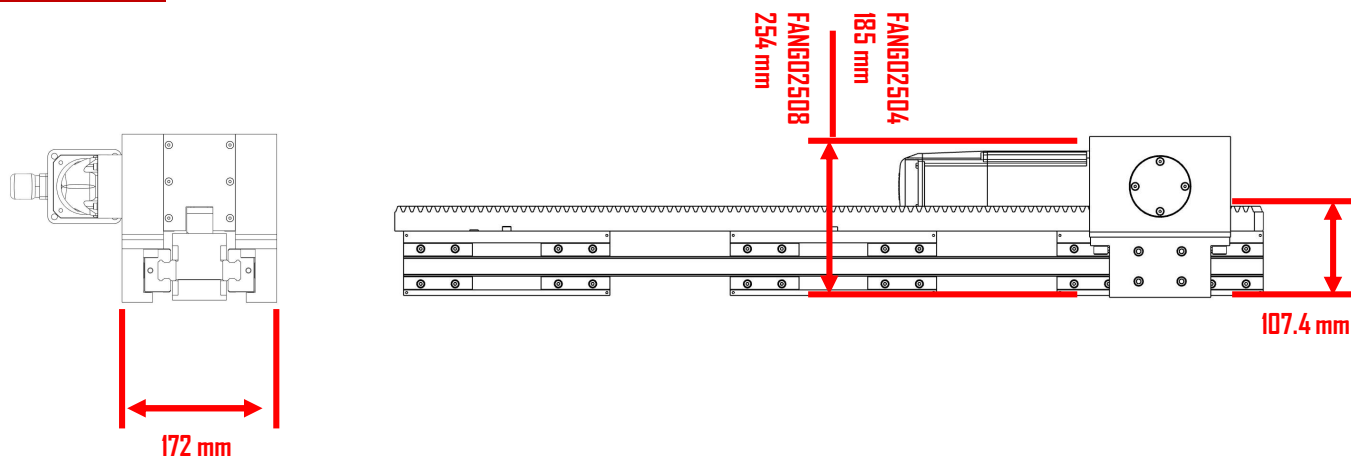


model shown: FANGO2504-P1HB-06PR010-1000RRGX/MOTOR

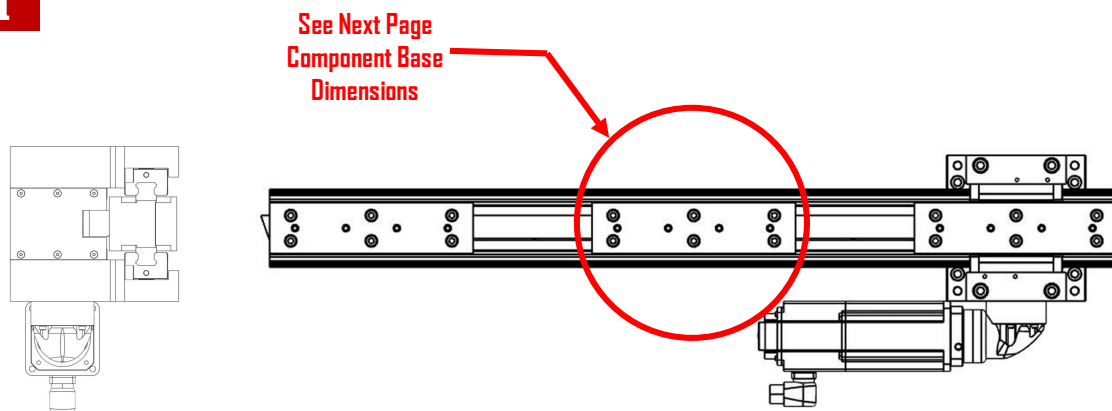
## TOP



## SIDE



## BOTTOM





# GEARBOX TECHNICAL DATA

15

\* FANG2504 Max Input Torque = XX Nm (XX lb-in)

\* FANG2508 Max Input Torque = XX Nm (XX lb-in)

\* 06PL Planetary Values Based on 5000 rpm input

\* 09PL Planetary Values Based on 4000 rpm input



Type	RATIO	Inline / Right		Inline / Right	
		06PL	06PR	09PL	09PR
Nom Output Torque (T2n)	4:1	48 (425)	48 (425)	130 (1150)	130 (1150)
	5:1	60 (531)	60 (531)	160 (1416)	160 (1416)
	7:1	50 (442)	50 (442)	140 (1239)	140 (1239)
	10:1	40 (354)	60 (531)	100 (885)	160 (1416)
	14:1	NA	42 (372)	NA	140 (1239)
	16:1	48 (425)	NA	130 (1150)	NA
	20:1	48 (425)	40 (354)	130 (1150)	140 (1239)
	21:1	60 (531)	NA	160 (1416)	NA
Nm (lb-in)	25:1	60 (531)	60 (531)	160 (1416)	160 (1416)
	31:1	50 (442)	NA	140 (1239)	NA
	35:1	50 (442)	50 (442)	140 (1239)	140 (1239)
	40:1	48 (425)	48 (425)	130 (1150)	130 (1150)
	50:1	60 (531)	60 (531)	160 (1416)	160 (1416)
	61:1	50 (442)	NA	140 (1239)	NA
	70:1	50 (442)	50 (442)	140 (1239)	140 (1239)
	91:1	40 (354)	NA	100 (885)	NA
	100:1	40 (354)	40 (354)	100 (885)	100 (885)
	140:1	NA	NA	NA	140 (1239)
	200:1	NA	NA	NA	10 (885)
Max Output Torque (T2n)	4:1	72 (638)	72 (638)	195 (1725)	195 (1725)
	5:1	90 (796)	90 (796)	240 (2124)	240 (2124)
	7:1	75 (663)	75 (663)	210 (1859)	210 (1859)
	10:1	60 (531)	90 (796)	150 (1327)	240 (2124)
	14:1	NA	63 (558)	NA	210 (1859)
	16:1	72 (638)	NA	195 (1725)	NA
	20:1	72 (638)	90 (796)	195 (1725)	210 (1859)
	21:1	90 (796)	NA	240 (2124)	NA
Nm (lb-in)	25:1	90 (796)	90 (796)	240 (2124)	240 (2124)
	31:1	75 (663)	NA	210 (1859)	NA
	35:1	75 (663)	75 (663)	210 (1859)	210 (1859)
	40:1	72 (638)	72 (638)	195 (1725)	195 (1725)
	50:1	90 (796)	90 (796)	240 (2124)	240 (2124)
	61:1	75 (663)	NA	210 (1859)	NA
	70:1	75 (663)	75 (663)	210 (1859)	210 (1859)
	91:1	60 (531)	NA	150 (1327)	NA
	100:1	60 (531)	60 (531)	150 (1327)	150 (1327)
	140:1	NA	NA	NA	210 (1859)
	200:1	NA	NA	NA	150 (1327)



Type Series	RATIO	Inline / Right		Inline / Right	
		06PL	06PR	09PL	09PR
Efficiency %	4:1	97	95	97	95
	5:1	97	95	97	95
	7:1	97	95	97	95
	10:1	97	95	97	95
	14:1	NA	95	NA	95
	16:1	97	NA	97	NA
	20:1	97	95	97	95
	21:1	94	92	94	NA
	25:1	94	NA	94	92
	31:1	94	92	94	NA
	35:1	94	92	94	92
	40:1	94	92	94	92
	50:1	94	NA	94	92
	61:1	94	92	94	NA
	70:1	94	NA	94	92
	91:1	94	92	94	NA
	100:1	94	NA	NA	92
140:1	NA	NA	NA	92	
200:1	NA	NA	NA	92	
Mass Moment of Inertia(In)  Kg cm <sup>2</sup>	4:1	0.14	0.35	0.51	2.25
	5:1	0.13	0.35	0.47	2.25
	7:1	0.13	0.35	0.45	2.25
	10:1	0.13	0.35	0.44	2.25
	14:1	NA	0.31	NA	1.87
	16:1	0.03	NA	0.13	NA
	20:1	0.03	0.31	0.13	1.87
	21:1	0.03	NA	0.13	NA
	25:1	0.03	0.09	0.13	0.35
	31:1	0.03	NA	0.13	NA
	35:1	0.03	0.09	0.13	0.35
	40:1	0.03	0.09	0.13	0.35
	50:1	0.03	0.09	0.13	0.35
	61:1	0.03	NA	0.13	NA
	70:1	0.03	0.09	0.13	0.35
	91:1	0.03	NA	0.13	NA
	100:1	0.03	0.09	0.13	0.35
140:1	NA	NA	NA	0.31	
200:1	NA	NA	NA	0.31	

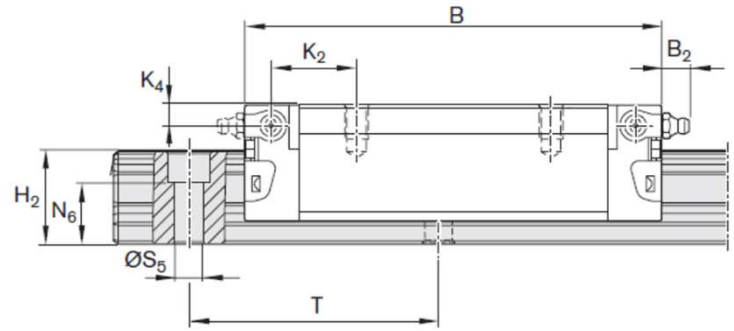
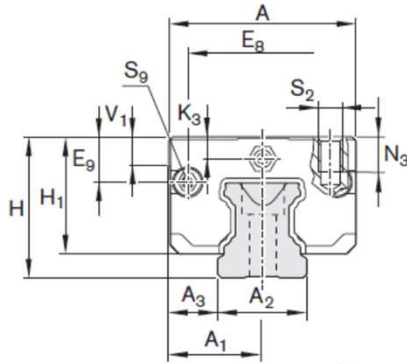
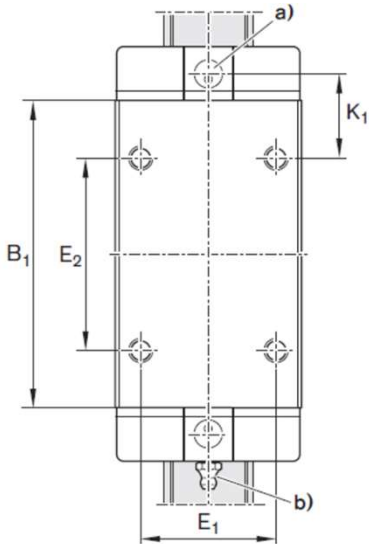
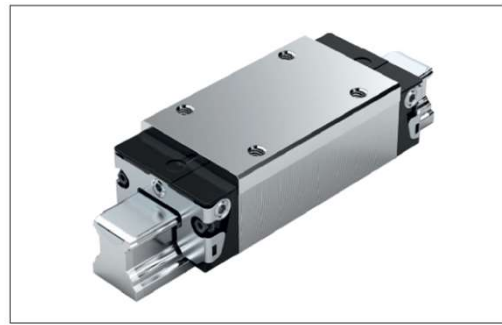


Type Series		Inline / Right		Inline / Right	
		06PL	06PR	09PL	09PR
Nom Input Speed (n1n)		5000	5000	4000	4000
Max Input Speed (1max)		10000	10000	8000	8000
1 STAGE arc-min		<5	<6	<5	<6
2 STAGE arc-min		<7	<9	<7	<9
Weight (m)	kg (lb) 1 STAGE	1.2 (2.65)	2.1 (4.63)	3.0 (6.61)	5.9 (13)
	kg (lb) 2 STAGE	1.6 (3.53)	1.9 (4.19)	3.7 (8.16)	4.5 (9.9)
Average Service Life		> 25,000 hours			
Lubrication		Sealed Synthetic Grease			
Protection Rating		IP67			
Operating Temperature		-10 to 90 C			

# RUNNER BLOCK SPECIFICATIONS

## SIZE 25

18



Brand	Model	Dimensions							Ratings	
		A	A <sub>2</sub>	B	H	H <sub>2</sub>	E <sub>1</sub>	E <sub>2</sub>	C <sub>d</sub> (N)	C <sub>0</sub> (N)
Bosch Rexroth	1623-214-20	48	23	107.9	36	24.45	35	50	37300	52500
THK	SHS25LV	48	23	109.0	36	20.00	35	50	29208	64700
Hiwin	LGH25HA	48	23	104.6	*40	20.00	35	50	24986	50800
IKO	MMSGG25	48	23	118.0	36	22.00	35	50	24446	38300
INA	KUSE25BHL	48	23	104.3	*40	21.70	35	50	35300	93700
NSK	LY25BN	48	23	107.0	*40	22.00	35	50	27383	71000
Thomson	500D25	48	23	103.5	36	22.70	35	50	25500	60300
Ewellix (SKF)	LLRHS25U	48	23	107.9	36	22.00	35	50	24400	44600



## TO USED WITH FANGopen STANDARD AXIS SELECTION TABLES

### 500 mm MOVES

#### SECTION 00 [500mm of Travel – 16.68 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Size 2504 Max Motor Speed	Size 2508 Max Motor Speed	Gearbox Ratio
00.01	2.20 sec	0.10 sec	0.10 sec	0.25 m/s	2.5 m/s <sup>2</sup>	885.38 rpm	681.80 rpm	10:1
00.02	1.20 sec	0.20 sec	0.20 sec	0.50 m/s	2.5 m/s <sup>2</sup>	1730.76 rpm	1363.60 rpm	10:1
00.03	0.60 sec	0.10 sec	0.10 sec	1.00 m/s	10 m/s <sup>2</sup>	3461.52 rpm	2727.20 rpm	10:1
00.03	0.60 sec	0.10 sec	0.10 sec	1.00 m/s	10 m/s <sup>2</sup>	NA	1363.46 rpm	5:1
00.04	0.40 sec	0.12 sec	0.12 sec	1.78 m/s	15 m/s <sup>2</sup>	3072.10 rpm	2420.40 rpm	5:1

### 1000 mm MOVES

#### SECTION 01 [1000mm of Travel – 39.37 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Size 2504 Max Motor Speed	Size 2508 Max Motor Speed	Gearbox Ratio
01.01	4.20 sec	0.10 sec	0.10 sec	0.25 m/s	2.5 m/s <sup>2</sup>	885.38 rpm	681.80 rpm	10:1
01.02	2.20 sec	0.10 sec	0.10 sec	0.50 m/s	5.0 m/s <sup>2</sup>	1730.76 rpm	1363.60 rpm	10:1
01.03	1.20 sec	0.20 sec	0.20 sec	1.00 m/s	5.0 m/s <sup>2</sup>	3461.52 rpm	2727.20 rpm	10:1
01.04	0.60 sec	0.10 sec	0.10 sec	2.00 m/s	20.0 m/s <sup>2</sup>	3072.10 rpm	2727.20 rpm	5:1
01.05	0.43 sec	0.10 sec	0.10 sec	3.00 m/s	30.0 m/s <sup>2</sup>	5192.26 rpm	4090.80 rpm	5:1

### 2500 mm MOVES

#### SECTION 03 [2500mm of Travel – 98.43 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Size 2504 Max Motor Speed	Size 2508 Max Motor Speed	Gearbox Ratio
03.01	10.25 sec	0.250 sec	0.250 sec	0.25 m/s	1.0 m/s <sup>2</sup>	885.38 rpm	681.80 rpm	10:1
03.02	5.25 sec	0.250 sec	0.250 sec	0.50 m/s	2.0 m/s <sup>2</sup>	1730.76 rpm	1363.60 rpm	10:1
03.03	2.50 sec	0.250 sec	0.250 sec	1.00 m/s	4.0 m/s <sup>2</sup>	3461.52 rpm	2727.20 rpm	10:1
03.04	1.25 sec	0.125 sec	0.125 sec	2.00 m/s	16.0 m/s <sup>2</sup>	3461.52 rpm	2727.20 rpm	5:1
03.05	0.87 sec	0.100 sec	0.100 sec	3.00 m/s	30.0 m/s <sup>2</sup>	5192.26 rpm	4090.80 rpm	5:1

FANGopen Linear Axis Weight	500mm (2 bases) 1 RAIL	500mm (2 bases) 2 RAILS	1000mm (3 bases) 1 RAIL	1000mm (3 bases) 2 RAILS	2500mm (7 bases) 1 RAIL	2500mm (7 bases) 2 RAILS
kg	7.00	8.60	17.20	20.40	75.00	83.00
lbs	15.43	19.00	38.00	45.00	165.35	183.00

#### SIZING/SELECTION PRECAUTIONS:

Fangtooth Inc. is not responsible for and does not warrant (a) equipment, components and/or material furnished by the Buyer; (b) the sufficiency of functionality of any design specifications furnished by the Buyer; nor shall Company be liable for defects or damages arising from the foregoing. Notwithstanding any other provision in Fangtooth inc. Terms and Conditions, none of the warranties given by the Company shall apply to products manufactured by others and sold by the Company. Buyer will at its own expense arrange for any dismantling and reassembly of any goods and equipment and the provision of all equipment (including without limitation lifting equipment and crane-age) to the extent that this is necessary to remedy the defect or facilitate re-performance of service.

Fangtooth Inc. shall not be responsible for any claims which the Company determines are due to improper installation, operation above rated capacity, exceeds L10 life cycles, operation at extreme conditions, normal wear and tear, accident, or because the Product has been used, adjusted, altered, handled, maintained, repaired or stored other than as directed by the Company.

Tables published herein are intended as an estimated guide to help begin the design process. All applications require full evaluation against the actual intended use. Buyers select products at their own risk. Consider factors such as cycle duty and motor sizing due to torque, speed and heat requirements.

Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
Total Weight Includes Fangtooth Moving Parts Weight

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGopen STANDARD AXIS HORIZONTAL MOVES

20

### SECTION 00 [500mm of Travel – 16.68 inches] HORIZONTAL

500 mm

USING FANGO-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.20 sec	0.25 m/s	00.01	0.33 Nm	0.64 Nm	1.27 Nm	2.53 Nm	3.37 Nm	5.05 Nm
1.20 sec	0.50 m/s	00.02	0.33 Nm	0.64 Nm	1.27 Nm	2.53 Nm	3.37 Nm	5.05 Nm
0.60 sec	1.00 m/s	00.03	1.17 Nm	2.27 Nm	4.48 Nm	-	-	-

USING FANGO-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.40 sec	1.78 m/s	00.04	3.33 Nm	6.59 Nm	13.13 Nm	-	-	-

USING FANGO-2508 09PL 25:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	1.00 m/s	00.03	-	-	-	6.56 Nm	8.71 Nm	-

### SECTION 01 [1000mm of Travel – 39.37 inches] HORIZONTAL

1000 mm

USING FANGO-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
4.20 sec	0.25 m/s	01.01	0.35 Nm	0.69 Nm	1.37 Nm	2.73 Nm	3.63 Nm	5.44 Nm
2.20 sec	0.50 m/s	01.02	0.61 Nm	1.18 Nm	2.34 Nm	4.65 Nm	6.19 Nm	-
1.20 sec	1.00 m/s	01.03	0.61 Nm	1.18 Nm	2.34 Nm	4.65 Nm	6.19 Nm	-

USING FANGO-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	2.00 m/s	01.04	4.38 Nm	8.70 Nm	-	-	-	-

USING FANGO-2508 09PL 25:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	300 lbs	600 lbs	800 lbs	1200 lbs	1800 lbs	2400 lbs
2.20 sec	0.50 m/s	01.02	-	-	-	6.81 Nm	-	-

USING FANGO-2508 09PL 7:1 Gear Ratio [Gearbox Inertia 0.47 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	2.00 m/s	01.04	-	-	15.77 Nm	-	-	-
0.40 sec	3.00 m/s	01.05	8.67 Nm	16.89 Nm	-	-	-	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150

Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
Total Weight Includes Fangtooth Moving Parts Weight

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGopen STANDARD AXIS HORIZONTAL MOVES

21

### SECTION 03 [2500mm of Travel – 98.34 inches] HORIZONTAL ← 2500 mm →

USING FANG0-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed
10.25 sec	0.25 m/s
5.25 sec	0.50 m/s
2.50 sec	1.00 m/s

Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
03.01	0.16 Nm	0.32 Nm	0.63 Nm	1.26 Nm	1.68 Nm	2.51 Nm
03.02	0.27 Nm	0.53 Nm	1.06 Nm	2.11 Nm	2.80 Nm	4.20 Nm
03.03	0.49 Nm	0.97 Nm	1.91 Nm	3.80 Nm	5.06 Nm	-

USING FANG0-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed
1.25 sec	2.00 m/s

Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
03.04	3.53 Nm	7.0 Nm	13.94 Nm	-	-	-

USING FANG0-2508 09PL 10:1 Gear Ratio [Gearbox Inertia 0.44 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed
2.50 sec	1.00 m/s

Profile #	300 lbs	600 lbs	800 lbs	1200 lbs	1800 lbs	2400 lbs
03.03	-	-	-	13.61 Nm	-	-

USING FANG0-2508 09PL 4:1 Gear Ratio [Gearbox Inertia 0.51 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed
0.87 sec	3.00 m/s

Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
03.05	16.10 Nm	31.60 Nm	-	-	-	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150

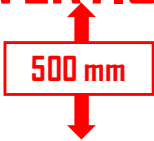
Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
Total Weight Includes Fangtooth Moving Parts Weight

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGopen STANDARD AXIS VERTICAL MOVES

22



### SECTION 00 [500mm of Travel – 16.68 inches] VERTICAL

USING FANGO-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.20 sec	0.25 m/s	00.01	1.31 Nm	2.60 Nm	5.19 Nm	-	-	-
1.20 sec	0.50 m/s	00.02	1.31 Nm	2.60 Nm	5.19 Nm	-	-	-
0.60 sec	1.00 m/s	00.03	2.14 Nm	4.22 Nm	-	-	-	-

USING FANGO-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

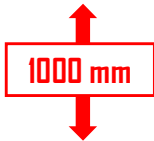
Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.40 sec	1.78 m/s	00.04	5.29 Nm	10.51 Nm	-	-	-	-

USING FANGO-2508 09PL 50:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.20 sec	0.25 m/s	00.01	-	-	-	3.83 Nm	-	-
1.20 sec	0.50 m/s	00.02	-	-	-	3.83 Nm	-	-

USING FANGO-2508 09PL 21:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	1.00 m/s	00.03	-	-	7.35 Nm	-	-	-



### SECTION 01 [1000mm of Travel – 39.37 inches] VERTICAL

USING FANGO-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
4.20 sec	0.25 m/s	01.01	1.31 Nm	2.60 Nm	5.19 Nm	-	-	-
2.20 sec	0.50 m/s	01.02	1.58 Nm	3.14 Nm	-	-	-	-
1.20 sec	1.00 m/s	01.03	1.58 Nm	3.14 Nm	-	-	-	-

USING FANGO-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	2.00 m/s	01.04	6.35 Nm	12.62 Nm	-	-	-	-

USING FANGO-2508 09PL 50:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
4.20 sec	0.25 m/s	01.01	-	-	1.93 Nm	3.83 Nm	-	-
2.20 sec	0.50 m/s	01.02	-	-	2.35 Nm	-	-	-

USING FANGO-2508 09PL 25:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.20 sec	0.50 m/s	01.02	-	-	-	9.17 Nm	-	-
1.20 sec	1.00 m/s	01.03	-	-	-	9.17 Nm	-	-

USING FANGO-2508 09PR 10:1 Gear Ratio [Gearbox Inertia 2.25 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.60 sec	2.00 m/s	01.04	-	-	23.52 Nm	-	-	-

USING FANGO-2508 09PR 10:1 Gear Ratio [Gearbox Inertia 2.25 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.40 sec	3.00 m/s	01.05	15.85 Nm	31.18 Nm	-	-	-	-

Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
Total Weight Includes Fangtooth Moving Parts Weight

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGopen STANDARD AXIS VERTICAL MOVES

23



### SECTION 03 [2500mm of Travel – 98.43 inches] VERTICAL

USING FANG0-2504 06PL 10:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
10.25 sec	0.25 m/s	03.01	1.14 Nm	2.28 Nm	5.19 Nm	-	-	-
5.25sec	0.50 m/s	03.02	1.25 Nm	2.49 Nm	4.98 Nm	-	-	-
2.50 sec	1.00 m/s	03.03	1.86 Nm	3.71 Nm	-	-	-	-

USING FANG0-2504 06PL 5:1 Gear Ratio [Gearbox Inertia 0.14 kgcm<sup>2</sup>] P.D. 55.174 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
1.25 sec	2.00 m/s	03.04	5.49 Nm	10.92 Nm	-	-	-	-

USING FANG0-2508 09PL 50:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
10.25 sec	0.25 m/s	03.01	-	-	-	3.28 Nm	4.36 Nm	-
5.25 sec	0.50 m/s	03.02	-	-	-	3.67 Nm	4.88 Nm	-

USING FANG0-2508 09PL 50:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.50 sec	1.00 m/s	03.03	-	-	5.10 Nm	-	-	-

USING FANG0-2508 09PL 21:1 Gear Ratio [Gearbox Inertia 0.13 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
2.50 sec	1.00 m/s	03.03	-	-	-	10.17 Nm	-	-

USING FANG0-2508 09PL 5:1 Gear Ratio [Gearbox Inertia 0.47 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.87 sec	3.00 m/s	03.05	15.52 Nm	-	-	-	-	-

USING FANG0-2508 09PL 7:1 Gear Ratio [Gearbox Inertia 0.47 kgcm<sup>2</sup>] P.D. 98.96 mm

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	800 lbs	1200 lbs
0.87 sec	3.00 m/s	03.05	-	21.90 Nm	-	-	-	-



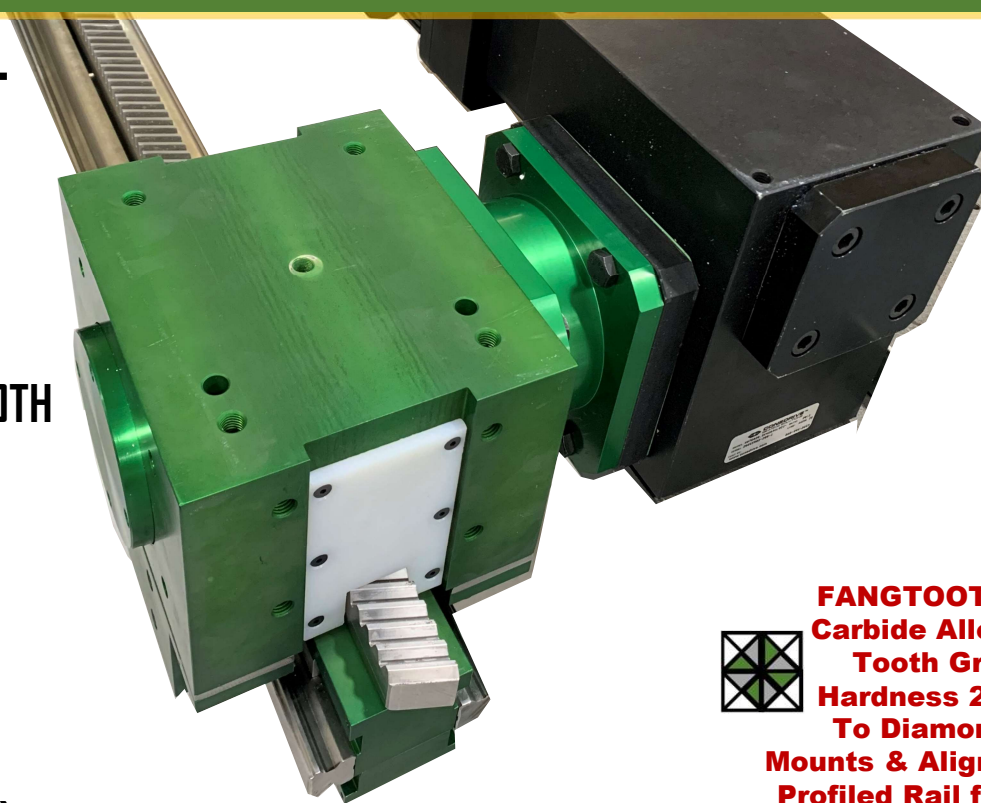


fang

**MAX**  
**Heavy Axis**

2500# SERIES FANGX2560

SIZE 25 PROFILED RAIL  
MOD 3 HELICAL RACK  
70.03mm DIA PINION



BOSCH REXROTH  
THK  
HIWIN  
IKO  
INA  
NSK  
THOMSON  
EWELLIX (SKF)

**Your Rail Preference**

**FANGTOOTH**  
Carbide Alloy  
Tooth Grip  
Hardness 2<sup>nd</sup>  
To Diamond  
Mounts & Aligns  
Profiled Rail for  
Linear Bearings



**GUIDED RACK DRIVEN AXIS  
TRANSFERS, LIFTS & GANTRIES**

**LONGER STRONGER & FASTER**  
- than Belt Drives & Ball Screws  
- ideal for welding applications

**Multiple Heads on 1 Axis**  
**Extremely Long Lengths**  
**Safe Vertical Hold**  
**High Precision, Force & Speed**

[www.fang2th.com](http://www.fang2th.com)



## INTRODUCTION

<b>Features .....</b>	<b>26</b>
<b>Construction .....</b>	<b>27</b>
<b>Axis Configurations .....</b>	<b>28</b>

## ORDERING CODES – APPLICATION EXAMPLES

<b>Ordering .....</b>	<b>29</b>
<b>Application Examples .....</b>	<b>30 - 31 - 32</b>
<b>System Setups .....</b>	<b>33</b>
<b>Rack Kit Length Diagrams .....</b>	<b>34</b>

## SPECIFICATIONS

<b>Dimensions FANGmax .....</b>	<b>35</b>
<b>Dimensions FANGclamp .....</b>	<b>36</b>
<b>Gearbox Technical Data .....</b>	<b>37 - 38 - 39</b>
<b>Runner Block Specifications ...</b>	<b>40</b>
<b>Motion Profiles for Design .....</b>	<b>41</b>
<b>Input Torque Charts .....</b>	<b>42 - 46</b>

Fangtooth Inc builds heavy duty guided gear rack actuators and cartesian pick N place systems based on a unique linear profiled rail mounting technique using a fangtooth clamp.

Fangtooth Specializes in high precision moves which are **LONGER STRONGER & FASTER** - than Belt Drives & Ball Screws - ideal for welding applications as there are no plastic parts – large Aerospace envelopes – Lifts & Elevators – Warehousing – 7<sup>th</sup> Axis Robot Moves – Long Axis with multiple independent heads, etc.

### FANGX2560 – FANGX2562 – FANGW2522 / (Mod 3 Rack)

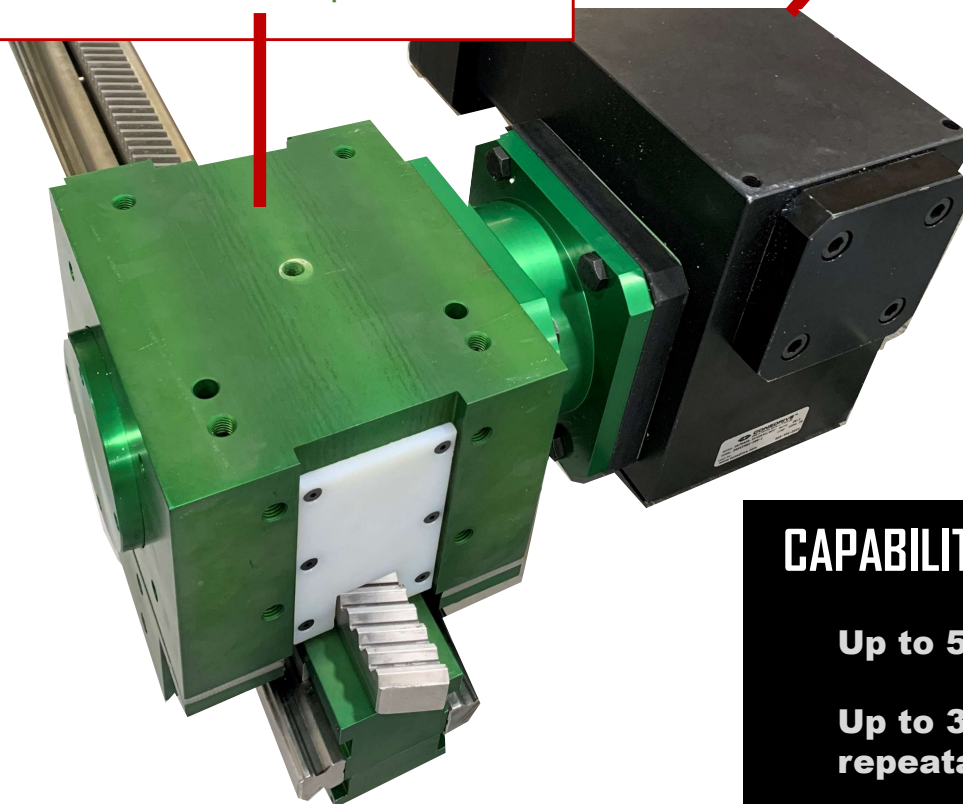
Pinion Pitch dia.	70.030	mm	2.7570	in
Travel per rev	220.000	mm	8.6614	in
Pinion Inertia	4.64	kgcm <sup>2</sup>	1.5856	lbin <sup>2</sup>
Efficiency	92%			
Max Lifting Force	11120.000	N	2500.0000	lbs
Max Input Torque*	580.000	Nm	5133.0000	inlb
Repeatability	0.030	mm	0.0012	in
Pinion Box Weight	14.000	kg	30.865	lb
Rack Weight	6.000	kg/m	4.032	lb/ft
Rail Weight	3.200	kg/m	2.150	lb/ft
Base Clamp Weight	3.048	kg	6.720	lb



### FANGX-2560 Figure 1.0

[000] Pre-Engineered Pinion Drive with a sealed pinion built for low backlash, precision and lubrication ports.

[050] Ready Servo Gearboxes that will mount the motor of your choice.



### CAPABILITIES

**Up to 5 m/s**

**Up to 30 microns  
repeatability**

**Single Axis Up to  
2500 lbs lift forces**

**Dual Axis Up to  
5000 lbs lift forces**

**Quad Axis Up to  
10000 lbs lift  
forces**



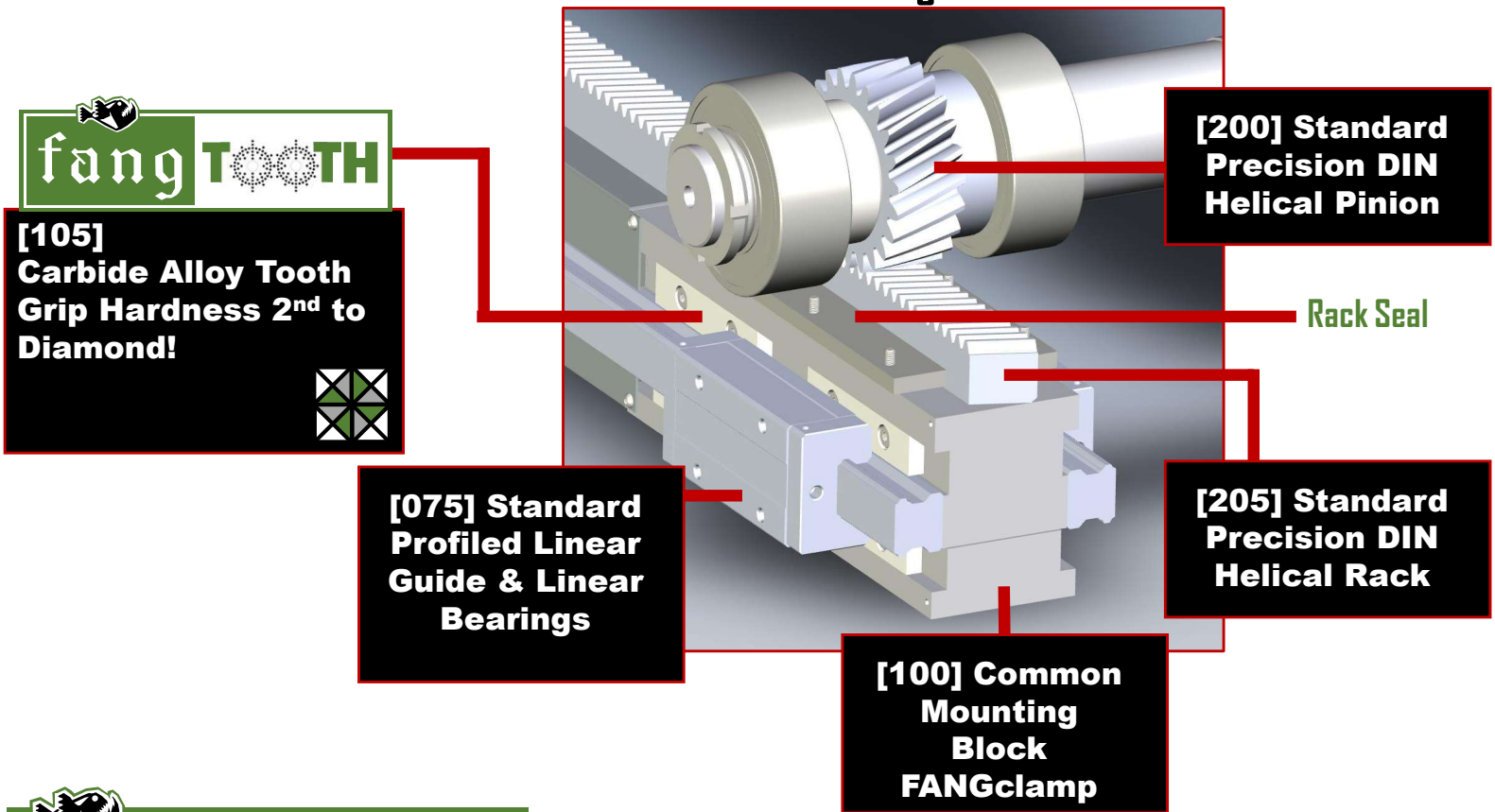


The base of the FANGaxis is a common mounting block called a FANGclamp [100] that uses a Fangtooth™ [105] which has a coating (hardness 2<sup>nd</sup> to diamond) to clamp and align the reference edge of the linear rail [075]. This also mounts a standard precision DIN helical gear rack [205] to create an actuated linear guide system

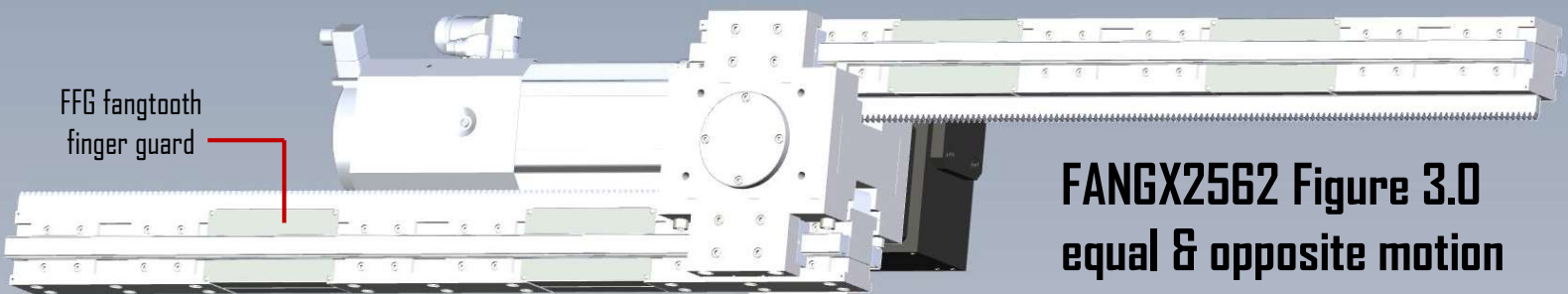
## INFINITE CONFIGURATIONS

- Fangtooth™ FANGaxis can be specified with many input configurations.
- Single or Dual Rails & Single or Dual Racks.
- Additional Runner Blocks (Guide Cars) can be added easily on each axis
- Synchronize Axis Electrically or Mechanically for Gantries, Elevators, Lifts, etc.

FANG2560 Figure 2.0

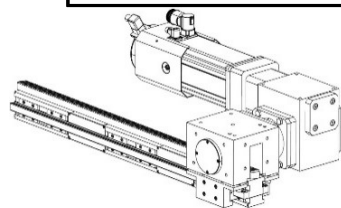


## fang FLIP Dual Axis

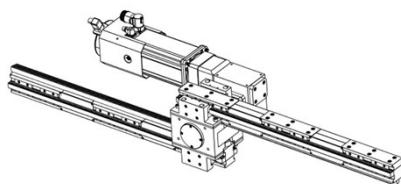


FANGX2560 – FANGX2562 – FANGW2522 / (Mod 3 Rack)

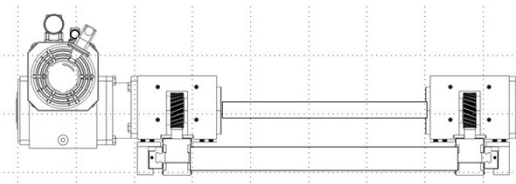
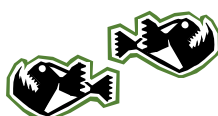
Pinion Pitch dia.	70.030	mm	2.7570	in
Travel per rev	220.000	mm	8.6614	in
Pinion Inertia	4.64	kgcm <sup>2</sup>	1.5856	lbin <sup>2</sup>
Efficiency	92%			
Max Lifting Force	11120.000	N	2500.0000	lbs
Max Input Torque*	580.000	Nm	5133.0000	inlb
Repeatability	0.030	mm	0.0012	in
Pinion Box Weight	14.000	kg	30.865	lb
Rack Weight	6.000	kg/m	4.032	lb/ft
Rail Weight	3.200	kg/m	2.150	lb/ft
Base Clamp Weight	3.048	kg	6.720	lb



**FANGmax**  
**FANGX-2560**  
(Size 25 Rail / Clamp 60mm Wide)



**FANGflip**  
**FANGX-2562**  
(2 Rack Flip)

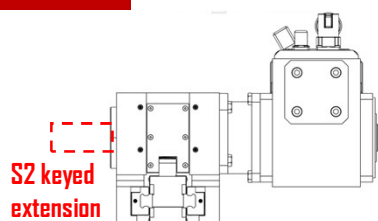


**FANG-XX**  
**FANGW-2522**  
(2 Rack Double Wide)  
(Customized Width)



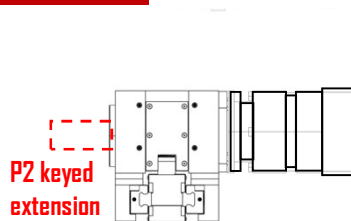
## INPUT OPTIONS

**S1/S2**



**Keyed Gearbox Connection**

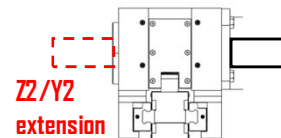
**P1/P2**



**Split Clamp Planetary Connection**

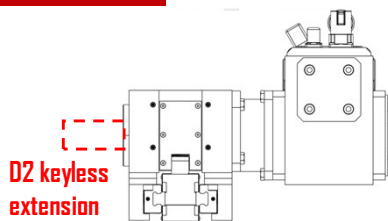
**Z1/Z2**  
**Y1/Y2**

"Z" keyed  
"Y" keyless



**Solid Drive Shaft**

**D1/D2**



**Shrink Disc Gearbox Connection**



# HOW TO ORDER FANG<sup>max</sup> HEAVY AXIS & FANG<sup>flip</sup>

## FANGX2560 and FANGX2562

**MAX**

**FANG<sup>max</sup>: FANGX2560P1BB-51SW010-1000RXGX/MS2N05D**

Overall Length

Servo Motor PN

2560: 2500# Max Thrust Force per Pinion

Size 25 Rail

Mounting Base Width 60 mm

"62" = 2 Rack Flip

Input Style – See Page "06"

- Z1 / Z2: Keyed Solid Shaft
- Y1 / Y2: Keyless Solid Shaft
- P1 / P2: Planetary Gearhead
- S1 / S2: Servo Worm (Keyed)
- D1 / D2: Servo (Shrink Disc)

- Linear Brand**
- TB = THK Ball Rail
  - HB = Hiwin Ball Rail
  - BB = Bosch Ball Rail
  - KB = IKO Ball Rail
  - NB = NSK Ball Rail
  - EB = Ewellix Ball Rail

**Gearbox:**

- Blank – No Gearbox
- 38SW – Size 38 Servo Worm
- 51SW – Size 51 Servo Worm
- 64SW – Size 64 Servo Worm
- 76SW – Size 76 Servo Worm
- 89SW – Size 89 Servo Worm
- T5SW – T-100/5 Servo Worm

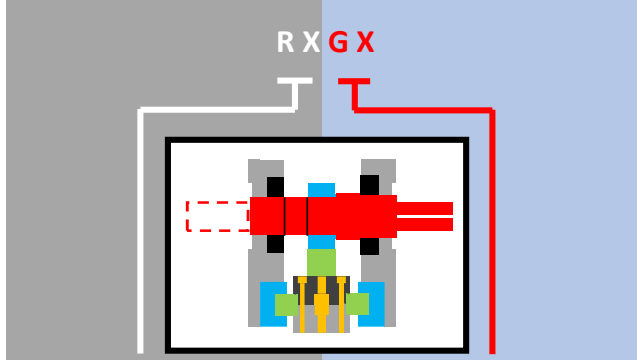
**Ratio:**

003 – 3:1	015 – 15:1
004 – 4:1	020 – 20:1
475 – 4.75:1	025 – 25:1
005 – 5:1	030 – 30:1
006 – 6:1	040 – 40:1
675 – 6.75:1	050 – 50:1
007 – 7:1	060 – 60:1
008 – 8:1	070 – 70:1
009 – 9:1	080 – 80:1
925 – 9.25:1	090 – 90:1
010 – 10:1	100 – 100:1
	150 – 150:1

NOTE: Many other gearboxes & gearmotors/brakemotors available upon request.

**Additional Options:**

- FFG – Fangtooth Finger Guards
- BLW – Bellows
- TDC – Thin Dense Chrome Protection



**RAIL POSITIONS**

- (i) 1<sup>st</sup> Character  
R = Rail on Left  
X = No Rail on Left
- (ii) 2<sup>nd</sup> Character  
R = Rail on Right  
X = No Rail on Right

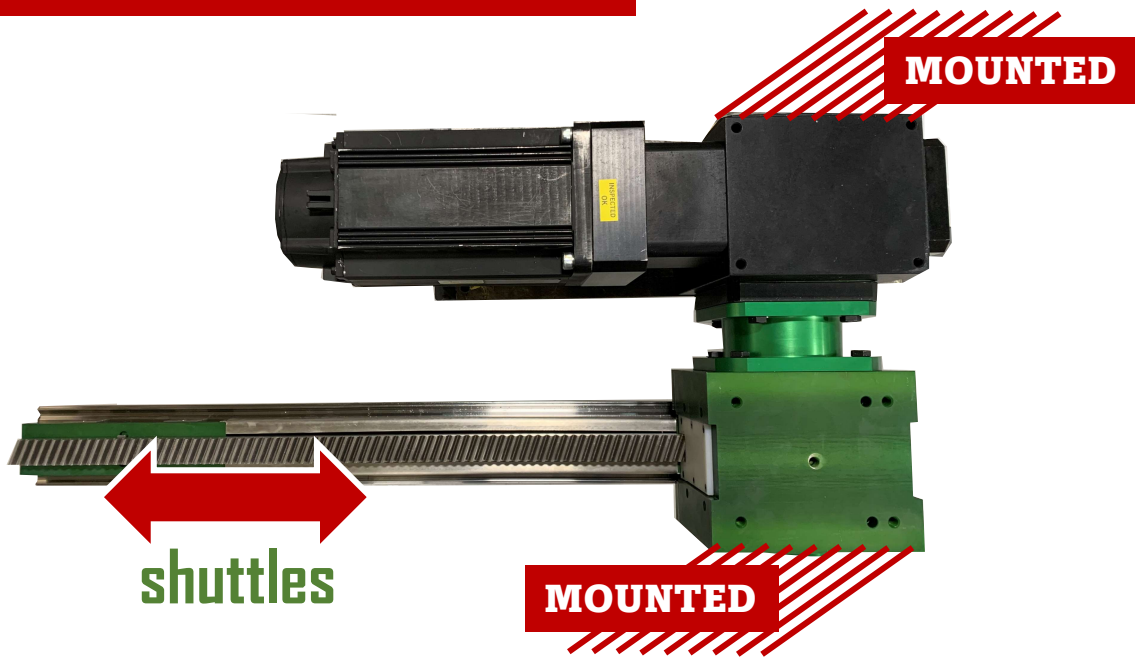
**INPUT POSITIONS**

- (i) 3<sup>rd</sup> Character  
G = Gearbox on Left  
X = Nothing no Left  
Z/Y = Shaft on Left
- (ii) 4<sup>th</sup> Character  
G = Gearbox on Right  
X = Nothing no Right  
Z/Y = Shaft on Right



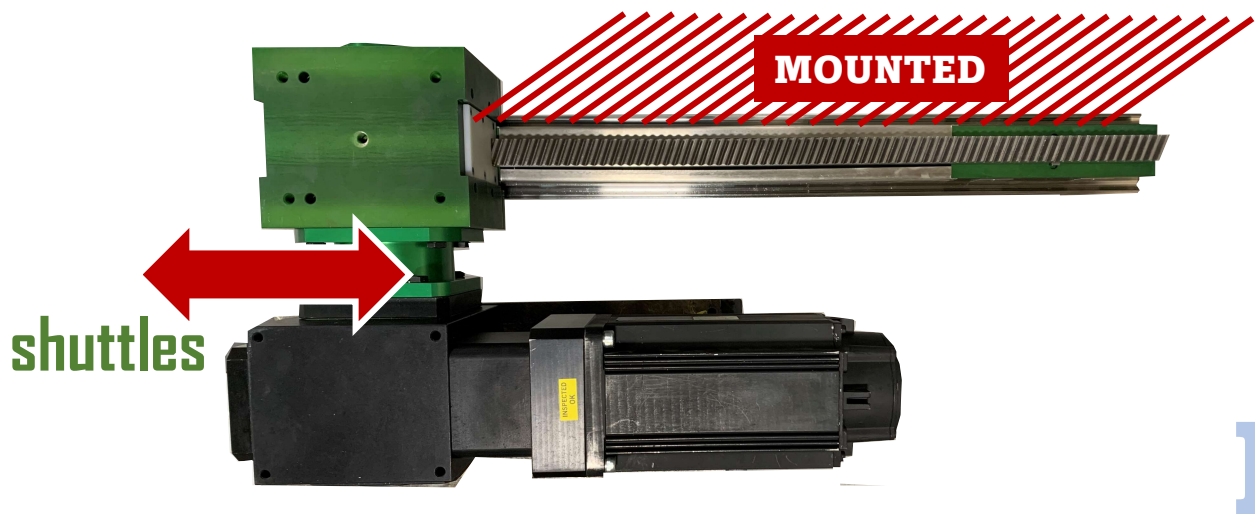
- two methods of movement -

**FIXED PINION – GUIDE CARS**  
**RACK – RAIL SHUTTLES**



**FIXED RACK – RAIL**  
**PINION – GEARBOX SHUTTLES**

- great for multiple pinions moving independently on a single axis -





**F#BT-XYZ**

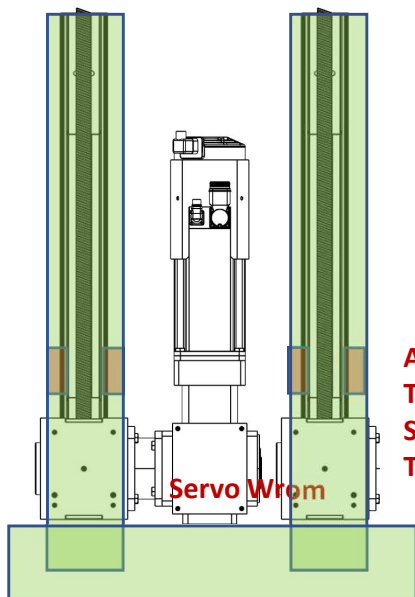
Configurable Cartesian Systems  
and Pick & Place  
(\*# = Number of Axis in System)



**INFINITE GANTRY  
COMBINATIONS**



## CANTILEVERED LIFTS



**FANGL-25XX**\*

Vertical Stand, Built for Cantilevered Loads ( \*10,000 lbs Max with 4 posts)

Additional Runner Block  
To create 4 rail 8 bearing  
Size 25 per-mounted system  
To support cantilevered load



Pre-Engineered Post Supports



## DUAL HORIZONTAL SYSTEMS



**FANGW-2522**

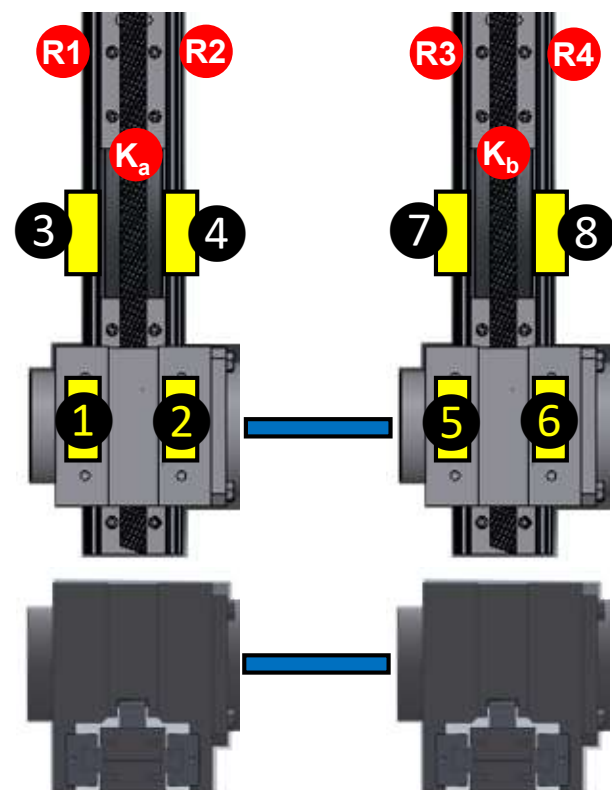
Two Parallel Rails and Racks  
Infinite Width 5000 lb Max



Fangtooth Inc FANGaxis offers flexibility in the system set up that optimizes the system performance while allowing you to control costs.

Each Axis can be set up with one or two rails which should be dictated by your loading requirements. In many cases a single axis with two rails can handle significant offset loads. A double wide configuration with 4 rails can handle even more.

Additionally, you can add as many runner blocks per rail to add a great deal of load capacity especially in vertical application with cantilevered loads.

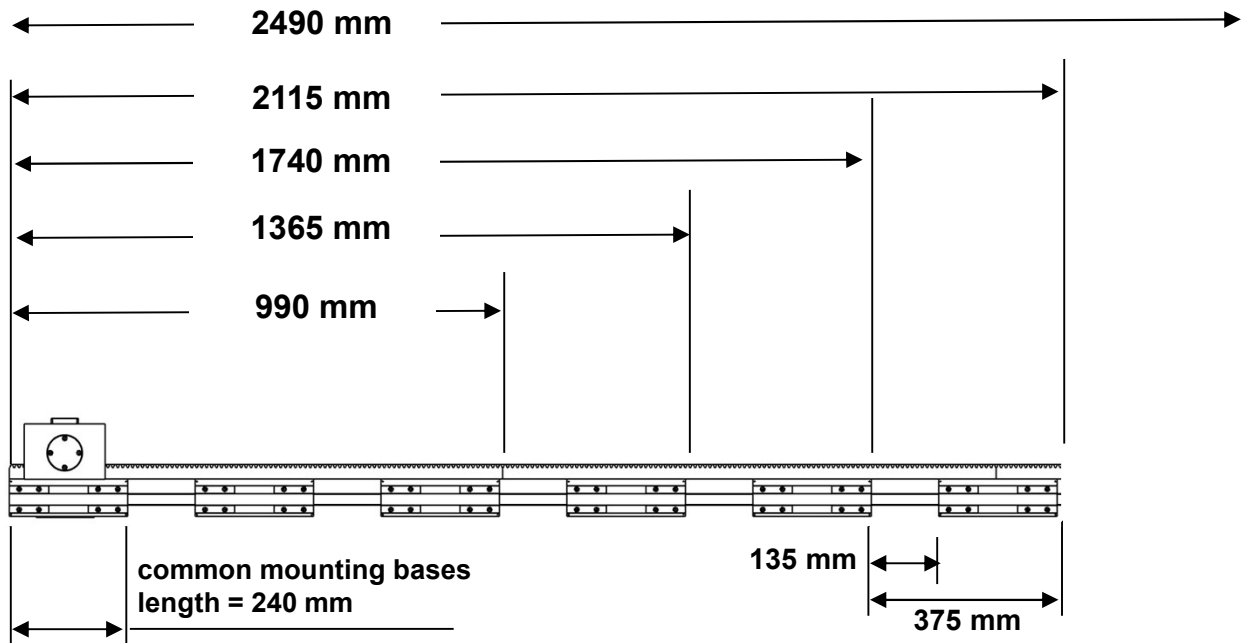


<u>Configuration</u>	<u># Guide Rails</u>	<u># Guide Cars</u>	<u># Racks</u>
a. 1X1-01RX -uses:	1 R1	1 1	1 Ka
b. 1X2-01RX -uses:	1 R1	2 1 3	1 Ka
c. 2X2-01RR -uses:	2 R1 R2	2 1 2	1 Ka
d. 2X4-01RR -uses:	2 R1 R2	4 1 2 3 4	1 Ka
e. 2X2-02RR -uses:	2 R1 R4	2 1 6	2 Ka Kb
f. 2X4-02RR -uses:	2 R1 R4	4 1 6 3 8	1 Ka Kb
g. 4X4-02RR -uses:	4 R1 R3 R2 R4	4 1 2 5 6	2 Ka Kb
h. 4X8-02RR -uses:	4 R1 R3 R2 R4	8 1 2 3 4 6 5 7 8	2 Ka Kb

- (a) For Lengths at 750mm or below – Two Mounting Bases
- (b) For Lengths at 1000mm or below – Three Mounting Bases
- (c) For Lengths Above 1000mm – One Mounting Base for Every 375mm
- (d) Minimum Standard Length 480 mm

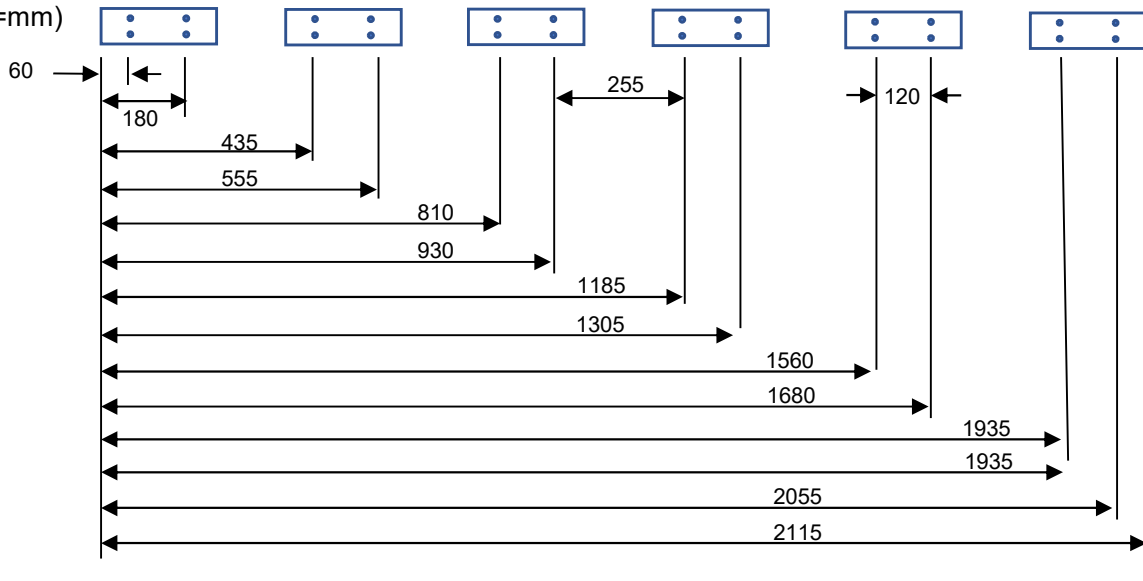
**STANDARD LENGTHS:** Custom Lengths, Shorter and Longer Lengths are available.  
**The Fangtooth System is Designed for Infinite Length.**

**Standard Uses  
 375 mm Length  
 Increments  
 Spacing  
 Between Bases  
 is 135 mm**

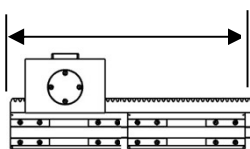


## Base Mounting Holes M8

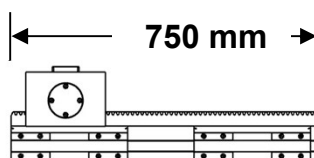
(units=mm)



**2 x Clamp  
 Bases**



**480 mm**



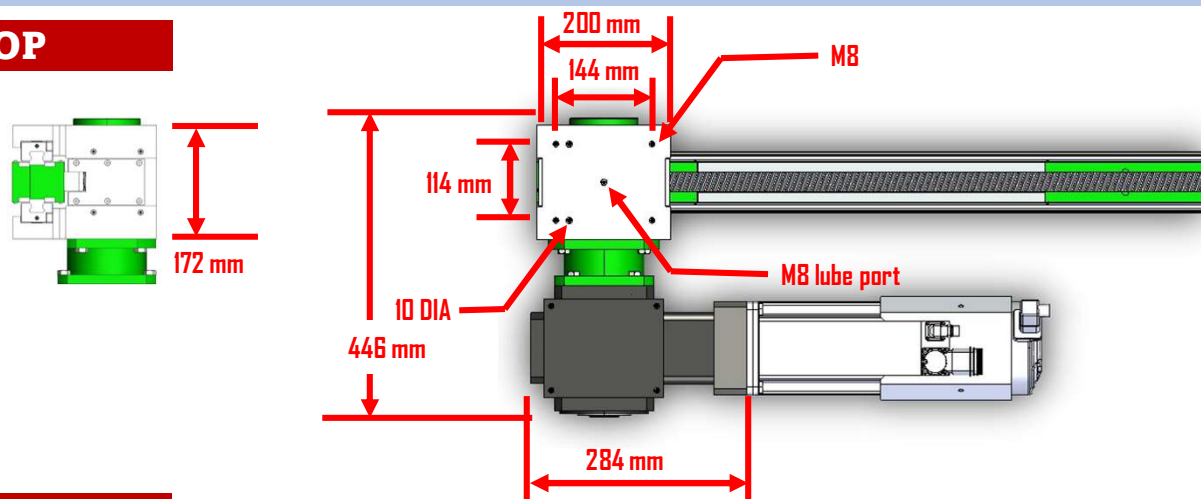
**750 mm**



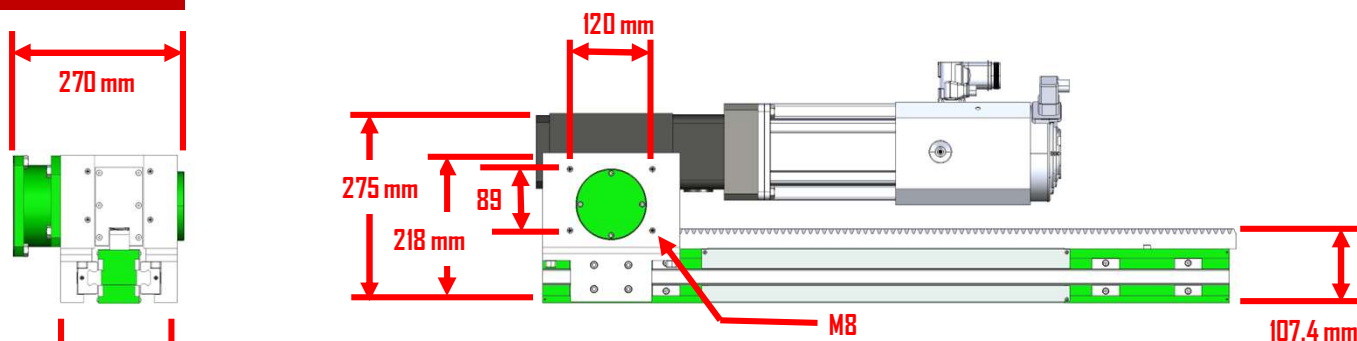


model shown: FANGX2560-S1HB-76SW040-1000RRGX/MOTOR

## TOP

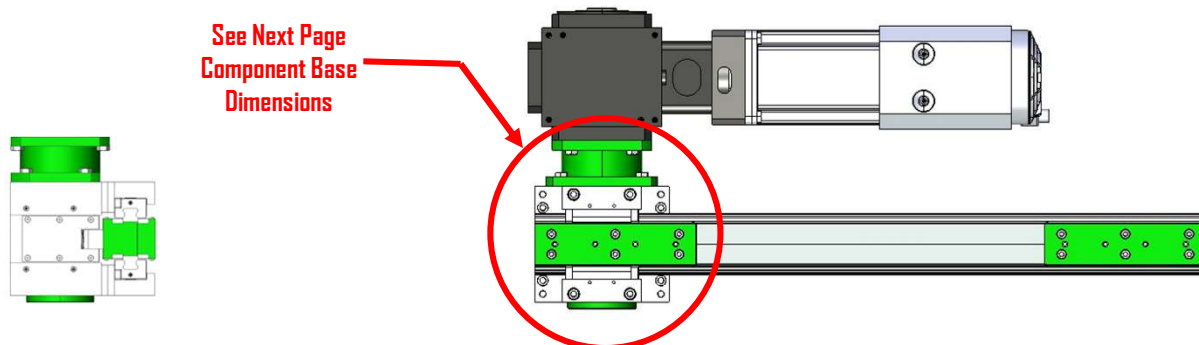


## SIDE



Pinion Pitch dia.	70.030 mm	2.7570 in
Travel per rev	220.000 mm	8.6614 in
Pinion Box Weight	14.000 kg	30.865 lb
Rack Weight	6.000 kg/m	4.032 lb/ft
Rail Weight	3.200 kg/m	2.150 lb/ft
Base Clamp Weight	3.048 kg	6.720 lb

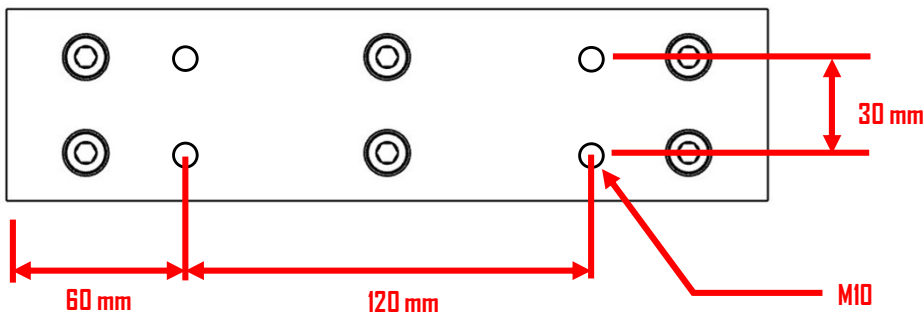
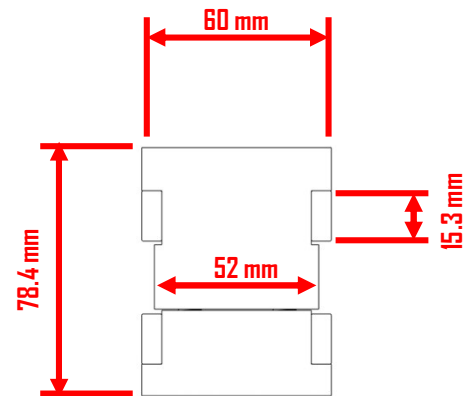
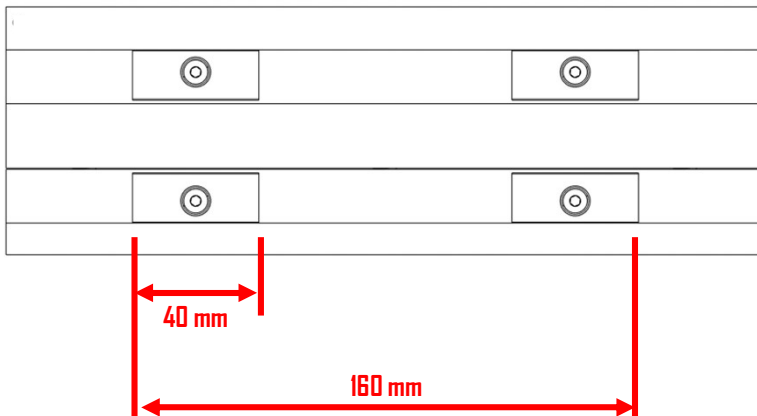
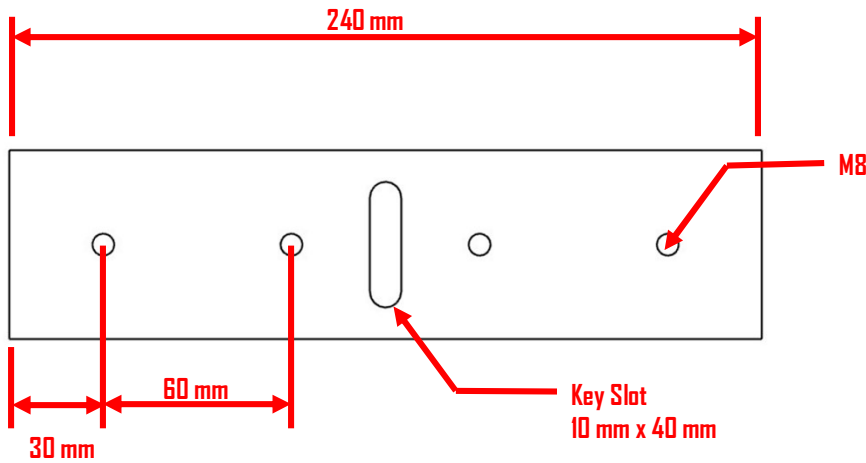
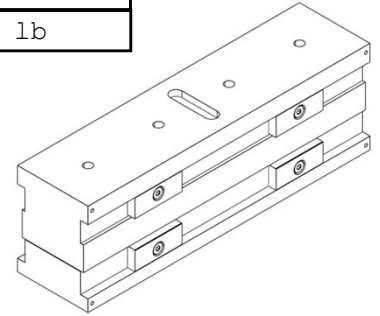
## BOTTOM



# FANGclamp STANDARD "FCB" CLAMP BASE DIMENSIONS 36

## Standard model shown: FCB60MAX

Pinion Pitch dia.	70.030 mm	2.7570 in
Travel per rev	220.000 mm	8.6614 in
Pinion Box Weight	14.000 kg	30.865 lb
Rack Weight	6.000 kg/m	4.032 lb/ft
Rail Weight	3.200 kg/m	2.150 lb/ft
Base Clamp Weight	3.048 kg	6.720 lb



\* FANG2560 Max Input Torque = 580 Nm (5133 lb-in)

\* Servo Worm Gear Values Based on 3000 rpm input



Type		Servo Worm Gear*					Ultra Worm*	
Series	RATIO	38SW	51SW	64SW	76SW	89SW	T5SW	
Nm (lb-in)	Nom Output Torque (T2n)	4.75:1	NA	NA	NA	NA	NA	520 (4620)
		5:1	29 (260)	54 (480)	100 (850)	130 (1110)	260 (2300)	NA
		6:1	NA	61 (540)	150 (1350)	170 (1480)	290 (2580)	NA
		6.75:1	NA	NA	NA	NA	NA	520 (4620)
		7:1	NA	64 (570)	110 (1000)	270 (2370)	310 (2740)	NA
		8:1	NA	68 (600)	120 (1060)	200 (1740)	330 (2950)	NA
		9:1	NA	69 (520)	120 (1060)	200 (1740)	340 (3050)	NA
		9.25:1	NA	NA	NA	NA	NA	520 (4620)
		10:1	38 (340)	71 (630)	130 (1110)	210 (1870)	360 (3170)	NA
		15:1	40 (354)	75 (660)	130 (1110)	220 (1950)	370 (3280)	NA
		20:1	40 (354)	73 (650)	130 (1150)	220 (1950)	370 (3280)	NA
		25:1	NA	73 (650)	130 (1150)	220 (1950)	370 (3280)	NA
		30:1	37 (330)	70 (620)	120 (1060)	210 (1870)	350 (3130)	NA
		40:1	34 (300)	67 (590)	120 (1060)	200 (1740)	350 (3130)	NA
		50:1	34 (300)	64 (570)	110 (1000)	190 (1700)	330 (2880)	NA
		60:1	32 (280)	62 (550)	110 (1000)	180 (1630)	310 (2760)	NA
Nm (lb-in)	Max Acceleration	4.75:1	NA	NA	NA	NA	NA	870 (7700)
	Output Torque (T2n)	5:1	46 (407)	90 (796)	170 (1504)	310 (2743)	480 (4248)	NA
		6:1	NA	99 (876)	180 (1593)	320 (2832)	540 (4779)	NA
		6.75:1	NA	NA	NA	NA	NA	870 (7700)
		7:1	NA	110 (973)	190 (1681)	320 (2832)	520 (4602)	NA
		8:1	NA	110 (973)	210 (1859)	310 (2743)	600 (5310)	NA
		9:1	NA	110 (973)	210 (1859)	350 (3098)	620 (5487)	NA
		9.25:1	NA	NA	NA	NA	NA	870 (7700)
		10:1	59 (522)	120 (1062)	210 (1859)	370 (3275)	640 (5664)	NA
		15:1	60 (531)	120 (1062)	220 (1947)	380 (3363)	660 (5841)	NA
		20:1	60 (531)	120 (1062)	220 (1947)	370 (3275)	660 (5841)	NA
		25:1	NA	120 (1062)	220 (1947)	370 (3275)	650 (5753)	NA
		30:1	52 (460)	110 (973)	210 (1859)	360 (3186)	620 (5487)	NA
		40:1	52 (460)	110 (973)	200 (1770)	340 (3009)	590 (5222)	NA
		50:1	52 (460)	100 (885)	190 (1681)	330 (2832)	570 (5045)	NA
		60:1	42 (372)	100 (885)	180 (1593)	320 (2832)	550 (4868)	NA

\* Servo Worm Gear Values Based on 3000 rpm input



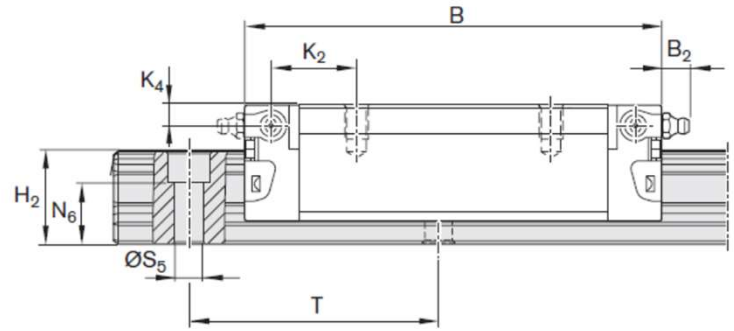
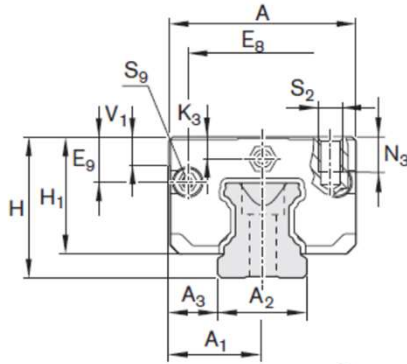
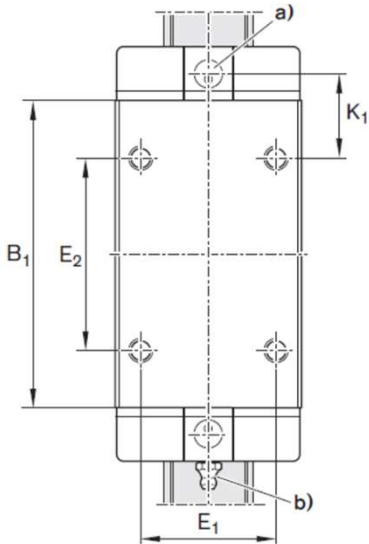
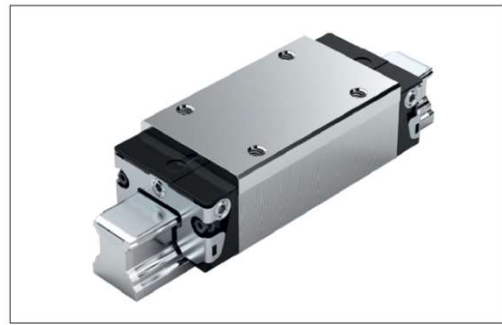
Type	RATIO	Servo Worm Gear*					Ultra Worm*
		38SW	51SW	64SW	76SW	89SW	T5SW
Efficiency %	4.75:1	NA	NA	NA	NA	NA	93
	5:1	87	91	91	91	90	NA
	6:1	NA	91	91	91	90	NA
	6.75:1	NA	NA	NA	NA	NA	90
	7:1	NA	90	90	90	90	NA
	8:1	NA	90	90	89	89	NA
	9:1	NA	89	89	89	89	NA
	9.25:1	NA	NA	NA	NA	NA	88
	10:1	85	89	89	89	88	NA
	15:1	83	87	87	87	86	NA
	20:1	80	84	84	84	83	NA
	25:1	NA	83	83	83	82	NA
	30:1	75	79	79	79	78	NA
	40:1	71	75	75	75	74	NA
	50:1	68	71	71	71	71	NA
	60:1	65	69	69	69	68	NA
	Mass Moment of Inertia(In) Kg cm <sup>2</sup>	4.75:1	NA	NA	NA	NA	NA
5:1		1.26	2.31	8.38	14.40	24.80	NA
6:1		NA	2.10	7.82	12.50	23.30	NA
6.75:1		NA	NA	NA	NA	NA	12.88
7:1		NA	1.97	7.45	11.30	17.60	NA
8:1		NA	1.90	7.26	10.60	15.80	NA
9:1		NA	1.84	7.11	10.10	14.60	NA
9.25:1		NA	NA	NA	NA	NA	8.10
10:1		1.09	1.80	7.10	9.73	13.80	NA
15:1		1.06	1.71	6.75	8.87	11.70	NA
20:1		1.05	1.67	6.67	8.57	11.00	NA
25:1		NA	1.66	6.62	8.43	10.70	NA
30:1		1.04	1.65	6.62	8.35	10.50	NA
40:1		1.04	1.64	6.58	8.28	10.30	NA
50:1		1.04	1.64	6.57	8.24	10.20	NA
60:1		1.04	1.64	6.56	8.22	10.20	NA



Type	Servo Worm Gear*					Ultra Worm*
Series	38SW	51SW	64SW	76SW	89SW	T5SW
Nom Input Speed (n1n)	3000	2500	3000	2500	2500	2500
Max Input Speed (1max)	6000	5000	6000	5000	5000	5000
1 STAGE arc-min	<8	<6	<5	<4	<3	<1
NOTE: Active Zero Backlash is available for a price premium but may affect upper speed limits						
Weight (m) kg (lb) 1 STAGE	4.1 (9)	8.2 (18)	14.5 (32)	25.4 (56)	49.9 (110)	38 (83.7)
Average Service Life	> 25,000 hours					> 12,000 hours
Lubrication	Synthetic Gear Oil					Synthetic Grease
Protection Rating	Mobil SHC 634					Klubersynth GH6-220
Operating Temperature	IP65 -25 to 100 C					IP67 -25 to 90 C

# RUNNER BLOCK / GUIDE CAR SPECIFICATIONS SIZE 25

40



Brand	Model	Dimensions							Ratings	
		A	A <sub>2</sub>	B	H	H <sub>2</sub>	E <sub>1</sub>	E <sub>2</sub>	C <sub>d</sub> (N)	C <sub>0</sub> (N)
Bosch Rexroth	1623-214-20	48	23	107.9	36	24.45	35	50	37300	52500
THK	SHS25LV	48	23	109.0	36	20.00	35	50	29208	64700
Hiwin	LGH25HA	48	23	104.6	*40	20.00	35	50	24986	50800
IKO	MMSGG25	48	23	118.0	36	22.00	35	50	24446	38300
INA	KUSE25BHL	48	23	104.3	*40	21.70	35	50	35300	93700
NSK	LY25BN	48	23	107.0	*40	22.00	35	50	27383	71000
Thomson	500D25	48	23	103.5	36	22.70	35	50	25500	60300
Ewellix (SKF)	LLRHS25U	48	23	107.9	36	22.00	35	50	24400	44600

## TO USED WITH FANGmax HEAVY AXIS SELECTION TABLES

### 500 mm MOVES

#### SECTION 00 [500mm of Travel – 16.68 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Motor Speed	Max Gearbox Ratio
00.01	2.20 sec	0.10 sec	0.10 sec	0.25 m/s	2.5 m/s <sup>2</sup>	681.80 rpm	10:1
00.02	1.20 sec	0.20 sec	0.20 sec	0.50 m/s	2.5 m/s <sup>2</sup>	1363.60 rpm	10:1
00.03	0.60 sec	0.10 sec	0.10 sec	1.00 m/s	10 m/s <sup>2</sup>	2727.20 rpm	10:1
00.04	0.40 sec	0.12 sec	0.12 sec	1.78 m/s	15 m/s <sup>2</sup>	2420.40 rpm	5:1

### 1000 mm MOVES

#### SECTION 01 [1000mm of Travel – 39.37 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Motor Speed	Max Gearbox Ratio
01.01	4.20 sec	0.10 sec	0.10 sec	0.25 m/s	2.5 m/s <sup>2</sup>	681.80 rpm	10:1
01.02	2.20 sec	0.10 sec	0.10 sec	0.50 m/s	5.0 m/s <sup>2</sup>	1363.60 rpm	10:1
01.03	1.20 sec	0.20 sec	0.20 sec	1.00 m/s	5.0 m/s <sup>2</sup>	2727.20 rpm	10:1
01.04	0.60 sec	0.10 sec	0.10 sec	2.00 m/s	20.0 m/s <sup>2</sup>	2727.20 rpm	5:1
01.05	0.43 sec	0.10 sec	0.10 sec	3.00 m/s	30.0 m/s <sup>2</sup>	4090.80 rpm	5:1

### 2500 mm MOVES

#### SECTION 03 [2500mm of Travel – 98.43 inches]

Profile #	Total Time	Accel Time	Decel Time	Speed	Acceleration	Motor Speed	Max Gearbox Ratio
03.01	10.25 sec	0.250 sec	0.250 sec	0.25 m/s	1.0 m/s <sup>2</sup>	681.80 rpm	10:1
03.02	5.25 sec	0.250 sec	0.250 sec	0.50 m/s	2.0 m/s <sup>2</sup>	1363.60 rpm	10:1
03.03	2.50 sec	0.250 sec	0.250 sec	1.00 m/s	4.0 m/s <sup>2</sup>	2727.20 rpm	10:1
03.04	1.25 sec	0.125 sec	0.125 sec	2.00 m/s	16.0 m/s <sup>2</sup>	2727.20 rpm	5:1
03.05	0.87 sec	0.100 sec	0.100 sec	3.00 m/s	30.0 m/s <sup>2</sup>	4090.80 rpm	5:1

FANGmax Linear Axis Weight	500mm (2 bases) 1 RAIL	500mm (2 bases) 2 RAILS	1000mm (3 bases) 1 RAIL	1000mm (3 bases) 2 RAILS	2500mm (7 bases) 1 RAIL	2500mm (7 bases) 2 RAILS
kg	7.80	9.40	18.80	22.00	79.00	87.00
lbs	17.20	20.72	41.45	48.50	174.16	191.80

### SIZING/SELECTION PRECAUTIONS:

Fangtooth Inc. is not responsible for and does not warrant (a) equipment, components and/or material furnished by the Buyer; (b) the sufficiency of functionality of any design specifications furnished by the Buyer; nor shall Company be liable for defects or damages arising from the foregoing. Notwithstanding any other provision in Fangtooth inc. Terms and Conditions, none of the warranties given by the Company shall apply to products manufactured by others and sold by the Company. Buyer will at its own expense arrange for any dismantling and reassembly of any goods and equipment and the provision of all equipment (including without limitation lifting equipment and crane-age) to the extent that this is necessary to remedy the defect or facilitate re-performance of service.

Fangtooth Inc. shall not be responsible for any claims which the Company determines are due to improper installation, operation above rated capacity, exceeds L10 life cycles, operation at extreme conditions, normal wear and tear, accident, or because the Product has been used, adjusted, altered, handled, maintained, repaired or stored other than as directed by the Company.

Tables published herein are intended as an estimated guide to help begin the design process. All applications require full evaluation against the actual intended use. Buyers select products at their own risk. Consider factors such as cycle duty and motor sizing due to torque, speed and heat requirements.



Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
 Pinion Pitch Diameter 70.03 mm  
 Pinion Max Torque 580 Nm  
 Doesn't Include Motor Inertia

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGmax HEAVY AXIS HORIZONTAL MOVES

# 42

Total Weight Includes Fangtooth Moving Parts Weight

### SECTION 00 [500mm of Travel – 16.68 inches] HORIZONTAL

500 mm

USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
2.20 sec	0.25 m/s	00.01	0.56 Nm	0.99 Nm	1.85 Nm	3.57 Nm	7.02 Nm	-
1.20 sec	0.50 m/s	00.02	0.56 Nm	0.99 Nm	1.85 Nm	3.57 Nm	7.02 Nm	-
0.60 sec	1.00 m/s	00.03	2.04 Nm	3.55 Nm	6.57 Nm	12.60 Nm	-	-

USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 2.31 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.40 sec	1.78 m/s	00.04	5.01 Nm	9.48 Nm	18.42 Nm	-	-	-

USING SERVO WORM SIZE "76SW" 5:1 Gear Ratio [Gearbox Inertia 14.40 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60 sec	1.00 m/s	00.03	-	-	-	-	50.38 Nm	-
0.40 sec	1.78 m/s	00.04	-	-	-	38.90 Nm	-	-

USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 24.80 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	50 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60 sec	1.00 m/s	00.03	-	-	-	-	-	100.16 Nm
0.40 sec	1.78 m/s	00.04	-	-	-	-	76.88 Nm	-

### SECTION 01 [1000mm of Travel – 39.37 inches] HORIZONTAL

1000 mm

USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
4.20 sec	0.25 m/s	01.01	0.56 Nm	0.99 Nm	1.85 Nm	3.57 Nm	7.02 Nm	-
2.20 sec	0.50 m/s	01.02	1.05 Nm	1.84 Nm	3.42 Nm	6.58 Nm	12.90 Nm	-
1.20 sec	1.00 m/s	01.03	1.05 Nm	1.84 Nm	3.42 Nm	6.58 Nm	12.90 Nm	-
0.60 sec	2.00 m/s	01.04	4.01 Nm	6.96 Nm	12.85 Nm	-	-	-

USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 2.31 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.43 sec	3.00 m/s	01.05	9.85 Nm	18.63 Nm	-	-	-	-

USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
2.20 sec	0.50 m/s	01.02	-	-	-	-	-	27.34 Nm
1.20 sec	1.00 m/s	01.03	-	-	-	-	-	27.34 Nm
0.60 sec	2.00 m/s	01.04	-	-	-	29.17 Nm	-	-

USING SERVO WORM SIZE "76SW" 5:1 Gear Ratio [Gearbox Inertia 14.40 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.43 sec	3.00 m/s	01.05	-	-	41.36 Nm	-	-	-

USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 23.30 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60	2.00 m/s	01.04	-	-	-	-	101.05 Nm	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150



Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
 Pinion Pitch Diameter 70.03 mm  
 Pinion Max Torque 580 Nm  
 Doesn't Include Motor Inertia

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGmax HEAVY AXIS HORIZONTAL MOVES

# 43

Total Weight Includes Fangtooth Moving Parts Weight

### SECTION 03 [2500mm of Travel – 98.43 inches] HORIZONTAL 2500 mm

USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
10.25 sec	0.25 m/s	03.01	0.27 Nm	0.48 Nm	0.91 Nm	1.77 Nm	3.48 Nm	6.91 Nm
5.25 sec	0.50 m/s	03.02	0.46 Nm	0.82 Nm	1.54 Nm	2.97 Nm	5.84 Nm	11.57 Nm
2.50 sec	1.00 m/s	03.03	0.86 Nm	1.50 Nm	2.80 Nm	5.38 Nm	10.55 Nm	-

USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 2.31 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	03.04	5.32 Nm	10.07 Nm	-	-	-	-

USING SERVO WORM SIZE "64SW" 5:1 Gear Ratio [Gearbox Inertia 8.38 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.87 sec	3.00 m/s	03.05	12.46 Nm	21.23 Nm	-	-	-	-

USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.43 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	3500 lbs	600 lbs	1200 lbs	2400 lbs
2.50 sec	1.00 m/s	03.03	-	-	-	-	-	21.76 Nm

USING SERVO WORM SIZE "76SW" 5:1 Gear Ratio [Gearbox Inertia 14.40 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	03.04	-	-	22.32 Nm	41.30 Nm	-	-
0.87 sec	3.00 m/s	03.05	-	-	41.36 Nm	-	-	-

USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 23.30 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	03.04	-	-	-	-	81.29 Nm	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150

Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

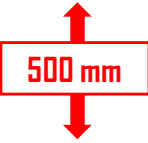
Based on weight & Motion Profile from page "14"  
 Pinion Pitch Diameter 70.03 mm  
 Pinion Max Torque 580 Nm  
 Doesn't Include Motor Inertia

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGmax HEAVY AXIS VERTICAL MOVES

44

Total Weight Includes Fangtooth Moving Parts Weight



### SECTION 00 [500mm of Travel – 16.68 inches] VERTICAL

USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
2.20 sec	0.25 m/s	00.01	1.90 Nm	3.67 Nm	7.22 Nm	-	-	-
1.20 sec	0.50 m/s	00.02	1.90 Nm	3.67 Nm	7.22 Nm	-	-	-
0.60 sec	1.00 m/s	00.03	3.38 Nm	6.23 Nm	11.93 Nm	-	-	-

USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.40 sec	1.78 m/s	00.04	7.70 Nm	-	-	-	-	-

USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
2.20 sec	0.25 m/s	00.01	-	-	-	14.87 Nm	29.03 Nm	-
1.20 sec	0.50 m/s	00.02	-	-	-	14.87 Nm	29.03 Nm	-
0.60 sec	1.00 m/s	00.03	-	-	-	25.59 Nm	-	-

USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.40 sec	1.78 m/s	00.04	-	17.44 Nm	31.74 Nm	-	-	-

USING SERVO WORM SIZE "89SW" 10:1 Gear Ratio [Gearbox Inertia 13.80 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
2.20 sec	0.25 m/s	00.01	-	-	-	-	-	57.66 Nm
1.20 sec	0.50 m/s	00.02	-	-	-	-	-	57.66 Nm
0.60 sec	1.00 m/s	00.03	-	-	-	-	48.56 Nm	-

USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 23.30 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.40 sec	1.78 m/s	00.04	-	-	-	62.26 Nm	119.47 Nm	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150

Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

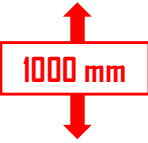
Based on weight & Motion Profile from page "14"  
 Pinion Pitch Diameter 70.03 mm  
 Pinion Max Torque 580 Nm  
 Doesn't Include Motor Inertia

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGmax HEAVY AXIS VERTICAL MOVES

# 45

Total Weight Includes Fangtooth Moving Parts Weight



### SECTION 01 [1000mm of Travel – 39.37 inches] VERTICAL

#### USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
4.20 sec	0.25 m/s	01.01	1.90 Nm	3.67 Nm	7.22 Nm	-	-	-
2.20 sec	0.50 m/s	01.02	2.40 Nm	4.53 Nm	8.79 Nm	-	-	-
1.20 sec	1.00 m/s	01.03	2.40 Nm	4.53 Nm	8.79 Nm	-	-	-

#### USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 2.31 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60 sec	2.00 m/s	01.04	9.30 Nm	-	-	-	-	-
0.43 sec	3.00 m/s	01.05	12.54 Nm	-	-	-	-	-

#### USING SERVO WORM SIZE "64SW" 10:1 Gear Ratio [Gearbox Inertia 7.0 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
4.20 sec	0.25 m/s	01.01	-	-	-	14.67 Nm	-	-
2.20 sec	0.50 m/s	01.02	-	-	-	18.05 Nm	-	-
1.20 sec	1.00 m/s	01.03	-	-	-	18.05 Nm	-	-

#### USING SERVO WORM SIZE "64SW" 5:1 Gear Ratio [Gearbox Inertia 8.38 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60 sec	2.00 m/s	01.04	-	19.61 Nm	36.77 Nm	-	-	-
0.43 sec	3.00 m/s	01.05	-	26.59 Nm	-	-	-	-

#### USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
4.20 sec	0.25 m/s	01.01	-	-	-	-	29.03 Nm	-
2.20 sec	0.50 m/s	01.02	-	-	-	-	35.49 Nm	-
1.20 sec	1.00 m/s	01.03	-	-	-	-	-	-

#### USING SERVO WORM SIZE "76SW" 5:1 Gear Ratio [Gearbox Inertia 14.40 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.43 sec	3.00 m/s	01.05	-	-	52.08 Nm	-	-	-

#### USING SERVO WORM SIZE "89SW" 10:1 Gear Ratio [Gearbox Inertia 13.80 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
4.20 sec	0.25 m/s	01.01	-	-	-	-	-	57.66 Nm

#### USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 23.30 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.60 sec	2.00 sec	01.04	-	-	-	75.34 Nm	-	-



Warning: As this is only a general guide, to ensure acceptable system life please call Fangtooth Application Engineering with full duty cycle to verify.

Based on weight & Motion Profile from page "14"  
 Pinion Pitch Diameter 70.03 mm  
 Pinion Max Torque 580 Nm  
 Doesn't Include Motor Inertia

# MAXIMUM INPUT TORQUE REQUIREMENTS

## FANGmax HEAVY AXIS VERTICAL MOVES

# 46

Total Weight Includes Fangtooth Moving Parts Weight



### SECTION 03 [2500mm of Travel – 98.43 inches] VERTICAL

#### USING SERVO WORM SIZE "51SW" 10:1 Gear Ratio [Gearbox Inertia 1.8 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
10.25 sec	0.25 m/s	03.01	1.61 Nm	3.16 Nm	6.27 Nm	12.49 Nm	-	-
5.25 sec	0.50 m/s	03.02	1.81 Nm	3.50 Nm	6.90 Nm	-	-	-
2.50 sec	1.00 m/s	03.03	2.20 Nm	4.91 Nm	8.16 Nm	-	-	-

#### USING SERVO WORM SIZE "51SW" 5:1 Gear Ratio [Gearbox Inertia 2.31 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	03.04	8.01 Nm	15.43 Nm	-	-	-	-
0.87 sec	3.00 m/s	03.05	12.54 Nm	-	-	-	-	-

#### USING SERVO WORM SIZE "64SW" 10:1 Gear Ratio [Gearbox Inertia 7.0 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
5.25 sec	0.50 m/s	03.02	-	-	-	14.00 Nm	-	-
2.20 sec	1.00 m/s	03.03	-	-	-	16.70 Nm	-	-

#### USING SERVO WORM SIZE "64SW" 5:1 Gear Ratio [Gearbox Inertia 8.38 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	03.04	-	-	31.67 Nm	-	-	-
0.87 sec	3.00 m/s	03.05	-	26.59 Nm	-	-	-	-

#### USING SERVO WORM SIZE "76SW" 10:1 Gear Ratio [Gearbox Inertia 9.73 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
10.25 sec	0.25 m/s	03.01	-	-	-	-	25.16 Nm	-
5.25 sec	0.50 m/s	03.02	-	-	-	-	27.74 Nm	-
2.50 sec	1.00 m/s	03.03	-	-	-	-	32.87 Nm	-

#### USING SERVO WORM SIZE "76SW" 5:1 Gear Ratio [Gearbox Inertia 14.40 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
0.487sec	3.00 m/s	01.05	-	-	52.08 Nm	-	-	-

#### USING SERVO WORM SIZE "89SW" 10:1 Gear Ratio [Gearbox Inertia 13.80 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
10.25 sec	0.25 m/s	03.01	-	-	-	-	-	50.16 Nm
5.25 sec	0.50 m/s	03.02	-	-	-	-	-	55.16 Nm
2.50 sec	1.00 m/s	03.03	-	-	-	-	-	65.16 Nm

#### USING SERVO WORM SIZE "89SW" 5:1 Gear Ratio [Gearbox Inertia 23.30 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	01.04	-	-	-	64.79 Nm	-	-

#### USING SERVO WORM SIZE "T5SW" 4.75:1 Gear Ratio [Gearbox Inertia 22.93 kgcm<sup>2</sup>]

Total Time	Speed	Profile #	75 lbs	150 lbs	300 lbs	600 lbs	1200 lbs	2400 lbs
1.25 sec	2.00 m/s	01.04	-	-	-	-	124.11 Nm	-



INSPIRE . GREAT . AUTOMATION

www.fang2th.com - 11970 Mayfield - Livonia, MI 48150



## SECTION 1: APPLICABILITY

1.1 These terms & conditions (the "Terms and Conditions") of sale are applicable to all quotations for the sale or orders for the purchase of all equipment or goods (the "Products") made by or for Fangtooth Inc 11970 Mayfield St. Livonia MI 48150 ("Company".)

1.2 Unless otherwise agreed, written quotations are valid for 30 days from the date of quotation. All price lists and discounts are subject to change without notice.

1.3 All orders placed by the Buyer are subject to written acceptance by the Company. No contract between Buyer and Company shall exist prior to the time of such acceptance by the Company.

1.4 These Terms & Conditions supersede all prior written terms, understandings, purchase orders, assurances and offers. Company shall not be deemed to have waived these Terms & Conditions if it fails to object to the conditions appearing in or attached to a purchase order issued by Buyer. Buyer's acceptance of the Products or services furnished by the Company shall constitute its acceptance of these Terms & Conditions.

## SECTION 2: PRICE & SHIPPING DATES

2.1 All orders must be bona fide commitments showing a complete description of equipment, quantity, price & shipping dates required by the Buyer.

2.2 Timely performance by Company is contingent upon Buyer supplying to Company, when applicable, all required technical information and data, including drawing approvals, and all required commercial documentation. Shipping dates are subject to final confirmation or change by Company and are based on prompt receipt of all necessary information regarding the order. Unless otherwise indicated, all delivery dates specified by the Company are estimated time frames and time is not of the essence in Company's performance of the sale of the Products.

2.3 If shipment is delayed for thirty (30) days or more from the delivery date accepted by the Company for reasons attributable to the Buyer and provided that the Buyer shall have no other liability to the Company in respect of such delay, the reasonable direct costs of putting the Products into storage at a facility off-site of Company's premises until such times as they are shipped (or delivered) shall be the to the Buyer's account and at Buyer's sole risk.

## SECTION 3: PAYMENT

Terms of payment are net 30 days from the date of invoice unless otherwise agreed in writing. Late payments may be subject to interest on the unpaid balance at the greater of 2% per month or the maximum rate permitted by law. No deductions or set-offs are to be made by Buyer from amounts due unless specifically authorized by the Company in writing. If in the judgment of the Company, the financial condition of Buyer at any time does not justify continuance of production or shipment on the terms of payment specified, the Company may require full or partial payment in advance.

## SECTION 4: TAXES

The Company's prices do not include sales, use, excise taxes, tariffs, duties or value added or similar taxes or fees. The Company will add such taxes or fees to the invoice unless the Buyer provides Company with tax-exempt certificate acceptable to the applicable taxing authorities or arranges payment of such taxes or fees directly by the Buyer.

## SECTION 5: WARRANTY

5.1 NEW PRODUCT – Company warrants the Products shall be free of defects in material and workmanship and meet the Product specifications for a period from the date of shipment as specified below.

5.1.a FANGTOOTH MAX straddle mounted pinion systems – 3 years.

5.1.b FANGTOOTH OPEN cantilevered pinion systems – 2 years.

5.1.c FANGTOOTH Any products not specified as standard including any units with non-standard coatings for corrosion claims – 1 year.

5.1.d FANGBOT integrated systems – FANGTOOTH MAX integrated into larger systems will carry the full 3 year warranty. FANGTOOTH OPEN integrated into larger systems will carry the full 2 year warranty. Custom (non-standard) engineered products within the larger systems or any other non-standard FANGTOOTH products will be warranties for 18 months.

5.2 Notwithstanding the warranty periods listed above, the warranty on normal wear items such as oil seals is limited to one year. The warranties of gearboxes, motors, brakes, couplings, linear rail, linear bearings, gear rack and pinion and all other add on items shall be the warranties provided by, and shall be the responsibility of, the original equipment manufacturer. The Company is not responsible for and does not warrant (a) equipment, components and/or material furnished by the Buyer; (b) the sufficiency of functionality of any design specifications furnished by the Buyer; nor shall Company be liable for defects or damages arising from the foregoing. Notwithstanding any other provision in these Terms and Conditions, none of the warranties given by the Company shall apply to products manufactured by others and sold by the Company. Buyer will at its own expense arrange for any dismantling and reassembly of any goods and equipment and the provision of all equipment (including without limitation lifting equipment and crane-age) to the extent that this is necessary to remedy the defect or facilitate re-performance of service.

Unless otherwise agreed, necessary transport of the Products and/or parts thereof to and from Company in connection with the remedying of defects will be at the risk and expense of the Buyer. Buyer will follow Company's instructions regarding such transport.

Unless otherwise agreed, Buyer will bear any additional costs which Company incurs as a result of the Products being located in a place other than the place of delivery.

Defective parts which have been replaced will be made available to Company and will be its property.

5.3 Any claims under this warranty must be made in writing to the Company at the address set forth above (or by email) within thirty (30) days of the discovery thereof. The

Company's obligation under this warranty shall be limited to the repair or replacement, at the Company's option, of the Product, or any part thereof, when the Company has determined the Product is not warranted; any Product or parts repaired or replaced pursuant to the warranty will be warranted for the remainder of the original warranty period. The Company shall not be responsible for any claims which the Company determines are due to improper installation, operation above rated capacity, exceeds L10 life cycles, operation at extreme conditions, normal wear and tear, accident, or because the Product has been used, adjusted, altered, handled, maintained, repaired or stored other than as directed by the Company.

5.4 This warranty shall not apply in the event of defects caused by: (i) physical abuse of the Products or any component, or acts of vandalism by any persons other than Company; (ii) alterations, modifications, additions, or repairs made during the applicable warranty period by anyone other than Company, and its authorized employees, agents or subcontractors; (iii) accidents or damage resulting from fire, water, wind, hail, lightning, electrical surge or failure, earthquake, theft or similar causes not caused by the sole negligence of Company; (iv) damage as a result of corrosion or other damage caused by Buyer's failure to protect and maintain the Products in accordance with Company's written instructions and warnings; or (v) design specifications furnished by Buyer.

5.5 Buyer shall not rely upon Company's skill or judgement or furnish Products for any particular purpose beyond the specific express warranties provided herein. Buyer has the responsibility to determine whether the Products and specifications are fit for buyer's intended purpose. Company does not warrant the Products will comply with the requirements or any safety code or regulations, or with any environmental or other law or regulation. Buyer is responsible for the safe and lawful operation and use of the Products.

5.9 THE FOREGOING WARRANTIES ARE THE SOLE WARRANTIES PROVIDED BY COMPANY FOR THE PRODUCTS AND ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ALL OF WHICH ARE HEREBY DISCLAIMED AND EXCLUDED BY MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. BUYER AGREES THAT ITS SOLE AND EXCLUSIVE REMEDY AGAINST COMPANY WILL BE LIMITED TO THE REPAIR AND REPLACEMENT OF NONCONFORMING OR DEFECTIVE PRODUCTS PROVIDED COMPANY IS PROMPTLY NOTIFIED IN WRITING OF ANY DEFECT. THIS EXCLUSIVE REMEDY WILL NOT BE DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE SO LONG AS COMPANY IS WILLING TO REPAIR OR REPLACE THE NONCONFORMING OR DEFECTIVE PRODUCTS.

## SECTION 6: OWNERSHIP OF INTELLECTUAL PROPERTY

Company retains ownership and all rights to its intellectual property. Buyer shall have no rights to Company's intellectual property. Any intellectual property developed by Company and arising in connection with the supply of Products hereunder shall be deemed property of Company, and Company shall have exclusive rights to the use and ownership of such intellectual property.

## SECTION 7: THIRD PARTY INTELLECTUAL PROPERTY CLAIMS

Company shall pay costs and damages finally awarded in any suit against Buyer by a third party to the extent based upon a finding that the design or construction of the Products as furnished infringes a patent or other third party intellectual property rights (except infringement occurring as a result of incorporating a design or modification at Buyer's request), provided that Buyer promptly notifies Company of any charge of infringement, and Company is given the right at its expense to settle such charge and to defend or control the defense of any suit based upon such charge. Company shall have no obligation hereunder with respect to claims, suits or proceedings, resulting from or related to, in whole or in part, (i) the use of software or software documentation, (ii) compliance with Buyer's specifications, (iii) the combination with other products, or modification of, the Products after delivery by Company, or (iv) the use of the Products, or any part thereof, in the practice of a process. THIS SECTION SETS FORTH COMPANY'S ENTIRE LIABILITY WITH RESPECT TO PATENTS OR OTHER INFRINGEMENTS OF INTELLECTUAL PROPERTY.

## SECTION 8: RETURN OF PRODUCTS

In the event that the Buyer does not accept the Products, the Buyer must apply for authorization from the Company before returning the Products to the Company for credit. The Company will advise the Buyer of the credit to be allowed and necessary restocking charges on the unused material, subject to the Company's inspection and acceptance when received. No material should be returned to the Company except upon receipt of written authorization. In addition to the usual restocking charges, the Buyer must pay the actual transportation expense of the Company, plus all return transportation costs. Motors and specially designed parts will not be accepted for return or credit.

## SECTION 9: DELIVERY, TITLE AND RISK OF LOSS

The Products will be delivered Ex Works – Fangtooth Inc's facility (in accordance with Incoterms 2010) unless otherwise agreed in writing by Company. The Buyer will be responsible for making all shipping arrangements, and Buyer will provide sufficient notice and details of such arrangements to allow Company to prepare the Products for delivery. Title and risk of loss will remain with Company and not pass to Buyer until delivery to the Incoterm delivery point.

## SECTION 10: FORCE MAJEURE

Company will not be deemed to be in default or otherwise responsible for delays or failures in performance resulting from acts of God: acts of war, or civil disturbance, terrorism, epidemics, governmental action or inaction, fires, floods, earthquakes, tornadoes, or other events beyond Company's reasonable control (a "Force majeure Event"). A Force Majeure Event affecting Company's vendors shall also be deemed as a Force Majeure Event for the Company, provided that the Company shall use commercially reasonable efforts to mitigate any delays caused by its vendor's Force Majeure situation. Company shall in such instances give notice of the non-performance (including its anticipated duration) to the Customer promptly after becoming aware that it has occurred or will occur. In no event shall lack of finances or ability to pay as a result of the financial condition of either party be considered a Force Majeure Event.

**SECTION 11: CANCELLATION**

Upon written acceptance of an order by the Company, Buyer may not cancel or terminate for convenience, or direct suspension of manufacture, except with Company's written consent and then only upon terms that will compensate Company for its engineering, fabrication and purchasing charges and any other costs relating to such cancellation, termination, or suspension, plus a reasonable amount for profit and overhead.

**SECTION 12: ETHICAL BUSINESS PRACTICES**

Company requires manufacturing and business practices that are compliant with all applicable laws and regulations, including, the need to conduct all transactions in compliance with ethical business practices. Both the Company and the Buyer agree that neither of them nor their employees, agents, representatives, or other intermediaries will engage in any activity that may be construed to be in violation of their respective codes of ethical business practices or applicable law. Buyer acknowledges and agrees that it shall not, in regards to the sale or resale of the Company's products, make any payment or transfer of value to any third party (including through any or multiple intermediaries) that would cause either the Buyer, Company or any of Company's affiliates to violate either the U.S. Foreign Corrupt Practices Act or any other applicable anti-corruption laws. Buyer shall indemnify and hold Company and Company's affiliates harmless in the even of any breach of this paragraph by buyer or any of its intermediaries.

**SECTION 13: LIMITATION OF LIABILITY**

NEITHER COMPANY AND ITS AFFILIATES AND THEIR RESPECTIVE OFFICERS, DIRECTORS, EMPLOYEES, AGENTS, INSURERS AND ATTORNEYS SHALL BE LIABLE, WHETHER IN CONTRACT, WARRANTY, FAILURE OF A REMEDY TO ACHIEVE ITS INTENDED OR ESSENTIAL PURPOSES, TORT (INCLUDING LOSS OF USE, REVENUE OR PROFIT, OR FOR COSTS OF CAPITAL OR OF SUBSTITUTE USE OR PERFORMANCE, OR FOR INDIRECT, SPECIAL, LIQUIDATED, INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR FOR ANY OTHER LOSS OR COST OF SIMILAR TYPE, OR FOR OTHER CLAIMS BY BUYER FOR ANY DAMAGES OR LOSSES. COMPANY'S MAXIMUM LIABILITY FOR ALL CLAIMS AND LOSSES ARISING OUT OF THE MANUFACTURE OR SALE OF THE PRODUCTS SHALL BE THE PRICE CONFIRMED BY THE COMPANY RELATING TO THE INDIVIDUAL SALE TRANSACTION WITH THE BUYER. BUYER AND COMPANY AGREE THAT THE EXCLUSIONS AND LIMITATIONS SET FORTH IN THIS SECTION ARE SEPARATE AND INDEPENDENT FROM ANY REMEDIES WHICH BUYER MAY HAVE HEREUNDER AND SHALL BE GIVEN FULL FORCE AND EFFECT WHETHER OR NOT ANY OR ALL SUCH REMEDIES SHALL BE DEEMED TO HAVE FAILED OF THEIR ESSENTIAL PURPOSE.

**SECTION 14: GOVERNING LAW**

The terms of the sales of the Products shall be governed and controlled in all respects by the laws of the State of Michigan and all disputes, including interpretation, enforceability, validity, and construction, shall be determined under the law of the State of Michigan without regard to any conflict of law provisions. Any dispute arising between the parties will be finally resolved in the state or federal courts of Michigan. Each party consents to personal jurisdiction in the state and federal courts of the State of Michigan for any all matters related to or arising out of the sale, attempted sale, delivery, warranty, maintenance or use of the Products, and agrees that personal jurisdiction in any such court will be deemed proper. Buyer shall be liable to Company for any attorney fees and costs incurred by Company in enforcing any of its rights hereunder.

**SECTION 15: STATUTE OF LIMITATIONS**

To the extent permitted by applicable law, any lawsuit for breach of contract, including breach of warranty, arising out of the transactions covered by this Purchase Order, must be commenced not later than twelve (12) months from the date the cause of action accrued.

**SECTION 16: CHANGES IN LAWS AND REGULATIONS**

Company's prices and timely performance are based on all applicable laws, rules, regulations, orders, codes, standards or requirements of governmental authorities effective on the date of Company's proposal. Any applicable change to the forgoing shall entitle Company to an equitable adjustment in the prices and time of performance.

**SECTION 17: COMPLIANCE WITH EXPORT LAWS AND REGULATIONS**

Certain Products manufactured by Company, as well as technical data related thereto, may be subject to export licensing controls under the U.S. Export Administration Regulations and/or the U.S. International Traffic in Arms Regulations, which require licensing for and/or prohibit the export or diversion of the Company's products to certain countries. If Buyer is responsible for obtaining export approvals. Buyer warrants that it will not assist or participate in any export of the Company's products or related technical data without first obtaining the required export license and will not knowingly assist or participate in any such diversion or other violation of applicable U.S. laws and regulations. If Company is responsible for obtaining export approvals, Buyer shall assist the Company, as necessary, in obtaining such approvals. Buyer shall indemnify and hold the Company and its affiliates harmless from any losses or claims arising out of or related to Buyer's failure to comply with applicable export control laws and regulations.

**SECTION 18: COMPLIANCE WITH LAWS**

Buyer agrees to comply with all applicable local, state, Federal and Foreign laws, orders, directives, and regulations at any time in effect, including, but not limited to, those found in 41 CFR 60 requiring equal opportunity and affirmative action without regard to race, color, religion, sex, national origin, presence of disability or status as a special disabled veteran or Vietnam era veteran, which specifically incorporated herein by reference. If Buyer fails to comply with the provisions of this paragraph, Company may, by written notice to Buyer, terminate any Order for Buyer's default in addition to exercising any other rights or remedies provided by law.

**SECTION 19: RELATIONSHIP OF THE PARTIES**

Buyer and Company are independent contractors, and nothing in the contract makes either party the agent or legal representative of the other party for any purpose. Neither party has authority to assume or to create any obligation on behalf of the other party.

**SECTION 20: WAIVER**

The failure of Company to enforce any right or remedy provided in contract or by law on a particular occasion will not be deemed a waiver of that right or remedy on a subsequent occasion or a waiver of any other right or remedy.

**SECTION 21: SEVERABILITY**

A finding that any provision in these Terms & Conditions or an accepted purchase order is invalid or unenforceable in any jurisdiction will not affect the validity or enforceability of any other provision of these Terms & Conditions or an accepted purchase order or the validity or enforceability of that provision in any other jurisdiction.

**SECTION 22: ASSIGNMENT and DELEGATION**

No right or interest in the sale of Products hereunder shall be assigned by the Buyer without written permission of the Company. No delegation of any obligation owed, or the performance of any obligation by the Buyer, shall be made without the written permission of the Company. Any attempted assignment of delegation shall be wholly void and totally ineffective for all purposes unless made in conformity with this section. Company shall have the right to assign its obligations to any affiliate of the Company or any successor to substantially all the business or assets of the Company.

**SECTION 23: THIRD PARTY RIGHTS**

Notwithstanding any provision of law, no third party (including Buyer's customer) shall have the right to enforce these Terms & Conditions or any other contractual rights against Company or its affiliates.

**SECTION 24: HEADINGS**

The headings of the various paragraphs of these Terms & Conditions have been inserted for convenient reference only and shall not to any extent have the effect of modifying, amending, or changing the expressed terms and provisions hereof.

**SECTION 25: ENTIRE AGREEMENT**

These Terms & Conditions, including any attachments hereto, constitutes the entire understanding and agreement between the parties and supersedes any prior oral or written agreements with respect to the subject matter hereof. No course of prior dealings between the and the Buyer, and no usage of the trade shall be relevant to supplement or explain and term used herein. Acceptance or acquiescence in a course of performance rendered hereunder shall not be relevant to determine the meaning of these Terms & Conditions even though the accepting or acquiescing party has knowledge of the performance and opportunity for objection. Whenever a term defined by the Uniform Commercial Code is used herein, the definition contained in the Uniform Commercial Code shall control



**Fangtooth Inc.**  
**11790 Mayfield St**  
**Livonia, MI 48150**  
**Ph 248-798-4877**



**ACTUATORS**



**GEAR  
BOXES**

**ROLLED  
BALLSCREWS**



**HIGH FORCE  
LIFTING JACKS  
& GUIDED RACK**



**MULTI  
AXIS  
SYSTEMS**



**CUSTOM  
ENGINEERED  
PRODUCTS**