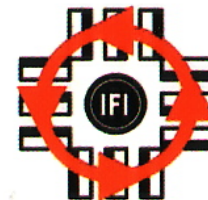


FRC Drivetrain Reference Tables



Varying Kitbot Speed by Changing Wheel Sprockets

CIM Motor with KOP (1:12) Transmission				
Transmission Sprocket	Wheel Sprocket	4" Wheel	6" Wheel	8" Wheel
15 tooth	24 tooth	4.05 ft/sec	6.07 ft/sec	8.1 ft/sec
15 tooth	28 tooth	3.47 ft/sec	5.21 ft/sec	6.94 ft/sec
15 tooth	30 tooth	-	4.86 ft/sec	6.48 ft/sec
15 tooth	36 tooth	-	4.05 ft/sec	5.4 ft/sec
15 tooth	40 tooth	-	3.64 ft/sec	4.86 ft/sec
15 tooth	44 tooth	-	-	4.42 ft/sec
15 tooth	48 tooth	-	-	4.05 ft/sec

Note: KOP Transmission comes with a 15 tooth output sprocket standard.

Coefficient of Friction	Maximum Robot Pushing Force (lbs)	
	100% Weight on Drive Wheels	50% Weight on Drive Wheels
Skyway Wheelchair Wheels: 0.8	118.4	59.2
FRC KOP-Wheels: 1.0	148	74
IFI Traction Wheels - Wedgetop Tread: 1.2	177.6	88.8
IFI Traction Wheels - Roughtop Tread: 1.3	192.4	96.2

Skyway Wheelchair Wheels:
FRC KOP-Wheels:
IFI Traction Wheels - Wedgetop Tread:
IFI Traction Wheels - Roughtop Tread:

$$\text{Pushing Force} = (\text{Wheel Coeff of Friction}) \times (\text{Weight on Drive Wheels})$$

Robot Current Draw under Max Drivetrain Load:

The tables below show the amount of current a robot's motors will draw in their maximum loaded configuration. (Pushing against a wall). In the example below, it is assumed the drivetrain is 90% efficient, and the robot weighs 148 lbs (120 lb robot + 13 lb battery + 15 lb bumpers). COF = Coefficient of Friction, (Skyway Wheelchair Wheels = 0.8, FRC-Kit of Parts Wheels = 1.0, IFI Roughtop Wheels = 1.3)

2x CIM Motor Drivetrain

2x CIM Motor Drivetrain

4x CIM Motor Drivetrain

4x CIM Motor Drivetrain

50% of Robot Weight on Driven Wheels

100% of Robot Weight on Driven Wheels

50% of Robot Weight on Driven Wheels

100% of Robot Weight on Driven Wheels

Robot Speed (ft / sec)	Current Draw per Motor (Amp)		
	0.8 COF	1.0 COF	1.3 COF
2	10.4	12.4	15.5
2.5	12.4	15.0	18.8
3	14.5	17.5	22.1
3.5	16.5	20.0	25.4
4	18.5	22.6	28.7
4.5	20.6	25.1	32.0
5	22.6	27.7	35.3
5.5	24.6	30.2	38.6
6	26.6	32.7	41.9
6.5	28.7	35.3	45.2
7	30.7	37.8	48.4
7.5	32.7	40.3	51.7
8	34.8	42.9	55.0
8.5	36.8	45.4	58.3
9	38.8	47.9	61.6
9.5	40.8	50.5	64.9
10	42.9	53.0	68.2
10.5	44.9	55.5	71.5
11	46.9	58.1	74.8
11.5	49.0	60.6	78.1
12	51.0	63.2	81.4
12.5	53.0	65.7	84.7
13	55.0	68.2	88.0
13.5	57.1	70.8	91.3
14	59.1	73.3	94.6
14.5	61.1	75.8	97.9
15	63.2	78.4	101.2

Robot Speed (ft / sec)	Current Draw per Motor (Amp)		
	0.8 COF	1.0 COF	1.3 COF
2	18.5	22.6	28.7
2.5	22.6	27.7	35.3
3	26.6	32.7	41.9
3.5	30.7	37.8	48.4
4	34.8	42.9	55.0
4.5	38.8	47.9	61.6
5	42.9	53.0	68.2
5.5	46.9	58.1	74.8
6	51.0	63.2	81.4
6.5	55.0	68.2	88.0
7	59.1	73.3	94.6
7.5	63.2	78.4	101.2
8	67.2	83.4	107.8
8.5	71.3	88.5	114.4
9	75.3	93.6	121.0
9.5	79.4	98.7	127.6
10	83.4	103.7	134.1
10.5	87.5	108.8	140.7
11	91.5	113.9	147.3
11.5	95.6	118.9	153.9
12	99.7	124.0	160.5
12.5	103.7	129.1	167.1
13	107.8	134.1	173.7
13.5	111.8	139.2	180.3
14	115.9	144.3	186.9
14.5	120.0	149.4	193.5
15	124.0	154.4	200.1

Robot Speed (ft / sec)	Current Draw per Motor (Amp)		
	0.8 COF	1.0 COF	1.3 COF
2	6.4	7.4	8.9
2.5	7.4	8.6	10.5
3	8.4	9.9	12.2
3.5	9.4	11.2	13.8
4	10.4	12.4	15.5
4.5	11.4	13.7	17.1
5	12.4	15.0	18.8
5.5	13.5	16.2	20.4
6	14.5	17.5	22.1
6.5	15.5	18.8	23.7
7	16.5	20.0	25.4
7.5	17.5	21.3	27.0
8	18.5	22.6	28.7
8.5	19.5	23.9	30.3
9	20.6	25.1	32.0
9.5	21.6	26.4	33.6
10	22.6	27.7	35.3
10.5	23.6	28.9	36.9
11	24.6	30.2	38.6
11.5	25.6	31.5	40.2
12	26.6	32.7	41.9
12.5	27.7	34.0	43.5
13	28.7	35.3	45.2
13.5	29.7	36.5	46.8
14	30.7	37.8	48.4
14.5	31.7	39.1	50.1
15	32.7	40.3	51.7

Robot Speed (ft / sec)	Current Draw per Motor (Amp)		
	0.8 COF	1.0 COF	1.3 COF
2	10.4	12.4	15.5
2.5	12.4	15.0	18.8
3	14.5	17.5	22.1
3.5	16.5	20.0	25.4
4	18.5	22.6	28.7
4.5	20.6	25.1	32.0
5	22.6	27.7	35.3
5.5	24.6	30.2	38.6
6	26.6	32.7	41.9
6.5	28.7	35.3	45.2
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7.5	32.7	40.3	51.7
8	34.8	42.9	55.0
8.5	36.8	45.4	58.3
9	38.8	47.9	61.6
9.5	40.8	50.5	64.9
10	42.9	53.0	68.2
10.5	44.9	55.5	71.5
11	46.9	58.1	74.8
11.5	49.0	60.6	78.1
12	51.0	63.2	81.4
12.5	53.0	65.7	84.7
13	55.0	68.2	88.0
13.5	57.1	70.8	91.3
14	59.1	73.3	94.6
14.5	61.1	75.8	97.9
15	63.2	78.4	101.2

Legend: Under 40A Breaker Limit Risk of Popping Breakers Outside Safe Zone