



# Prime Drives Inc.

## DS SERIES DIRECT DRIVE SERVO MOTORS

### System Features:

- Absolute Accuracy as low as +/- 3 arc-sec
- Resolution up to .25 arc-sec/count
- Repeatability as low as +/- .5 arc-sec
- Power up to 3,000 watts
- Speeds up to 3,670 RPM
- Peak torque up to 119 N-m
- Continuous torque up to 29.4 N-m
- Height as low as 80mm
- Back EMF constants from 30 VDC/Krpm to 400 VDC/Krpm
- Digital encoder feedback or 1Vpp sin/cos
- Number of motor poles as high as 16
- Superior slow speed performance
- Mechanical runout as low as 10 microns
- Flexibility to adapt our design to your system requirements



# ABOUT PRIME DRIVES

At Prime Drives we are dedicated to the art of precise rotary motion. We design, engineer and manufacture products that provide power, feedback and mechanical support for rotational applications. All of this in a single package that can be easily integrated into your system.

We realize that all too often designers are forced to adapt their designs to components that are commercially available. The foundation for Prime Drives direct drive motor is a focused adherence to a “design for flexibility”. Empowering your designers with flexibility results in a better system design requiring a shorter amount of development time. At Prime Drives we believe our product should adapt to your requirements, not the reverse.

Our direct drive technology enables us to reach absolute accuracies as low as  $\pm 0.3$  arc-sec with resolutions as high as 4,736,000 post quadrature counts per revolution while delivering as much as 3,000 watts of power. Using a high precision crossed roller bearing for support, our direct drive motor supports as much as 3,000 N-m of moment load and 1,000 N of axial load. By using up to 16 motor poles Prime Drives' motors provide superior slow speed performance.

To further reduce development time and increase design reliability we provide all the tools your designers might need to specify and integrate our motor into your application. Online access to winding data via user friendly spreadsheets allows your engineers to pick just the right winding. A library of 3D CAD models speeds up the time your designers need to integrate our product into your system. And of course, our engineers are always available to answer any technical questions your designers might have.

## Industries Served:

- Medical Equipment
- Semiconductor Equipment
- Grinding Industry
- Inspection Equipment
- Automotive Automation
- Homeland Security
- Aviation Automation
- Filming Industry
- Food Packaging
- Solar Manufacturing Equipment
- Metrology

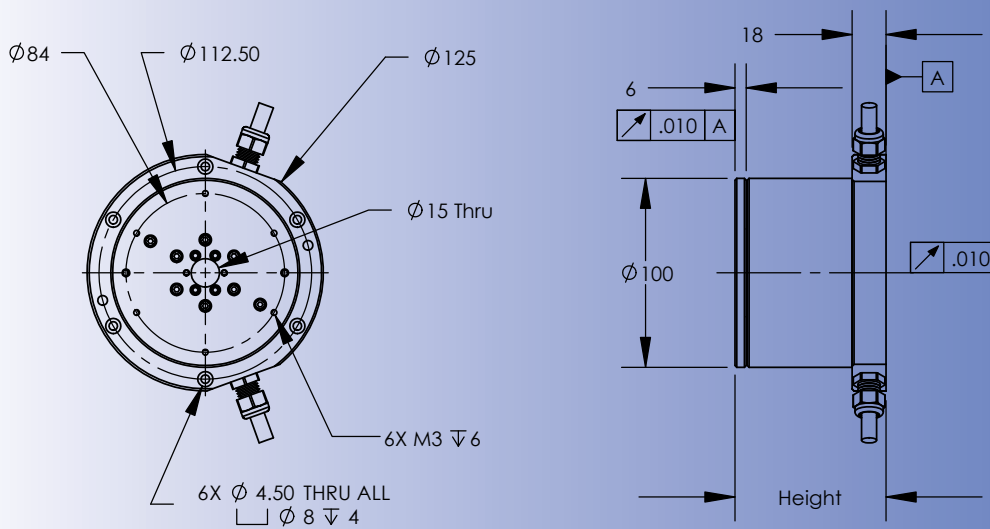


# FLEXIBILITY TO MATCH YOUR DESIGN REQUIREMENTS

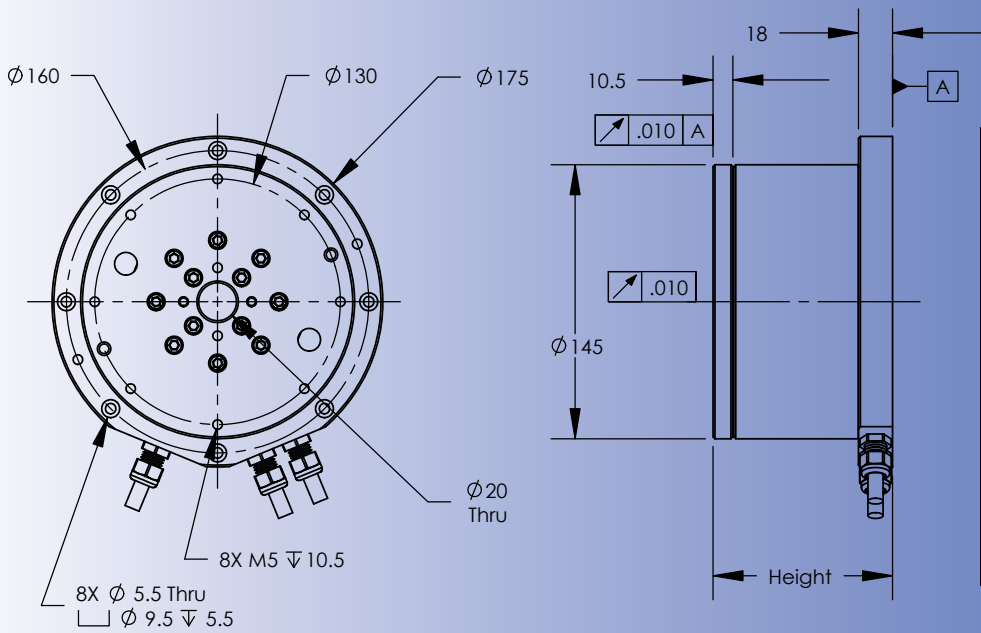


At Prime Drives we are determined to tailor our motor solutions to our customers' applications. Our flexible design allows us to adapt key design parameters to to your application. Our engineer's will work closely with yours to develop a solution with the power, absolute accuracy, resolution, cable egress, size, winding constants

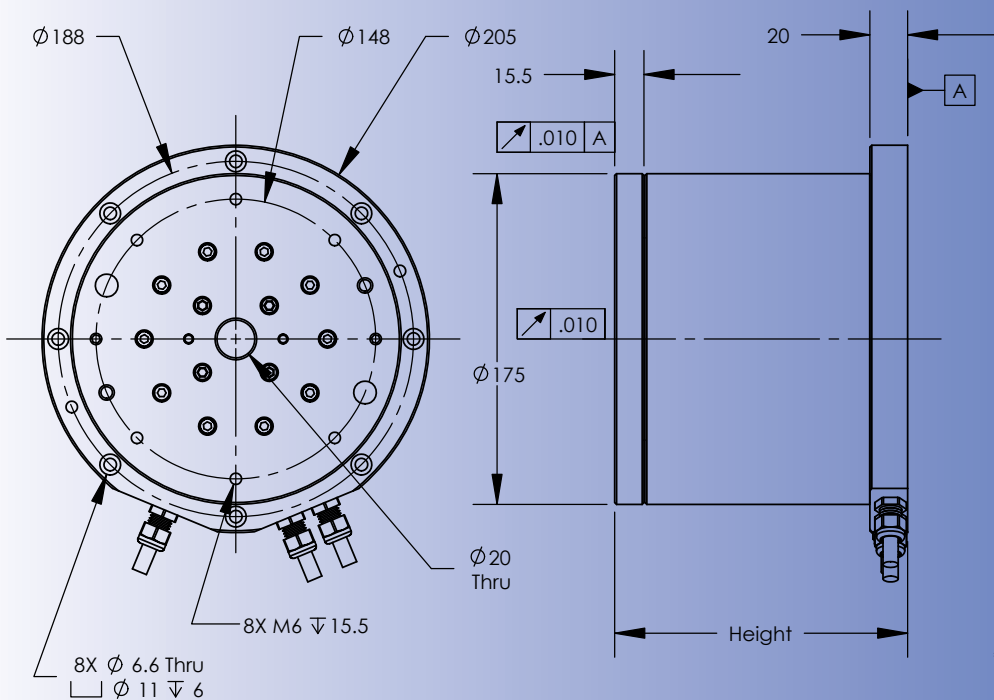
and cable termination that best matches your design requirements. We can provide a motor only solution to work with your controller or build a system level solution including controller, amplifier and interface cables. Rather than force your application to adapt to our motors we adapt our motors to fit your application.



DS100 Mechanical Parameters				
Height (mm)	80	93	106	119
Power (watts)	100	150	230	280
Continuous Torque (N-m)	.5	1.0	1.3	1.7
Peak Torque (N-m)	3.5	5.0	6.6	8.9
Rated Axial Load* (N)	100	100	100	100
Rated Moment Load* (N-m)	300	300	300	300
Rotor Inertia (Kg-m <sup>2</sup> )	.00029	.00031	.00033	.00035
Mass (Kg)	2.2	2.6	2.9	3.2



DS145 Mechanical Parameters					
Height (mm)	95	105	115	125	135
Power (watts)	360	670	910	1,250	1,500
Continuous Torque (N-m)	2.4	4.4	6.1	8.2	9.9
Peak Torque (N-m)	7.9	16.9	24.9	32.8	41.8
Rated Axial Load* (N)	500	500	500	500	500
Rated Moment Load* (N-m)	1,500	1,500	1,500	1,500	1,500
Rotor Inertia (Kg-m <sup>2</sup> )	.0023	.0025	.0027	.0029	.0031
Mass (Kg)	4.4	5.1	5.9	6.7	7.4



DS175 Mechanical Properties					
Height (mm)	130	155	180	205	235
Power (watts)	750	1,500	2,000	2,500	3,000
Continuous Torque (N-m)	6.7	14.2	19.2	23.9	29.4
Peak Torque (N-m)	28.0	47.5	71.1	94.9	118.9
Rated Axial Load* (N)	1,000	1,000	1,000	1,000	1,000
Rated Moment Load* (N-m)	3,000	3,000	3,000	3,000	3,000
Rotor Inertia (Kg-m <sup>2</sup> )	.0075	.0081	.0087	.0093	.0099
Mass (Kg)	12.1	14.0	17.0	21.3	25.6

\*Load will vary dependent on life requirements  
Consult factory for life expectancy based on your load

Available Encoder Options**				
DS Series	Resolution (post quad cts/rev)	High Grade Abs Accuracy (+/- arc-sec)	Precision Grade Abs Accuracy (+/- arc-sec)	Repeatability (+/- arc-sec)
DS100	8,192 (1Vpp)	45	N/A	consult factory
	32,768	45	15	40
	163,840	45	15	10
	327,680	45	15	4
	819,200	45	15	2
	1,638,400	45	15	2
	3,276,800	45	15	.5
DS145 and DS175	11,840 (1Vpp)	30	3	consult factory
	40,000	240	N/A	40
	80,000	240	N/A	40
	47,360	30	3	30
	236,800	30	3	6
	473,600	30	3	4
	1,184,000	30	3	2
	2,368,000	30	3	1
	4,736,000	30	3	.5

### Sample Winding Constants\*

DS Motor	Torque, Peak N-m	Torque, Cont N-m	Torque Sensitivity N-m/Arms	Armature Resistance Ohms	Back EMF Constant Vdc/Krpm	Current @ Tc Arms
DS100-80-D0	3.5	0.5	0.68	35.0	50	1.1
DS100-80-B0	3.5	0.5	0.41	11.5	30	1.8
DS100-92-K0	5.0	1.0	1.62	65.7	120	0.8
DS100-92-F0	5.0	1.0	0.95	21.8	70	1.5
DS100-106-V0	6.6	1.3	2.43	103.7	180	0.8
DS100-106-K0	6.6	1.3	1.62	42.7	120	1.1
DS100-106-G0	6.6	1.3	1.08	18.2	80	1.6
DS100-119-SA	8.9	1.7	3.24	128.7	240	0.7
DS100-119-V0	8.9	1.7	2.43	67.8	180	0.9
DS100-119-K0	8.9	1.7	1.62	28.2	120	1.4
DS145-95-V0	7.9	2.4	2.43	50.5	180	1.3
DS145-95-K0	7.9	2.4	1.62	21.2	120	2.5
DS145-105-SA	16.9	4.4	3.24	26.5	240	2.3
DS145-105-K0	16.9	4.4	1.62	6.8	120	3.7
DS145-115-SE	24.9	6.1	5.40	39.6	400	1.6
DS145-115-W0	24.9	6.1	2.70	10.0	200	3.2
DS145-125-SE	32.8	8.2	5.40	28.9	400	2.0
DS145-125-W0	32.8	8.2	2.70	7.2	200	4.0
DS145-135-SE	41.8	9.9	5.40	21.0	400	2.5
DS145-135-W0	41.8	9.9	2.70	5.2	200	4.3
DS175-130-SE	28.0	6.7	5.40	36.7	400	1.7
DS175-130-SA	28.0	6.7	3.24	12.3	240	2.9
DS175-155-SE	47.5	14.2	5.40	11.8	400	3.6
DS175-155-SA	47.5	14.2	3.24	4.5	240	5.8
DS175-180-SE	71.1	19.2	5.40	6.5	400	4.3
DS175-180-SA	71.1	19.2	3.24	2.4	240	8.1
DS175-205-SE	94.9	23.9	5.40	4.8	400	6.0
DS175-205-SA	94.9	23.9	3.24	1.6	240	10.4
DS175-230-SE	118.5	29.4	5.40	3.6	400	7.3
DS175-230-SA	118.5	29.4	3.24	1.4	240	11.9

### Available Motor Windings

Back EMF Constant (Ke Vpeak/Krpm)	Designator	DS100-80	DS100-92	DS100-106	DS100-119	DS145-95	DS145-105	DS145-115	DS145-125	DS145-135	DS175-130	DS175-155	DS175-180	DS175-205	DS175-230
30	B0	X	X	X	X	X	X	X	X	X	X	X			
40	C0	X	X	X	X	X	X	X	X	X	X	X			
50	D0	X	X	X	X	X	X	X	X	X	X	X	X		
60	E0		X	X	X	X	X	X	X	X	X	X	X	X	
70	F0		X	X	X	X	X	X	X	X	X	X	X	X	X
80	G0		X	X	X	X	X	X	X	X	X	X	X	X	X
100	J0		X	X	X	X	X	X	X	X	X	X	X	X	X
120	K0		X	X	X	X	X	X	X	X	X	X	X	X	X
140	L0			X	X	X	X	X	X	X	X	X	X	X	X
160	M0			X	X	X	X	X	X	X	X	X	X	X	X
180	V0			X	X	X	X	X	X	X	X	X	X	X	X
200	W0				X		X	X	X	X	X	X	X	X	X
240	SA				X		X	X	X	X	X	X	X	X	X
280	SB							X	X	X	X	X	X	X	X
320	SC							X	X	X	X	X	X	X	X
360	SD							X	X	X	X	X	X	X	X
400	SE							X	X	X	X	X	X	X	X

\* Further options are available consult factory or website for additional winding data

\*\* Further options are available consult factory or website for additional feedback options

# SPECIFYING A PART NUMBER

**DSV-H-W-X-Y-Z**

**Example:** DS145-95-K0-H-1184000-H is a: 145 series motor  
 95mm tall  
 120 V/Krpm back EMF winding  
 with hall sensors  
 1,184,000 post quad cts/rev encoder  
 High accuracy grade

**ACCURACY GRADE**

H = High  
 P = Precision

**ENCODER RESOLUTION** (Post Quad Cts/Rev)

DS100 SERIES	DS145 SERIES	DS175 SERIES
8,192 (1Vpp, sin/cos)	11,840 (1Vpp, sin/cos)	11,840 (1Vpp, sin/cos)
8,192 (no thru bore)	8,192 (no thru bore)	8,192 (no thru bore)
32,768	47,360	47,360
163,840	40,000 (no thru bore)	40,000 (no thru bore)
327,680	80,000 (no thru bore)	80,000 (no thru bore)
819,200	236,800	236,800
1,638,400	473,600	473,600
3,276,800	1,184,000	1,184,000
	2,368,000	2,368,000
	4,736,000	4,736,000

**HALL SENSOR OPTION**

H = with hall effect sensors  
 N = no hall effect sensors

**WINDING SELECTION**

**HEIGHT**

DS100 SERIES	DS145 SERIES	DS175 SERIES
80 = 80mm	95 = 95mm	130 = 130mm
93 = 93mm	105 = 105mm	155 = 155mm
106 = 106mm	115 = 115mm	180 = 180mm
119 = 119mm	125 = 125mm	205 = 205mm
	135 = 135mm	230 = 230mm

**SERIES IDENTIFIER** (Rotating Diameter)

100 = 100mm Series  
 145 = 145mm Series  
 175 = 175mm Series

## MAXIMUM SPEED CHART

Min Receiver Clock Frequency (MHz)	32,768 cts/rev	163,840 cts/rev	327,680 cts/rev	819,200 cts/rev	1,638,400 cts/rev	3,276,800 cts/rev
50	3,673	3,673	3,673	2,380	1,190	595
40	3,673	3,673	3,673	1,983	992	496
25	3,673	3,673	2,975	1,190	595	297
20	3,673	3,673	2,479	992	496	248
12	3,673	3,306	1,653	661	331	165
10	3,673	2,975	1,487	595	297	149
8	3,673	2,380	1,190	474	238	119
6	3,673	1,653	826	331	165	83
4	3,673	1,238	617	246	124	62
1	1,543	309	154	59	31	15

Min Receiver Clock Frequency (MHz)	47,360 cts/rev	236,800 cts/rev	473,600 cts/rev	1,184,000 cts/rev	2,368,000 cts/rev	4,736,000 cts/rev
50	2,546	2,546	2,546	1,650	825	413
40	2,546	2,546	2,546	1,375	688	344
25	2,546	2,546	2,063	825	413	206
20	2,546	2,546	1,719	688	344	172
12	2,546	2,292	1,146	458	229	115
10	2,546	2,063	1,031	413	206	103
8	2,546	1,650	825	328	165	83
6	2,546	1,146	573	229	115	57
4	2,546	858	428	171	86	43
1	1,070	214	107	41	21	11