



DB SERIES

Belt Drive Actuators

High Speed Linear Actuators



DB SERIES

DB Series

High Speed Long Travel

Positive Belt Drive

High Output Gearheads

Steel or Plastic Bearings

Custom Designs



Del-Tron's belt-driven DB series actuators operate at speeds up to 5.1 meters per second (MPS) and do not require lubrication or maintenance under normal operating conditions. Del-Tron's DB series actuators are ideal for use in applications where speed is critical such as pick-and-place applications on high speed automation equipment. Another advantage of the new DB series is that they can provide travel lengths up to 6 meters while maintaining repeatability of ± 0.025 mm and linear accuracy of ± 0.083 mm per meter.

New DB series actuators feature a steel-reinforced polyurethane belt that helps deliver repeatable positioning by avoiding belt stretching. The positive timing belt drive provides further improvements in accuracy and speed. A proprietary extrusion design provides long travel, smooth movements, and excellent repeatability. DB series actuators are available standard to accept NEMA 17, 23, and 34 motors and can be configured to accept other sizes.

The DB series planetary gearheads contribute to the performance of the actuators by providing gear geometry optimized for planetary systems using zero helix angle gears to avoid unbalanced forces caused by helical gears. Generously-sized sealed deep-groove ball bearings support the output shaft. All gears are case hardened for high surface hardness and high strength ductile core. The gearhead handles input speeds up to 10,000 rpm and delivers exceptionally high output loads.

Different types of bearings are offered. Steel concave rollers (DBM) riding on chrome-plated steel rails provide excellent positioning accuracy even in applications that require long travel. A plastic coated needle (DBN) bearing assembly offers the highest possible speeds. Finally, plastic bearings (DBP) running on aluminum rails provide the ultimate in durability in tough push-pull applications. The steel bearings are supplied with lifetime lubrication while both types of plastic bearings require no lubrication at all.

Del-Tron applications engineers can help you select the appropriate belt actuator and gear box for your application. Del-Ton can also provide special designs of DB series actuators for nearly any application. To request a quotation please use the form provided.

Specifications

Specifications	Del-Tron Model	DBM-95	DBN-325
	Units		
Repeatability	in		±.001
	mm		±0.025
Linear Accuracy	in/36		±.003
	mm/m		±0.083
Breakaway Torque	oz-in		8 TO 10
	Nm		0.057 TO 0.071
Belt Tensile Limit	lbs		1150
	N		5120
Belt Running Load	lbs		288
	N		1280
Travel/Revolution	in/rev		4.134
	mm/rev		105
Pulley Diameter	in		1.316
	mm		33.426
Pulley Weight	oz		5.24 (DS); 4.81 (SS); 4.37 (NS)
	kg		0.149 (DS); 0.136 (SS); 0.124 (NS)
Maximum Speed	in/sec		200
	m/s		5.1
Acceleration Exceeding Motor Mount/Coupling	G's		5
	Nema		23; 34
Straight Line Accuracy	in/36"	±.003	±.015
	mm/m	±.07	±.38
Shipping Weight First Meter of Length	lbs	10.0	6.8
	kg	4.5	3.1
Additional Per Meter	lbs	4.0	3.6
	kg	1.8	1.6
Inertia			
Cart & Hardware	lbs-in-s ²	1.29481E-03	3.17030E-03
	kg-m ²	1.46294E-04	3.58196E-04
Belt/First Meter of Travel	lbs-in-s ²	2.55233E-04	2.81280E-04
	kg-m ²	2.88375E-05	3.17804E-05
Pulleys	lbs-in-s ²	1.16951E-03 (DS); 1.15846E-03 (SS); 1.11474E-03 (NS)	
	kg-m ²	1.32137E-04 (DS); 1.30888E-04 (SS); 1.29640E-04 (NS)	
Weight			
Cart & Hardware	lbs	1.155	2.829
	kg	0.524	1.283
Belt/Meter of Travel	lbs/meter		0.095
	kg/meter		0.043

DS = Double Shafted pulley
SS = Single shaft pulley
NS = Pulley without protruding shaft

Specifications

Specifications	Del-Tron Model	DBP-125	DBP-225	DBP-325
	Units			
Repeatability	in		±.001	
	mm		±0.025	
Linear Accuracy	in/36		±.003	
	mm/m		±0.083	
Breakaway Torque	oz-in		12 TO 16	
	Nm		0.085 TO 0.113	
Belt Tensile Limit	lbs		1150	
	N		5120	
Belt Running Load	lbs		288	
	N		1280	
Travel/Revolution	in/rev		4.134	
	mm/rev		105	
Pulley Diameter	in		1.316	
	mm		33.426	
Pulley Weight	oz		5.24 (DS); 4.81 (SS); 4.37 (NS)	
	kg		0.149 (DS); 0.136 (SS); 0.124 (NS)	
Maximum Speed	in/sec		20 to 30 - load dependent	
	m/s		0.51 to 0.76 - load dependent	
Acceleration Exceeding Motor Mount/Coupling	G's		up to 2 - load dependent	
	Nema		23; 34	
Straight Line Accuracy	in/36"		±.030	
	mm/m		±.76	
Shipping Weight First Meter of Length	lbs	4.6	5.3	6.0
	kg	2.1	2.4	2.7
Additional Per Meter	lbs	3.0	3.0	3.0
	kg	1.4	1.4	1.4
Inertia				
Cart & Hardware	lbs-in-s ²	9.48866E-04	1.75689E-03	2.56738E-03
	kg-m ²	1.07208E-04	1.98502E-04	2.90075E-04
Belt/First Meter of Travel	lbs-in-s ²	2.59930E-04	2.70605E-04	2.81280E-04
	kg-m ²	2.93682E-05	3.05743E-05	3.17804E-05
Pulleys	lbs-in-s ²	1.16951E-03 (DS); 1.15846E-03 (SS); 1.11474E-03 (NS)		
	kg-m ²	1.32137E-04 (DS); 1.30888E-04 (SS); 1.29640E-04 (NS)		
Weight				
Cart & Hardware	lbs	0.847	1.567	2.291
	kg	0.384	0.711	1.039
Belt/Meter of Travel	lbs/meter		0.095	
	kg/meter		0.043	

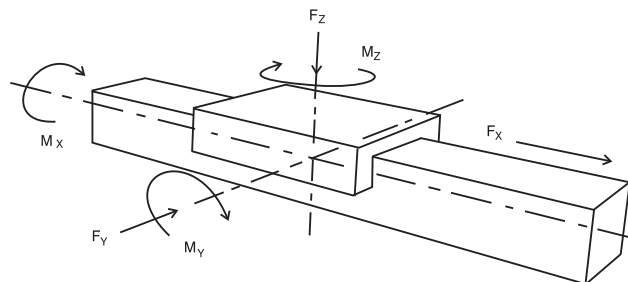
DS = Double Shafted pulley

SS = Single shaft pulley

NS = Pulley without protruding shaft

System Allowable Loads

		DBM-95	DBN-325	DBP-125	DBP-225	DBP-325
LOADS (Dynamic)						
Fz max	[N]	240	220			
	[Lbs]	54	49			
Fz max (Tension)	[N]			125	328	530
	[Lbs]			28	74	119
Fz max (Compression)	[N]			220	577	933
	[Lbs]			49	130	210
Fy max	[N]	420	60	63	166	268
	[Lbs]	94	13	14	37	60
LOADS (Static)						
Foz max	[N]	200	280			
	[Lbs]	45	63			
Foz max (Tension)	[N]			2500	6560	10600
	[Lbs]			562	1474	2382
Foz max (Compression)	[N]			4400	11540	18660
	[Lbs]			989	2593	1493
Foy max	[N]	330	300	1260	3320	5360
	[Lbs]	74	67	283	746	1204
MOMENTS (Dynamic)						
Mx max	[N-m]	3.4	2.1	661	1734	2802
	[Lb-in]	30	19	6	15	25
Mz max	[N-m]	10.7	5.4	634	4338	11355
	[Lb-in]	94	48	6	38	100
My max	[N-m]	6.1	11.2	626	4289	11226
	[Lb-in]	54	99	6	38	99
Moments (Static)						
Mox max	[N-m]	2.9	2.7	13220	34680	56040
	[Lb-in]	25	24	117	307	496
Moz max	[N-m]	8.4	27.1	12680	86760	227100
	[Lb-in]	74	240	112	768	2009
Moy max	[N-m]	5.1	14.2	12520	85780	224520
	[Lb-in]	45	126	111	759	1986



Belt Load Calculations-Metric

Require:

Units Load, Stroke, Velocity, Acceleration, Acceleration in time (Theoretical)
(N=Newtons, mm=millimeter, m/s=meter per second, m/s²=meter per second squared, s=seconds)

N Translating Mass=Load + System Mass(.384)

MM Belt Length=Stroke x 2 + System Length(See Table 1)

N Belt Mass=Length x Mass/meter(.043)

Kg-m² Translating Inertia=Moving Mass + Belt Mass x .000279

Kg-m² Total Inertia=Translating Inertia + System Inertia(.000262)

Nm Torque Due to Inertia=Total Inertia x Velocity x 59.83/Acceleration in time

Nm Torque Due to Friction=(.0978xLN(V)+.46)+ Load x Factor 1(See Table 1)

Nm Total Torque= Torque Due to Inertia + Torque Due to Friction

N Calculated Load Due to Torque= Torque x 59.839

Safety Factor=Strength of Belt/Calculated Load

RPM Input speed=Velocity x 14.51

Table 1	Metric	
Model Number	System Length	Factor 1
DBP-125	435	0.0328
DBP-225	535	0.0328
DBP-325	635	0.0328
DBM-95	391	.00574
DBN-325	635	0.00738

Belt Load Calculations-Inch

Require:

Units Load, Stroke, Velocity, Acceleration, Acceleration in time (Theoretical)
(Lbs=pounds, in/s= inch per second, in/s²= inches per second-squared, s=seconds)

Lbs Translating Mass=Load + System Mass(.384)

In Belt Length= Stroke x 2 + System Length(See Table 1)

Lbs Belt Mass= Length x Mass/meter(.043)

lb-in-s² Translating Inertia=Moving Mass + Belt Mass x .000279

lb-in-s² Total Inertia= Translating Inertia + System Inertia(.000262)

lb-in Torque Due to Inertia=Total Inertia x Velocity x 59.83/Acceleration in time

lb-in Torque Due to Friction=(.0978 x LN(V)+.46)+Load x Factor 1(See Table 1)

lb-in Total Torque=Torque Due to Inertia + Torque Due to Friction

lb Calculated Load Due to Torque=Torque x 59.839

Safety Factor= Strength of Belt/Calculated Load

RPM Input speed=velocity x 14.51

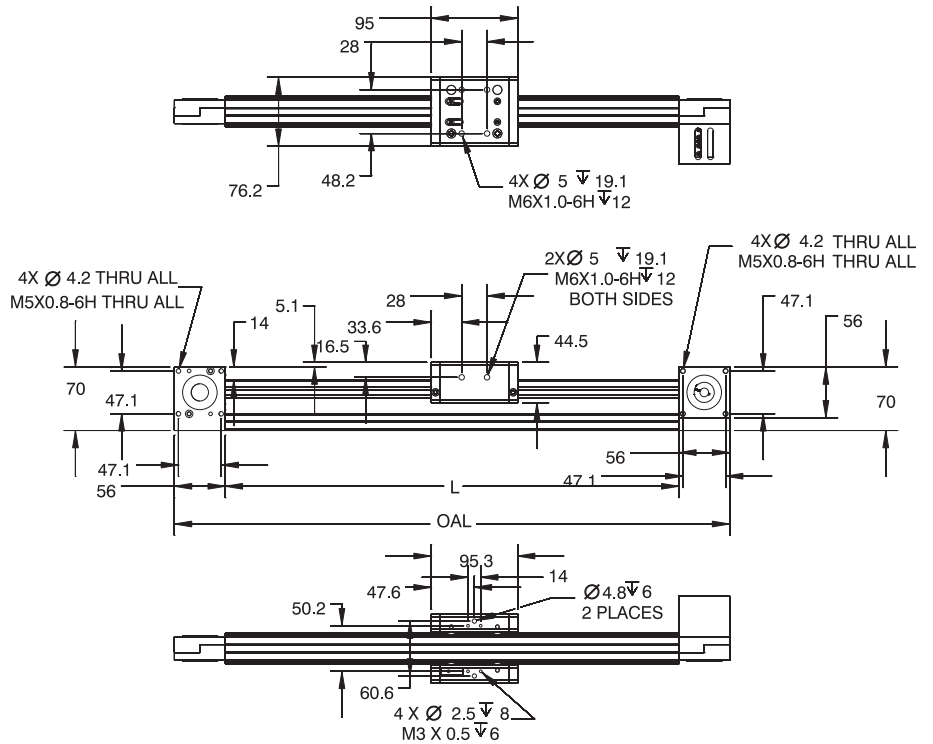
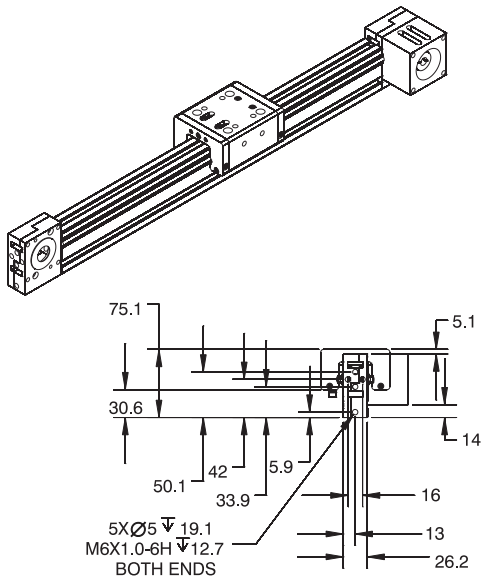
Table 1	Inch	
Model Number	System Length	Factor 1
DBP-125	17.125	0.1316
DBP-225	21.062	0.1316
DBP-325	24.999	0.1316
DBM-95	15.55	0.0023
DBN-325	24.999	0.0029

DBM-95

The DBM series utilizes steel concave rollers riding on chrome-plated steel rails to provide excellent positioning accuracy even in applications that require long travel. The steel bearings are supplied with lifetime lubrication. High acceleration and maximum speeds are possible with this series.

MODEL NUMBER	L	OAL	OT
DBM-95	TRAVEL + 148	TRAVEL + 260	53
OT=OVER TRAVEL DESIGNED IN SYSTEM			

MODEL	L	OAL	OT
DBM-95-150	298	410	53
DBM-95-300	448	560	
DBM-95-450	598	710	
DBM-95-600	748	860	

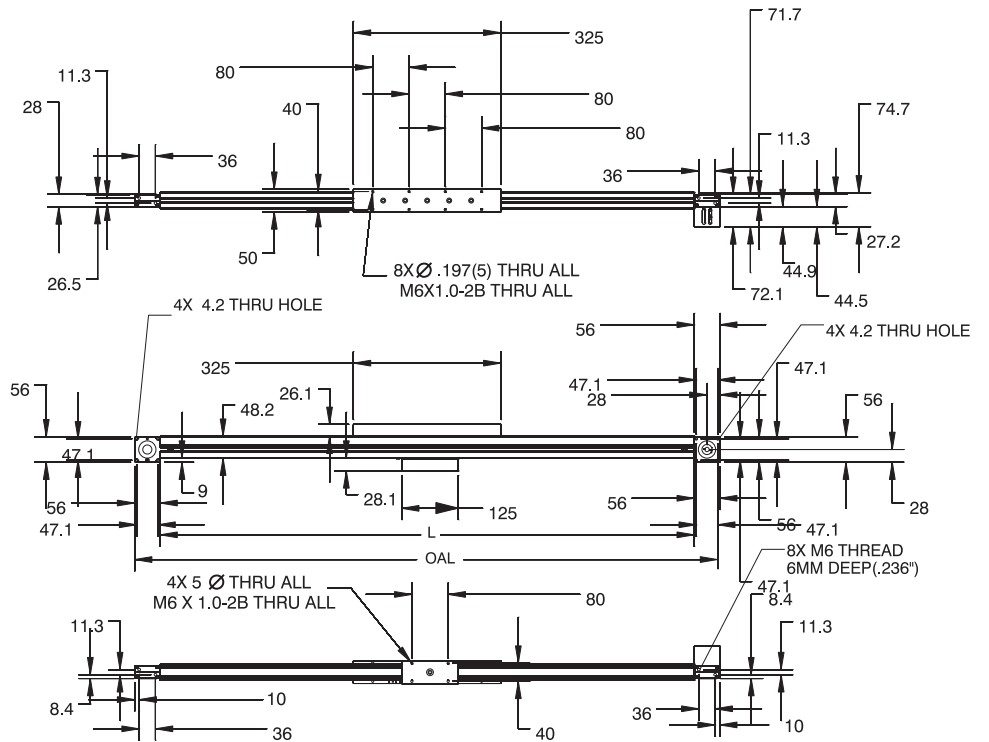
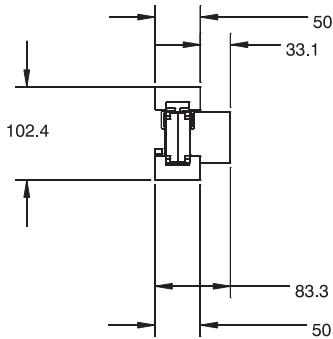
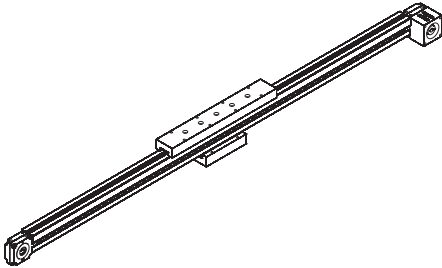


DBN-325

A plastic coated needle bearing assembly offered in this series allows the highest possible speeds while requiring no lubrication. High speeds and high G forces are no problem for this series

MODEL NUMBER	L	OAL	OT
DBN-325	TRAVEL + 388	TRAVEL + 500	63
OT=OVER TRAVEL DESIGNED IN SYSTEM			

MODEL	L	OAL	OT
DBN-325-150	538	650	63
DBN-325-300	688	800	
DBN-325-450	838	950	
DBN-325-600	988	1100	

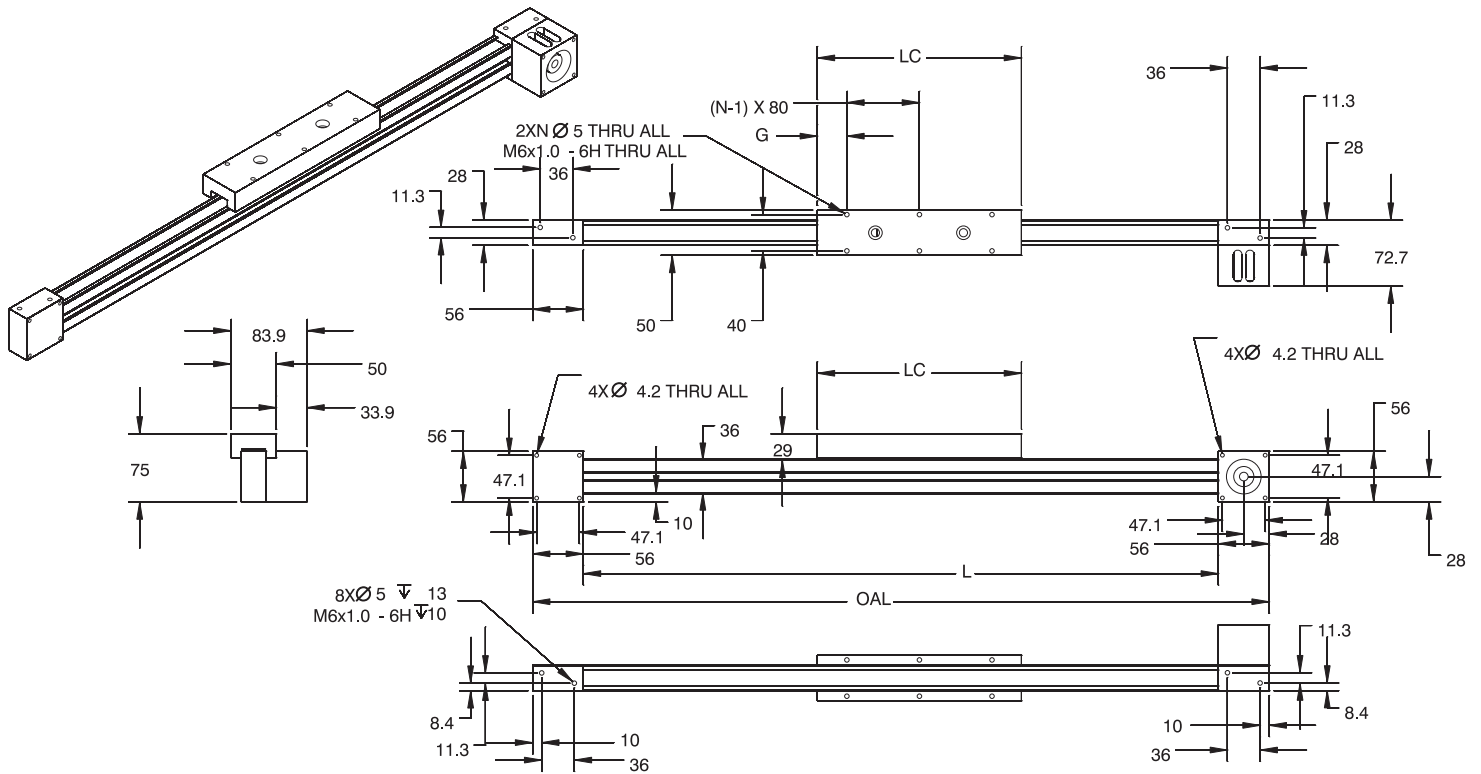


DBP Series

Plastic bearings running on aluminum rails provide the ultimate in durability in tough push-pull applications and require no lubrication. DBP actuators are the value leaders among Del-Tron's belt drive systems.

MODEL NUMBER	L	OAL	OT	LC	N	G
DBP-125	TRAVEL + 188	TRAVEL + 300	63	125	2	22.5
DBP-225	TRAVEL + 288	TRAVEL + 400	63	225	3	32.5
DBP-325	TRAVEL + 388	TRAVEL + 500	63	325	4	

OT=OVER TRAVEL DESIGNED IN SYSTEM



Planetary Servo Gearheads

OPTIMIZED GEAR GEOMETRY Gear geometry optimized for planetary system using zero helix angle gears to avoid unbalanced forces caused by helical gears. Crowned gear profile with tip relief.

CASE HARDENED GEARS All gears are case hardened for high surface hardness and high strength ductile core.

HIGH TORQUE DENSITY Industry highest torque ratings; 4 planets are used in the output stage to boost loadability.

APPLICATION FRIENDLY OPTIONS Available option such as solid free accessible high speed shaft, NEMA output flanges.

2 SIZES 40, 60mm round housing / ratios per size (3:1 to 512:1).

PLANETS SUPPORTED IN NEEDLE ROLLER BEARINGS Planets are supported in needle roller bearings for high loadability and precise run.

HIGH OUTPUT SHAFT LOADS Generously sized sealed deep-groove ball bearings supporting the output shaft.

LIFETIME LUBRICATION Lubricated for life with high grade synthetic grease.

HOUSING PROTECTION CLASS Dedicated input and output housing, protection class IP54.

FLEXIBLE MOUNTING Can be mounted to virtually any servo motor; using the patented PCS® clamping system.

STRONG CARRIER / OUTPUT SHAFT Planet carrier and output shaft are made of one integral piece.

INTEGRAL RING-GEAR & HOUSING Ring gears are machined directly into the housing, case hardened and honed.

TRUE, RELIABLE TORQUE RATINGS Transparent, reliable torque ratings, based on fatigue strength and L10 bearing life according to recognized standards.

HIGH INPUT SPEEDS Peak input speeds up to 10,000 rpm.

EXCEPTIONAL LONG RELIABLE LIFE Up to 5 years limited warranty on gearing.



Ratio	GEARHEAD SIZE - TORQUE RATING (1)		
	G 40	G 60	Stages (2)
3	4.5 (40)	12 (106)	1
4	6.0 (53)	16 (141)	1
5	6.0 (53)	16 (141)	1
8	5.0 (44)	15 (132)	1
9	20 (177)	44 (389)	2
12	20 (177)	44 (389)	2
15	18 (159)	44 (389)	2
16	20 (177)	44 (389)	2
20	20 (177)	44 (389)	2

(1) Rated torque is based on continuous duty, uniform load, 30 000 hrs L10 life at 100 rpm output speed. (2) Number of planetary reduction stages.

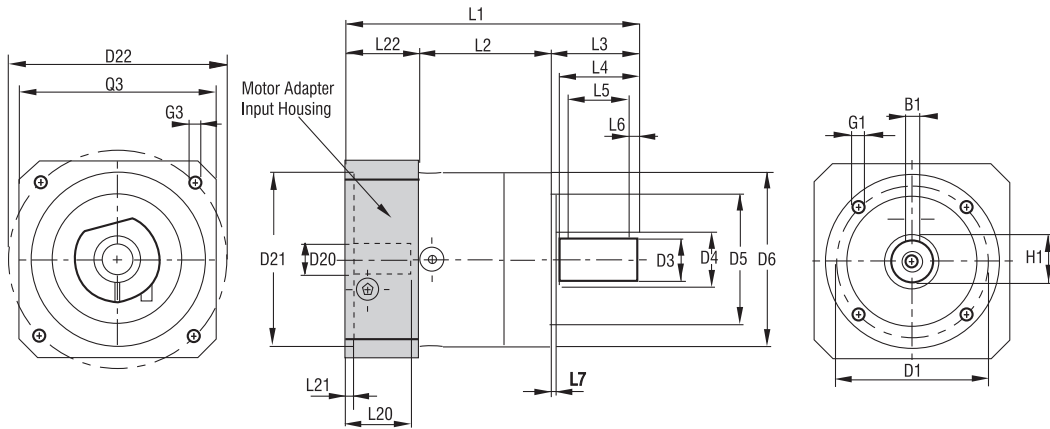
Efficiency at Full load %	Stages	PLE 40	PLE 60
		1	96
	2	94	94
Torsional Stiffness Nm/ang.min (lbin /arc.min)	1	0.45 (3.9)	1.5 (13.2)
	2	0.47 (4.1)	1.5 (13.2)
Rotational Backlash (3) (arc.min)	1	<30	<20
	2	<35	<25

(3) Maximum value of the rotational backlash measured at the output in arc minutes (1 arc min = 1 angular min). Average backlash is approximately 30% smaller than the listed worst case value.

Emergency Stop / Short Term Peak Torque 200% to 300% of the rated torque. The gearhead will withstand this torque only for a few thousand load cycles. -Torques at this magnitude shall not be part of the normal operating cycle!

		Stages	PLE 40	PLE 60
Output shaft max. radial load ⁽¹⁾	N (lb)	1,2	200 (44)	500 (112)
Output shaft max. axial load ⁽¹⁾	N (lb)	1,2	200 (44)	600 (134)
Max. peak input speed	rpm	1,2	10,000	8,000
Continuous input speed ⁽²⁾	rpm	1,2	4,500	4,000
Noise level ⁽³⁾ dBA		1,2	55	58
Gearhead weight	kg (lb)	1	0.35 (0.77)	0.9 (1.9)
		2	0.45 (0.99)	1.1 (2.4)
Max. motor weight	kg (lb)	1,2	2 (4.4)	3.5 (7.7)

(1) Based on 10,000 hrs. L10 life, 100 rpm mean output speed, radial load at shaft midpoint. (Detailed bearing life calculation utility is available at www.neugartusa.com or contact Neugart USA with the application data.) (2) Recommended continuous duty mean input rpm. The gearhead temperature shall not exceed 90°C (194°F). (3) Sound pressure level measured at 3,000 rpm, no load, at 1m distance from the gearhead.



		PLE 40	PLE 60
D1	Output flange bolt hole circle	34 (1.338)	52 (2.047)
G1	Mounting thread lengths	4x M4 x 6	M5 x 8
D3	Output shaft diameter	h7 10 (0.393)	14 (0.551)
D4	Shaft collar diameter	12 (0.472)	17 (0.669)
D5	Output flange pilot diameter	h7 26 (1.023)	40 (1.574)
D6	Housing diameter	40 (1.574)	60 (2.362)
L2	Main housing length	1 Stage 39 (1.535)	47 (1.850)
	2 Stage	52 (2.04)	59 (2.322)
L3	Shaft length (from pilot root)	26 (1.023)	35 (1.377)
L4	Shaft length (from the collar)	23 (0.905)	30 (1.181)
L5	Key length	18 (0.708)	25 (0.984)
L6	Distance from shaft end	2.5 (0.098)	2.5 (0.098)
L7	Pilot length	2 (0.078)	3 (0.118)
B1	Key width	3 (0.118)	5 (0.196)
H1	Key & Shaft height	11.2 (0.440)	16 (0.629)
Z	Thread in the output shaft	M3 x 9	M5 x 12
M	Thread x depth	8 (0.314)	11 (0.433)
D20	Maximum input pinion bore ⁽¹⁾	F7	14 (0.551) optional size
Available, standard bushing bore sizes		4; 5; 6; 6.35; 8	6; 6.35; 7; 8; 9; 9.525; 11; {12; 12.7; 14} ⁽¹⁾
mm			
in		0.157; 0.196; 0.236; 0.25; 0.314	0.236; 0.25; 0.275; 0.314; 0.354; 0.375; 0.433; 0.5; {0.472; 0.5; 0.551} ⁽¹⁾
Motor dependent dimensions: D21, D22, L1, L20, L21, L22, G3, Q3		Adaptor / Input Housing dimensions and unit overall length depend on motor shaft size, motor flange style and motor flange dimensions. To match your motor a customized adaptor / input housing is provided.	

For smaller diameter motor shafts matching bushing (insert) is used. See below the available standard bushing diameters.

(1) with optional 14 mm bore PLE 60 unit

Gearheads Continued

Lubrication

The 6 gearheads are lubricated for life with high grade synthetic grease "Kluberplex BEM 34-132" (Kluber Lubrication LP, - www.klueber.com). Under normal operating conditions it is not required to change or replenish the lubricant.

Mounting Positions

Any mounting position is permissible.

Operating Temperature

Temperature range is -25°C to +90° C (-13°F to 194°F) . Contact Del-Tron Precision if operating temperatures are outside this range.

Recommended Motor Flange / Motor shaft run out tolerances

The motor shaft run out and flange perpendicularity should be according to DIN 42955-R tolerances to avoid unnecessary bearing loads and associated heat build up along with possible premature bearing wear.

Seals

Integrated sealed bearing on input and output.

Protection Class

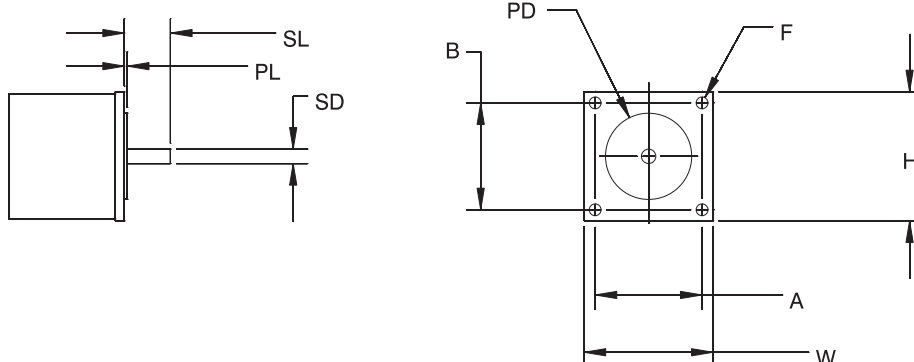
The enclosure protection class of the PLE planetary servo gearheads corresponds to class IP 54

Standard Motor Mount PLE Gearhead			
Moment of Inertia (at the input)		kgcm ² (in-lb-sec ² 10 ⁻⁴)	
PLE 40	PLE 60	Ratio	Stages
0.031 (0.27)	0.135 (1.19)	3	1
0.022 (0.19)	0.093 (0.82)	4	1
0.019 (0.16)	0.078 (0.69)	5	1
0.017 (0.15)	0.065 (0.57)	8	1
0.03 (0.26)	0.131 (1.15)	9	2
0.029 (0.25)	0.127 (1.12)	12	2
0.023 (0.2)	0.077 (0.68)	15	2
0.022 (0.19)	0.088 (0.77)	16	2
0.019 (0.16)	0.075 (0.66)	20	2

Motor Adaptors

Del-Tron standard motor adaptors are designed for motors with specifications as listed.

If you are using a motor with other specifications, please supply motor manufacturer and model number.



MANUFACTURER MODEL NO MOTOR MODEL	NEMA 17		NEMA23		NEMA 34	
	STEPPER ORIENTAL PK243 MT17	SERVO YASKAWA SGMAH-A3 MV17	STEPPER ORIENTAL PK264 MT23	SERVO YASKAWA SGMAH-02 MV23	STEPPER ORIENTAL PK296 MT34	SERVO YASKAWA SGMAH-08A MV34
A	31	32.5	47.14	49.49	69.58	63.64
B	31	32.5	47.14	49.49	69.58	63.64
F	4-40 THREADS	4.3 THRU HOLES	4.5 THRU HOLES	5.5 THRU HOLES	6.5 THRU HOLES	7 THRU HOLES
SD	5	6	6.36	14	12.7	16
SL	20	25	20.6	30	37	40
PD	22	30	38.1	50	73	70
PL	2	2.5	1.6	3	2	3
W	42	40	56.4	60	85	80
H	42	40	56.4	60	85	80

Dimensions in mm

Nomenclature

XXXX	XXX	XX	XXX	XX	XXXX	XX
Model Number	Stroke	Mounting Position	Gearhead	Ratio	Motor adaptor model number	Accessories
DBM-95	150	A1	G40	3	MT17	B
DBN-325	300	A2	G60	4	MV17	E1
DBP-125	450	A3	GCS	5	MT23	E2
DBP-225	600	A4	blank = no gearhead	8	MV23	E3
DBP-325	900	B1		9	MT34	FP
		B3		12	MV34	FR
				15	MCS	
				16	blank = no motor	
				20		

Mounting Position

A= single shaft, B= double shaft (double shaft location 1+2 only.)

GCS = customer supplied gearhead for mounting.

Blank = no gearhead.

Adapters for Motor Model Number

M= motor, T= stepper, V= servo, 17= NEMA 17,

23= NEMA 23, 34= NEMA 34.

MCS= Customer supplied motor

Blank= No motor

Accessories

B=Bumpers and are available only on the DBM series.

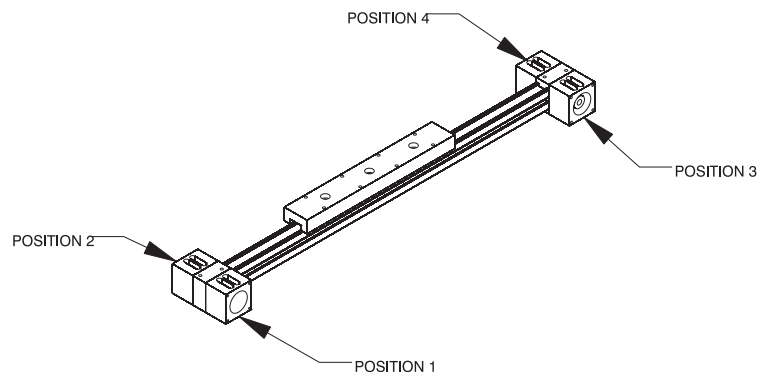
E1=One limit switch

E2=Two limit switches

E3=Three limit switches

FP=Mounting feet to attach to the pulley housing which has threads on the bottom for mounting.

FR=Mounting feet to attach to the rail through a drop in t-nut and be placed anywhere the customer would desire.



SHAFT PULLEY ASSEMBLY OPTIONS
A= SINGLE SHAFTED PULLEY
B= DOUBLE SHAFTED PULLEY

Del-Tron Precision Belt Actuator Application Form

If you would like Del-Tron Precision to select the appropriate Belt Actuator and Gearhead if needed for you application, please fill out the form below and either fax it to 203-778-2721 or email it to deltron@deltron.com.

Date _____

Name _____

Company Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Fax _____

Email _____

Cost Goal _____

Expected Delivery _____

Anticipated Number of Units _____

Stroke _____

Load _____

Velocity _____

Acceleration and Deceleration _____

Moment Load _____

Duty Cycle _____

Repeatability _____

Linear Accuracy _____

Operating Temperature _____

Life Requirement _____

Gearhead- Del-Tron Precision Supplied or Customer Supplied or Customer Mount or NA

Size _____ Ratio _____

Motor Type _____ Servo or Stepper _____

Del-Tron Precision Motor Adaptor (Circle One) MT23, MV23, MT34, MV34 Other

Other Motor Manufacturer and Model Number _____

Mounting of Actuator

Feet for Rail _____

Feet for Pulley Housing _____

Sensors Required

How Many _____

What Locations _____

Comments and Questions _____



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