

OFFSET STEPPER GEARMOTORS		Voltage	Gear Ratios	Max. Cont. Torque ozf in.	Step Angle	Max. Input Speed rpm	Page
NEMA Size	17	35V DC	5:1, 10:1, 18:1	160	1.8°	1000	14-2
	23	35V DC	5:1, 10:1, 18:1	320	1.8°	1000	14-3

HYBRID STEPPER GEARMOTORS		Max. Drive Voltage	Min. Holding Torque ozf in.	Step Angle	Page
NEMA Size	11	24V DC	7 – 15	1.8°	14-7
	14	80V DC	8 – 26	1.8°	14-9
	17	80V DC	17 – 62.8	.9° & 1.8°	14-11
	23	80V DC	54.2 – 264	1.8°	14-13
	23	160V DC	69 – 212	1.8°	14-15
	34	160V DC	850 – 1845	1.8°	14-17
	34	160V DC	150 – 636	1.8°	14-19
	42	160V DC	1125 – 1591	1.8°	14-21

D.C. GEARMOTORS		Voltage	Rated Torque ozf in.	No Load Speed rpm	Page
Size	20	3V DC	.2 – 32	.5 – 115	14-23
	20	6V DC	.2 – 32	.5 – 115	14-23
	20	12V DC	.2 – 32	.5 – 115	14-23

**Technical Notes:**

Stepper Motor Specifications - pg. 14-5

Hybrid Stepper Motors, NEMA Size 11 - pg. 14-6

Hybrid Stepper Motors, NEMA Size 14 - pg. 14-8

Hybrid Stepper Motors, NEMA Size 17 - pg. 14-10

Hybrid Stepper Motors, NEMA Size 23 - pgs. 14-12 &amp; 14-14

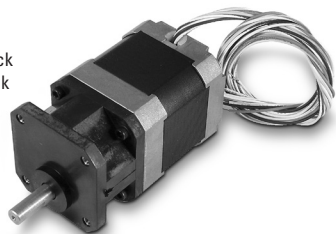
Hybrid Stepper Motors, NEMA Size 34 - pgs. 14-16 &amp; 14-18

Hybrid Stepper Motors, NEMA Size 42 - pg. 14-20

Wiring Configuration - pg. 14-22

1.8° NOMINAL MOTOR STEP ANGLE  
 5:1, 10:1, 18:1 GEAR RATIOS  
 LIGHT-DUTY

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**MATERIAL:**

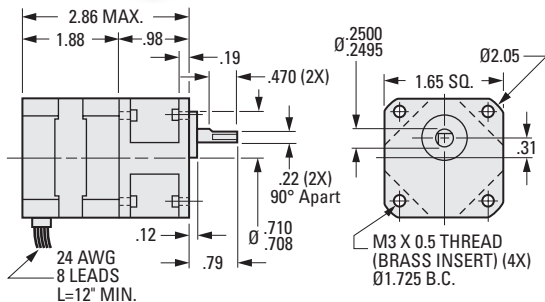
- Gearhead Housing** - Ryton® (Engineering Resin), Black
- Mounting Flanges** - Ryton® (Engineering Resin), Black
- Output Shaft** - Stainless Steel
- Gears** - Stainless Steel
- Bearings** - Composite Bushings

**OPERATING TEMPERATURE:**

-40°F to +255°F

**SPECIFICATIONS:**

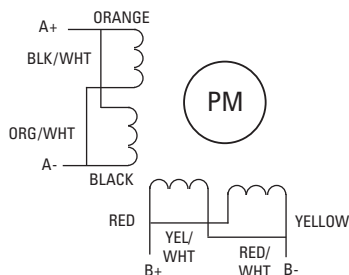
- Max. Input Speed:** 1000 rpm
- Shaft Loading - Radial:** 4 lbf
- Axial:** 4 lbf
- Shaft Play Max. - Radial:** .002
- Axial:** .010
- Gearhead Max. Cont. Torque:** 160 ozf in.
- Phase Resistance:** 3.3 ohms ± 10% @ 25°C
- Winding Inductance:** 3 mH ± 20%
- Rated Current:** 1.25 Amp. / Phase
- Min. Efficiency:** 80%
- Max. Backlash:** 45 arc min.



**WEIGHT:**

13 oz.

**SCHEMATIC**



**Bipolar Chopper Drive  
 Switching Sequence for CW  
 Rotation Facing Mounting End**

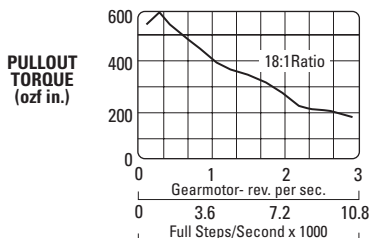
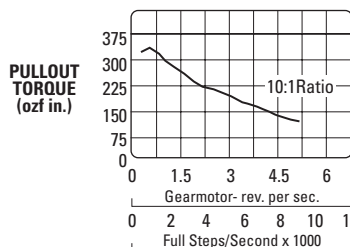
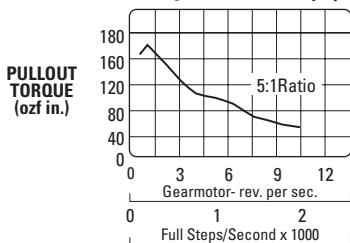
Step	A+	A-	B+	B-
0	+	-	+	-
1	-	+	+	-
2	-	+	-	+
3	+	-	-	+
4	+	-	+	-

**INCH COMPONENT**

Catalog Number	Gear Ratio	Torque Rating ozf in.		Maximum Inertia ozf in. sec. <sup>2</sup>
		Cont.	Holding	
S9117C-S18GM005	5:1	See Curve	222	2.67 x 10 <sup>-5</sup>
S9117C-S18GM010	10:1		444	1.82 x 10 <sup>-6</sup>
S9117C-S18GM018	18:1		799	2.97 x 10 <sup>-4</sup>

Step Angle is 1.8° per step.

**SPEED vs. TORQUE CHARACTERISTICS  
 Drive Setting 35V DC - 1.25 Amps per phase**



1.8° NOMINAL MOTOR STEP ANGLE  
5:1, 10:1, 18:1 GEAR RATIOS  
LIGHT-DUTY

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► MATERIAL:

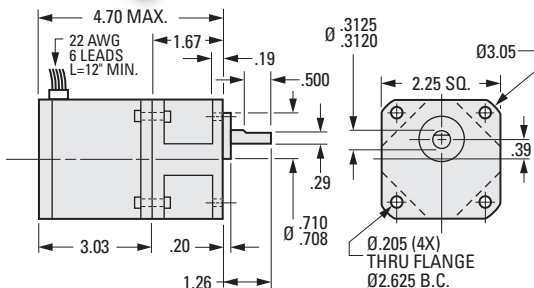
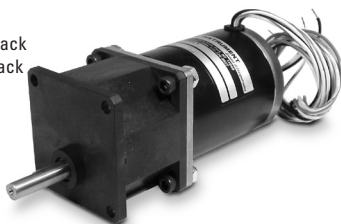
- Gearhead Housing** - Ryton® (Engineering Resin), Black
- Mounting Flanges** - Ryton® (Engineering Resin), Black
- Output Shaft** - Stainless Steel
- Gears** - Stainless Steel
- Bearings** - Composite Bushings

► OPERATING TEMPERATURE:

-40°F to +255°F

► SPECIFICATIONS:

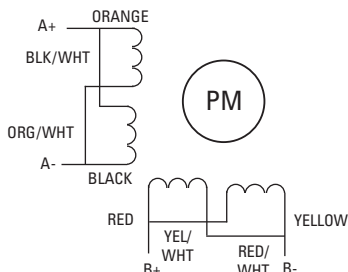
- Max. Input Speed:** 1000 rpm
- Shaft Loading - Radial:** 15 lbf
- Axial:** 15 lbf
- Shaft Play Max. - Radial:** .002
- Axial:** .010
- Gearhead Max. Cont. Torque:** 320 ozf in.
- Phase Resistance:** .37 ohms ± 10% @ 25°C
- Winding Inductance:** .6 mH ± 20%
- Rated Current:** 4.70 Amp. / Phase
- Min. Efficiency:** 80%
- Max. Backlash:** 45 arc min.



► WEIGHT:

45 oz.

SCHEMATIC



**Bipolar Chopper Drive  
Switching Sequence for CW  
Rotation Facing Mounting End**

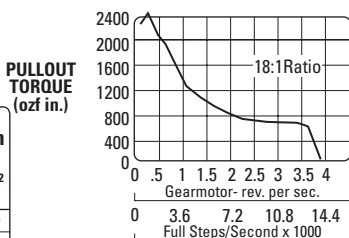
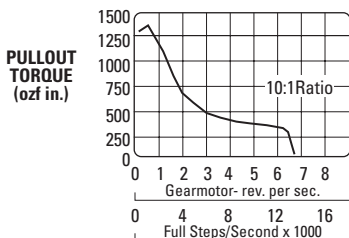
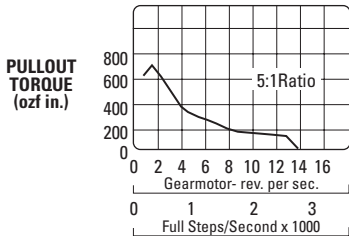
Step	A+	A-	B+	B-
0	+	-	+	-
1	-	+	+	-
2	-	+	-	+
3	+	-	-	+
4	+	-	+	-

**INCH COMPONENT**

Catalog Number	Gear Ratio	Torque Rating ozf in.		Maximum Inertia ozf in. sec. <sup>2</sup>
		Cont.	Holding	
S9123C-S18GM005	5:1	See Curve	500	1.471 x 10 <sup>-5</sup>
S9123C-S18GM010	10:1		1000	9.570 x 10 <sup>-6</sup>
S9123C-S18GM018	18:1		1800	1.986 x 10 <sup>-5</sup>

Step Angle is 1.8° per step.

**SPEED vs. TORQUE CHARACTERISTICS  
Drive Setting 35V DC - 3.3 Amps per phase**



- I
- R
- T
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

LOW VOLTAGE  
REVERSIBLE  
SELF-STARTING

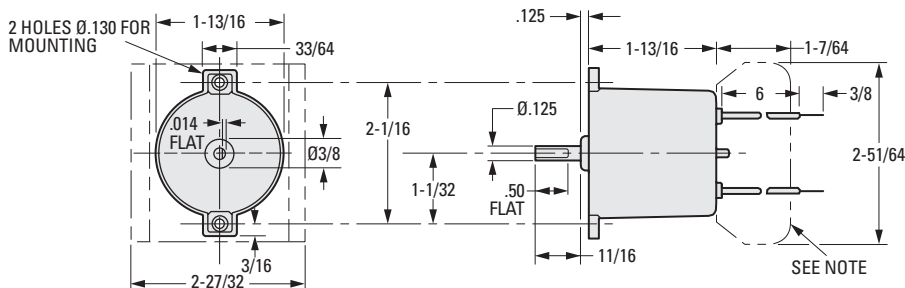
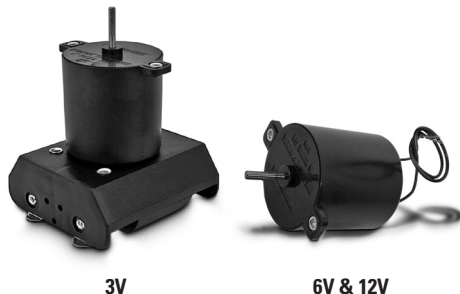
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**> MATERIAL:**

**Housing** - Molded Plastic  
**Shaft** - Steel

**> SPECIFICATIONS:**

**No Load Drain Approx:**  
10 mA @ 3V  
8 mA @ 6V  
4 mA @ 12V



**INCH COMPONENT**

Catalog Number			No Load rpm	Gear Ratio	Stall Torque ozf in.	Rated Torque ozf in.
3 Volts	6 Volts	12 Volts				
A 3Z16-0010A	A 3Z16-0010B	A 3Z16-0010C	1.0	1740:1	65.0	25.0
A 3Z16-0015A	A 3Z16-0015B	A 3Z16-0015C	1.5	1075:1	40.0	16.0
A 3Z16-0020A	A 3Z16-0020B	A 3Z16-0020C	2.0	845:1	31.0	12.0
A 3Z16-0040A	A 3Z16-0040B	A 3Z16-0040C	4.0	435:1	18.0	6.0
A 3Z16-0050A	A 3Z16-0050B	A 3Z16-0050C	5.0	342:1	14.0	5.0
A 3Z16-0070A	A 3Z16-0070B	A 3Z16-0070C	7.0	269:1	12.0	4.0
A 3Z16-0085A	A 3Z16-0085B	A 3Z16-0085C	8.5	211:1	10.0	3.0
A 3Z16-0160A	A 3Z16-0160B	A 3Z16-0160C	16.0	109:1	5.0	1.5
A 3Z16-0200A	A 3Z16-0200B	A 3Z16-0200C	20.0	86:1	3.2	1.0
A 3Z16-0250A	A 3Z16-0250B	A 3Z16-0250C	25.0	67:1	2.8	.9
A 3Z16-0300A	A 3Z16-0300B	A 3Z16-0300C	30.0	53:1	2.4	.7
A 3Z16-1150A	A 3Z16-1150B	A 3Z16-1150C	115.0	16:1	.8	.2

**NOTE:** 3 Volt gearmotors supplied with twist-on clip for two "D" size batteries (not included).