Low Cost Brushless Pancake Resolver

Sizes 11, 14, 15, 21 and 22

TYPICAL APPLICATIONS

- Brushless DC servo commutation, position, and velocity feedback
- Robotics and factory automation
- Machine tools
- Material handling equipment
- Packaging equipment
- Commercial aircraft
- Oil and gas market
- COTS military - aerospace/radar
- Gimbals
- Guidance systems

FEATURES

- 1, 2, 3, 4 speeds standard; others available
- Ideal for brushless dc motor commutation
- Compact design
- Mounts directly on motor shaft - no coupling devices needed
- No brushes or contacts
- High reliability: long-life design - no bearings or electronics
- Compatible with A / D converters
- 1,200 – 10,000 Hz frequency range standard
- Low electrical noise
- Ruggedness in demanding environments: no glass discs or optics to fail
- Low cost
- Custom modifications available
- High speeds, up to 15 kRPM for size 21 and 22, up to 20 kRPM for smaller sizes

For commutation, position, and velocity feedback

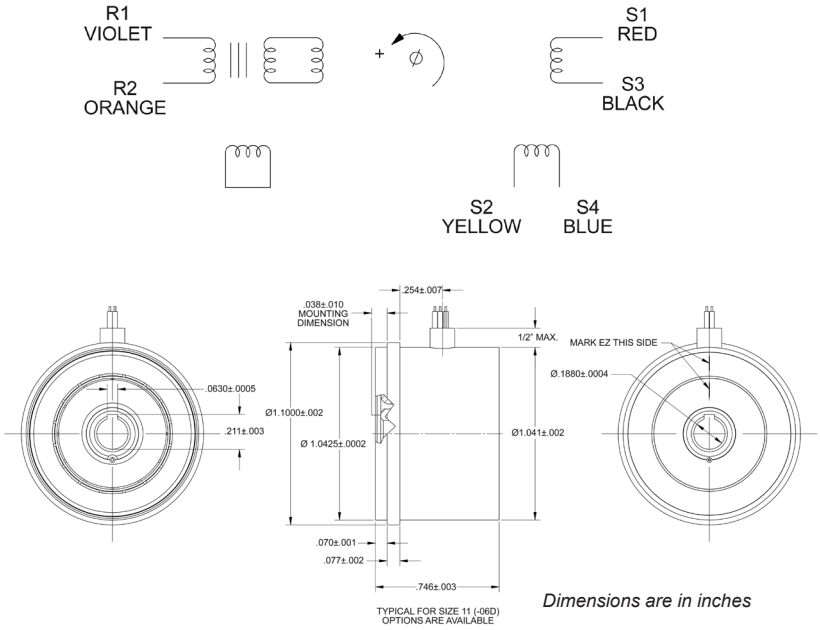
Rugged, reliable - ideal for demanding environments. Brushless resolvers provide accurate position and velocity feedback as well as commutation in precision equipment, without the structural or temperature restrictions imposed by other electronic feedback devices. They are resistant to the shock and vibration levels often encountered in industrial and instrument applications.

These low cost brushless resolvers are available in standard sizes or with custom modifications. Our Engineering Department is available for consultation to help tailor a brushless resolver to fit your needs.

Note: *This catalog contains basic marketing information and general part descriptions of Moog product lines. With respect to the U.S. export regulations, the products described herein are controlled by the U.S. Commerce Department or the U.S. State Department. Contact Moog for additional detail on the export controls that are applicable to your part.*

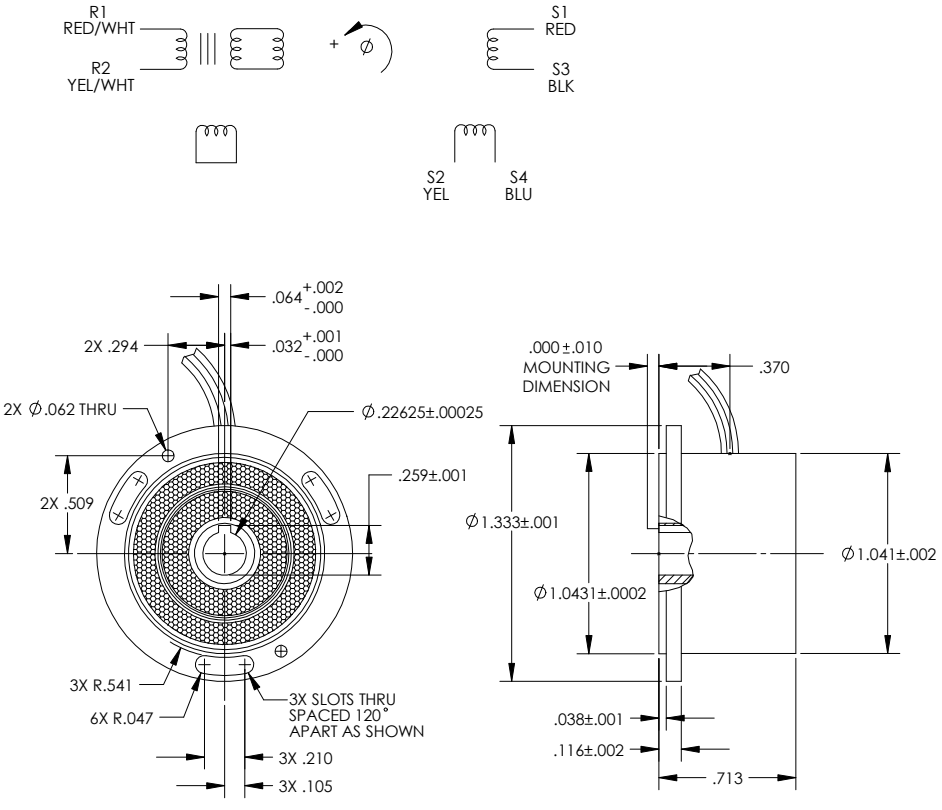
Size 11 and 14 Specifications

Size 11	Brushless Resolvers		
PARAMETER	**JSSB-11-A-02A**	**JSSB-11-A-06D**	**JSSB-11-A-05D**
Primary	Rotor	Rotor	Rotor
Speed	One	One	One
Input Voltage	5 Vrms 5 KHz	4 Vrms 4.74 KHz	5.3 Vrms 5 KHz
Input Current	43 mA max	14.4 mA max	18.3 mA max
Input Power	0.125 watt	0.036 watt	0.06 watt
Transformation Ratio (±10%)	0.5	0.5	0.5
Phase Shift	6.5°	7°	5.5°
Impedance Zro Zso Zrs	83 + j170 175 + j335 76 + j90	174 + j220 322 + j575 157 + j195	180 + j228 330 + j596 162 + j203
DC Resistance Stator Rotor	 47 ohms 77 ohms	 84 ohms 164 ohms	 84 ohms 164 ohms
Null Voltage	20 mV	15 mV	20 mV
Electrical Error †	±10 minutes	±24 minutes	±20 minutes
Output Voltage	2.5 Vrms	2 Vrms	2.65 Vrms



Dimensions are in inches

Size 14	Brushless Resolvers	
PARAMETER	**JSSB-14-A-01A**	**JSSB-14-C-01D**
Primary	Rotor	Rotor
Speed	One	One
Input Voltage	7 Vrms 10 KHz	4 Vrms 3.4 KHz
Input Current	0.042 mA Max.	18.8 mA Max.
Input Power	0.126 watt	0.046 watt
Transformation Ratio (±10%)	0.5	0.5
Phase Shift	–2.3° ± 2°	12.5° ± 3°
Impedance Zro Zso Zrs	100 + j170 220 + j460 192 + j420	129 + j169 283 + j399 123 + j146
DC Resistance Stator Rotor	 48 ohms 77 ohms	 67 ohms 159 ohms
Null Voltage	15 mV	15 mV
Electrical Error †	±10 minutes	±20 minutes
Output Voltage	3.5 Vrms	2 Vrms

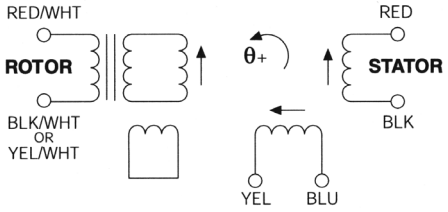


Dimensions are in inches

Size 15	Brushless Resolvers				
PARAMETER	**JSSB-15-J-05K**	**JSSB-15-D-01H**	**DSSB-15-AB-01AM**	**JSMB-15-J-05A**	**JSMB-15-K-06P**
Primary	Rotor	Rotor	Rotor	Rotor	Rotor
Speed	One	One	One	Three	Three
Input Voltage	7 Vrms 10 KHz	4 Vrms 3.4 KHz	4 Vrms 3.4 KHz	7 Vrms 10 KHz	5 Vrms 6 KHz
Input Current	0.050 A Max.	0.075 A Max.	0.075 A Max.	0.0457 A Max.	0.025 A Max.
Input Power	0.20 watt	0.13 watt	0.13 watt	0.176 watt	0.050 watt
Transformation Ratio (±10%)	0.5	0.5	0.5	0.286	0.4
Phase Shift–14.5°	4°	5° ± 3°	5° ± 3°	10°	20° ± 3°
Impedance Zro Zso Zrs	103.6 + j158.4 144.7 + j126.5 88.9 + j136.9	38 + j60 23 + j34 25 + j34	28 + j60 23 + j34 25 + j34	103.6 + j158.4 144.7 + j126.5 88.9 + j136.9	129 + j221 148 + j232 142 + j192
DC Resistance Stator Rotor	 77 ohms 40 ohms	 10.8 ohms 5.6 ohms	 10.8 ohms 5.6 ohms	 77 ohms 40 ohms	 82 ohms 21 ohms
Null Voltage	20 mV	15 mV	15 mV	20 mV	20 mV
Electrical Error †	±15 minutes £	±20 minutes	±20 minutes	±15 minutes	±3 minutes
Output Voltage	3.5 Vrms	2 Vrms	2 Vrms	3.5 Vrms	2 Vrms

Typical Schematic

CCW is positive when viewed from mounting end.

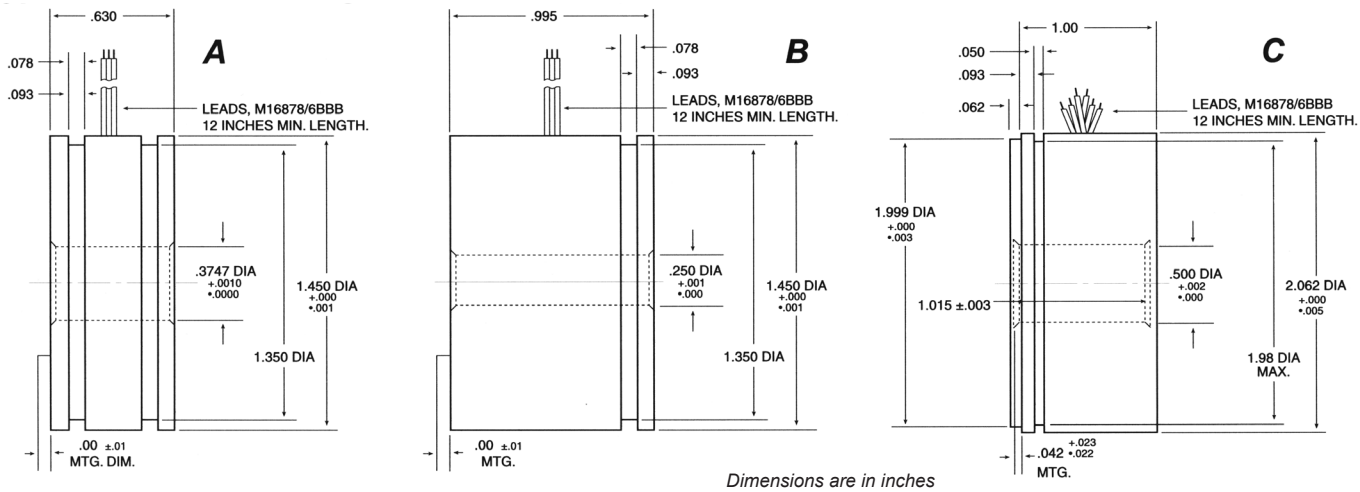


Alternate phasing available on request.

Typical performance characteristics at 25°C
† Higher accuracies available
*± 21 minutes max with 30 minutes max spread
**Contact the Engineering Department
£ 20 minutes spread

Size 21	Brushless Resolvers							
PARAMETER	**JSSB-21-B-02J**	**JSSB-21-B-04J**	**JSSB-21-C-08D**	**JSSB-21-F-02J**	**JSMB-21-B-06J**	**JSMB-21-B-04J**	**JSMB-21-F-08E**	**JSMB-21-D-02A**
Primary	Rotor	Rotor	Rotor	Rotor	Rotor	Rotor	Rotor	Stator
Speed	One	One	One	One	Four	Three	Three	Two
Input Voltage	7.5 Vrms 6.6 KHz	6 Vrms 1.2 KHz	10 Vrms 3.5 KHz	7.5 Vrms 6.6 KHz	7.5 Vrms 4 KHz	7.5 Vrms 4 KHz	14 Vrms 10 KHz	7 Vrms 2.5 KHz
Input Current	0.055 A Max.	0.010 A Max.	0.0181 A Max.	0.055 A Max.	0.070 A Max.	0.066 A Max.	0.055 A Max.	0.006 A Max.
Input Power	0.22 watt	0.03 watt	0.09 watt	0.22 watt	0.225 watt	0.29 watt	0.5 watt	0.025 watt
Transformation Ratio (±10%)	1	0.46	0.8	1	1	1	0.5	1.7
Phase Shift	–14.5°	21°	0°	–14.5°	12°	4°	5°	8°
Impedance Zro Zso Zrs	100 + j125 862 + j1760 762 + j1700	505 + j590 1120 + j975 1130 + j830	274 + j480 941 + j1710 800 + j1440	100 + j125 862 + j1760 762 + j1700	70 + j115 730 + j1400 700 + j1250	85 + j100 1000 + j1650 -	165 + j210 295 + j690 265 + j640	8500 + j15000 580 + j1500 7300 + j12000
DC Resistance Stator Rotor	 290 ohms 25 ohms	 675 ohms 200 ohms	 306 ohms 127 ohms	 290 ohms 25 ohms	 450 ohms 25 ohms	 590 ohms 25 ohms	 65 ohms 70 ohms	 3530 ohms 1970 ohms
Null Voltage	30 mV	30 mV	30 mV	30 mV	30 mV	30 mV	30 mV	30 mV
Electrical Error †	±21 minutes	±10 minutes	±21 minutes	±21 minutes	±10 minutes	±10 minutes	±8 minutes	±10 minutes
Output Voltage	7.5 Vrms	2.76 Vrms	8 Vrms	7.5 Vrms	7.5 Vrms	7.5 Vrms	7 Vrms	11.9 Vrms

Typical Outline Drawing



Dimensions are in inches

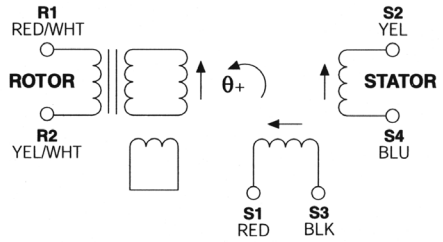
REVISED 10/20

Size 22 Specifications

Size 22	Brushless Resolvers		
PARAMETER	**JSSB-22-A-01A**	**JSSB-22-A-03A**	**JSMB-22-D-03D**
Primary	Rotor	Rotor	Rotor
Speed	One	One	Two
Input Voltage	5 Vrms 4 KHz	4 Vrms 5 KHz	7.5 Vrms 4 KHz
Input Current	0.030 A Max.	0.025 A Max.	0.065 A Max.
Input Power	0.061 watt	0.053 watt	0.29 watt
Transformation Ratio (±10%)	0.5	0.5	0.75
Phase Shift ±3°	–9°	-9°	2.6°
Impedance Zro Zso Zrs	92 + j175 217 + j404 181 + j367	102 + j142 202 + j348 170 + j324	80 + j106 435 + j725 72 + j95
DC Resistance Stator Rotor	 71 ohms 19.5 ohms	 75 ohms 25 ohms	 217 ohms 25 ohms
Null Voltage	20 mV	25 mV	25 mV
Electrical Error †	4 minutes	14 minutes	±7 minutes

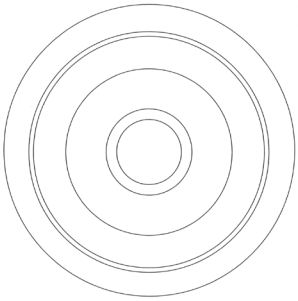
Typical Schematic

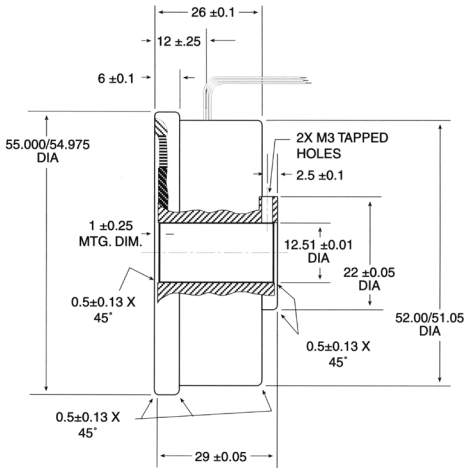
CCW is positive when viewed from side opposite mounting end.



Alternate phasing available on request.

Typical Outline Drawing





Dimensions are in inches

Pancake Brushless Resolvers

These units provide accurate position and velocity feedback as well as commutation in precision equipment, without the structural or temperature restrictions imposed by other electronic feedback devices. They are highly resistant to the shock and vibration levels often encountered in industrial environments, and do not require protection from the dirt, oil or other contaminants that normally occur in factory conditions.

Pancake brushless resolvers are supplied as separate rotor and stator assemblies, which are then mounted directly in the user's system. Since the energy is transmitted into and out of the rotor assembly by means of electromagnetic fields, no slip rings and brushes are necessary, reducing the cost and increasing the reliability of these devices.

The pancake brushless resolvers are designed with larger than normal airgaps, in comparison with a "standard" pancake resolver, to allow for a greater degree of imprecision in mounting. Normal considerations for these units require the rotor to be mounted inside the stator with an eccentricity no greater than 0.003 inch, and that the rotor and stator mounting surfaces be set in line within 0.020 inch. If eccentricities larger than 0.003 inch occur, the accuracy of the resolver will probably degrade; if the axial alignment exceeds 0.020 inch, input current, input power and phase shift will increase, while the output voltage drops. The mounting surfaces and the actual quantitative specifications for mounting, both concentrically and axially, may be found on the individual outline drawing for each unit type.

Normally, the housing assembly is held in place in the user's equipment by the use of synchro clamps and the mounting grooves or flanges provided on the outside of the housing. Rotor assemblies are usually mounted adhesively, by using a keyway provided in the rotor bore, by clamping against the end of the hub, by set screws in tapped holes provided in the rotor hub, or by some combination of these methods.

These low cost pancake brushless resolvers are available in the standard sizes and configurations shown, or with custom modifications to either the given mechanical or electrical characteristics. Our Engineering Department is available to assist you in tailoring these units to fit the specific requirements of your system.