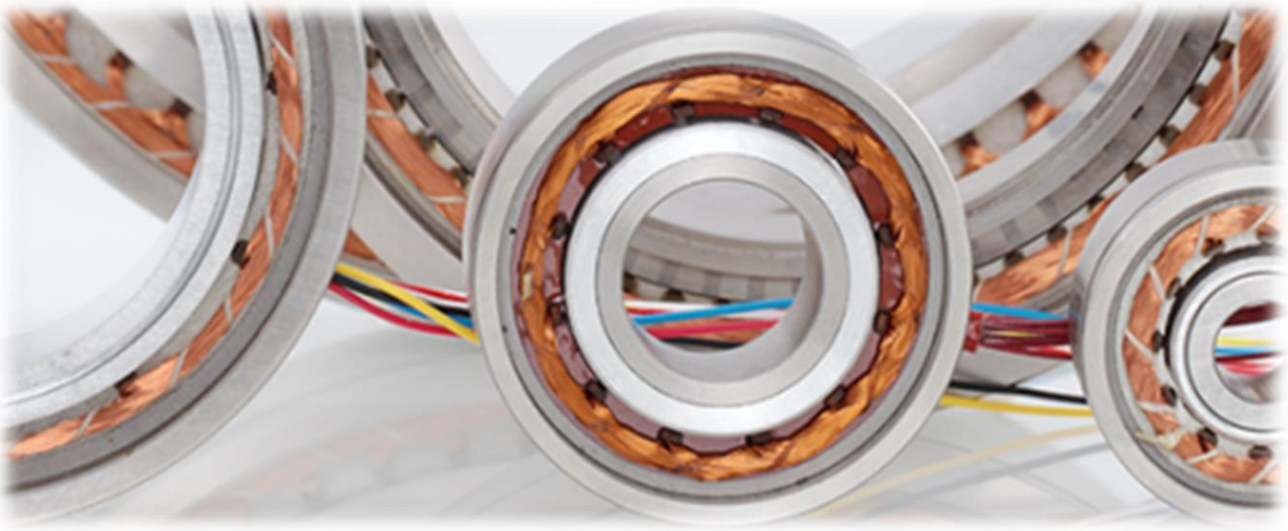
Rotasyn

Variable Reluctance Frameless Resolvers



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Solid rotor, variable reluctance, frameless, brushless resolvers for severe applications.

Admotec RO Series Rotasyn variable reluctance frameless resolvers provide high performance in measurement and feedback applications where traditional resolvers fail. Perfect for aerospace, down-hole, nuclear, and other severe applications, these solid-rotor resolvers offer original equipment manufacturers reliable solutions at any quantity—from prototype units all the way up to high-volume production.

The Rotasyn has fewer parts and a solid rotor without windings, making it much simpler than traditional brushless resolvers. Since the solid rotor has no coils and the stator has only half the number of windings of a traditional brushless resolver, reliability is significantly increased. And the solid rotor allows operation with the rotor immersed in hydraulic oil or other liquids.

The Rotasyn resolver is mechanically and electrically compatible with traditional brushless resolvers and can replace them as original equipment or in existing applications. And if our standard products don't meet your needs, custom versions can be quickly designed for your application.

Admotec — motion and position sensing for original equipment manufacturers.

RO

ROTASYN

SOLID ROTOR RESOLVER

TYPICAL APPLICATIONS

- Industrial tachometer
- Motor feedback
- Angle measurement
- Aerospace
- Downhole (oilwell)
- High-speed spindles
- AC and DC servo motors
- Flight control systems
- Hydraulic pumps
- Nuclear environments

FEATURE & BENEFITS

Non-contact design	No wear or aging
Rugged construction	Tolerates vibration and shock
Solid rotor	Higher speed, lower inertia
Lower impedance	Better noise immunity
Fewer coils	Higher reliability
Functionally equivalent to traditional brushless resolvers	Higher performance replacement for obsolete or unavailable devices
Absolute over 360°	No homing at power up

GENERAL SPECIFICATIONS

Operating Temperature		
ROxxxx-M	−55 to +155	°C
ROxxxx-K	−196 to +220*	°C
Shock	20	G
Vibration	10	G (10–500 Hz, 0.5 Hr)
Radial Air Gap	0.3	mm nominal
Excitation Frequency	5 to 50	kHz typical
	10	kHz recommended
Excitation Amplitude	2 to 12	Vrms typical
Transformation Ratio**	0.5	V/V ±10%
Angular Error***	±30	arc-minutes typical**
	±60	arc-minutes maximum
Insulation Resistance	100	MΩ minimum
Dielectric Strength (Hitpot)		
Winding to Winding	300	Vac (50 Hz for 1 min)
Winding to Housing	500	Vac (50 Hz for 1 min)
Lead Wire Size	26	AWG
Lead Length	300	mm

* Only on Request, Standard −70 to +200 °C
** With 10 kHz and 5 Vrms Excitation
*** Every Rotasyn shipped with an individual accuracy report.

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ROTASYN

SOLID ROTOR RESOLVER

Size		08	10	15		21
Type		**RO2010**	**RO2613***	**RO3620**	**RO3620S***	**RO5032**
Outer Diameter		20 mm	26 mm	36.83 mm	36.83 mm	50 mm
Bore Hole	Nominal	4 mm	7 mm	10 mm	10 mm	20 mm
	Max	4 mm	7 mm	12 mm	12 mm	22 mm
Length		18 mm	20 mm	20 mm	16 mm	20 mm
Excitation Amplitude	Nominal	5 Vrms				
	Range	2 to 12 Vrms				
Excitation Frequency	Nominal	10 kHz				
	Range	5 to 50 kHz				
Transformation Ratio**		0.5 V/V ±10%				
Angular Error**	Typical	±50 arcmin	±50 arcmin	±30 arcmin	±30 arcmin	±35 arcmin
	Max	±60 arcmin				
Operating Temperature	-M	−55 to +155 °C				
	-K	−70 to +200 °C (On Request −196 to +220 °C possible)				
Mass***	-x-R	30 grams	50 grams	100 grams	80 grams	165 grams
	-x-V	35 grams	55 grams	110 grams	90 grams	190 grams
Max Speed***	-x-R	150 kRPM	120 kRPM	100 kRPM	100 kRPM ??	60 kRPM
	-x-V	160 kRPM	130 kRPM	110 kRPM	110 kRPM ??	65 kRPM
Rotor Moment of Inertia***	-x-R	0.5 gram•cm^2	1.7 gram•cm^2	11 gram•cm^2	9 gram•cm^2	70 gram•cm^2
	-x-V	1 gram•cm^2	3 gram•cm^2	27 gram•cm^2	15 gram•cm^2	120 gram•cm^2
Primary DC Resistance**		11 Ω ±10%	14 Ω ±10%	13 Ω ±10%	13 Ω ±10%	18 Ω ±10%
Secondary DC Resistance**		19 Ω ±10%	28 Ω ±10%	20 Ω ±10%	18 Ω ±10%	29 Ω ±10%

Size		24	30	34	40	50
Type		**RO6040***	**RO7557**	**RO8565***	**RO10080***	**RO125100***
Outer Diameter		60 mm	75 mm	85 mm	100 mm	125 mm
Bore Hole Nom/Max	Nominal	25 mm	45 mm	55 mm	60 mm	85 mm
	Max	30 mm	46 mm	55 mm	65 mm	85 mm
Length		20 mm	22 mm	22 mm	24 mm	24 mm
Excitation Amplitude	Nominal	5 Vrms				
	Range	2 to 12 Vrms				
Excitation Frequency	Nominal	10 kHz				
	Range	5 to 50 kHz				
Transformation Ratio**		0.5 V/V ±10%				
Angular Error**	Typical	±50 arcmin	±40 arcmin	±40 arcmin	±40 arcmin	±40 arcmin
	Max	±60 arcmin				
Operating Temperature	-M	−55 to +155 °C				
	-K	−70 to +200 °C (On Request −196 to +220 °C possible)				
Mass***	-x-R	260 grams	300 grams	330 grams	555 grams	795 grams
	-x-V	285 grams	350 grams	395 grams	660 grams	935 grams
Max Speed***	-x-R	35 kRPM	25 kRPM	22 kRPM	19 kRPM	15 kRPM
	-x-V	40 kRPM	28 kRPM	24 kRPM	20 kRPM	16 kRPM
Rotor Moment of Inertia***	-x-R	210 gram•cm^2	600 gram•cm^2	720 gram•cm^2	3300 gram•cm^2	5000 gram•cm^2
	-x-V	310 gram•cm^2	980 gram•cm^2	1320 gram•cm^2	4700 gram•cm^2	8000 gram•cm^2
Primary DC Resistance**		18 Ω ±10%	20 Ω ±10%	32 Ω ±10%	31 Ω ±10%	36 Ω ±10%
Secondary DC Resistance**		35 Ω ±10%	50 Ω ±10%	103 Ω ±10%	145 Ω ±10%	137 Ω ±10%

* Non-standard, available only on request.

** For nominal excitation and specified mounting tolerances

*** For nominal dimensions

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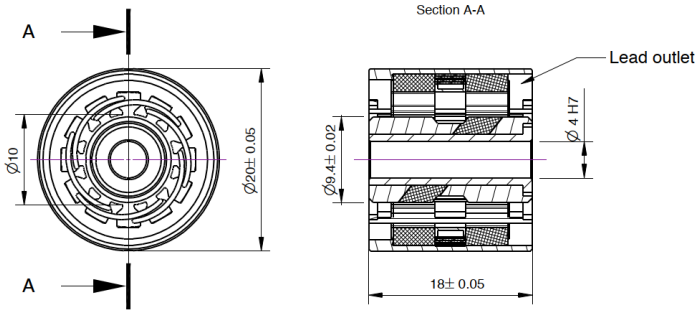
Series RO2010 is a frameless size 8 solid-rotor resolver with a 20mm stator OD and a 10mm airgap diameter. It fits shafts up to 4mm in diameter.

RO2010 Specifications

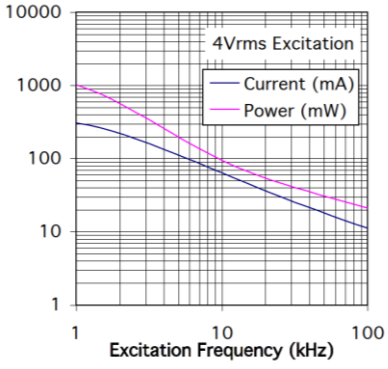
Mass (Weight)		
RO2010-M Models	30	grams
RO2010-K Models	35	grams
Maximum Speed		
RO2010-x-R Models	150	kRPM
RO2010-x-V Models	160	kRPM
Rotor Moment of Inertia		
RO2010-x-R Models	0.5	gram•cm^2
RO2010-x-V Models	1	gram•cm^2
Primary DC Resistance	11	Ω ±10%
Secondary DC Resistance	19	Ω ±10%

RO2010 Outline & Mounting Dimensions*



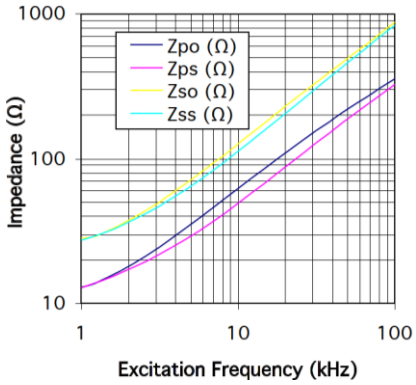
*All dimensions in mm.

RO2010 Primary Current and Power

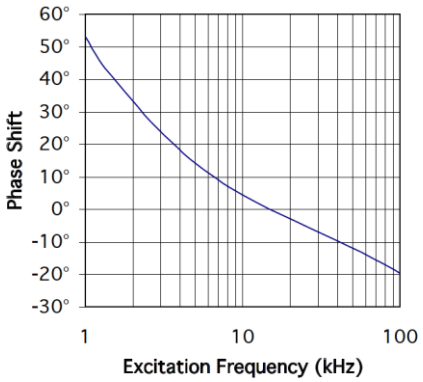


08
ROTASYN
SERIES RO2010

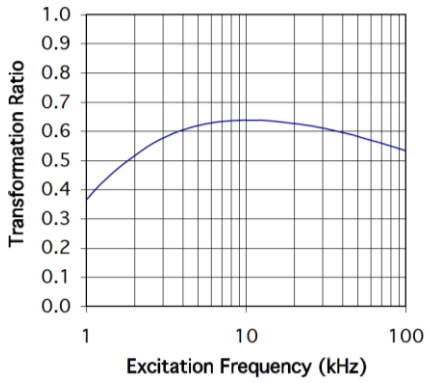
RO2010 Impedance



RO2010 Phase Shift



RO2010 Transformation Ratio



RO2010 Ordering Information

RO2010 - □ - □ □ □ □

Stator Construction
M = Standard
K = Hi Temp/Hi Rad (Kapton insulation)
Custom constructions available

Rotor Construction
R = Standard
V = Hi Speed

Rotor Bore (mm)
004 = 4mm (Standard)
Smaller bores available.

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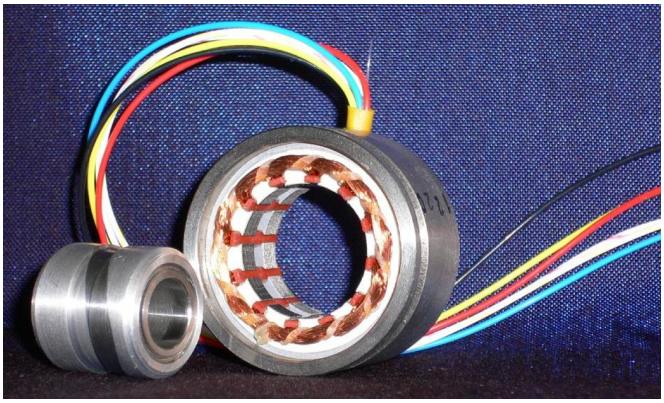
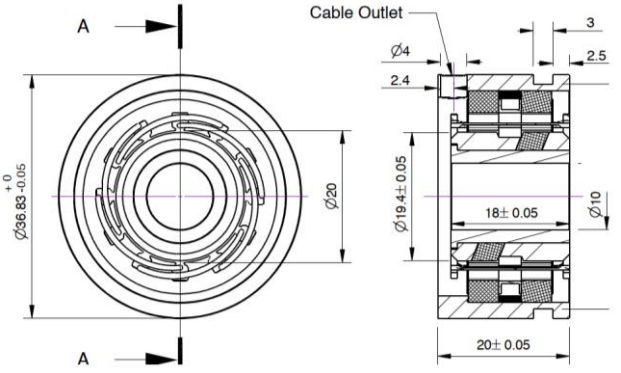


Series RO3620 is a frameless size 15 solid-rotor resolver with a 36mm stator OD and a 20mm airgap diameter. It fits shafts up to 12mm in diameter.

RO3620 Specifications

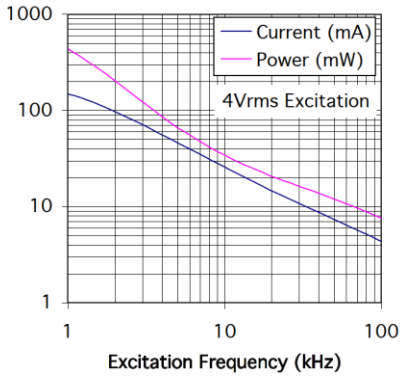
Mass (Weight)		
RO3620-x-R Models	100	grams
RO3620-x-V Models	110	grams
Maximum Speed		
RO3620-x-R Models	100	kRPM
RO3620-x-V Models	110	kRPM
Rotor Moment of Inertia		
RO3620-x-R Models	11	gram•cm^2
RO3620-x-V Models	27	gram•cm^2
Primary DC Resistance	13	Ω ±10%
Secondary DC Resistance	20	Ω ±10%

RO3620 Outline & Mounting Dimensions*



*All dimensions in mm.

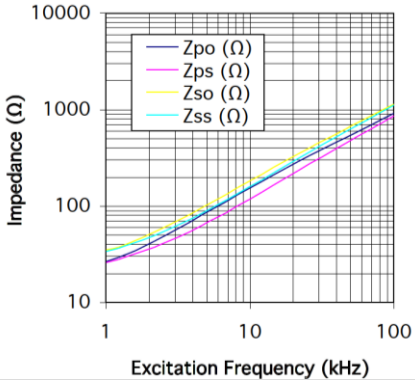
RO3620 Primary Current and Power



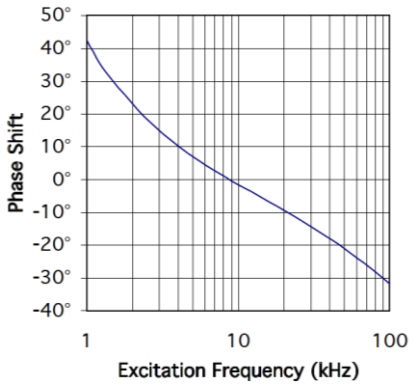
ROTASYN 15

SERIES RO3620

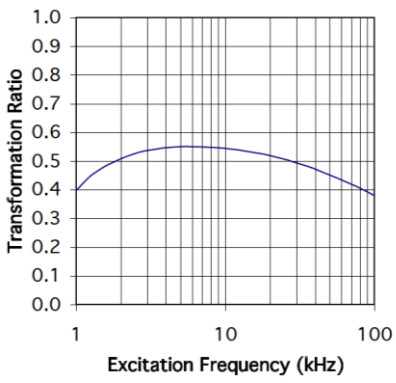
RO3620 Impedances



RO3620 Phase Shift



RO3620 Transformation Ratio



RO3620 Ordering Information

RO3620 - □ - □ □ □ □

Stator Construction
M = Standard
K = Hi Temp/Hi Rad (Kapton insulation)

Custom constructions available

Rotor Construction
R = Standard
V = Hi Speed

Rotor Bore (mm)
010 = 10mm (Standard)
952 = ⅜" (Standard)

Other bores available (12mm max)

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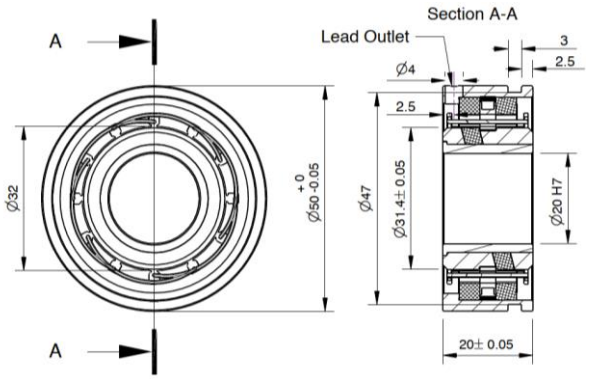
Series RO5032 is a frameless size 21 solid-rotor resolver with a 50mm stator OD and a 32mm airgap diameter. It fits shafts up to 22mm diameter.

RO5032 Specifications

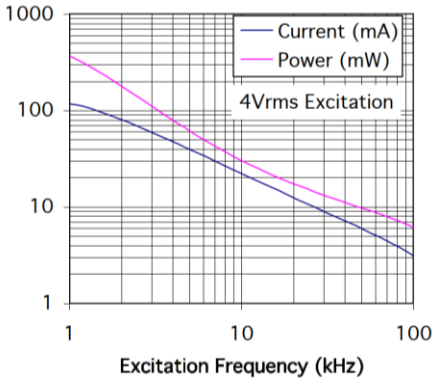
Mass (Weight)		
RO3620-x-R Models	165	grams
RO3620-x-V Models	190	grams
Maximum Speed		
RO3620-x-R Models	60	kRPM
RO3620-x-V Models	65	kRPM
Rotor Moment of Inertia		
RO3620-x-R Models	70	gram•cm^2
RO3620-x-V Models	120	gram•cm^2
Primary DC Resistance	18	Ω ±10%
Secondary DC Resistance	29	Ω ±10%

RO5032 Outline & Mounting Dimensions*



*All dimensions in mm.

RO5032 Primary Current and Power



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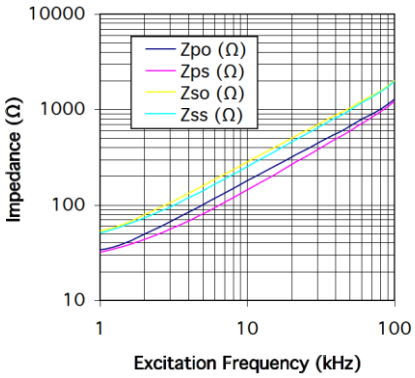
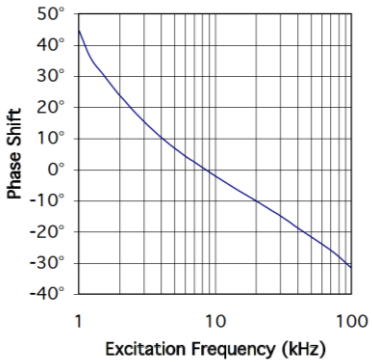
RO5032 Series

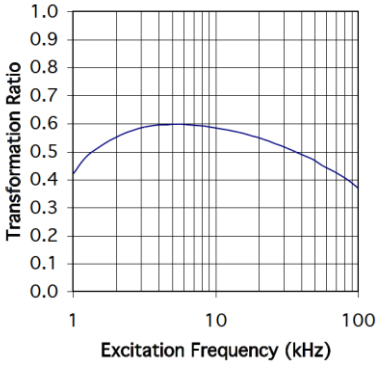
RO5032 Impedances



RO5032 Phase Shift



RO5032 Transformation Ratio



RO5032 Ordering Information

RO5032 - □ - □ □ □ □

Stator Construction
M = Standard
K = Hi Temp/Hi Rad (Kapton insulation)
Custom constructions available

Rotor Construction
R = Standard
V = Hi Speed

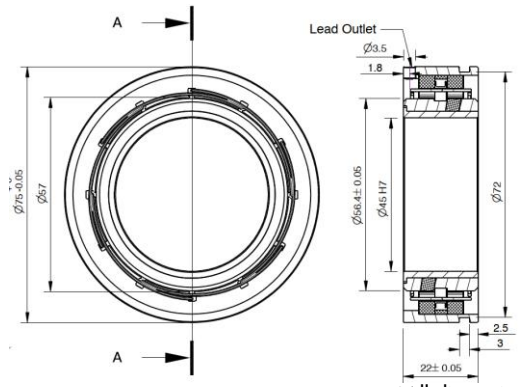
Rotor Bore (mm)
020 = 20mm (Standard)
Smaller bores available.

Series RO7557 is a frameless size 30 solid-rotor resolver with a 75mm stator OD and a 57mm airgap diameter. It fits shafts up to 47mm in diameter.

RO7557 Specifications

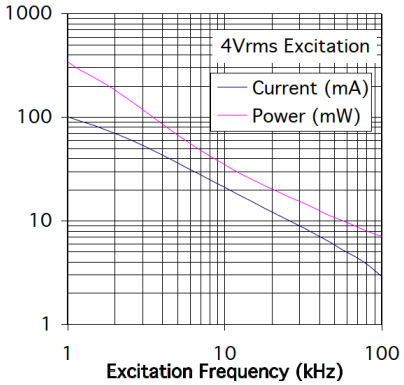
Mass (Weight)		
RO3620-x-R Models	300	grams
RO3620-x-V Models	350	grams
Maximum Speed		
RO3620-x-R Models	25	kRPM
RO3620-x-V Models	28	kRPM
Rotor Moment of Inertia		
RO3620-x-R Models	600	gram•cm^2
RO3620-x-V Models	980	gram•cm^2
Primary DC Resistance	20	Ω ±10%
Secondary DC Resistance	50	Ω ±10%

RO7557 Outline & Mounting Dimensions



*All dimensions in mm.

RO7557 Primary Current and Power



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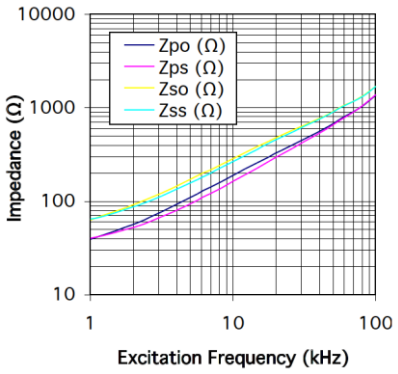
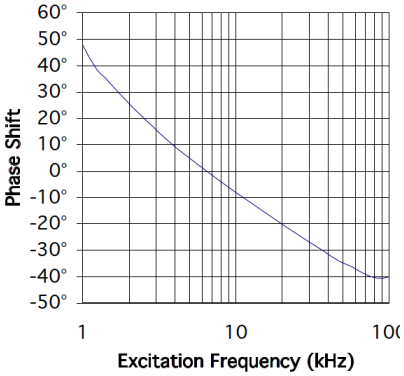
ROTASYN 30
SERIES RO7557

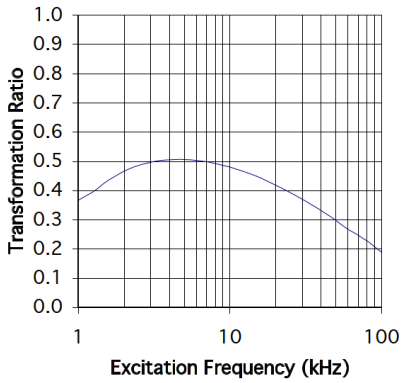
RO7557 Impedances



RO7557 Phase Shift



RO7557 Transformation Ratio



RO7557 Ordering Information

RO7557 - □ - □ □ □ □

Stator Construction
M = Standard
K = Hi Temp/Hi Rad (Kapton insulation)
Custom constructions available

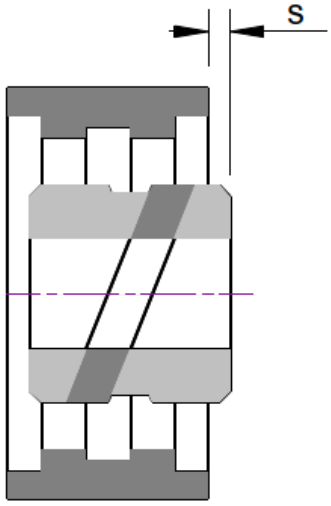
Rotor Construction
R = Standard
V = Hi Speed

Rotor Bore (mm)
045 = 45mm (Standard)
Other bores available (47mm max)

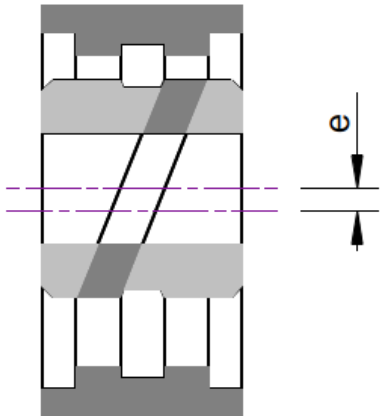
MOUNTING ACCURACY

When mounting the Rotasyn resolver the following tolerances needs to be respected:

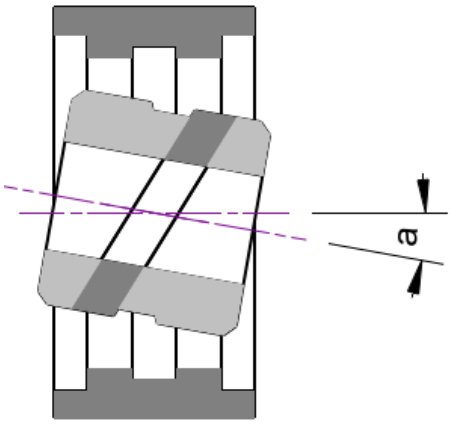
- Axial shift (s) of less than 0.1 mm.



- Eccentricity (e) and runout of rotor of less than 0.01 mm.



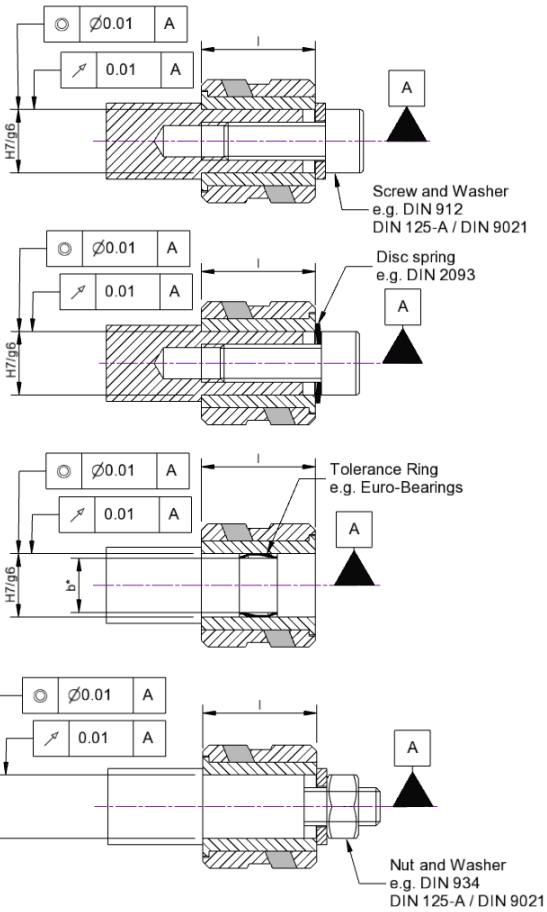
- Angular deviation (a) of less than 0.01°.

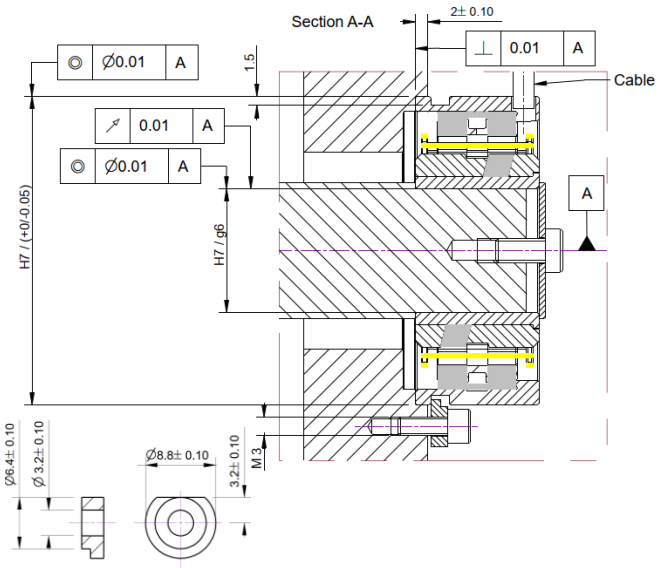


Accuracy of resolver can't be guaranteed if the mounting errors are greater than allowed.

ROTASYN
SOLID ROTOR RESOLVER

MOUNTING EXAMPLES





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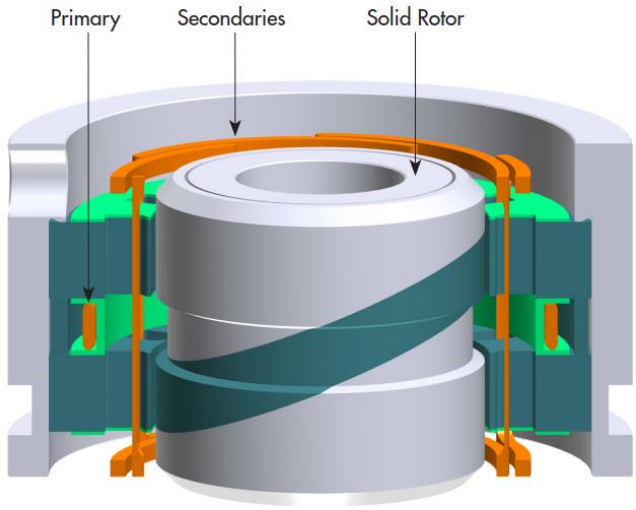
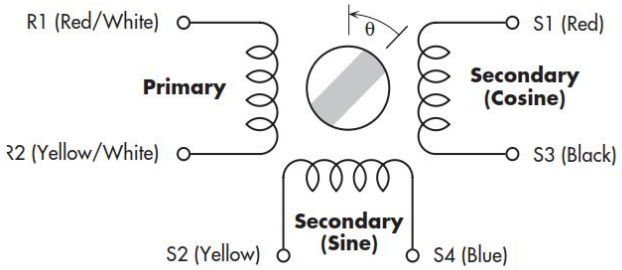
Principle of Operation

Unlike traditional brushless resolvers, the Rotasyn has both primary and secondary windings in the stator and thus no transformer is required—the Rotasyn is intrinsically brushless. The transferred energy remains magnetic from the primary coil through the airgap to the sinusoidally shaped poles of the solid rotor.



The Rotasyn is similar to a rotary variable differential rotary transformer (RVDT) in which the rotor acts as a magnetic valve completing the flux path. The total flux through the gap is constant—the rotor determines the angular position within the stator bore where the coupling occurs, and thus the relative amplitudes of the output signals.

Electrical Schematic



$V_{(S1-S3)} = V_{(R1-R2)} \times TR \times \cos(\theta)$

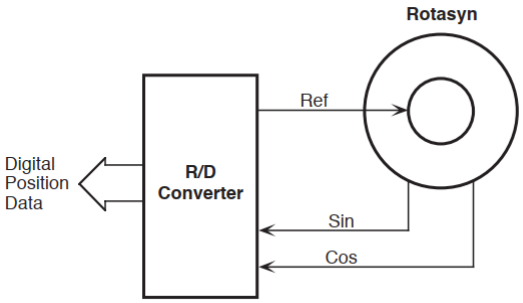
$V_{(S2-S4)} = V_{(R1-R2)} \times TR \times \sin(\theta)$

θ increases for CCW rotation when viewed from lead exit end

RO Rotasyn
Solid Rotor Resolver

Typical Application

Rotasyns can be used directly with all commercially available Resolver-to-Digital (R/D) converters to provide digital angle and speed information.



Custom Rotasyn

In addition to the standard versions, Series RO Rotasyn resolvers may be fully customized to your needs. Available customization options include (but are not limited to) those shown below. Contact us with your requirements for customized versions.

- Size 35, 40, 50, and 60 and larger models
- Customized housings for different stator mounting
- Larger airgap (up to 1mm)
- Flooded rotor to eliminate rotating seal
- Different windings for modified electrical characteristics
- Operating temperature down to 4 Kelvin
- Custom lead length and wire specification
- Bifilar winding for electrical redundancy
- Duplex units for complete redundancy
- Aerospace qualification testing
- Multispeed (multipole) design
- Enclosed units with bearings and shaft (Series DG)

Admotec Precision AG
Kieselgasse 12
CH 8008 Zürich Switzerland
www.admotec.ch
info@admotec.ch
Tel +41 44 422 2275
Fax +41 44 422 2276

Admotec Precision LLC
27 Dunsinane Drive
Lebanon, NH 03766 USA
www.admotec.com
info@admotec.com
Tel +1 603 727 4921

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