Motro Compo

BRUSHLESS RESOLVERS

Smartsyn[®] FA-solver[®]

BUILT-IN RESOLVERS
SHAFT RESOLVERS
HOLLOW SHAFT RESOLVERS



BRUSHLESS RESOLVERS

MEET YOUR NEEDS IN MOTION CONTROL APPLICATIONS

Wide Range of Built-in types for Direct Mounting onto Motors

Smartsyn, and brushless resolvers, are to offer you highly enhanced reliability which has been enabled by excluding human-dependent works in the major production / inspection procedures from parts processing, assembling to shipping.

We'd like to offer the resolvers for such applications as follows.

- · Commutation of brushless motors
- · Feedback sensor of servo systems
- Robots
- · Machine tools
- · Aerospace servo systems
- · Others where harsh environmental condition is involved

Smartsyn is a name of our brushless resolvers of a new type. They have their inherent characteristics as a resolver: maintenance-free brushless design, immunity to noise, vibration, shock, and high temperature.

And now they have more to offer: homogeneity in the evervariable parameters like accuracy, transformation ratio, phase shift, etc., which has been realized by highly automated production. Now this new quality can be taken for granted.



FEATURES

- Wide Operating Temperature Range
- -55 to +155°C (Built-in type)
- -30 to +100°C (All Shaft types, TS2028, and TS2054)
- Usable in Demanding Environments

Vibration : 196m/s^2 (20G) at $10\sim500\text{Hz}$ Shock : 981m/s^2 (100G) for 11ms Humidity : 90% Rh Min. at 60°C

- · High reliability and long life owing to brushlessness
- Operating speed up to : 100~500⁻¹ (6000~30000min⁻¹) / (Built-in type) 100s⁻¹ (6000min⁻¹) / (Shaft type)
- Free from electrical and mechanical noise

MOUNTING REQUIREMENTS

The following mounting requirements should be kept to satisfy the specifications.

Shaft Run-out

A motor shaft on which Rotor is mounted should have a run-out less than 0.050mm (TIR).

Concentricity

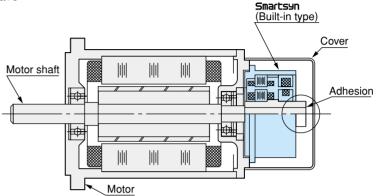
Centers of resolver and motor shaft should be aligned within 0.050mm (TIR).

Perpendicularity

Resolver case should be perpendicular to the motor shaft within 0.050mm (TIR).

· Axial Alignment

For built-in types, Stator and Rotor should be axially aligned within the tolerance of MTG.DIM.



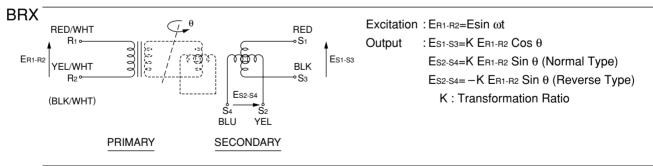
PRINCIPLE

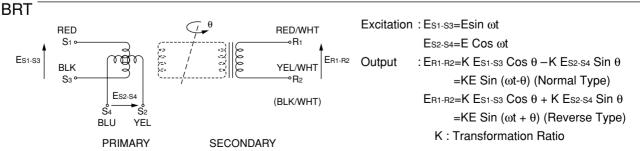
Resolver is a rotary transformer, which outputs AC voltage in accordance with angular position of the shaft. There are two types of resolvers, BRX and BRT, having different types of winding.

BRX resolver is excited by AC voltage to the rotor winding, and outputs from the stator windings sine and cosine voltages proportion to the rotation angle θ .

BRT resolver is excited by sine and cosine voltages to the stator windings, and outputs from the rotor winding a sine voltage phase-shifted in proportion to $\boldsymbol{\theta}.$

The difference is illustrated as follows.





 $^{+\}theta$:CCW is positive when viewed from mouting end.



BUILT-IN RESOLVERS

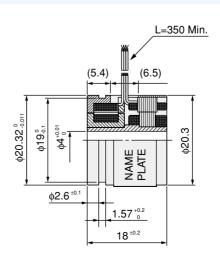


SIZ	E	08	10	15		21	
Model	No.	TS2605N1E64	TS2610N171E64	TS2620N21E11	TS2620N271E14	TS2640N321E64	TS2640N691E125
Тур	е	BRX	←	←	←	←	←
Prima	ary	R1-R2	←	←	←	←	←
Input Voltage/	Frequency	7Vrms 10kHz	7Vrms 10kHz	7Vrms 10kHz	10Vrms 4.5kHz	7Vrms 10kHz	5Vrms 4kHz
Transformat	ion Ratio	0.5±5%	0.5±5%	0.5±5%	0.5±10%	0.5±5%	0.5±10%
Erro	or	±10′ Max.	±10´ Max.	±10′ Max.	±10′ Max.	±10′ Max.	±8′ Max.
Null Voltage		20mVrms Max.	20mVrms Max.	20mVrms Max.	20mVrms Max.	25mVrms Max.	
Phase	Phase Shift		+5° Nom.	0° Nom.	+8° Nom.	-5° Nom.	+0 ~ +10°
	Zro	140Ω	160Ω	70+j100Ω	90+j180Ω	110+j140Ω	290Ω Nom.
Impedance	Zso		160Ω	180+j300Ω	220+j350Ω	150+j270Ω	
	Zss	120Ω	130Ω	175+j257Ω	210+j300Ω	130+j240Ω	420Ω Nom.
Operating Temperature		−55~+155°C	−55~+155°C			←	←
Max. Operating Speed		500s ⁻¹	333.3s ⁻¹			166.7s ⁻¹	←
Mass		0.03kg	0.04kg	0.06kg	0.07kg	0.22kg	025kg
Output Type		Reverse	Reverse	Normal	Normal	Normal	Normal

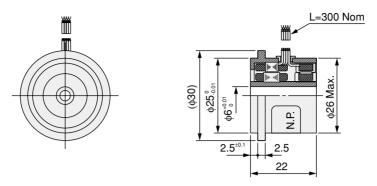
OUTLINE (DIMENSION: mm)

SIZE 08 TS2605N1E64

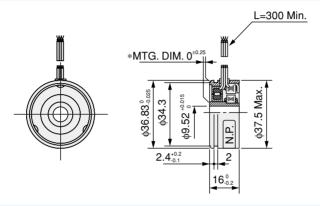




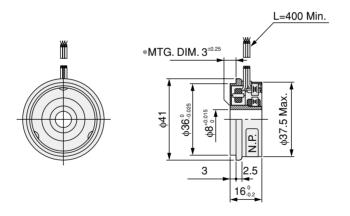
SIZE 10 TS2610N171E64



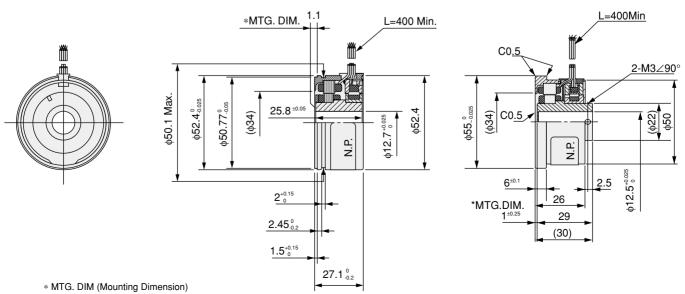
SIZE 15 TS2620N21E11



SIZE 15 TS2620N271E14



SIZE 21 TS2640N321E64 TS2640N691E125



FA-SOLVER®

BUILT-IN RESOLVERS

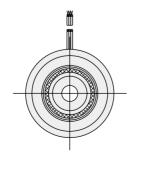


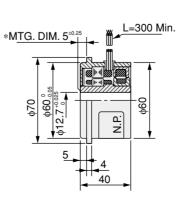
Products on this page are whithin FA-solver® series.

SIZE		25	30	35	43	47
Model No.		TS2013N211E57	TS2142N1E63	TS2158N21E63	TS2028N41E48	TS2054N91E51
Туре		BRX				
Primary		R1-R2				
Input Voltage/Frequency		10Vrms 4.5kHz	7Vrms 5kHz	10Vrms 5kHz	10Vrms 4.5kHz	6Vrms 10kHz
Transformation Ratio		0.5 ± 10%	0.5 ± 10%	0.5 ± 10%	0.5 ± 10%	0.28 ± 10%
Electrical Error		± 10′ Max.	± 10′ Max.	± 10′ Max.	± 10′ Max.	± 10′ Max.
Null Voltage		20mVrms Max.	20mVrms Max.	30mVrms Max.	30mVrms Max.	20mVrms Max.
Phase Shift		−8° Nom.	–10° Nom.	– 15° Nom.	–15° Nom.	-40° Nom.
	Zro	250+j377Ω	100+j170Ω	176Ω	200Ω	200+j345Ω
Impedance	Zso	400+j690Ω				
	Zss	326+j623Ω	200+j350Ω	250Ω	285Ω	214+j338Ω
Operating Temperature		−55 ~ +155°C			−30 ~ +100°C	−30 ~ +100°C
Max. Operating Speed		166.7s ⁻¹	100s ⁻¹			
Mass		0.35kg	0.6kg	0.9kg	1.4kg	1.6kg
Output Type		Reverse	Normal	Normal	Normal	Normal

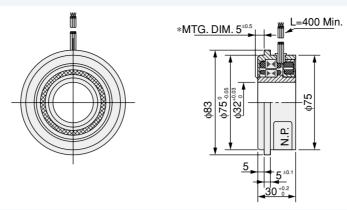
OUTLINE (DIMENSION: mm)

SIZE 25 TS2013N211E57

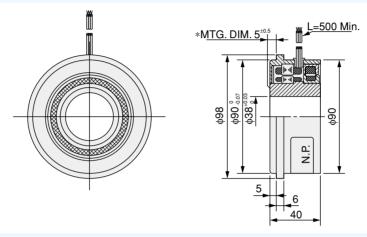




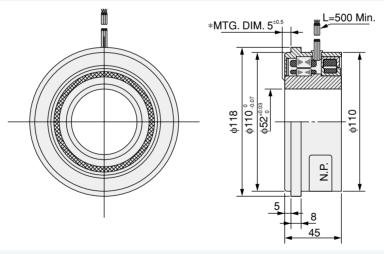
SIZE 30 TS2142N1E63



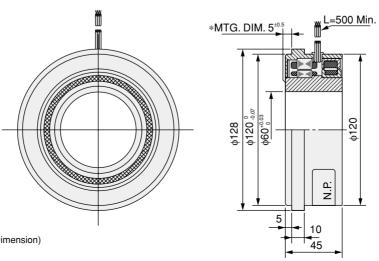
SIZE 35 TS2158N21E63



SIZE 43 TS2028N41E48

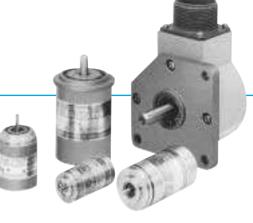


SIZE 47 TS2054N91E51



FA-SOLVER®

SHAFT RESOLVERS



BRX

Products on this page are whithin FA-solver® series.

Trouble of the page are minimum records						
SIZE		08	10	11	15	25
Model No.		TS510N35E18	TS520N46E9	TS530N33E10	TS540N33E12	TS2014N141E26
Туре		BRX		 -	 -	←
Primary		R1-R2				←
Input Voltage/Frequency		7Vrms 3kHz	7Vrms 3kHz	18Vrms 5kHz	15Vrms 1kHz	10Vrms 4.5kHz
Transformation Ratio		0.5 ± 10%	0.5 ± 10%	0.5 ± 20%	0.5 ± 10%	0.5 ± 10%
Electrical Error		±15′ Max.	±10′ Max.	Spread10 ²	±10′ Max.	±10′ Max.
Null Voltage		15mVrms Max.	15mVrms Max.	15mVrms Max.	20mVrms Max.	15mVrms Max.
Phase Shift		+9.5° Nom.	+6.5° Nom.	−5° Nom.	+5° Nom.	−7.5° Nom.
	Zro	860+j1,230Ω	847Ω	1,000Ω	1,030Ω	250+j377Ω
Impedance	Zso				680Ω	400+j690Ω
	Zss	205+j190Ω	252Ω	380Ω	540Ω	326+j623Ω
Operating Temperature		−30 ~ +100°C				←
Max. Operating Speed		100s ⁻¹				←
Mass		0.045kg	0.07kg	0.11kg	0.24kg	0.62kg
Output Type		Normal	Normal	Normal	Reverse	Normal

BRT

SIZ	/E	11	
<u> </u>		• •	
Mode	l No.	TS530N33E9	
Тур	ре	BRT	
Prim	ary	S1-S3, S2-4	
Input Voltage	e/Frequency	3.5Vrms 3kHz	
Transforma	ation Ratio	0.56 ⁺⁸ %	
Electrical Error		Spresd 10' Max. (AT 11.8Vrms)	
Impedance	Zso	500Ω Min. (AT 11.8Vrms)	
	Zrs	1000Ω Max. (AT 6.6Vrms) 400Hz	
Operating T	emperature	0 ~ +90°C	
Max. Opera	ting Speed	133.3s ⁻¹	
Ма	ss	0.11kg	

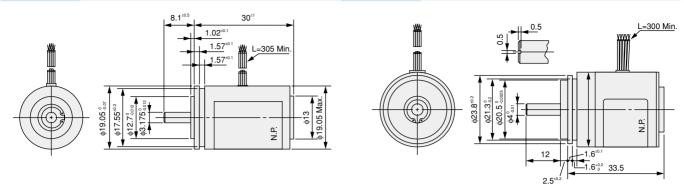


SIZE 08

TS510N35E18

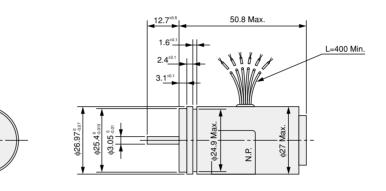
SIZE 10

TS520N46E9

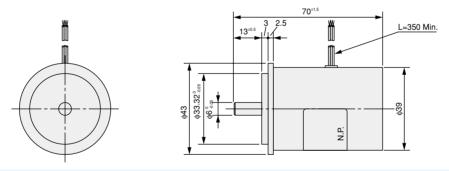


SIZE 11 TS530N33E10,TS530N33E9

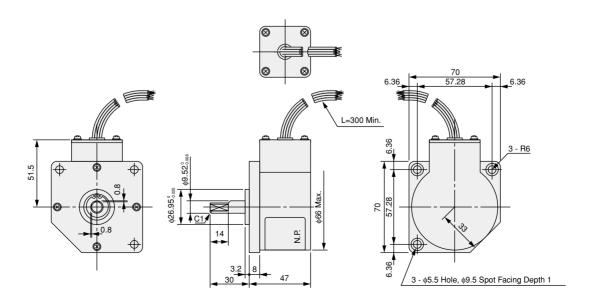
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SIZE 15 TS540N33E12



SIZE 25 TS2014N141E26



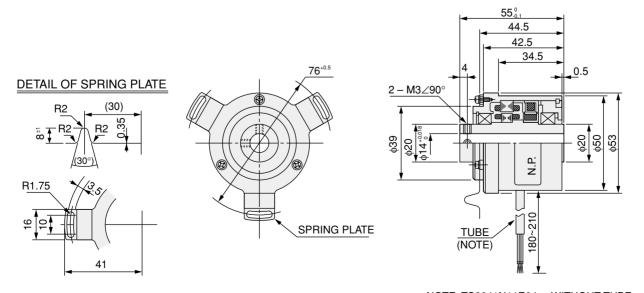


HOLLOW SHAFT RESOLVERS

SIZE		21		
Model N	0.	TS2641N11E64	TS2651N111E78	
Туре		BRX	BRT	
Primary		R1-R2	S1-S3, S2-S4	
Input Voltage/F	requency	7Vrms 10kHz	3.5Vrms 4kHz	
Transformatio	on Ratio	0.5 ± 5%	0.3 ± 5%	
Electrical Error		±10′ Max.	±10′ Max.	
Null Volta	age	20mVrms Max.		
Phase Shift		−5° Nom.		
	Z _{RO}	190Ω	51+j90Ω	
	Zrs		44+j76Ω	
Impedance	Zso	300Ω	102+j150Ω	
	Zss	270Ω	_	
Operating Temperature		−10 ~ +100°C	−10 ~ +150°C	
Max. Operating Speed		83.3s ⁻¹	133.3s ⁻¹	
Mass		0.3kg	0.305kg	
Output Type		Normal	ER1-R2=K(-ES1-S2 SIN θ-ES2-S4 COS θ)	

OUTLINE (DIMENSION: mm)

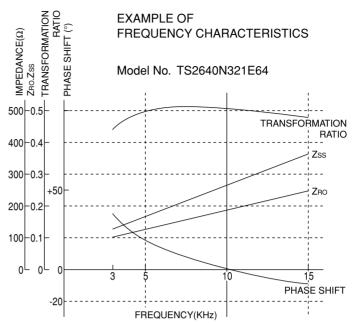
SIZE 21 TS2641N11E64, TS2651N111E78



NOTE TS2641N11E64 : WITHOUT TUBE TS2651N111E78 : WITH TUBE

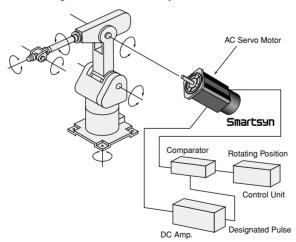
APPLICATION NOTES

- ■The supply voltage is a rated value, and a resolver can accept a voltage from 3V to approx. 1.2 times as high as the rating. However, the supply frequency should only be altered within ±5% lest it should affect the accuracy. Electrical parameters largely vary as the frequency varies as shown on the right.
- ■When a noise source is in vicinity, or when signal transfer distance is long, twisted/shielded pair cables should be used. When a noise still exists on the signals, they should be received by a differential amplifier.
- ■In BRX resolver, the two output voltages should be connected to the same amount of loads each other, or the voltages will get disproportionate, thus affect the accuracy.
- When an intense magnetic field surrounds a resolver, it may not work properly with its magnetic flux affected.
- ■When a resolver is used in a high humidity as close to 100% Rh for a long time, waterproof structure should be considered lest its insulation materials should deteriorate.
- All resolvers in the catalog are 1× (2 poles) resolvers. For winding modifications to other speeds, please consult us.

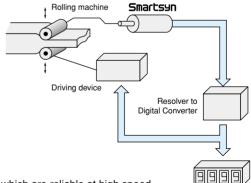


APPLICATIONS

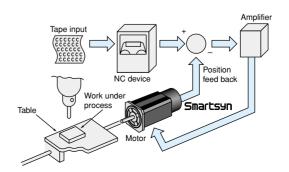
· For Driving Robot Hand and Body.



 Applicable to the roller positioning control of rolling mills.



• Smartsun resolvers which are reliable at high speed are suitable for numerical control systems.





TAMAGAWA TRADING CO.,LTD A COMPANY OF TAMAGAWA SEIKI CO.,LTD

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WARRANTY

Tamagawa Seiki warrants that this product is free from defects in material or workmanship under nornal use and service for a period of one year from the date of shipment from its factory. This warranty, however, excludes incidental and consequential damages caused by careless use of the product by the user. Even after the warranty period, Tamagawa Seiki offers repair service, with charge, in order to maintain the quality of the product. The MTBF (mean time between failures) of our product is quite long; yet, the predictable failure rate is not zero. The user is advised, therefore, that multiple safety means be incorporated in your system or product so as to prevent any consequential troubles resulting from the failure of our product.

All specifications are subject to change without notice.