SINGLE-COIL RESOLVER (SCR)

for the
Automotive Industry

SMARTER SENSORS FOR SMARTER VEHICLES

TE Connectivity‘s Sensor Solutions business unit is one of the leading suppliers of sensors and modules for automotive transmission applications.

The upgrade of existing transmissions to hybrid transmissions using power electric motors, mainly the synchronous type, leads to an increase of all requirements in terms of electric machines performance, which requires new technological developments.

The wide product and process portfolio of TE Sensor Solutions offers an ideal base for the development and production of such robust and reliable solutions.

The Sensor Solutions Single-Coil Resolver (SCR) is designed to determine the rotor position in integrated Powertrain concepts (Hybrid powertrain) by scanning magnetic fields. This SCR can withstand rotation speeds above 20,000 RPM and operates in a temperature range within –40° C up to +170° C, also in oil if necessary.

The innovative SCR layout also guarantees a competitive cost structure and advantages in terms of the overall performance. As a result, it can be fitted to large diameter machines featuring numerous permanent magnets – being installed between the thermal engine and the gearbox, to separate electrical machines mounted parallel to the transmission or to another axle for instance.

TE Connectivity’s Sensor Solutions developed the MCR technology as a product platform, capable to provide several ranges of speeds and shaft diameters in accordance with customer requirements.

APPLICATION

- Angular position sensor for electric motors for EV and HEV cars

DESCRIPTION

- Analoge Output Signal
- Plattform product based on polepairs of the e-motor (speed)
- Please see product specification 108-90822 for more details

PERFORMANCE

- Temperature range –40° C to +170° C (works in oil if neccessary)
- High rotational speed
- Accurate measurement of angular rotor position and speed
- Shock and vibration robust
- Robust against eccentricity
- Very high signal-noise ratio
- High reliability (no active components)
- Customized cable assembly and connector interface

ADVANTAGES OF TE SOLUTION

- Fault-tolerant with excentricity (static/dynamic) through patented winding scheme
- Fault-tolerant against external fields through patented winding scheme
- Flexible adaption of shaft diameter through smart tooling concept
- Different fixation designs of stator possible
- Different inner diameters of rotor possible
- Interface and connector as key competence of TE Connectivity

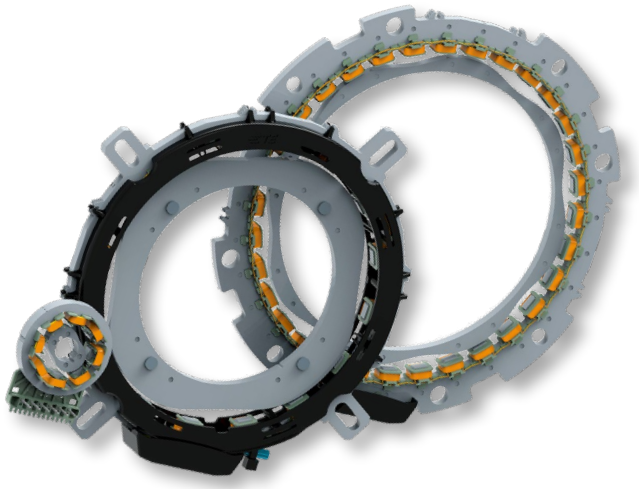
AVAILABLE SPEED NUMBERS

- 2-/ 3-/ 4- /5-/ 6-/ 8-/ 10-/ 12-Speed

AVAILABLE PLATFORMS

- x02/ x03/ x05/ x08/ x11/ x15/ x18 platform*)

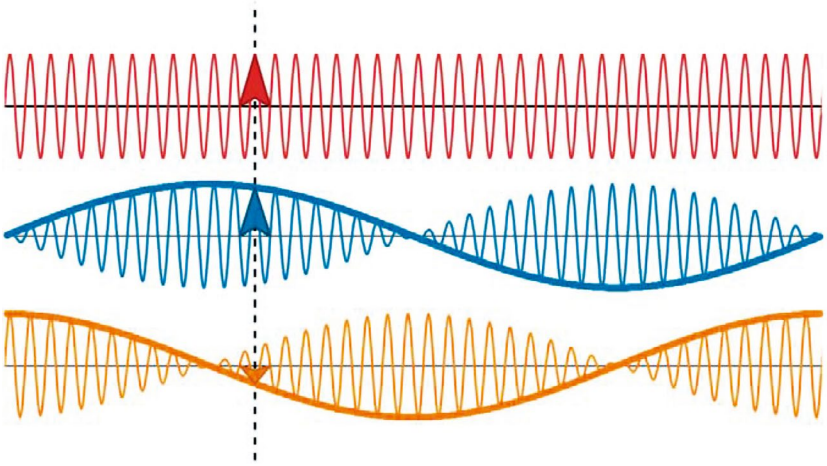
*) nomenclature

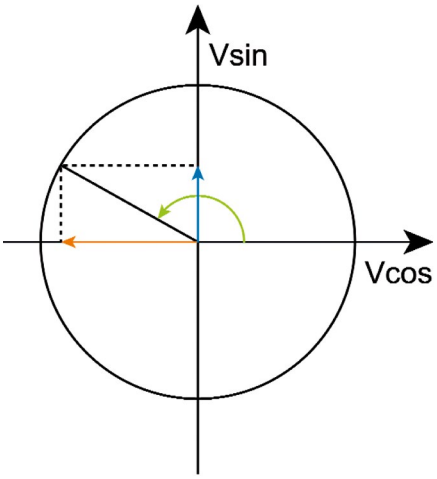


SCR XX YY - ZZ e.g. SCR 411

- XX: Speed numbers, e.g. 4, 6, 10, ... (leading zero not displayed)
- YY: Inner diameter stator [mm/10]
- ZZ: Customer specific features

SIGNAL





RECOMMENDED OPERATION CONDITIONS

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Unit
Ambient Temperature	For lifetime = 600h	Ta	-40		150	°C
Storage Temperature		Ts	-40		80	°C
Excitation Voltage		$\hat{U}_{EXC}$		7		V_{rms}
Excitation Frequency		f		10		kHz

MAXIMUM RATING

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Unit
Peak Temperature*	<100h over lifetime	Ta_{peak}			170	°C

* Peak temperature test need to be performed in application condition

ANALOG INPUT

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Unit
Input Impedance	@10kHz, 7V, with Rotor	$\lvert Z_{exc} \rvert$	96	(120)	144	Ω

ANALOG OUTPUT

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Unit
Sine Output Impedance	@10kHz, 7V, with Rotor	$\lvert Z_{sin} \rvert$	200	(250)	300	Ω
Cosine Output Impedance		$\lvert Z_{cos} \rvert$				

Values in all tables are typical values

Example: SCR 411 Performance

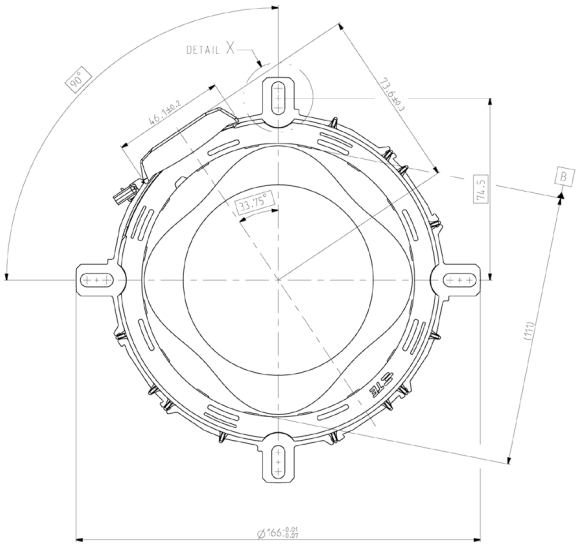
SIGNAL PERFORMANCE

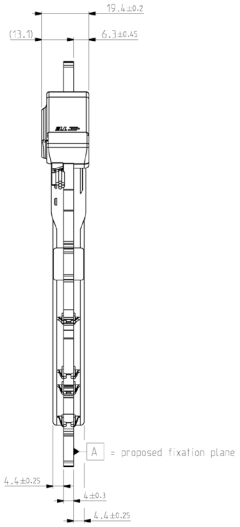
Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Unit
Transformation Ratio	@10 kHz, 7 V	$\overline{TR'}$	0.2574	(0.286)	0.3146	–
Phase Shift		φ	-15°	(0)	15°	dag
Rotor Angle Offset	Reference Rotor	$\overline{\Delta\alpha'_{el}}$	-12°	(0)	12°	dag
Span of Angular Error		$\lvert\Delta\alpha'_{el}\rvert$		(80′) (1.33°)	120′ 2°	arc min dag

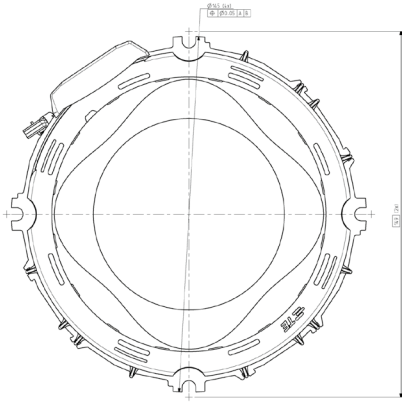
Values in all tables are typical values

$'_{el}$ means electrical minutes

Example: SCR 411 Diameters







Alternative ear option

YOUR ADVANTAGE

- Next level customer support
  - Design in support
  - Sensor function
  - Cable assembly
  - Connector definition
  - Manufacturing competence
- One Stop Shopping Solution
- TE Connectivity has a global footprint and customer support for every kind of question regarding to your products

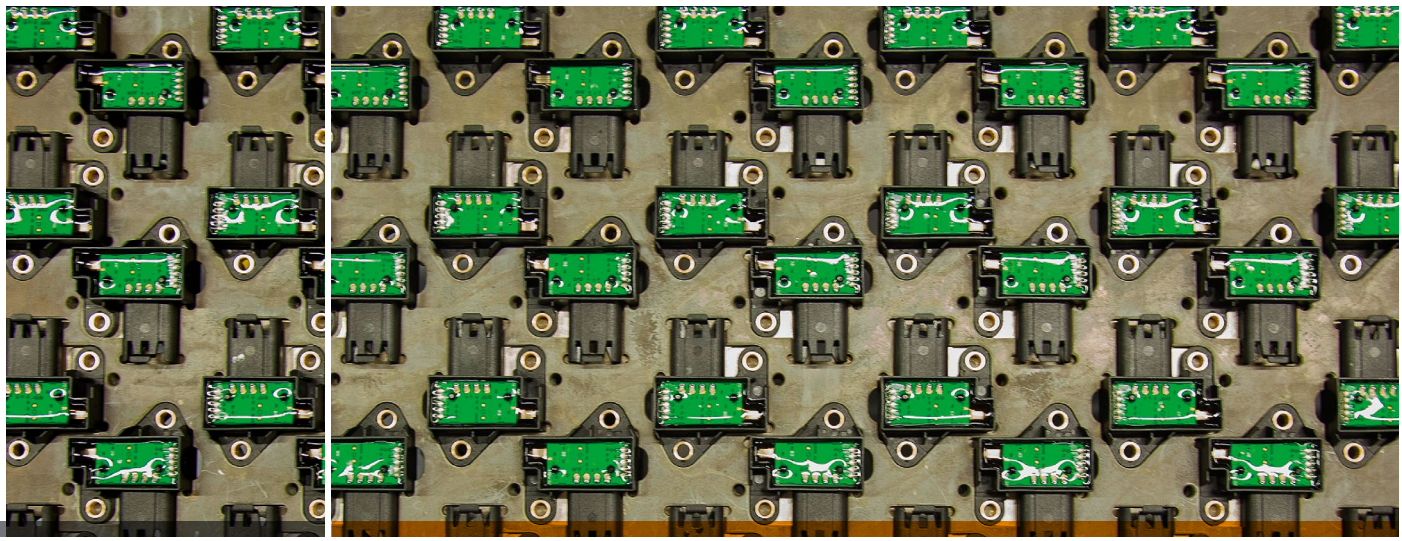
CONTACT

For further information please visit us on
www.te.com/transportationsensors

Or contact our Product Information Center (PIC):

Brazil	+55 11 2103 6105
China	+86 21 2407 1588
Germany	+49 6251 133 1999
Japan	+81 44 844 8111
Korea	+82 2 3415 4500
United States	+1 800 522 6752

www.te.com/support-center



TE Connectivity Germany GmbH
Ampèrestrasse 12–14
64625 Bensheim | Germany

Product Information Center:
+49 (0)6251 133-1999

www.TE.com

TE Connectivity
Sensor Solutions
for the Automotive Industry
ONLINE

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