



## Precision strain wave gears RT1-T

### Features

#### Increased performance and higher sensitivity

Many of today's applications incorporate automation solutions which involve the use of cobots. Robots and automation solutions play an integral role in overcoming future challenges, particularly in industrial automation but also in other areas such as logistics, medical technology and in agricultural applications.

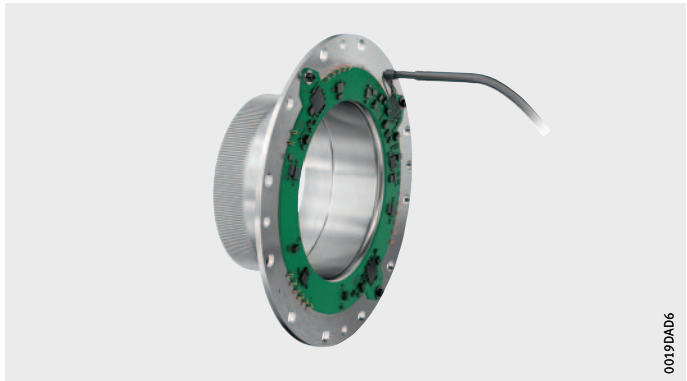
Schaeffler supports end users in their efforts to achieve a constant increase in performance, combined with simultaneous use in sensitive applications, with an innovative solution in the form of a precision strain wave gear with integrated sensors.

This solution supports improved dynamics when the sensorised precision strain wave gear RT1-T is used in each joint of a cobot and is combined with vibration compensation by robot manufacturers using control technology. As a result, higher velocities can be achieved while maintaining the positioning accuracy of the cobot through the active compensation of vibrations.

Product characteristics	Advantages for your cobot
Compact design with integrated microelectronics and embedded AI	No additional space required
	Very simple upgrade for non-sensor-based cobots
	Available in four sizes 14, 17, 25, 32
	Ideal for use in collaborative applications
High-precision Sensotect coating with structure in the sub-micrometre range	No influence on the mechanical system or on torsional rigidity
	Excellent long-term stability of the sensor technology over the entire operating life
Direct torque measurement; minimal deviation in hysteresis and linearity	Unaffected by temperature
	High sensitivity
	Precise torque measurement for very high requirements

# Precision strain wave gears RT1-T

- Torque sensor concept
- Adaptation of a system of strain gauges to the flange section of the gear flexspline.
  - The innovative Sensotect technology combines standard strain gauge material with the option of individually adapting the structure to the deformation properties.
  - The electronic control and signal processing system is also adapted directly to the flexspline, in order to keep the length of the connecting cables as short as possible.
  - The signals of all strain gauges are processed by a neuronal network running a multilayer perceptron AI.



*Figure 1*  
Torque sensor concept

## Functional safety

The torque sensor has been fitted with channels which operate independently of each other, so that wire breaks are detected on each channel. A plausibility check in the interface (e.g. cyclic redundancy check, life counter) and a microcontroller with functional safety capability serve as preparation for meeting functional safety requirements.

- unique master-slave communication with sensor as slave
- detection of wire breaks on every channel
- plausibility check in the interface (e.g. CRC, life counter)
- microcontroller with functional safety capability

**Note** Torque sensor is set up for reliable torque prediction.

## Sensor specifications

### Technical data

General					
Designation	RT1-H...UHS-T				
Size	14	17	25	32	
Sensor characteristics					
Main measurement range (= RPT)	± Nm	36	70	204	484
Accuracy (with main measurement range) <sup>1)</sup>	± % FS	1,5			
Maximum measurement range (= MPT)	± Nm	70	143	369	892
Resolution	bit	16			
Output resolution					
Communication	SPI				
	Open wire ends				
	Connector customisable				
Operating conditions					
Power supply	VDC	5 ± 0,5 V			
Current consumption	mA	500			
Operating temperature range	°C	0 – 80			
Standards					
Environment-specific capability	EN 61000-6-2, EN 61326-1				
	EN 61000-6-3 (CISPR 11, EN 55011)				
	In accordance with IEC 68000				
	UL94 V-0				
	EU Directive CE 2011/65/EU				
Suitable for robot-assisted use	In accordance with DIN EN ISO 10218-1, DIN EN ISO 10218-2				

<sup>1)</sup> FS = ± MPT.



*Figure 2*  
Torque sensor fully integrated

#### Further information

- PDB 64, DuraWave Strain Wave Gears,  
▶ <https://www.schaeffler.de/std/1FAA>

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## Ordering designation

Structure of the ordering designation for precision strain wave gears with integrated torque sensor.

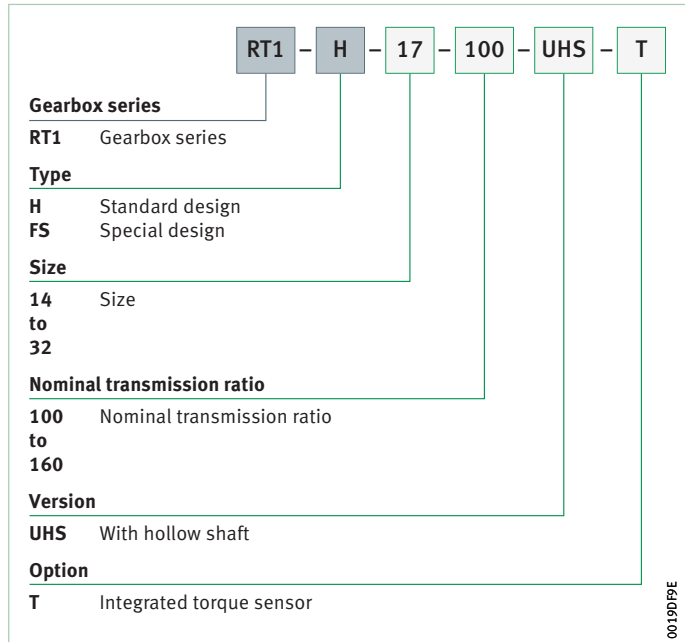


Figure 3  
Ordering designation

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