

**Data sheet**

# RT11eS



## Technical data

Type	-	RT11eS		
Accuracy class	%	$\leq\pm 0.03$		
Rated torque (Md <sub>n</sub> )	Nm	5 10	20 25	50

Torque measuring system				
Technology	-	Rotating		
Rated torque (Md <sub>n</sub> ) #1	Nm	5 10	20 25	50
Rated torque short measurement range (optional, minimum) (Md <sub>ns</sub> ) #2	Nm	1 2	4 5	10
Accuracy class extended (for Md <sub>n</sub> )	%	$\leq\pm 0.03$		
Outputs	-	Frequency (RS422), Voltage, Current, CAN bus, Alert		
Test signal	-	see test report		

Mechanical dimensions #3		
Outer diameter of rotor #4	mm	77
Lengths (Rotor, without centering)	mm	50
Pitch circle diameter #5	mm	63.00 / 40.00

Speeds and speed measuring systems		
Speed detection (integrated)	-	without
Speed detection (optional)	-	without
Maximum Speed without speed detection system	rpm	20,000
Optional increased speed	rpm	N/A
Maximum speed with magnetic speed encoder	rpm	N/A
Maximum speed with optical speed encoder	rpm	N/A
Maximum speed with inductive speed encoder	rpm	N/A

Torque accuracy class per output type (related to Md <sub>n</sub> )		
Frequency output	%	$\leq\pm 0.03$
CAN output	%	$\leq\pm 0.03$
Voltage output	%	$\leq\pm 0.05$
Current output	%	$\leq\pm 0.05$
Frequency output (option higher accuracy)	%	$\leq\pm 0.03$
CAN (option higher accuracy)	%	N/A

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Rated torque (Md <sub>n</sub> )	Nm	5 10	20 25	50

Linearity deviation including hysteresis related to Md <sub>n</sub> #6			
Frequency, 0%...30%	%		$\leq \pm 0.010$
Frequency, 30%...60%	%		$\leq \pm 0.020$
Frequency, 60%...100%	%		$\leq \pm 0.030$
CAN, 0%...30%	%		$\leq \pm 0.010$
CAN, 30%...60%	%		$\leq \pm 0.020$
CAN, 60%...100%	%		$\leq \pm 0.030$
Voltage output	%		$\leq \pm 0.05$
Current output	%		$\leq \pm 0.05$
Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to Md <sub>n</sub> )			
Frequency output	%		$\leq \pm 0.03$
CAN output	%		$\leq \pm 0.03$
Voltage output	%		$\leq \pm 0.05$
Current output	%		$\leq \pm 0.05$
Temperature influence per 10K in the nominal temperature range on the output signal related to the actual value of signal span (rel. to Md <sub>n</sub> )			
Frequency output	%		$\leq \pm 0.03$
CAN output	%		$\leq \pm 0.03$
Voltage output	%		$\leq \pm 0.05$
Current output	%		$\leq \pm 0.05$
Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to Md <sub>n</sub> )			
Frequency output	%		$\leq \pm 0.03$
CAN output	%		$\leq \pm 0.03$
Voltage output	%		$\leq \pm 0.05$
Current output	%		$\leq \pm 0.05$
Long-term drift over 48h at reference temperature			
Voltage output	mV		<1.0
Current output	$\mu$ A		<0.80

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Rated torque (Md <sub>n</sub> )	Nm	5 10	20 25	50
Nominal sensitivity (range between zero torque and rated torque)				
Frequency output	kHz	20		
Voltage output	V	5.0 / 10.0 / 2.5 / 5.0		
Current output	mA	8 / 10		
Output signal at zero torque				
Frequency output	kHz	60		
Voltage output	V	0.0 / 0.0 / 2.5 / 5.0		
Current output	mA	12 / 10		
Nominal output signal				
Frequency output at positive nominal value	kHz	80		
Frequency output at negative nominal value	kHz	40		
Voltage output at positive nominal value	V	5 / 10 / 5 / 10		
Voltage output at negative nominal value	V	-5 / -10 / 0 / 0		
Current output at positive nominal value	mA	20 / 20		
Current output at negative nominal value	mA	4 / 0		
Max. modulation range				
Frequency output	kHz	30...90		
Voltage output	V	-10.5...10.5		
Current output	mA	0...24		
Group delay time (main TCU)				
Frequency output	μs	10		
Voltage output	μs	3,000		
CAN bus	μs	1,000		

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Rated torque (Md <sub>n</sub> )	Nm	5 10	20 25	50

Speed measuring system	Inductive (track at rotor)			
Pulse per rev (PPR)	ppr.		N/A	
Maximum speeds (related to PPR)	rpm		N/A	
Max. output frequency (RS422)	kHz		N/A	
Minimum speed for sufficient pulse stability	rpm		N/A	
Speed measuring system	Magneto resistive (2 tracks approx. 90 degree phase shifted)			
Pulses per rev (PPR)	ppr.		N/A	
Maximum speeds (related to PPR)	rpm		N/A	
Max. output frequency (RS422)	kHz		N/A	
Minimum speed for sufficient pulse stability	rpm		N/A	
Nominal clearance (sensor - pole ring)	mm		N/A	
Working airgap (sensor - pole ring)	mm		N/A	
Nominal axial displacement (rotor - stator) #7	mm		N/A	
Tolerance to nominal axial displacement (rotor - stator)	mm		N/A	
Speed measuring system	Optical			
Pulses per rev (PPR)	ppr.		N/A	
Maximum speeds (related to PPR)	rpm		N/A	
Max. output frequency (RS422)	kHz		N/A	
Minimum speed for sufficient pulse stability	rpm		N/A	
Nominal radial displacement (rotor - stator)	mm		N/A	
Tolerated radial displacement (rotor - stator) #7	mm		N/A	
Nominal axial displacement (rotor - stator) #7	mm		N/A	
Tolerance to nominal axial displacement (rotor - stator)	mm		N/A	

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Angular measuring system				
Requirement	-	N/A		
Pulses per rev	ppr.	N/A		
Resolution	°	N/A		
Output signals	-	N/A		
Measurement ranges	°	N/A		

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Temperature ranges				
Nominal temperature range (Rotor)	°C	0...80		
Operating temperature range (Rotor) #8	°C	-20...85		
Storage temperature range (Rotor)	°C	-30...85		
Nominal temperature range (Stator)	°C	0...80		
Operating temperature range (Stator) #9	°C	-20...85		
Storage temperature range (Stator)	°C	-30...85		
Nominal temperature range (TCU)	°C	0...70		
Operating temperature range (TCU)	°C	-20...70		
Storage temperature range (TCU)	°C	-30...85		
Mechanical shock (EN 60068-2-27)				
Quantity	-	1,000		
Duration	ms	3		
Acceleration	m/s <sup>2</sup>	650		
Vibration load (EN 60068-2-6)				
Frequency	Hz	10...2,000		
Duration	min.	150		
Acceleration	m/s <sup>2</sup>	200		
Load limits #10				
Limit torque, related to Md <sub>n</sub>	%	700 350	350	350
Breaking torque approx., related to Md <sub>n</sub>	%	1,000		
Axial limit force	kN	1.05	1.35 1.49	2.05
Lateral limit force	N	87.50	157.10 190.00	327.00
Bending limit torque	Nm	1.90	3.80 4.70	8.40

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Rated torque ( $M_{d_n}$ )	Nm	5 10	20 25	50
Mechanical values				
Torsional stiffness	kNm/rad	2.35	5.60 7.55	17.45
Angle of twist at $M_{d_n}$	°	0.120 0.240	0.200 0.190	0.160
Axial stiffness	kN/mm	52	67 74	102
Radial stiffness	kN/mm	5.15	9.20 11.10	19.20
Bending stiffness	kNm/°	0.04	0.08 0.10	0.18
Deflection at axial limit force	mm	$< 0.03$		
Additional radial deviation at lateral limit force	mm	$< 0.02$		
Parallel deviation at bending limit torque	mm	$< 0.05$		
Inherent frequency	Hz	1,290	1,735 1,900	2,480
Balance quality-level (DIN ISO 1949)	-	G2.5		
Inertia of rotor	$\text{kgm}^2$	0.0002		
Max. limits for relative shaft vibration (peak to peak) #11	µm	$S_{(p-p)} = \frac{9000}{\sqrt{n}}$		

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Rated torque (Md <sub>n</sub> )	Nm	5 10	20 25	50
Weight approx.				
Rotor #12	kg	0.31	0.32 0.33	0.33
Stator (without speed encoder) #12	kg	0.20		
Mounting distances (without optional speed detection system)				
Nominal radial displacement (rotor - stator)	mm	1.5		
Tolerance to nominal radial displacement (rotor - stator)	mm	$\leq \pm 0.2$		
Nominal axial displacement (rotor - stator) #7	mm	0		
Tolerance to nominal axial displacement (rotor - stator)	mm	$\leq \pm 0.5$		
Flatness and concentricity tolerances rotor				
Circular run-out-axial tolerance #13	mm	0.01		
Circular run-out-radial tolerance #13	mm	0.01		
Power supply				
Nominal supply	V	(DC) 24		
Supply range #14	V	(DC) 23...25		
Max. current consumption in measuring mode	A	<0.70		
Max. current consumption in start-up mode	A	<1		
Nominal power consumption	W	<17		
Load resistance				
Frequency output	-	RS422		
Voltage output	kOhm	$\geq 5$		
Dynamic				
Frequency output	kHz	$\leq 7$		
Voltage output	kHz	$\leq 1$		
Current output	kHz	$\leq 1$		
CAN output conversation rate	1/s	$\leq 1,000$		

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Miscellaneous			
Protection class (Rotor)	-	IP54	
Protection class (Stator)	-	IP54	
Protection class (rotor, extended)	-	N/A	
Protection class (stator, extended)	-	On request	
Pitch circle screw information	-	4 * M8 (8.8)	
CAN bus type	-	2B	
Configuration interface	-	RS232	
Central hole	mm	N/A	
Material	-	Titanium	
Measuring range (related to $M_d$ )	%	120	
Compatible evaluation units (TCU)	-	TCU2	
Stator type	-	eS	
Sales information			
Article number	-	10009570	
U.S. FCC certificate	-	Not required	

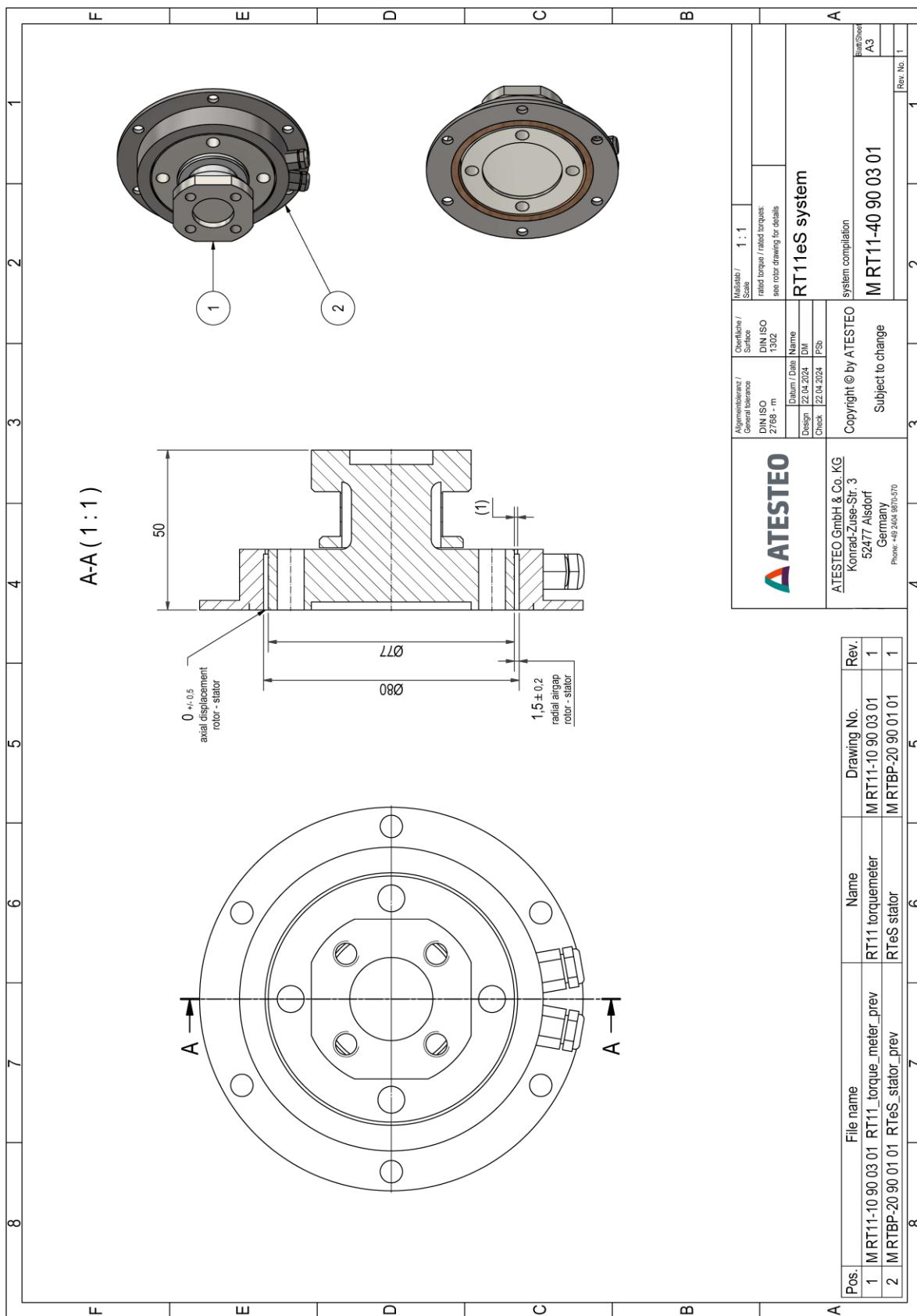
## Remarks and information

Link no.	Topic	Remark
#1	Nominal torque	Based on customer requests, the measurement systems can optionally be optimized for not listed nominal torque values (intermediate ranges possible).
#2	Second torque range	The written second nominal torque value ( $M_{d_{ns}}$ ) is the smallest possible. Greater second torque ranges can be chosen on demand.  Mechanical values and load limits vary between single and dual range torque meters. A data sheet for dual range torque meters with specific values can be requested.
#3	Dimensions	Mechanical dimensions are without engagement. Use the drawings and step files as master for your constructions.
#4	Details in the drawings	Value can vary by optional components. Please find details to this attribute in the integrated drawings.
#5	Pitch circle diameter	The pitch circle diameter is identically at input and output side for most systems. More information is given in the drawings of a product.
#6	Linearity	Values of Linearity deviation incl. Hysteresis can only be reached if positive and negative sensitivity values are used.
#7	Reference planes	Please check the drawings for information about the reference planes of this attribute.
#8	Temperature range (rotor)	No condensation allowed.
#9	Temperature range (stator)	No condensation allowed. Temperature related to housing ground point.
#10	Load limits	The given values are only valid if no other load occurs at the same time. If the loads in sum are 100%, the max. error will be 0.3% of the nominal torque. Limit and break torque are lower if other loads are applied (such as lateral forces).

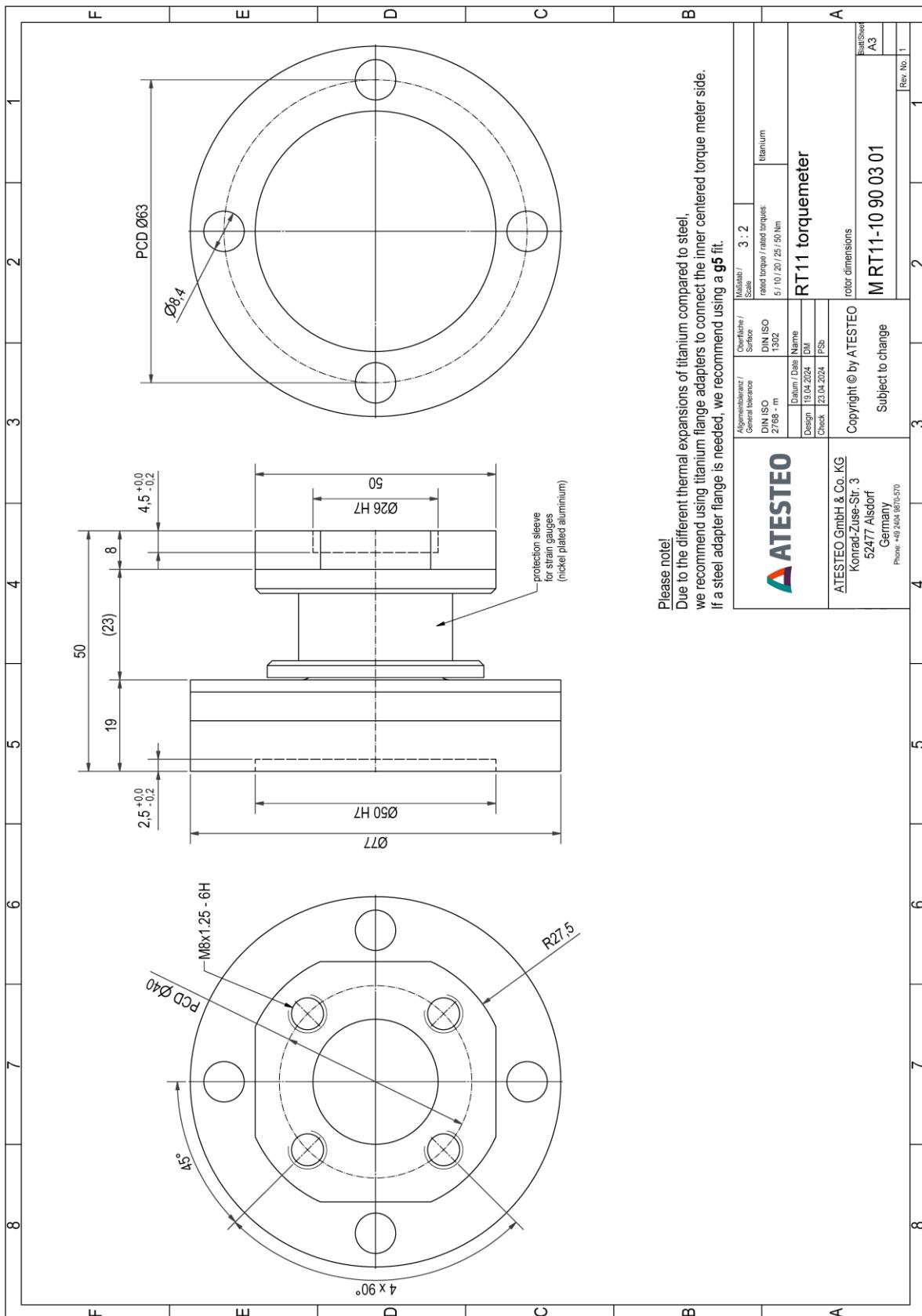
## Remarks and information

Link no.	Topic	Remark
#11	Vibration limits	Vibration limits are not an influence to the machine. They reflect the allowed effect onto the rotor (ISO 7919-3). Parameter "n" is given in "r/min.".
#12	Weights	Weights are related to components without options like speed detection system. Please contact us for exact weight information of options.
#13	Flatness and concentricity tolerances	The parameters of "Flatness and concentricity tolerances rotor" are manufacturing tolerances.
#14	Supply voltage	The supply voltage range must be given at measurement system side. Long wires can reduce the voltage level from power supply to measurement system.

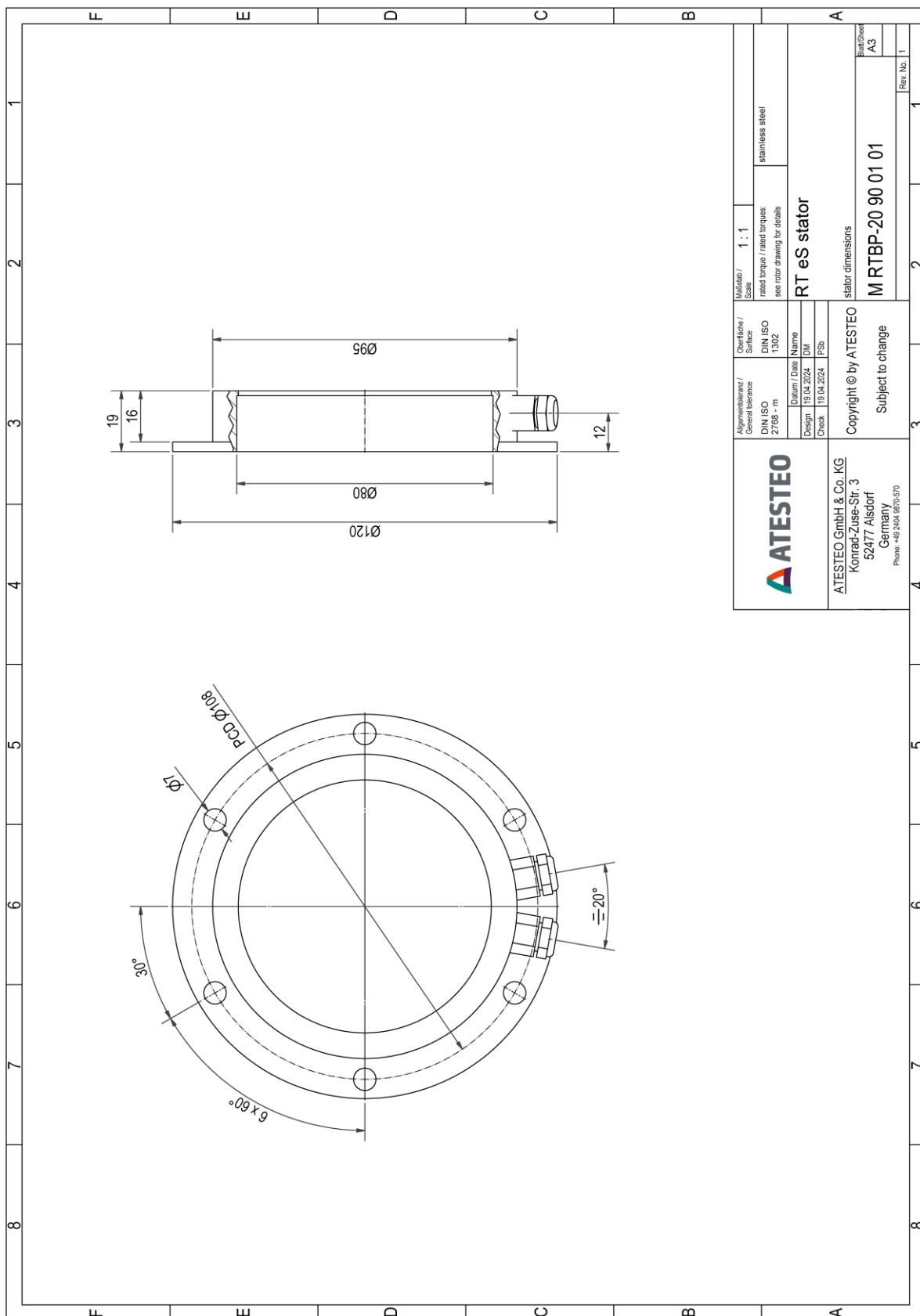
## Drawing



## Drawing



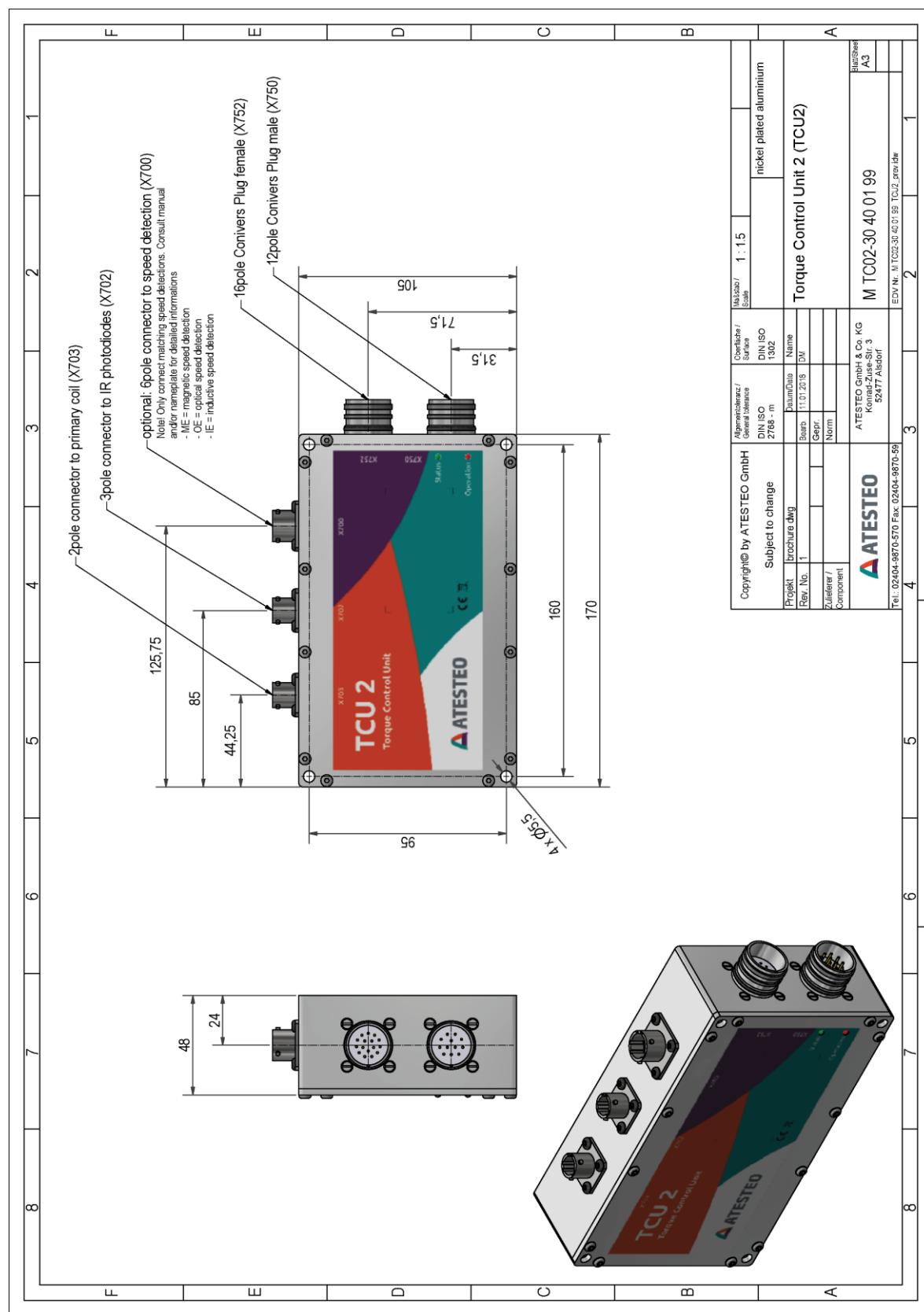
## Drawing



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