ATESTEO

Excellence in drivetrain testing

Data sheet

FxiS / FxeS

Instrumentation Devices

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Technical data

Type	-	F5eS		
Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000
Torque measuring system				
Technology	-	Rotating		
Rated torque (Md_n) #1	Nm	110,000	130,000	150,000
Rated torque short measurement range (optional, minimum) (Md_{ns}) #2	Nm	N/A		
Accuracy class extended (for Md_n)	%	N/A		
Outputs	-	Frequency, Voltage, Current, CAN bus, Alert		
Test signal	-	see test report		
Mechanical dimensions #3				
Outer diameter of rotor #4	mm	450		
Lengths (Rotor, without centering)	mm	240		
Pitch circle diameter #5	mm	400.0		
Speeds and speed measuring systems				
Speed detection (integrated)	-	inductive		
Speed detection (optional)	-	without		
Maximum Speed without speed detection system	rpm	7,000		
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	7,000		
Torque accuracy class per output type (related to Md_n)				
Frequency output	%	≤±0.10		
CAN output	%	≤±0.10		
Voltage output	%	≤±0.20		
Current output	%	≤±0.20		
Frequency output (option higher accuracy)	%	N/A		
CAN (option higher accuracy)	%	N/A		

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Technical data

Type	-	F5eS		
Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000
Linearity deviation including hysteresis related to Md_n #6				
Frequency, 0%...30%	%	≤±0.030		
Frequency, 30%...60%	%	≤±0.050		
Frequency, 60%...100%	%	≤±0.100		
CAN, 0%...30%	%	≤±0.030		
CAN, 30%...60%	%	≤±0.050		
CAN, 60%...100%	%	≤±0.100		
Voltage output	%	≤±0.20		
Current output	%	≤±0.20		
Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to Md_n)				
Frequency output	%	≤±0.10		
CAN output	%	≤±0.10		
Voltage output	%	≤±0.20		
Current output	%	≤±0.20		
Temperature influence per 10K in the nominal temperature range on the output signal related to the actual value of signal span (rel. to Md_n)				
Frequency output	%	≤±0.10		
CAN output	%	≤±0.10		
Voltage output	%	≤±0.20		
Current output	%	≤±0.20		
Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to Md_n)				
Frequency output	%	≤±0.10		
CAN output	%	≤±0.10		
Voltage output	%	≤±0.20		
Current output	%	≤±0.20		
Long-term drift over 48h at reference temperature				
Voltage output	mV	<1.0		
Current output	µA	<0.80		

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Technical data

Type	-	F5eS		
Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000
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	µs	1,000		

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Type	-	F5eS		
Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000

Speed measuring system	Inductive (track at rotor)
Pulse per rev (PPR)	ppr.	180
Maximum speeds (related to PPR)	rpm	7,000
Max. output frequency (RS422)	kHz	21
Minimum speed for sufficient pulse stability	rpm	>1.7
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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Type	-	F5eS		
Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000

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

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Technical data

Type	-	F5eS		
Accuracy class	%		≤±0.10	
Rated torque (Md_n)	Nm	110,000	130,000	150,000
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/s²		650	
Vibration load (EN 60068-2-6)				
Frequency	Hz		10...2,000	
Duration	min.		150	
Acceleration	m/s²		200	
Load limits #10				
Limit torque, related to Md_n	%	250	225	225
Breaking torque approx., related to Md_n	%	500	450	450
Axial limit force	kN	167.00	189.00	212.00
Lateral limit force	N	82,800.00	94,950.00	108,000.00
Bending limit torque	Nm	19,850.00	23,000.00	26,500.00

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Accuracy class	%		≤±0.10	
Rated torque (Md_n)	Nm	110,000	130,000	150,000

Mechanical values				
Torsional stiffness	kNm/rad	68,700	78,500	88,900
Angle of twist at Md_n	°	0.092	0.095	0.084
Axial stiffness	kN/mm	3,350	3,750	4,200
Radial stiffness	kN/mm	1,650	1,850	2,150
Bending stiffness	kNm/°	495.00	575.00	660.00
Deflection at axial limit force	mm		<0.06	
Additional radial deviation at lateral limit force	mm		<0.09	
Parallel deviation at bending limit torque	mm		<0.40	
Inherent frequency	Hz	800	850	950
Balance quality-level (DIN ISO 1949)	-		G2.5	
Inertia of rotor	kgm²	2.4092	2.4485	2.4909
Max. limits for relative shaft vibration (peak to peak) #11	µm		$S_{(p-p)} = \frac{9000}{\sqrt{n}}$	

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Type	-	F5eS		
Accuracy class	%		≤±0.10	
Rated torque (Md_n)	Nm	110,000	130,000	150,000
Weight approx.				
Rotor #12	kg	96.0	98.8	101.7
Stator (without speed encoder) #12	kg		3.80	
Mounting distances (without optional speed detection system)				
Nominal radial displacement (rotor - stator)	mm		5.0	
Tolerance to nominal radial displacement (rotor - stator)	mm		≤±0.5	
Nominal axial displacement (rotor - stator) #7	mm		12	
Tolerance to nominal axial displacement (rotor - stator)	mm		≤±1.0	
Flatness and concentricity tolerances rotor				
Circular run-out-axial tolerance #13	mm		0.03	
Circular run-out-radial tolerance #13	mm		0.03	
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		<2	
Nominal power consumption	W		<17	
Load resistance				
Frequency output	-		RS422	
Voltage output	kOhm		≥5	
Dynamic				
Frequency output	kHz		≤7	
Voltage output	kHz		≤1	
Current output	kHz		≤1	
CAN output conversation rate	1/s		≤1,000	

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Accuracy class	%	≤±0.10		
Rated torque (Md_n)	Nm	110,000	130,000	150,000

Miscellaneous		
Protection class (rotor)	-	IP54
Protection class (stator)	-	IP54
Protection class (rotor, extended)	-	On request
Protection class (stator, extended)	-	On request
Pitch circle screw information	-	16 * M30 (12.9)
CAN	-	2B
Configuration interface	-	RS232
Central hole	mm	N/A
Material	-	Steel
Measuring range (related to Md_n)	%	120
Compatible evaluation units (TCU)	-	TCU2
Stator type	-	eS
Sales information		
Article number	-	10004403
U.S. FCC certificate		Not required

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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 (Md_{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	Detail 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.

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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.

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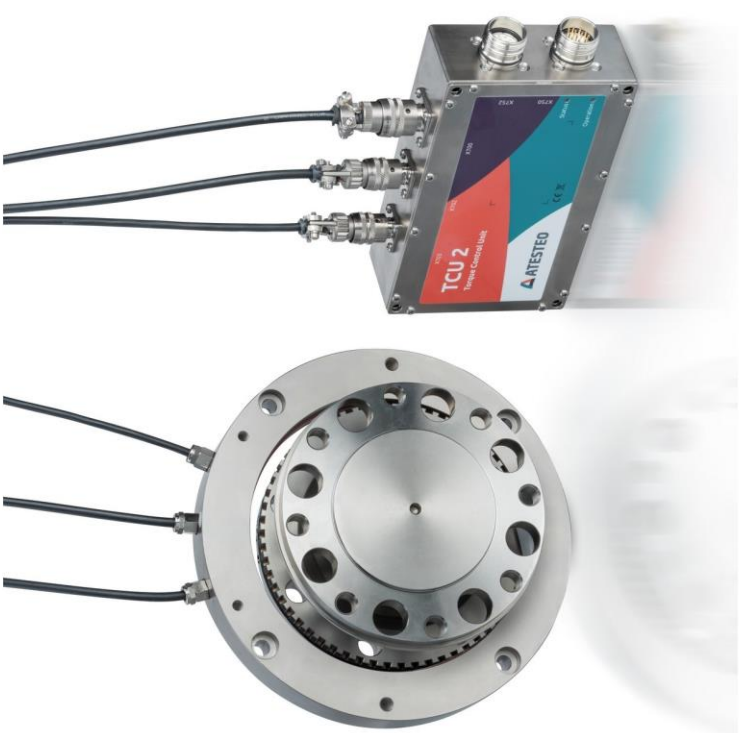
Drawing

iS

Rotor & stator with integrated evaluation unit (TCU)
Rotor & Stator mit integrierter Auswerteeinheit (TCU)

eS



Rotor, ring stator & external evaluation unit (TCU)
Rotor, Ringstator & abgesetzte Auswerteeinheit (TCU)

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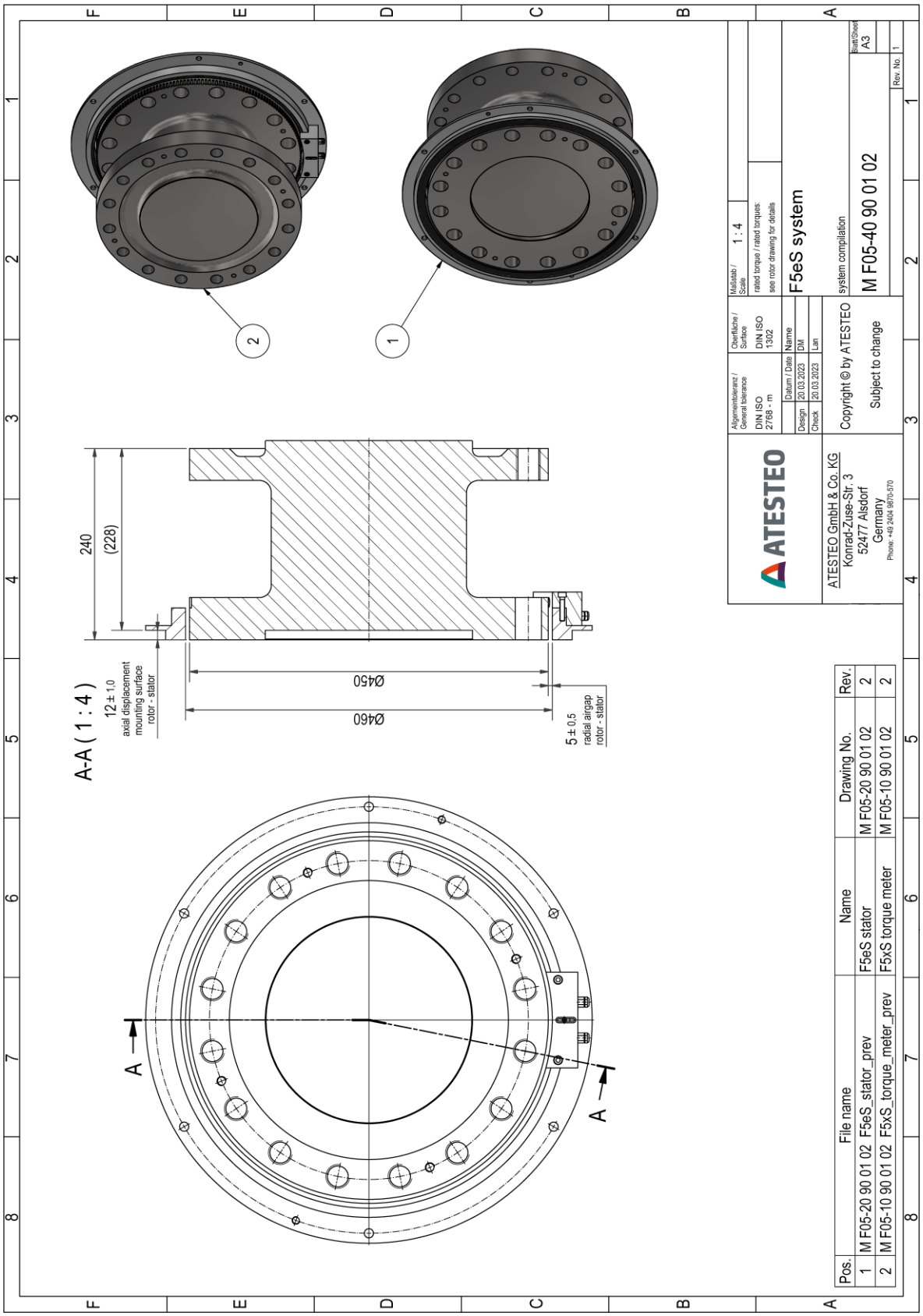

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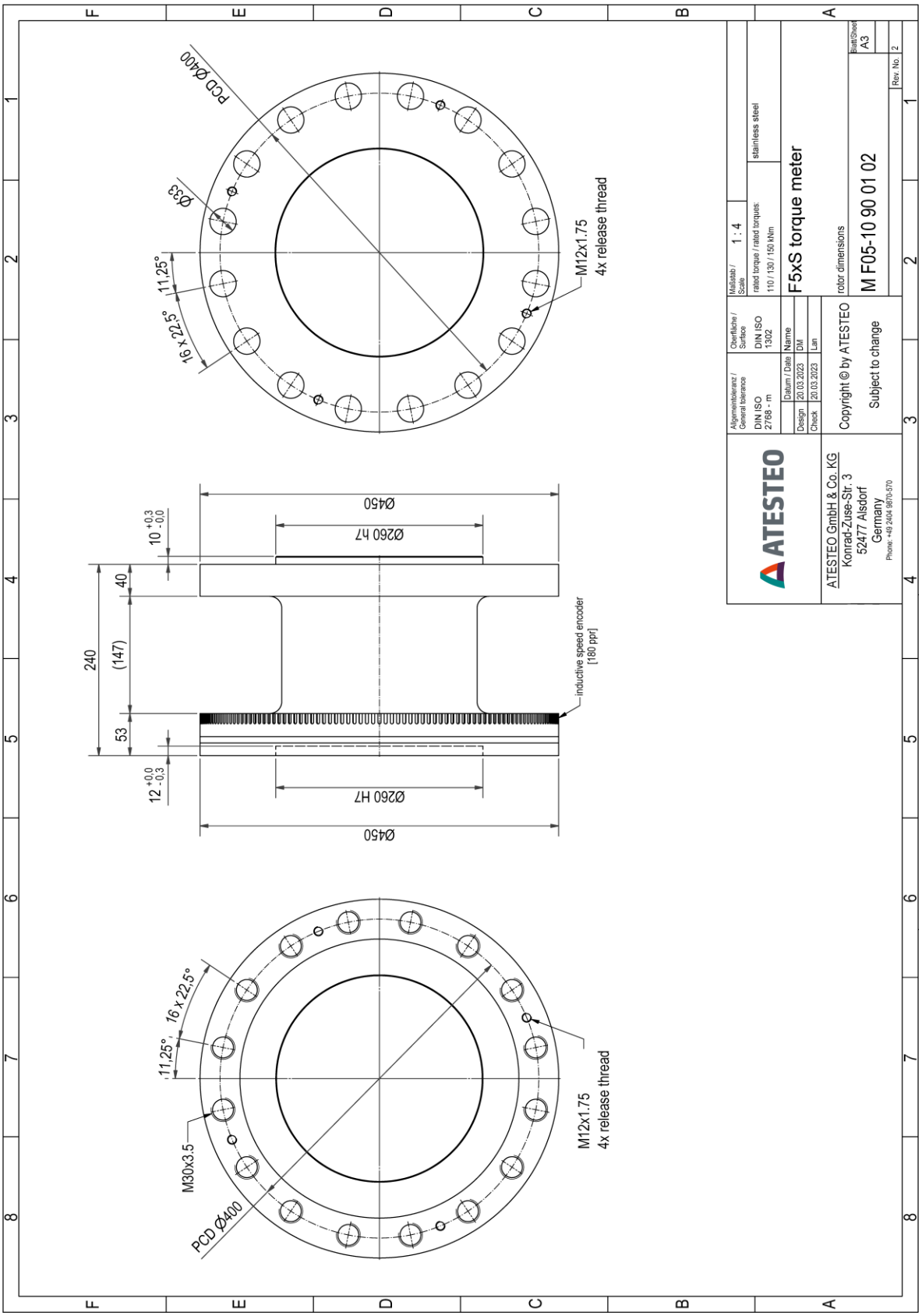

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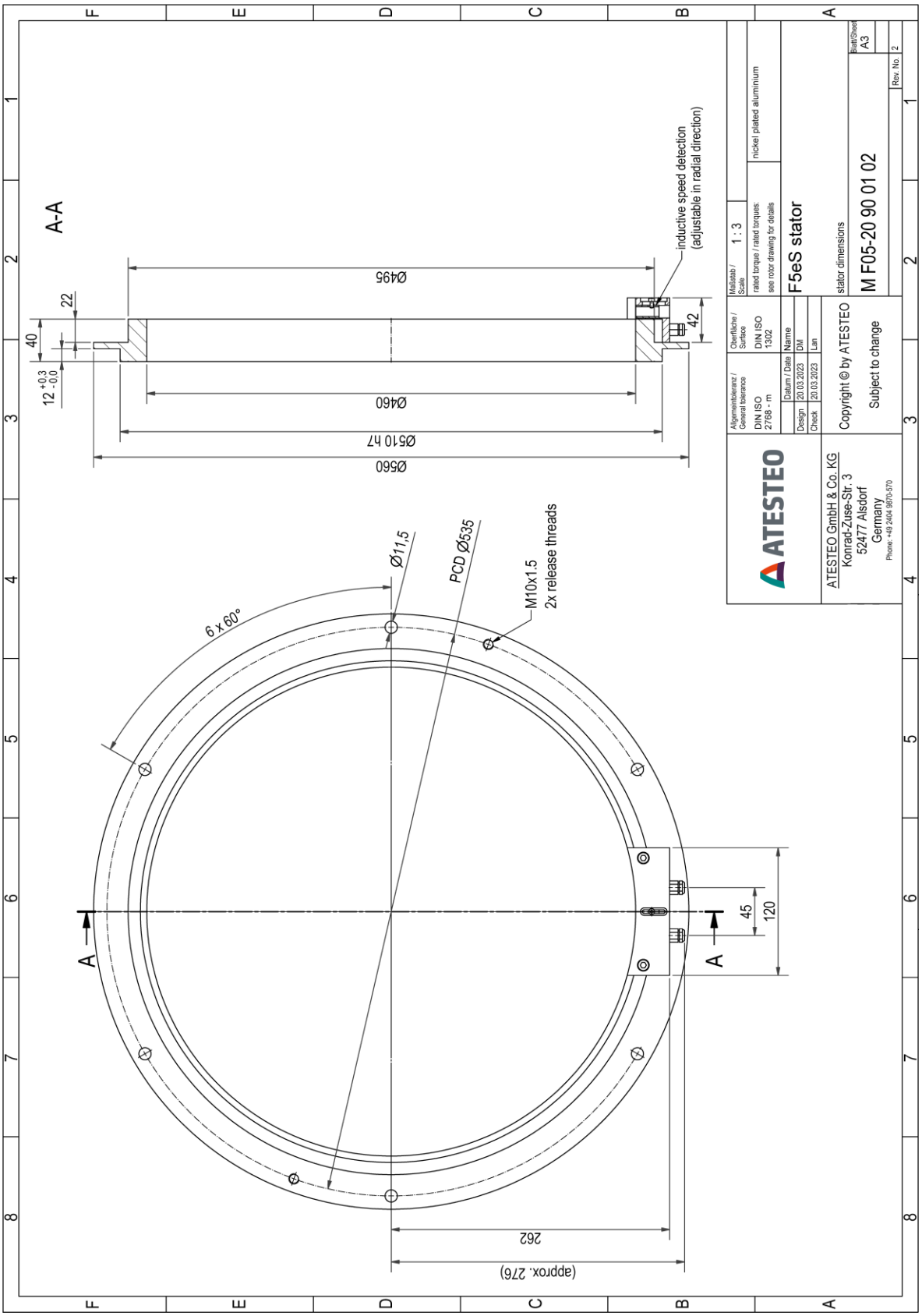

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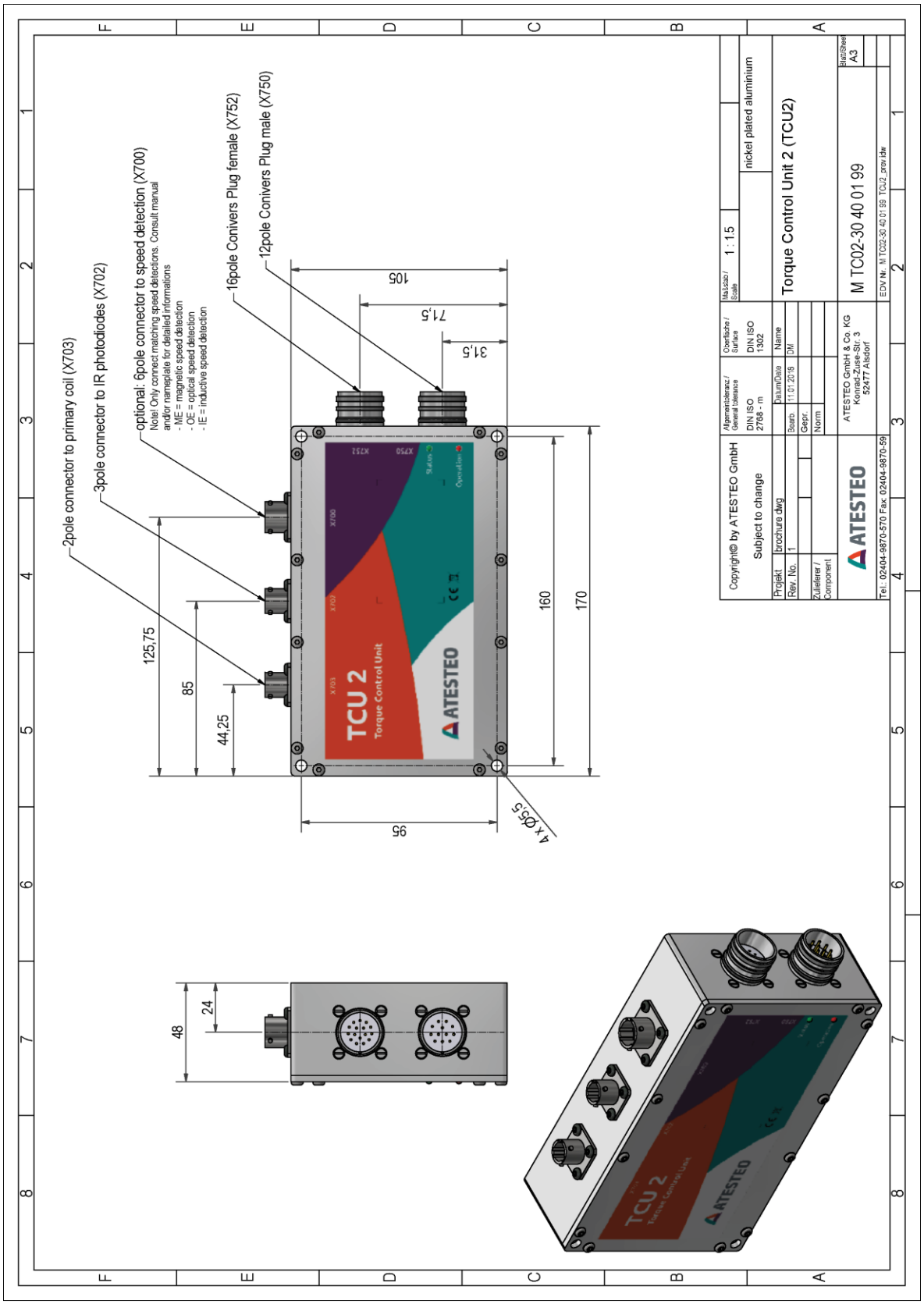

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TÜV SÜD

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