

Data sheet

FxiS / FxeS



Technical data

Type	-	F4iS	F4iS	F4eS	F4eS
Accuracy class	%	≤±0.10			
Rated torque (Md _n)	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000

Torque measuring system

Technology	-	Rotating			
Rated torque (Md _n) #1	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000
Rated torque short measurement range (optional, minimum) (Md _{ns}) #2	Nm	20,000 27,500	35,000 40,000	20,000 27,500	35,000 40,000
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	418
Lengths (Rotor, without centering)	mm	254
Pitch circle diameter #5	mm	369.0

Speeds and speed measuring systems

Speed detection (integrated)	-	inductive
Speed detection (optional)	-	without
Maximum Speed without speed detection system	rpm	8,000
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	8,000

Torque accuracy class per output type (related to Md_n)

Frequency output	%	≤±0.10
CAN output	%	≤±0.10
Voltage output	%	≤±0.15
Current output	%	≤±0.15
Frequency output (option higher accuracy)	%	N/A
CAN (option higher accuracy)	%	N/A

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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	%	≤±0.15			
Current output	%	≤±0.15			

Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to Md_n)

Frequency output	%	≤±0.05			
CAN output	%	≤±0.05			
Voltage output	%	≤±0.10			
Current output	%	≤±0.10			

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	%	≤±0.15			
Current output	%	≤±0.15			

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	%	≤±0.15			
Current output	%	≤±0.15			

Long-term drift over 48h at reference temperature

Voltage output	mV	<1.0			
Current output	μA	<0.80			

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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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Speed measuring system		Inductive (track at rotor)			
Pulse per rev (PPR)	ppr.			180	
Maximum speeds (related to PPR)	rpm			8,000	
Max. output frequency (RS422)	kHz			24	
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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Rated torque (M _{d1})	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000

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

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Accuracy class	%	≤±0.10			
Rated torque (Md _n)	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000

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...70	0...70	0...80	0...80
Operating temperature range (Stator) #9	°C	-20...70	-20...70	-20...85	-20...85
Storage temperature range (Stator)	°C	-30...85			
Nominal temperature range (TCU)	°C	N/A	N/A	0...70	0...70
Operating temperature range (TCU)	°C	N/A	N/A	-20...70	-20...70
Storage temperature range (TCU)	°C	N/A	N/A	-30...85	-30...85

Mechanical shock (EN 60068-2-27)					
Quantity	-	1,000			
Duration	ms	3			
Acceleration	m/s ²	650			

Vibration load (EN 60068-2-6)					
Frequency	Hz	10...2,000			
Duration	min.	150			
Acceleration	m/s ²	200			

Load limits #10					
Limit torque, related to Md _n	%	250 200	175	250 200	175
Breaking torque approx., related to Md _n	%	500 400	300	500 400	300
Axial limit force	kN	136.00 170.00	203.00 236.00	136.00 170.00	203.00 236.00
Lateral limit force	N	10,500.00 14,000.00	17,500.00 21,000.00	10,500.00 14,000.00	17,500.00 21,000.00
Bending limit torque	Nm	1,850.00 2,470.00	3,080.00 3,700.00	1,850.00 2,470.00	3,080.00 3,700.00

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Mechanical values					
Torsional stiffness	kNm/rad	28,650 36,240	45,080 52,950	28,650 36,240	45,080 52,950
Angle of twist at Md _n	°	0.120 0.126	0.127 0.130	0.120 0.126	0.127 0.130
Axial stiffness	kN/mm	2,268 2,833	3,395 3,939	2,268 2,833	3,395 3,939
Radial stiffness	kN/mm	598 791	993 1,193	598 791	993 1,193
Bending stiffness	kNm/°	235.00 308.00	385.00 462.00	235.00 308.00	385.00 462.00
Deflection at axial limit force	mm	<0.07			
Additional radial deviation at lateral limit force	mm	<0.02			
Parallel deviation at bending limit torque	mm	<0.06			
Inherent frequency	Hz	550 640	700 750	550 640	700 750
Balance quality-level (DIN ISO 1949)	-	G2.5			
Inertia of rotor	kgm ²	1.6378 1.6759	1.7144 1.7520	1.6378 1.6759	1.7144 1.7520
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 _n)	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000

Weight approx.

Rotor #12	kg	76.6 80.6	84.3 87.6	76.6 80.6	84.3 87.6
Stator (without speed encoder) #12	kg	7.00	7.00	6.50	6.50

Mounting distances (without optional speed detection system)

Nominal radial displacement (rotor - stator)	mm	3.5			
Tolerance to nominal radial displacement (rotor - stator)	mm	≤±0.2			
Nominal axial displacement (rotor - stator) #7	mm	13			
Tolerance to nominal axial displacement (rotor - stator)	mm	+0.5/-0.5			

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 (M _{d,n})	Nm	60,000 80,000	100,000 120,000	60,000 80,000	100,000 120,000
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 M _{d,n})	%	120			
Compatible evaluation units (TCU)	-	Integrated	Integrated	TCU2	TCU2
Stator type	-	iS	iS	eS	eS
Sales information					
Article number	-	10000227	10000227	10001060	10001060
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	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.

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.

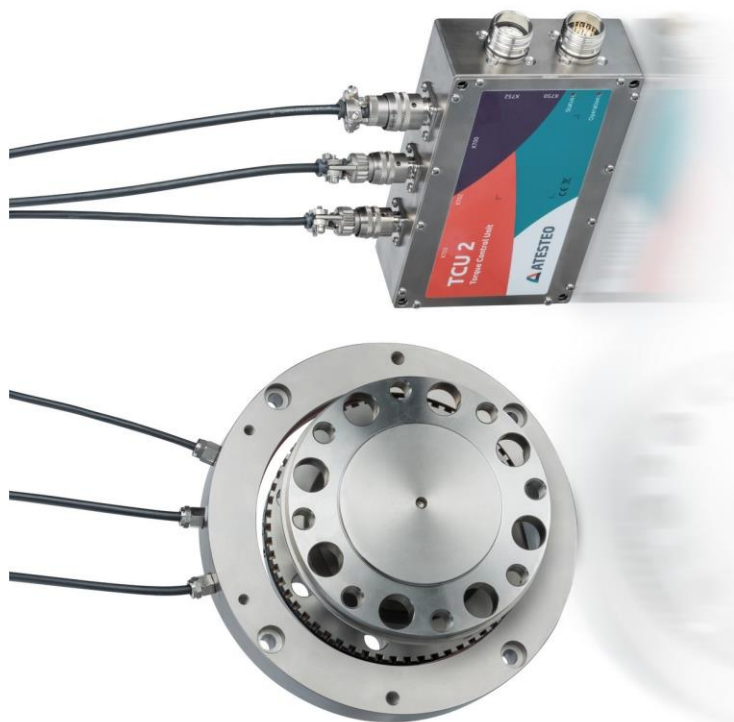
Drawing

iS



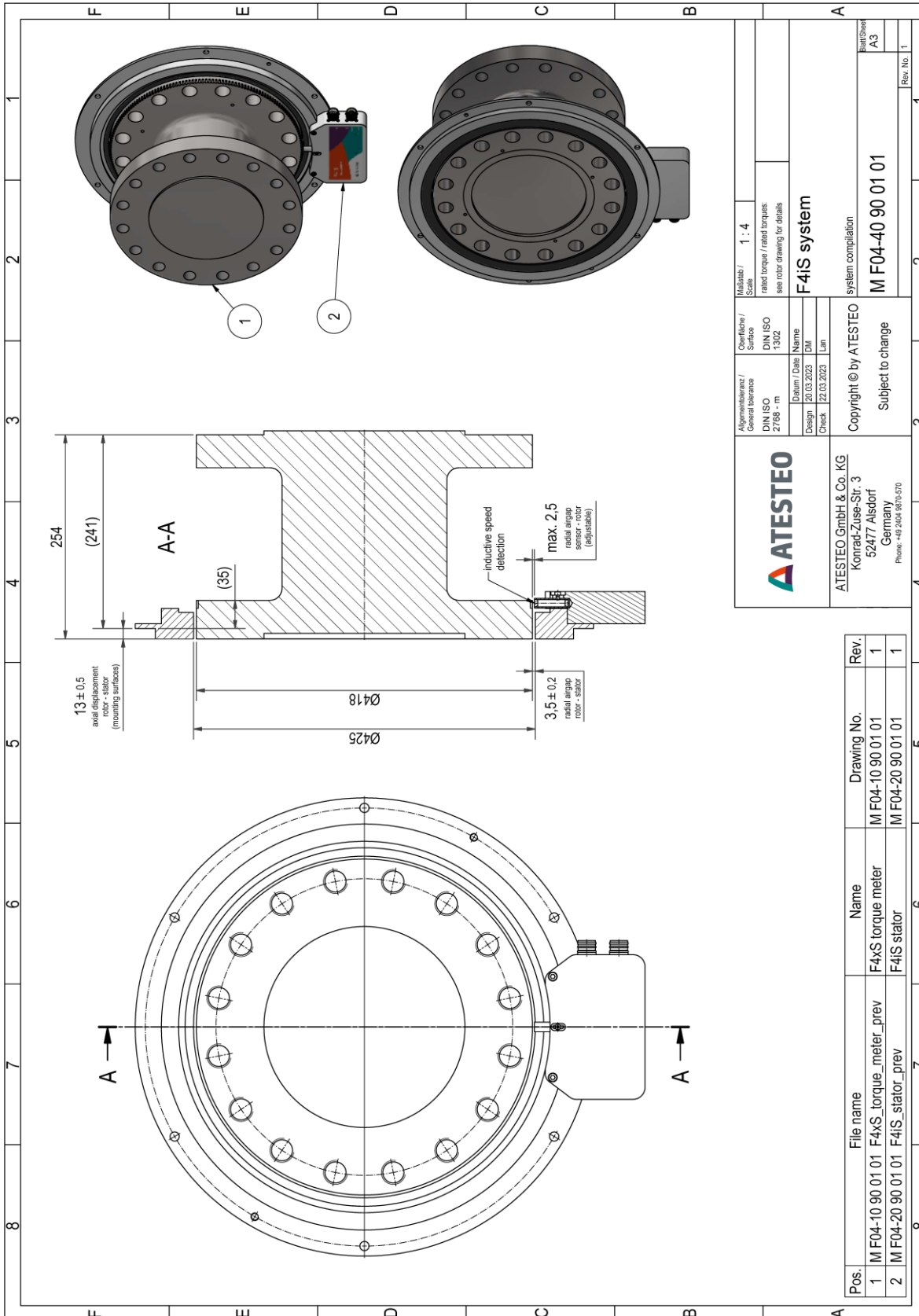
Rotor & stator with integrated evaluation unit (TCU)
Rotor & Stator mit integrierter Auswerteeinheit (TCU)

eS



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

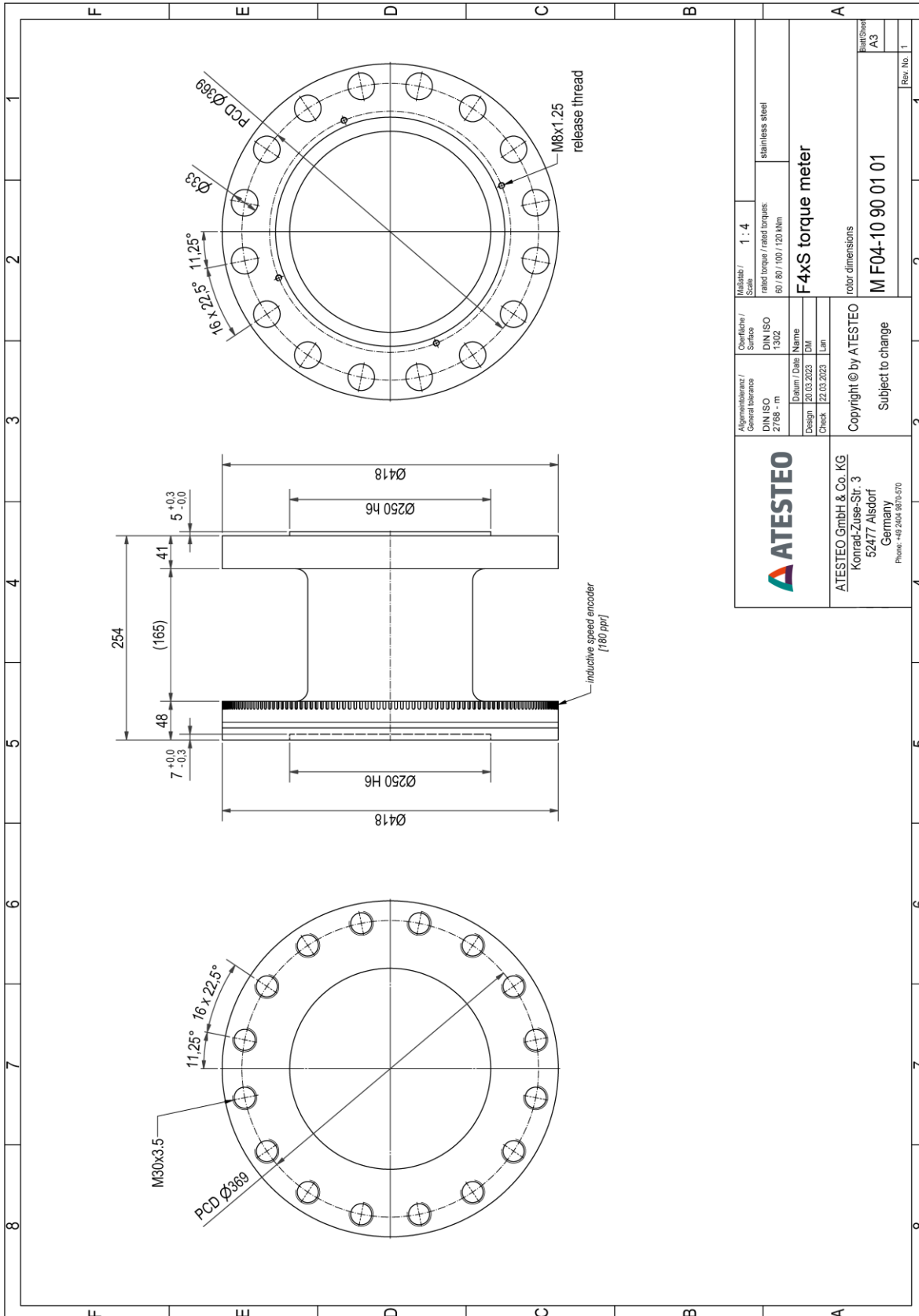
Drawing



ATESTEO ATESTEO GmbH & Co. KG Konrad-Zuse-Str. 3 52477 Aisdorf Germany Phone: +49 2404 9010-570		Multiplicatio / Scale: 1 : 4 rated torque / rated torques: see rotor drawing for details F4iS system	Certificate / Surface: DIN ISO 1302 General tolerance: DIN ISO 2768 - m Design: 20.03.2023 Check: 22.03.2023	System compilation M F04-40 90 01 01
Copyright © by ATESTEO Subject to change		Date / Date: 22.03.2023 Name: F4iS system Last:	Sheet / Blatt: A3 Rev. No.: 1	Rev. No.: 1

Pos.	File name	Name	Drawing No.	Rev.
1	M F04-10 90 01 01 F4xS_torque_meter_prev	F4xS torque meter	M F04-10 90 01 01	1
2	M F04-20 90 01 01 F4iS_stator_prev	F4iS stator	M F04-20 90 01 01	1

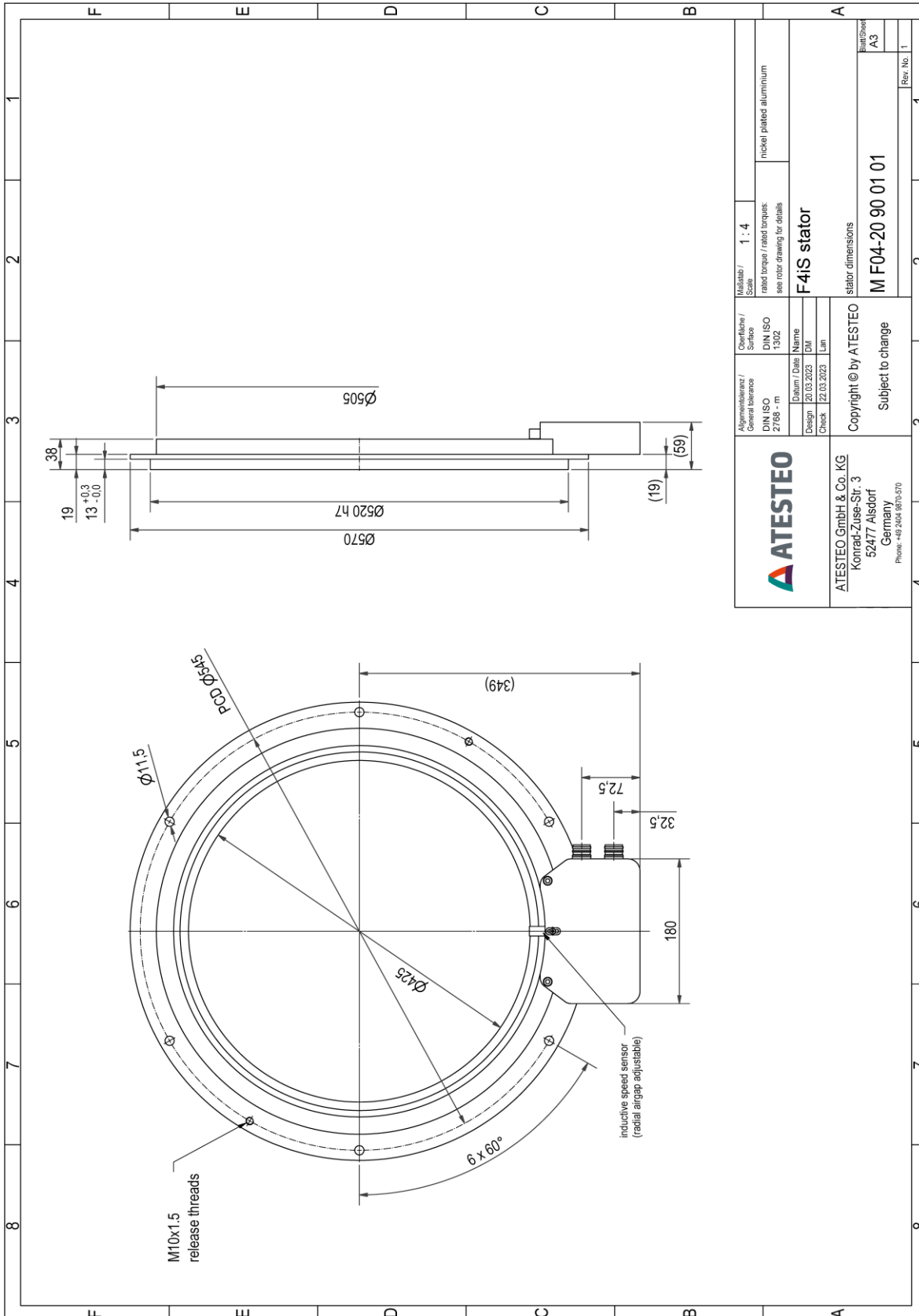
Drawing



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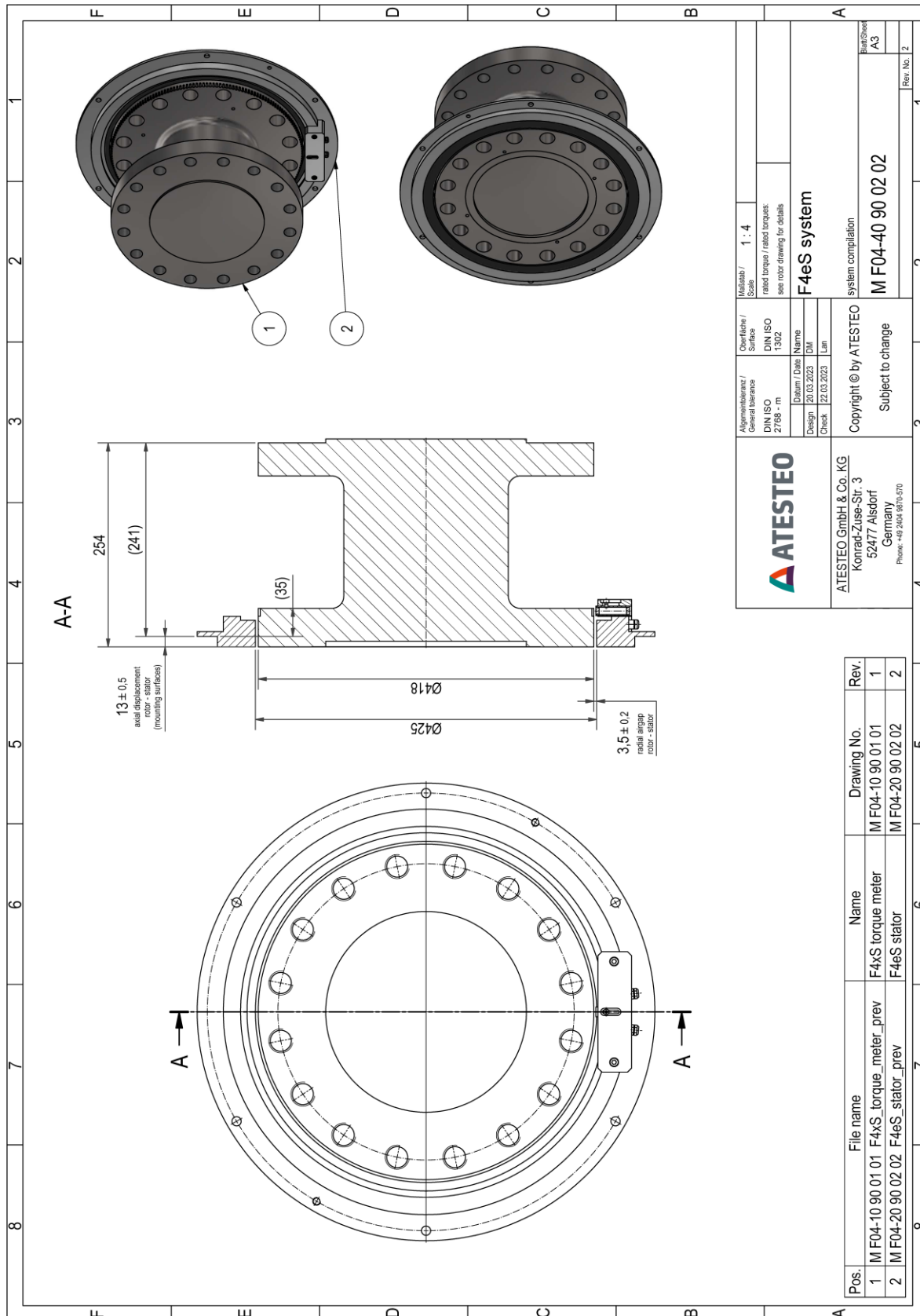
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Drawing



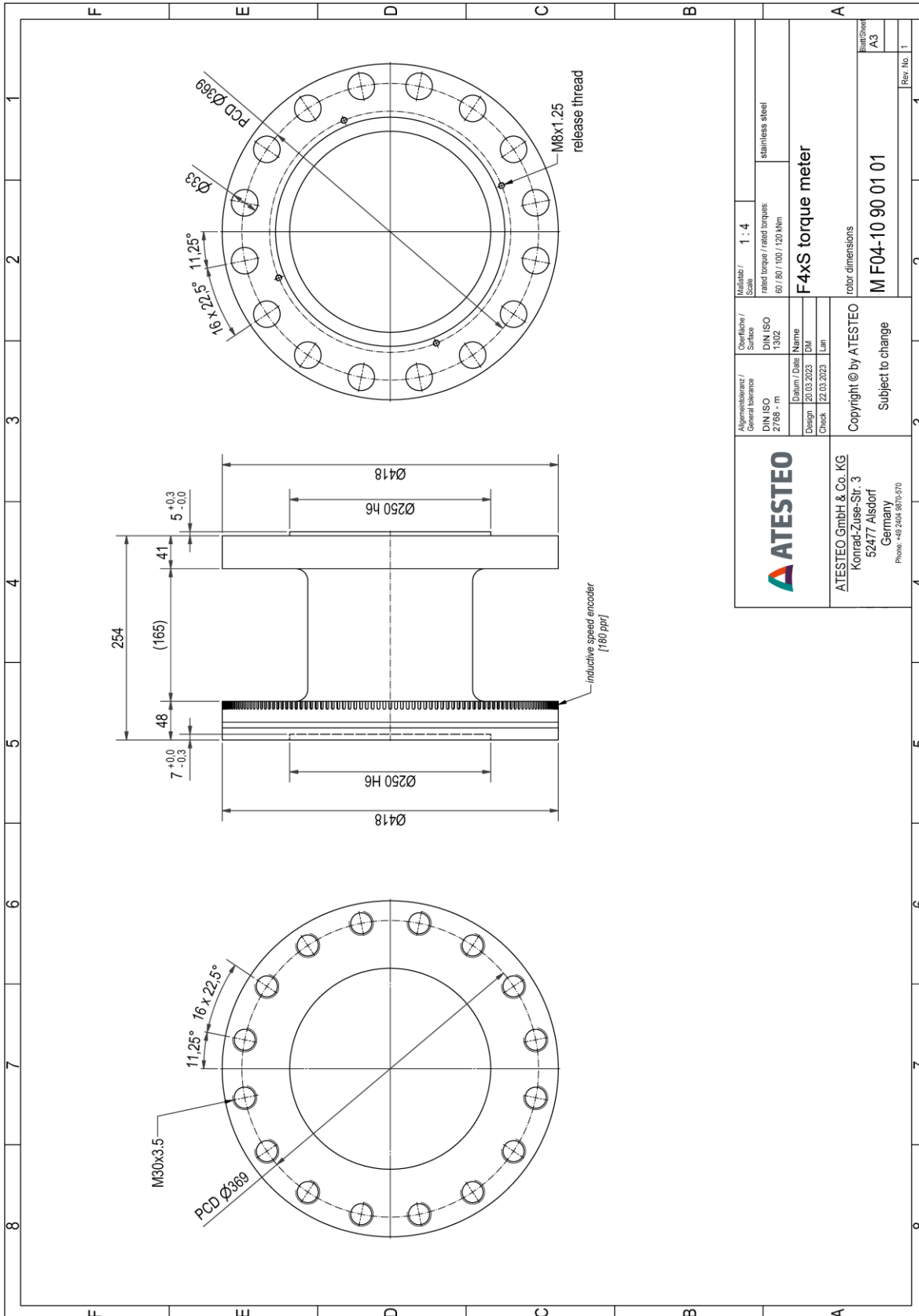
		ATESTEO GmbH & Co. KG Konrad-Zuse-Str. 3 52477 Aisdorf Germany Phone: +49 2404 900-570		Copyright © by ATESTEO Subject to change	
Allgemeine / General tolerance DIN ISO 2768 - m	Zeichnungs- / Surface DIN ISO 1302	Multiplikat. / Scale 1 : 4	F4eS system		
Datum / Date 20.03.2023	Name Lan	system compilation			
Design 20.03.2023	Check 22.03.2023	M F04-40 90 02 02			
		Blatt / Sheet A3		Rev. No. 2	

Pos.	File name	Name	Drawing No.	Rev.
1	M F04-10 90 01 01 F4xS torque_meter_prev	F4xS torque meter	M F04-10 90 01 01	1
2	M F04-20 90 02 02 F4eS_stator_prev	F4eS stator	M F04-20 90 02 02	2

F4eS Rotor

F4xS

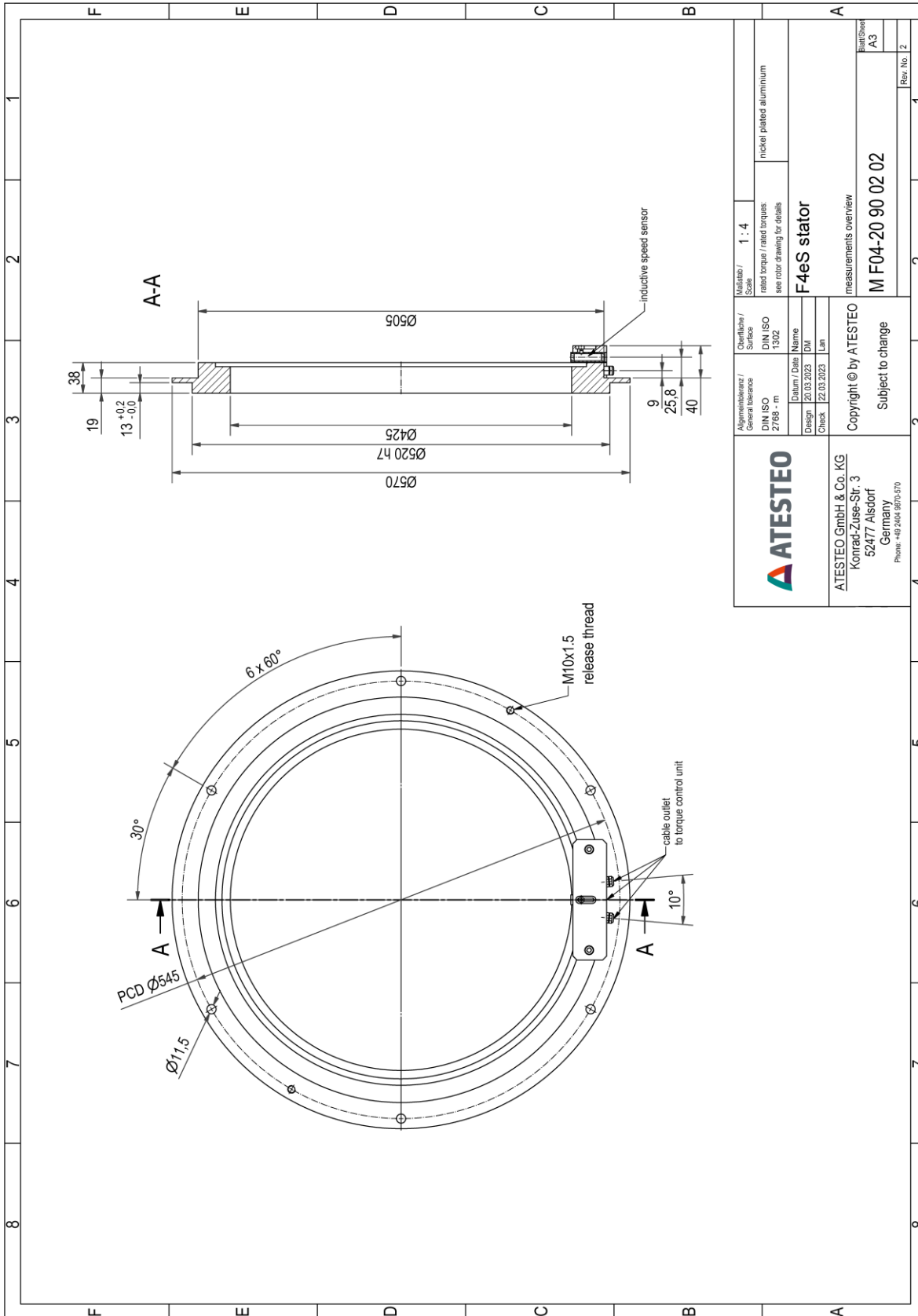
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Drawing



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