ATESTEO

Excellence in drivetrain testing

Data sheet

DF dual

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000
Torque measuring system			
Technology	-	Rotating	
Rated torque (Md_n) #1	Nm	2,000	3,000
Rated torque short measurement range (lower limit) (Md_{ns}) #2	Nm	400	600
Accuracy class (Md_{ns})	%	≤±0.04	
Accuracy class extended (for Md_n)	%	N/A	
Accuracy class extended (for Md_{ns})	%	N/A	
Outputs	-	Frequency (RS422), Voltage, CAN bus, Alert	
Test signal	-	see test report	
Mechanical dimensions #3			
Outer diameter of rotor #4	mm	158	
Lengths (Rotor, without centering)	mm	49	
Pitch circle diameter #5	mm	130.0	
Speeds and speed measuring systems			
Speed detection (integrated)	-	without	
Speed detection (optional)	-	magn.	
Maximum Speed without speed detection system	rpm	16,000	
Optional increased speed	rpm	18,000	
Maximum speed with magnetic speed encoder	rpm	9,000	
Maximum speed with optical speed encoder	rpm	N/A	
Maximum speed with inductive speed encoder	rpm	N/A	

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Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000

Torque accuracy class per output type (related to Md_n)		
Frequency output	%	≤±0.04
CAN output	%	≤±0.04
Voltage output	%	≤±0.04
Current output	%	N/A
Frequency output (option higher accuracy)	%	N/A
CAN (option higher accuracy)	%	N/A
Torque accuracy class per output type (related to Md_{ns})		
Frequency output	%	≤±0.04
CAN output	%	≤±0.04
Voltage output	%	≤±0.04
Current output	%	N/A
Frequency output (option higher accuracy)	%	N/A
CAN (option higher accuracy)	%	N/A

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000
Linearity deviation including hysteresis related to Md_n #6			
Frequency, 0%...30%	%	≤±0.015	
Frequency, 30%...60%	%	≤±0.030	
Frequency, 60%...100%	%	≤±0.040	
CAN, 0%...30%	%	≤±0.015	
CAN, 30%...60%	%	≤±0.030	
CAN, 60%...100%	%	≤±0.040	
Voltage output	%	≤±0.04	
Current output	%	N/A	
Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to Md_n)			
Frequency output	%	≤±0.04	
CAN output	%	≤±0.04	
Voltage output	%	≤±0.04	
Current output	%	N/A	
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	%	≤±0.04	
CAN output	%	≤±0.04	
Voltage output	%	≤±0.04	
Current output	%	N/A	
Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to Md_n)			
Frequency output	%	≤±0.04	
CAN output	%	≤±0.04	
Voltage output	%	≤±0.04	
Current output	%	N/A	
Long-term drift over 48h at reference temperature			
Voltage output	mV	<1.5 / <3.0 / <0.8 / <1.5	
Current output	µA	N/A	

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000

Linearity deviation including hysteresis related to Md_{ns} #6		
Frequency, 0%...30%	%	≤±0.015
Frequency, 30%...60%	%	≤±0.030
Frequency, 60%...100%	%	≤±0.040
CAN, 0%...30%	%	≤±0.015
CAN, 30%...60%	%	≤±0.030
CAN, 60%...100%	%	≤±0.040
Voltage output	%	≤±0.04
Current output	%	N/A
Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to Md_{ns})		
Frequency output	%	≤±0.04
CAN output	%	≤±0.04
Voltage output	%	≤±0.04
Current output	%	N/A
Temperature influence per 10K in the nominal temperature range on the output signal related to the actual value of signal span (rel. to Md_{ns})		
Frequency output	%	≤±0.04
CAN output	%	≤±0.04
Voltage output	%	≤±0.04
Current output	%	N/A
Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to Md_{ns})		
Frequency output	%	≤±0.04
CAN output	%	≤±0.04
Voltage output	%	≤±0.04
Current output	%	N/A

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000
Nominal sensitivity (range between zero torque and rated torque)			
Frequency output	kHz	5 / 20 / 30 / 120	
Voltage output	V	5.0 / 10.0 / 2.5 / 5.0	
Current output	mA	N/A	
Output signal at zero torque			
Frequency output	kHz	10 / 60 / 60 / 240	
Voltage output	V	0.0 / 0.0 / 2.5 / 5.0	
Current output	mA	N/A	
Nominal output signal			
Frequency output at positive nominal value	kHz	15 / 80 / 90 / 360	
Frequency output at negative nominal value	kHz	5 / 40 / 30 / 120	
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	N/A	
Current output at negative nominal value	mA	N/A	
Max. modulation range			
Frequency output	kHz	0...420	
Voltage output	V	-12.0...12.0	
Current output	mA	N/A	
Group delay time (main TCU)			
Frequency output	µs	300	
Voltage output	µs	300	
CAN bus	µs	800	

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000

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.	1,000
Maximum speeds (related to PPR)	rpm	9,000
Max. output frequency (RS422)	kHz	150
Minimum speed for sufficient pulse stability	rpm	>0.1
Nominal clearance (sensor - pole ring)	mm	0.7
Working airgap (sensor - pole ring)	mm	0.1...1.0
Nominal axial displacement (rotor - stator) #7	mm	7.0
Tolerance to nominal axial displacement (rotor - stator)	mm	±0.5
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

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000

Angular measuring system		
Requirement	-	Optional magnetic speed detection
Pulses per rev	ppr.	1,000
Resolution	°	0.090
Output signals	-	CAN bus, Voltage
Measurement ranges	°	0.00...360.00 / -180.00...180.00 / -360.00...360.00 / -720.00...720.00 / -1,080.00...1,080.00 / -1,440.00...1,440.00 / -1,800.00...1,800.00

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000
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	%	175	
Breaking torque approx., related to Md_n	%	355	320
Axial limit force	kN	9.20	11.30
Lateral limit force	N	2,800.00	3,600.00
Bending limit torque	Nm	78.00	101.00

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Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000

Mechanical values			
Torsional stiffness	kNm/rad	828	1,098
Angle of twist at Md_n	°	0.138	0.156
Axial stiffness	kN/mm	231	282
Radial stiffness	kN/mm	186	241
Bending stiffness	kNm/°	2.50	3.20
Deflection at axial limit force	mm	<0.05	
Additional radial deviation at lateral limit force	mm	<0.02	
Parallel deviation at bending limit torque	mm	<0.09	
Inherent frequency	Hz	970	1,114
Balance quality-level (DIN ISO 1949)	-	G2.5	
Inertia of rotor	kgm²	0.0092	
Max. limits for relative shaft vibration (peak to peak) #11	µm	$S_{(p-p)} = \frac{9000}{\sqrt{n}}$	

Technical data

Type	-	DF3 dual	
Accuracy class	%	≤±0.04	
Rated torque (Md_n)	Nm	2,000	3,000
Weight approx.			
Rotor #12	kg	3.0	
Stator (without speed encoder) #12	kg	1.04	
Mounting distances (without optional speed detection system)			
Nominal radial displacement (rotor - stator)	mm	164.5	
Tolerance to nominal radial displacement (rotor - stator)	mm	+0.2/-0.2	
Nominal axial displacement (rotor - stator) #7	mm	7.0	
Tolerance to nominal axial displacement (rotor - stator)	mm	≤±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	<1	
Max. current consumption in start-up mode	A	<2	
Nominal power consumption	W	<24	
Load resistance			
Frequency output	-	RS422	
Voltage output	kOhm	≥50	
Dynamic			
Frequency output	kHz	≤6	
Voltage output	kHz	≤6	
Current output	kHz	N/A	
CAN output conversation rate	1/s	≤2,000	

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Rated torque (Md_n)	Nm	2,000	3,000

Miscellaneous			
Protection class *(Rotor)*	-	IP54	
Protection class *(Stator)*	-	IP54	
Protection class (rotor, extended)	-	N/A	
Protection class (stator, extended)	-	N/A	
Pitch circle screw information	-	8 * M12 (10.9)	8 * M12 (12.9)
CAN bus type	-	2B	
Configuration interface	-	Ethernet	
Central hole	mm	N/A	
Material	-	Steel	
Measuring range (related to Md_n)	%	110	
Compatible evaluation units (TCU)	-	TCU5	
Stator type	-	DF3 dual	
Sales information			
Article number	-	10016143	
U.S. FCC certificate	-	No	

Remarks and information

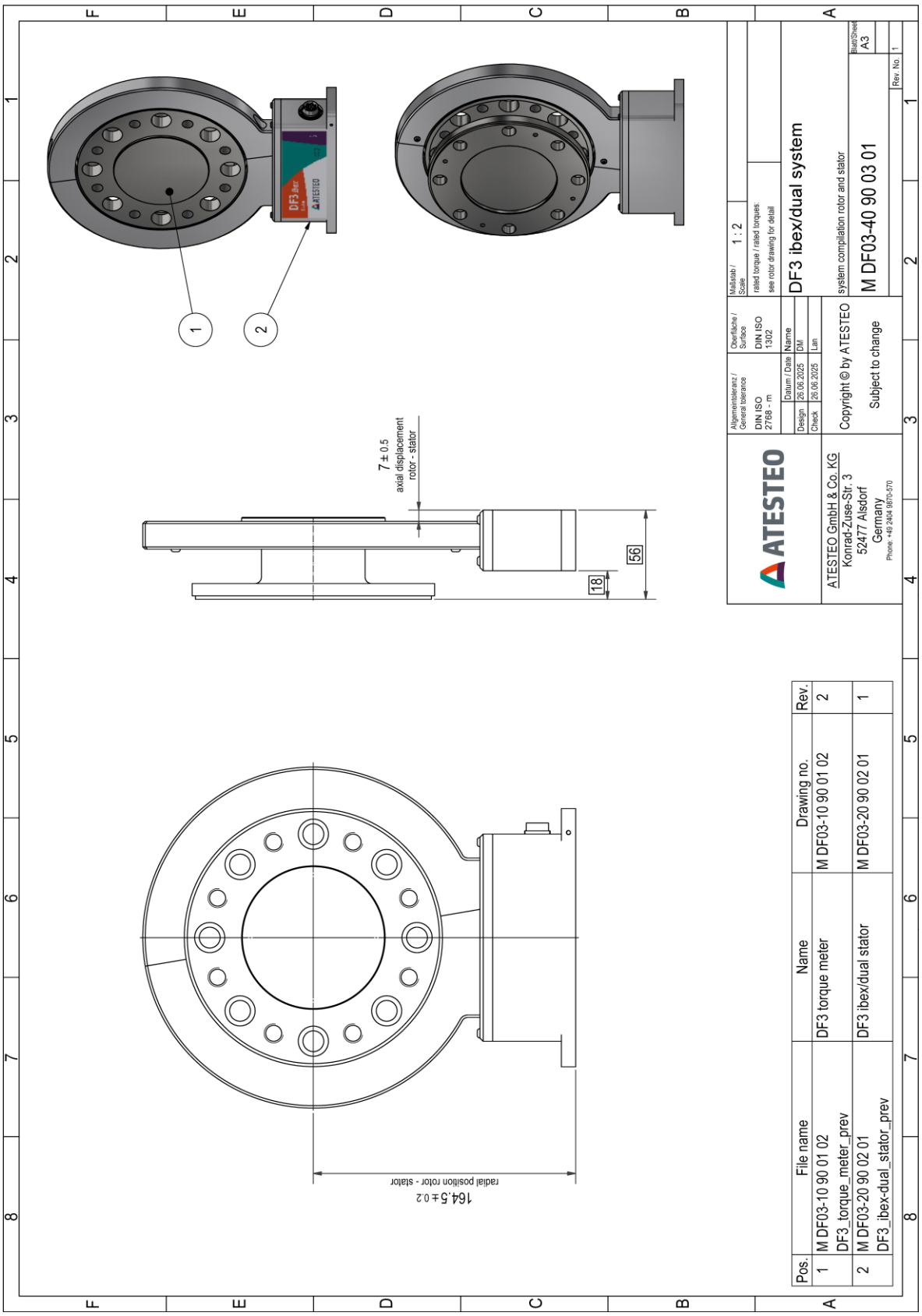
Link no.	Topic	Remark
#1	Nominal torque	Based on customer requests, the measurement systems can optionally be optimized for not listed nominal torque values (intermediate ranges possible).
#2	Second torque range	The written second nominal torque value (Md_{ns}) is the smallest possible. Greater second torque ranges can be chosen on demand.
#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

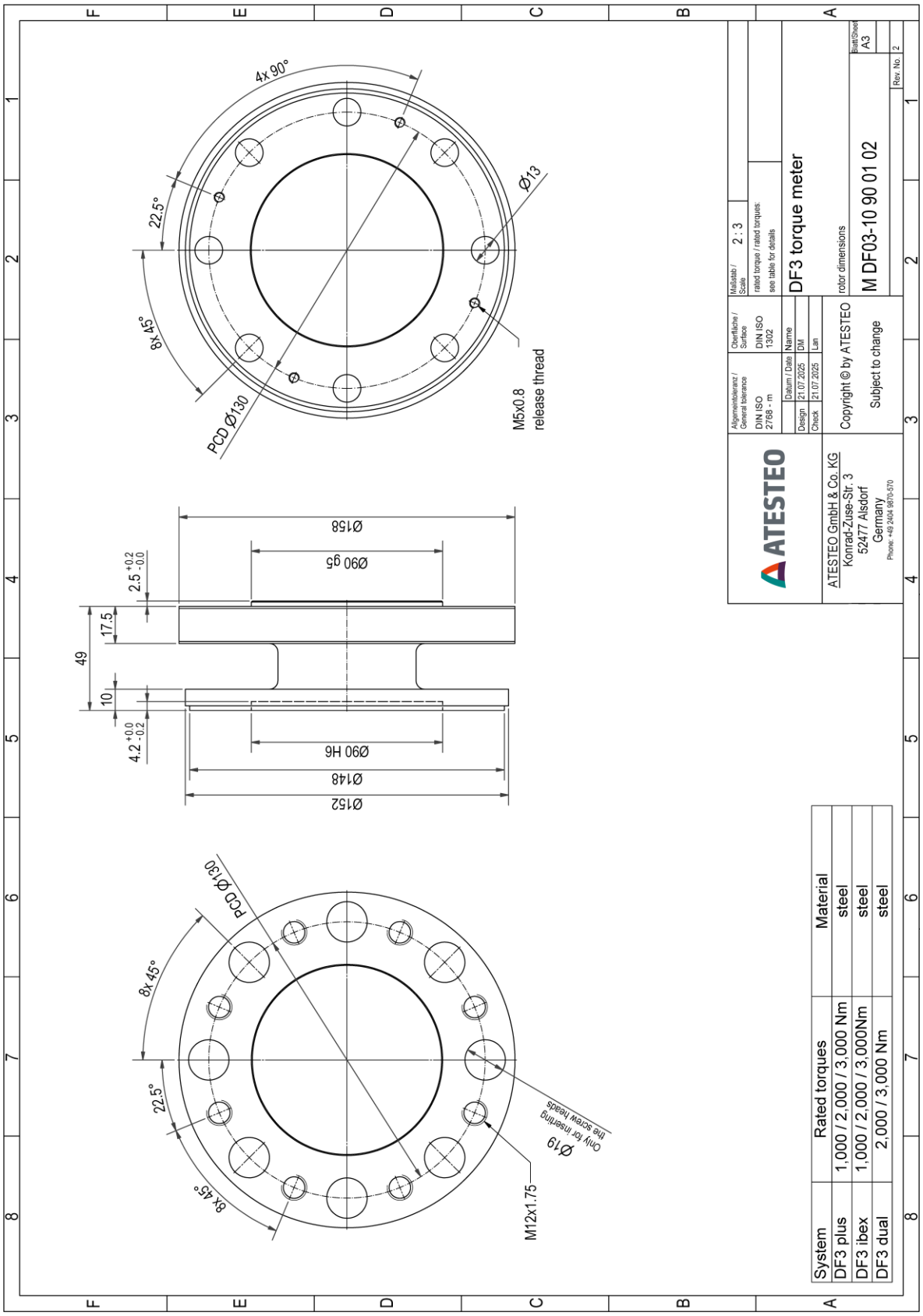
Link no.	Topic	Remark
#11	Vibration limits	Vibration limits are not an influence to the machine. They reflect the allowed effect onto the rotor (ISO 7919-3). Parameter "n" is given in "r/min.".
#12	Weights	Weights are related to components without options like speed detection system. Please contact us 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

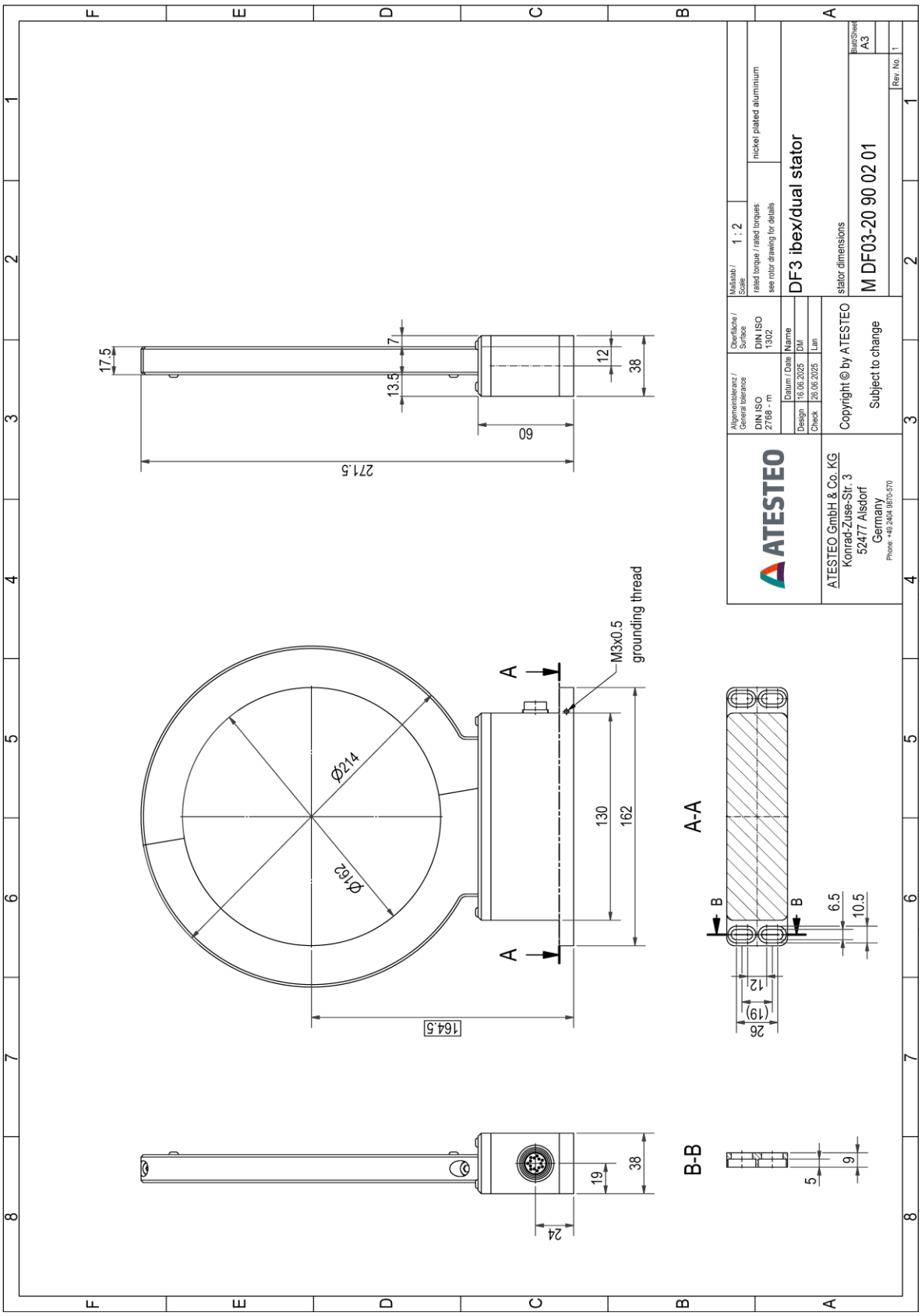


Drawing



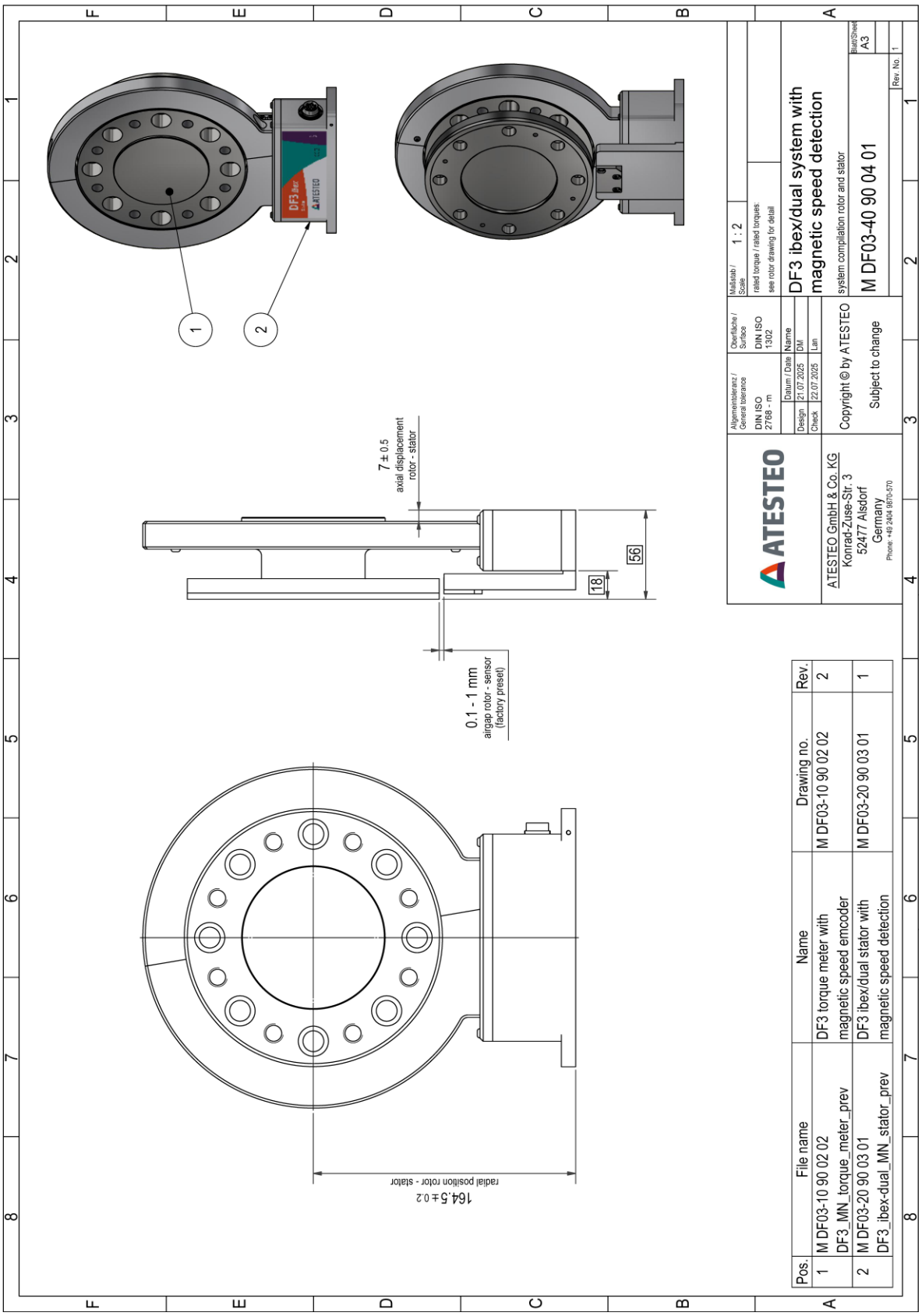
System	Rated torques	Material
DF3 plus	1,000 / 2,000 / 3,000 Nm	steel
DF3 ibex	1,000 / 2,000 / 3,000Nm	steel
DF3 dual	2,000 / 3,000 Nm	steel

Drawing



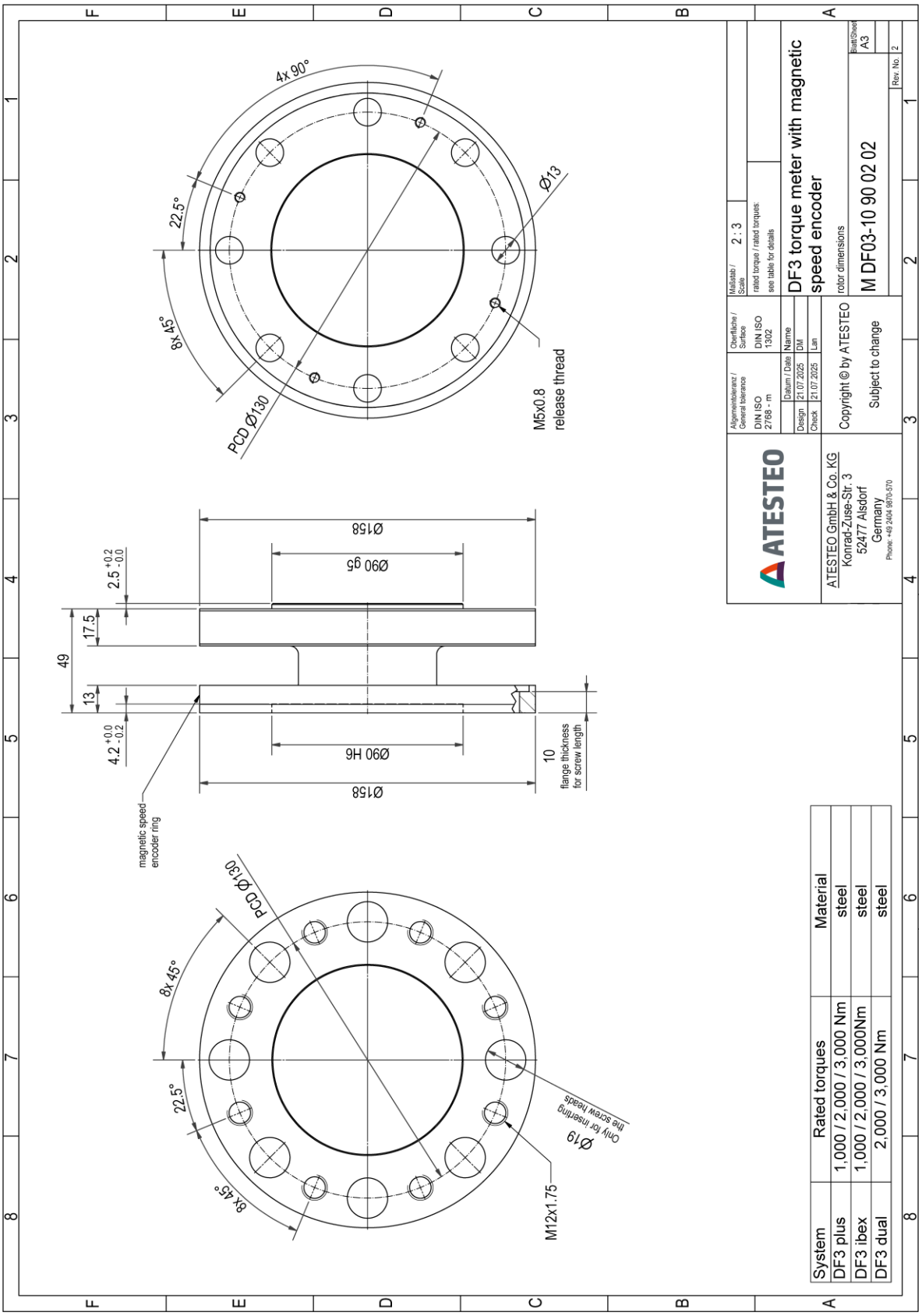
DF3 dual SPD_MGN System

Drawing



DF3 dual SPD_MGN
Rotor

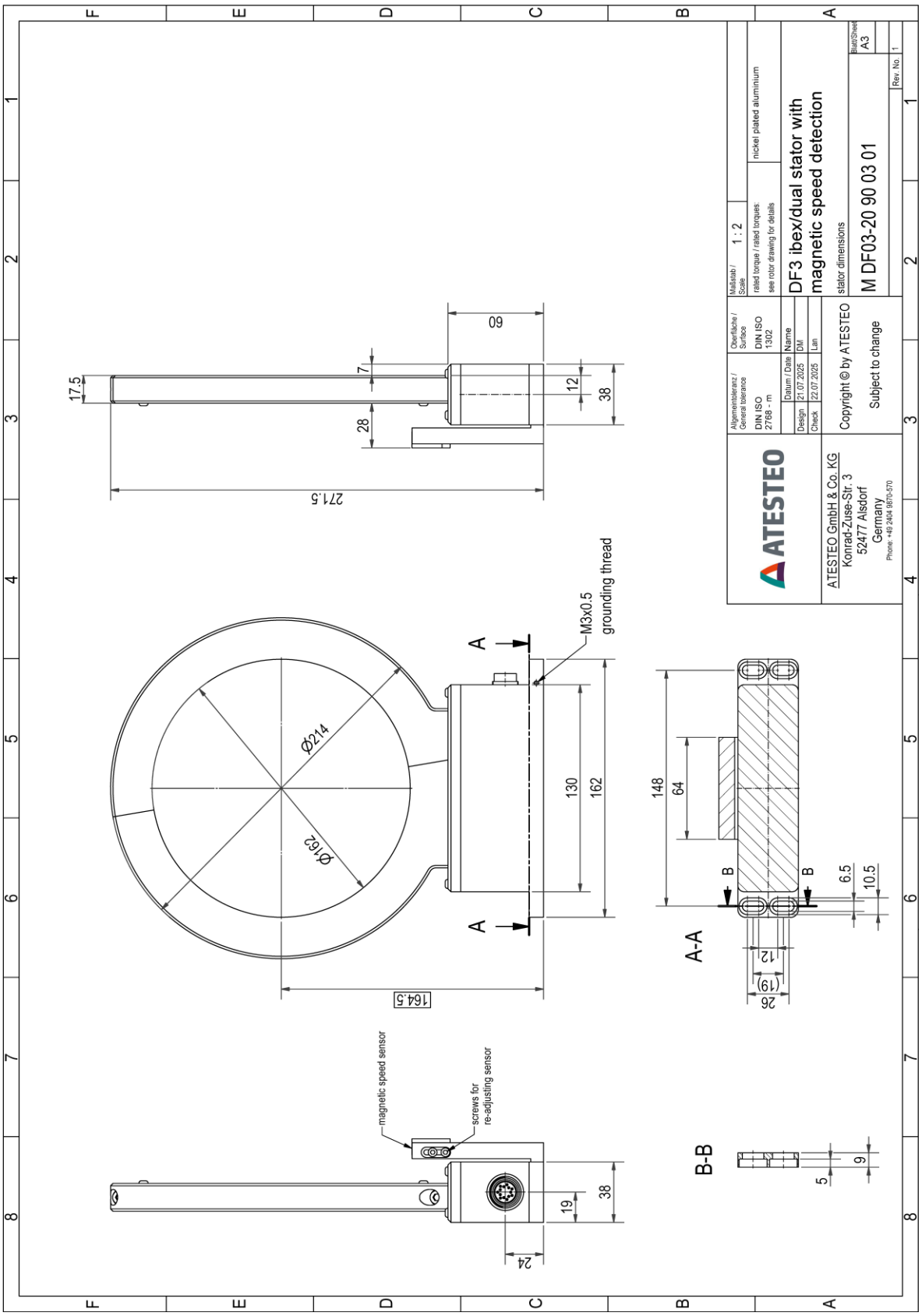
Drawing



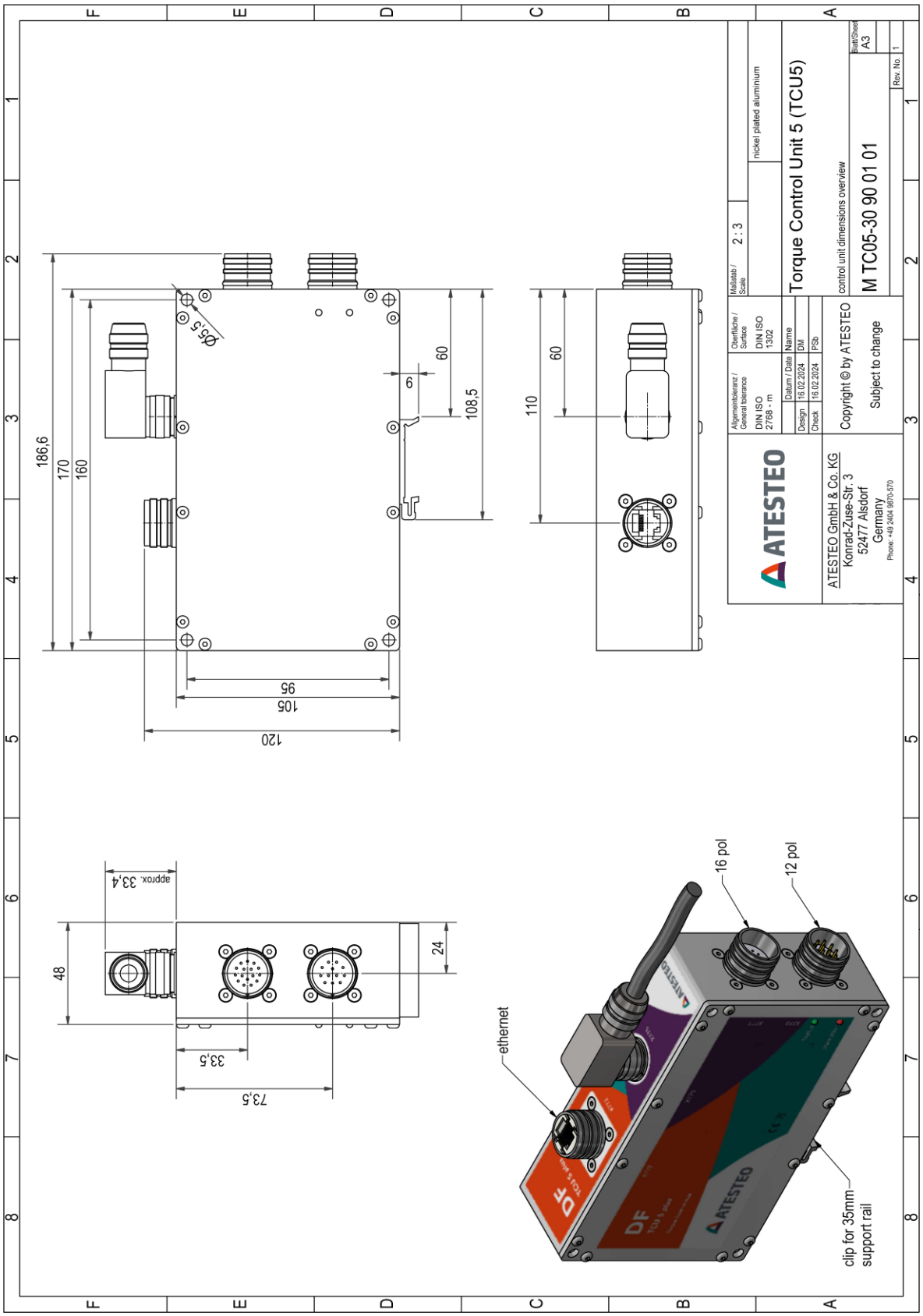
System	Rated torques	Material
DF3 plus	1,000 / 2,000 / 3,000 Nm	steel
DF3 ibex	1,000 / 2,000 / 3,000Nm	steel
DF3 dual	2,000 / 3,000 Nm	steel

DF3 dual SPD_MGN
Stator

Drawing



Drawing



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