

Data sheet

DF dual



Technical data

Type	-	DF5 dual
Accuracy class	%	≤±0.04
Rated torque (Md _n)	Nm	10,000

Torque measuring system		
Technology	-	Rotating
Rated torque (Md _n) #1	Nm	10,000
Rated torque short measurement range (lower limit) (Md _{ns}) #2	Nm	2,000
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	230
Lengths (Rotor, without centering)	mm	60
Pitch circle diameter #5	mm	196.0

Speeds and speed measuring systems		
Speed detection (integrated)	-	without
Speed detection (optional)	-	magn.
Maximum Speed without speed detection system	rpm	12,000
Optional increased speed	rpm	14,000
Maximum speed with magnetic speed encoder	rpm	6,500
Maximum speed with optical speed encoder	rpm	N/A
Maximum speed with inductive speed encoder	rpm	N/A

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Rated torque (Mdn)	Nm	10,000

Torque accuracy class per output type (related to Mdn)		
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 Mdns)		
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	-	DF5 dual
Accuracy class	%	≤±0.04
Rated torque (Md _n)	Nm	10,000

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

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Accuracy class	%	≤±0.04
Rated torque (Md _n)	Nm	10,000
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	-	DF5 dual
Accuracy class	%	≤±0.04
Rated torque (M _{dN})	Nm	10,000
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	-	DF5 dual
Accuracy class	%	≤±0.04
Rated torque (M _{dN})	Nm	10,000

Speed measuring system	Inductive (track at rotor)
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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)
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Pulses per rev (PPR)	ppr.	1,448
Maximum speeds (related to PPR)	rpm	6,500
Max. output frequency (RS422)	kHz	157
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
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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	-	DF5 dual
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Rated torque (M _{dN})	Nm	10,000

Angular measuring system		
Requirement	-	Optional magnetic speed detection
Pulses per rev	ppr.	1,448
Resolution	°	0.062
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

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Type	-	DF5 dual
Accuracy class	%	≤±0.04
Rated torque (Md _n)	Nm	10,000
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	%	312
Axial limit force	kN	12.40
Lateral limit force	N	6,400.00
Bending limit torque	Nm	240.70

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Mechanical values		
Torsional stiffness	kNm/rad	4,410
Angle of twist at Md _n	°	0.130
Axial stiffness	kN/mm	310
Radial stiffness	kN/mm	427
Bending stiffness	kNm/°	9.60
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	<0.10
Inherent frequency	Hz	960
Balance quality-level (DIN ISO 1949)	-	G2.5
Inertia of rotor	kgm²	0.0463
Max. limits for relative shaft vibration (peak to peak) #11	µm	$S_{(p-p)} = \frac{9000}{\sqrt{n}}$

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Rated torque (M _{dN})	Nm	10,000

Weight approx.

Rotor #12	kg	7.8
Stator (without speed encoder) #12	kg	1.22

Mounting distances (without optional speed detection system)

Nominal radial displacement (rotor - stator)	mm	200.5
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	0.04
Circular run-out-radial tolerance #13	mm	0.04

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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Miscellaneous		
Protection class (<i>Rotor</i>)	-	IP54
Protection class (<i>Stator</i>)	-	IP54
Protection class (rotor, extended)	-	N/A
Protection class (stator, extended)	-	N/A
Pitch circle screw information	-	8 * M16 (12.9)
CAN bus type	-	2B
Configuration interface	-	Ethernet
Central hole	mm	N/A
Material	-	Steel
Measuring range (related to M _{dN})	%	110
Compatible evaluation units (TCU)	-	TCU5
Stator type	-	DF5 dual
Sales information		
Article number	-	10016145
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 ($M_{d_{ns}}$) 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).

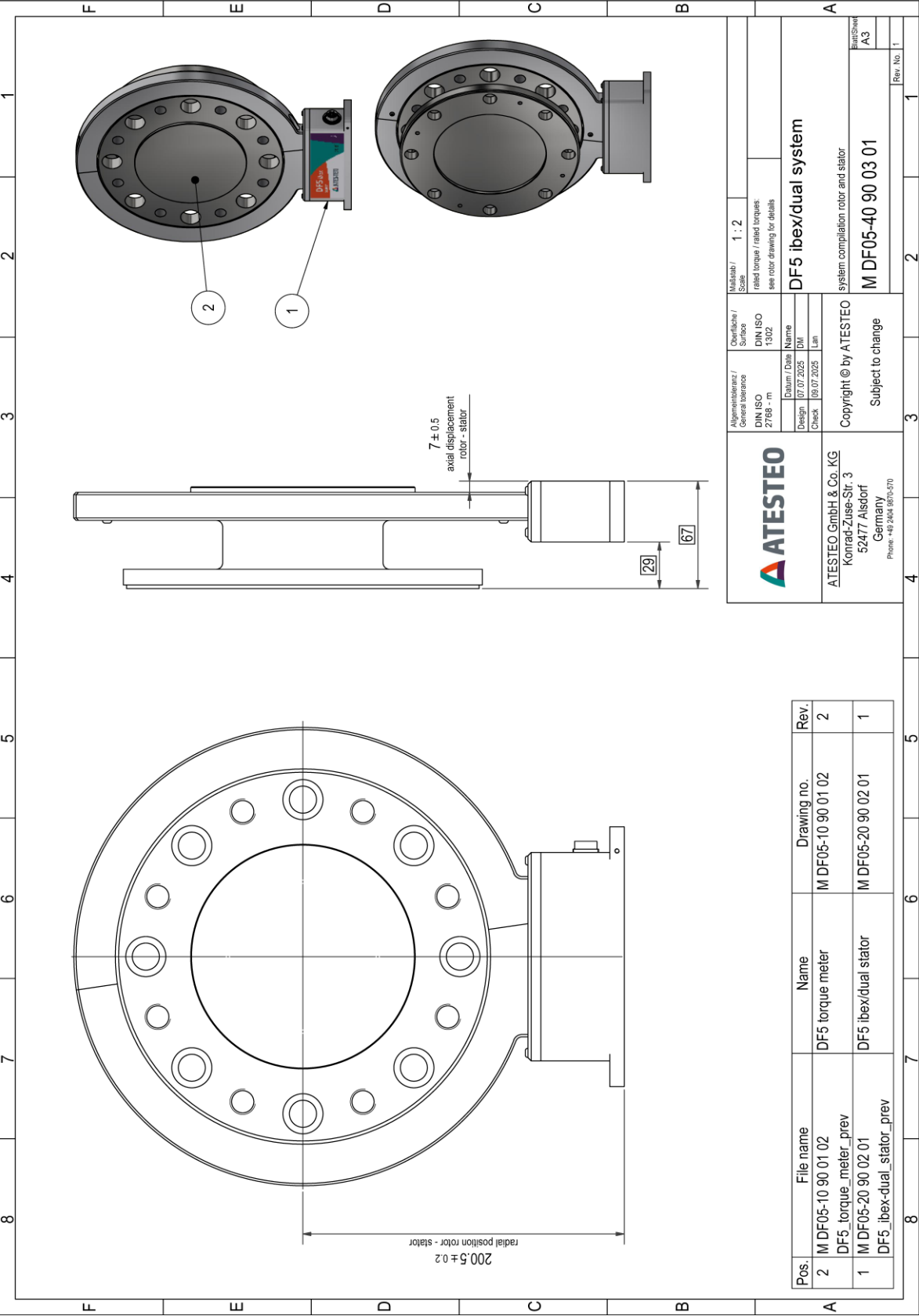
Remarks and information

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.

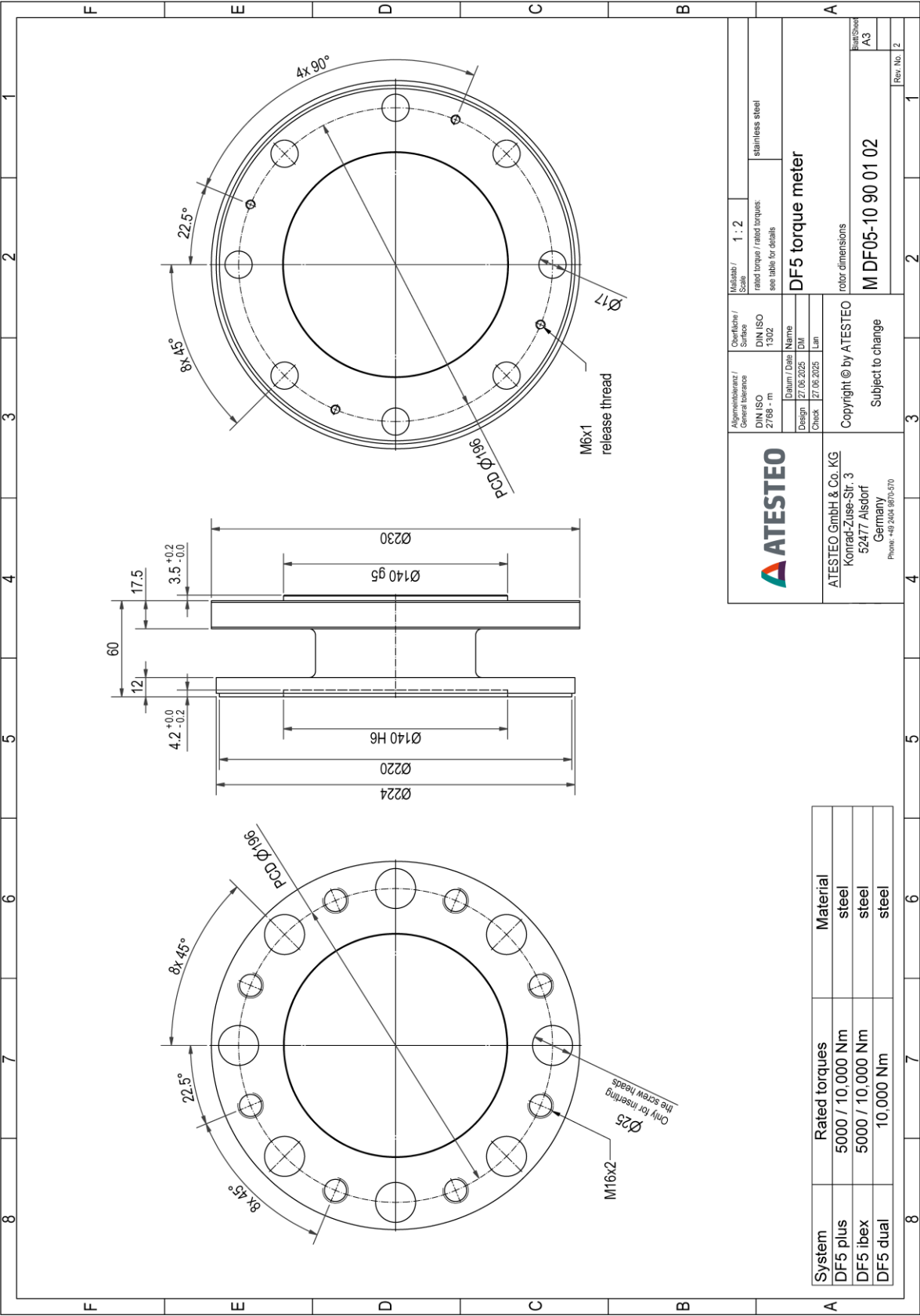
Drawing



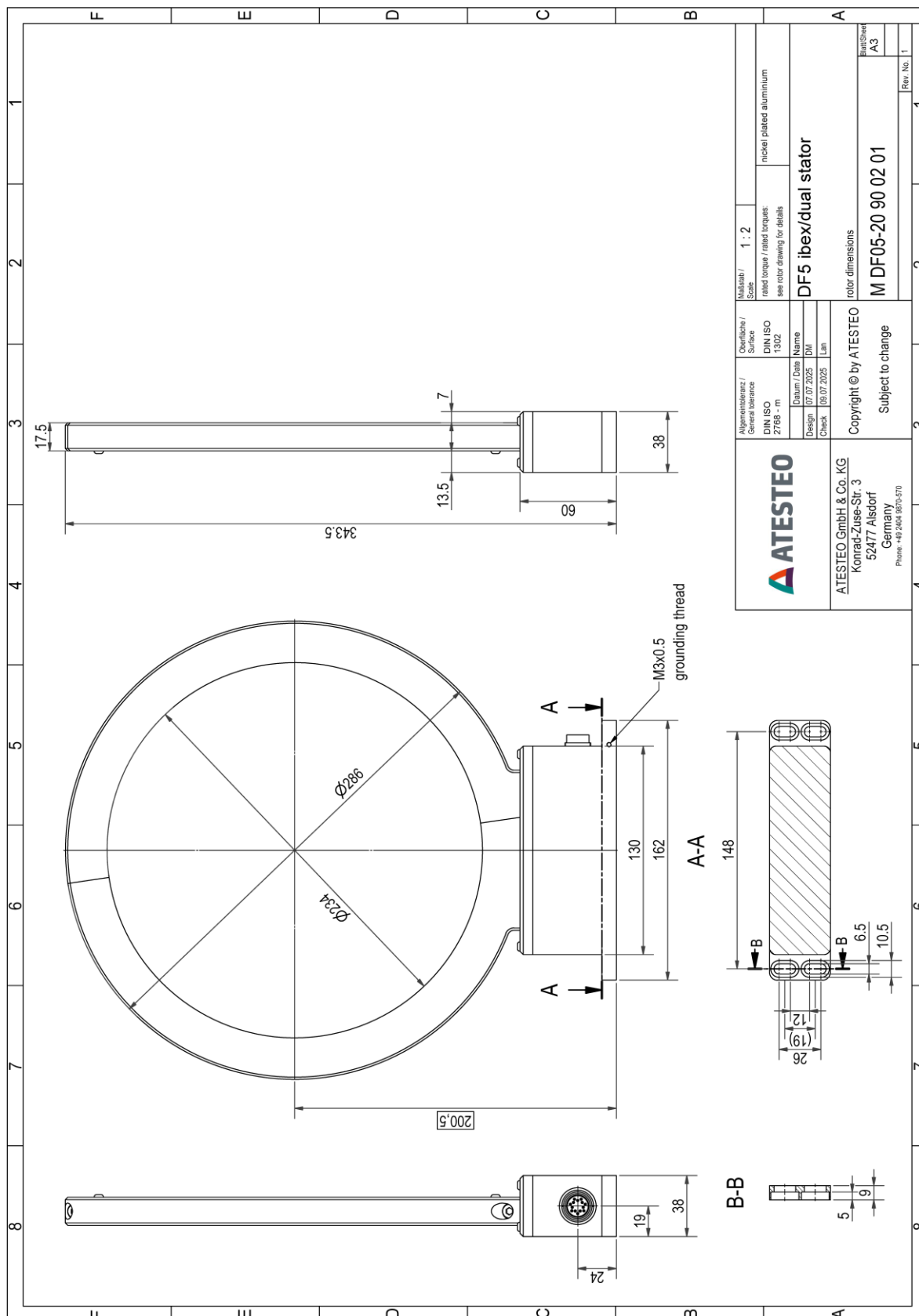
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Drawing



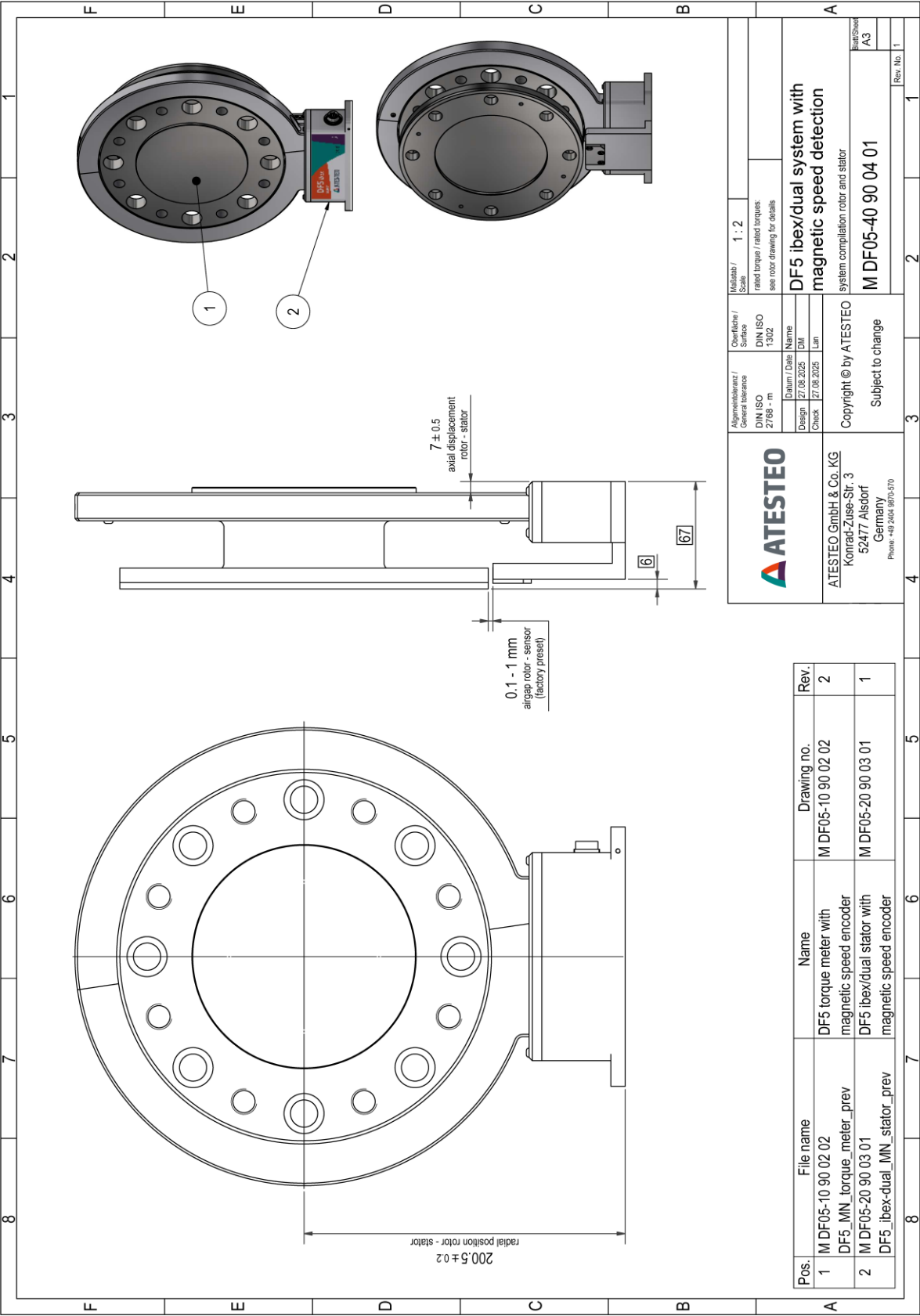
Drawing



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Drawing

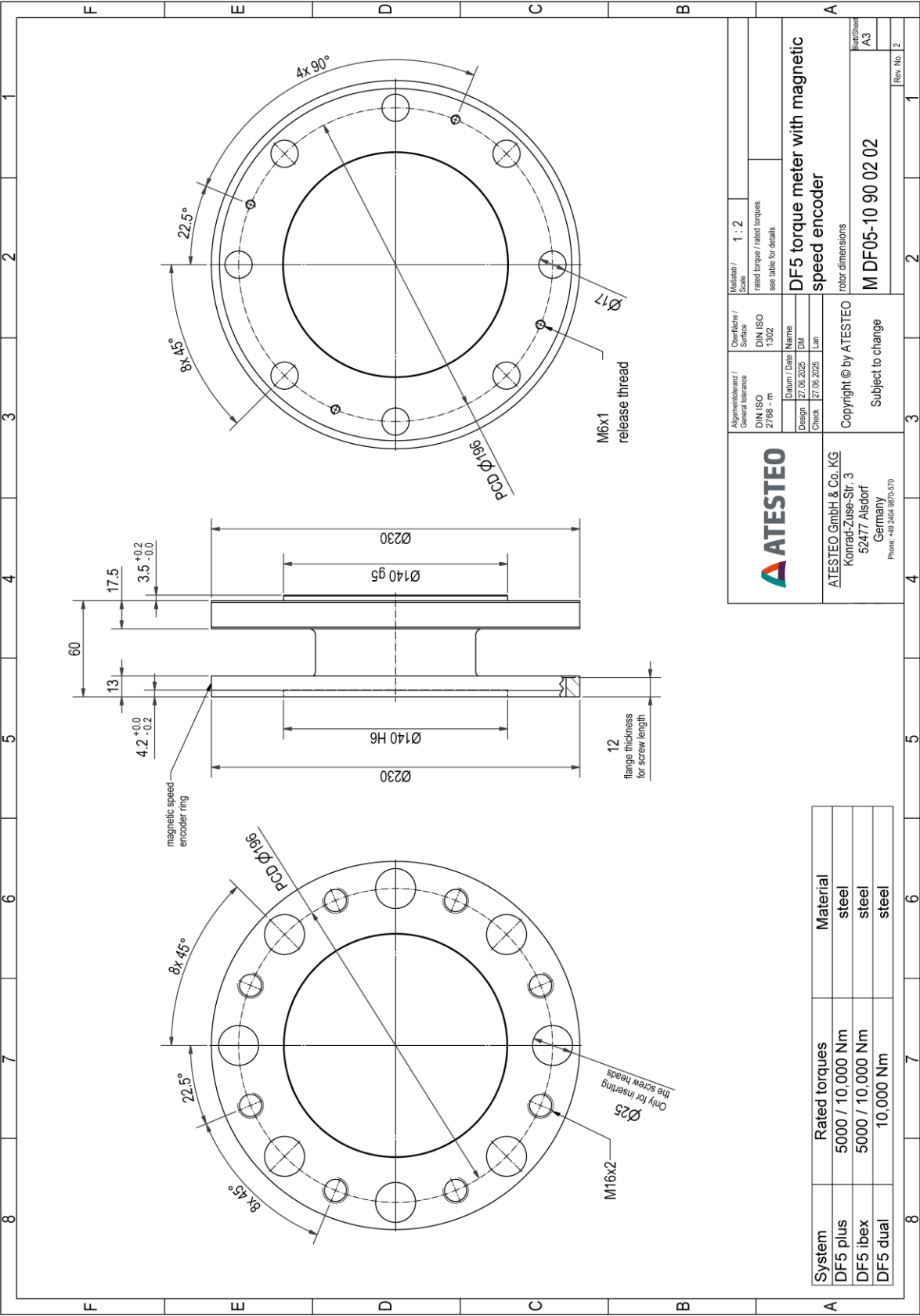


DF5 dual SPD_MGN

Rotor

DF5 dual

Drawing

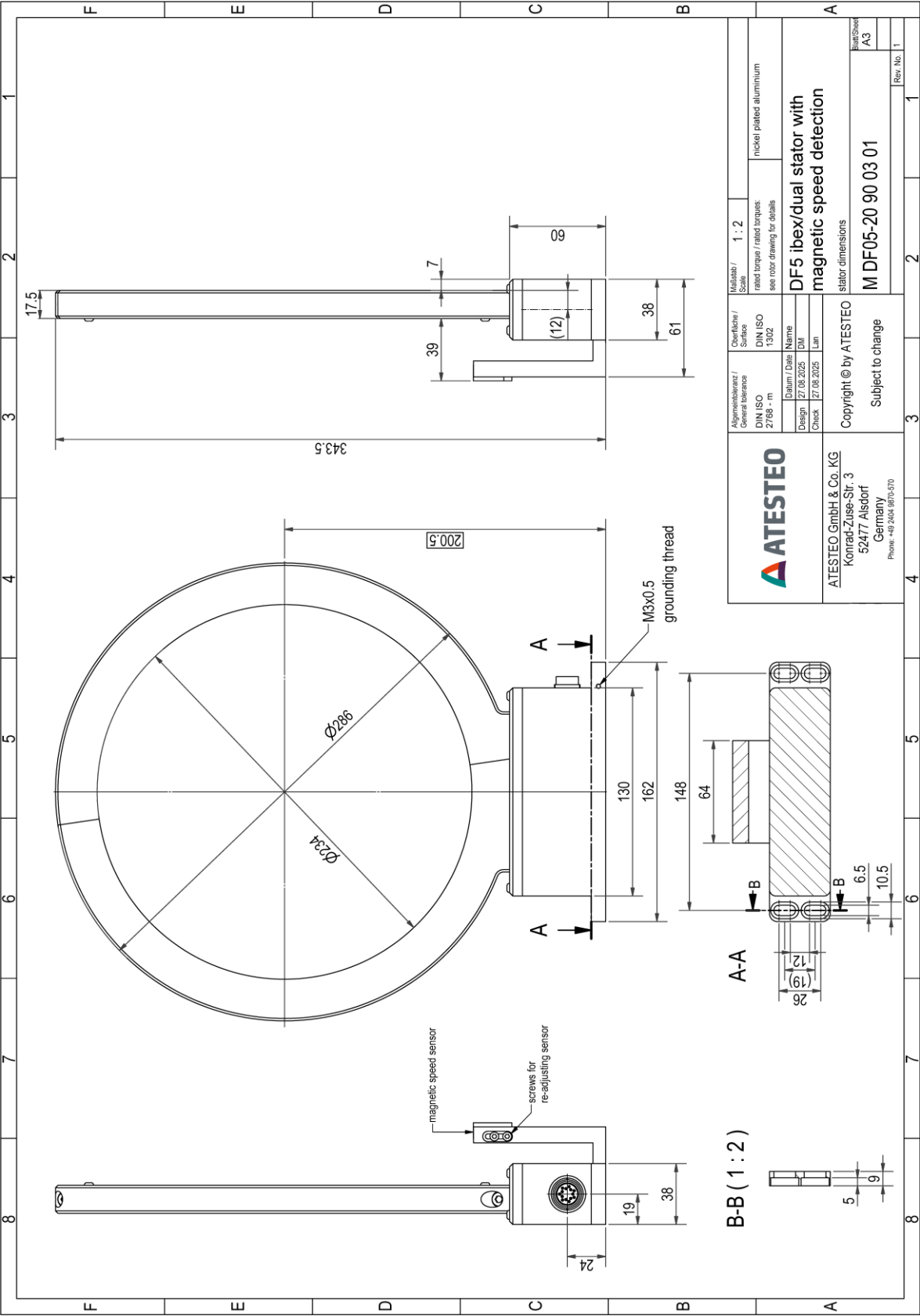


DF5 dual SPD_MGN

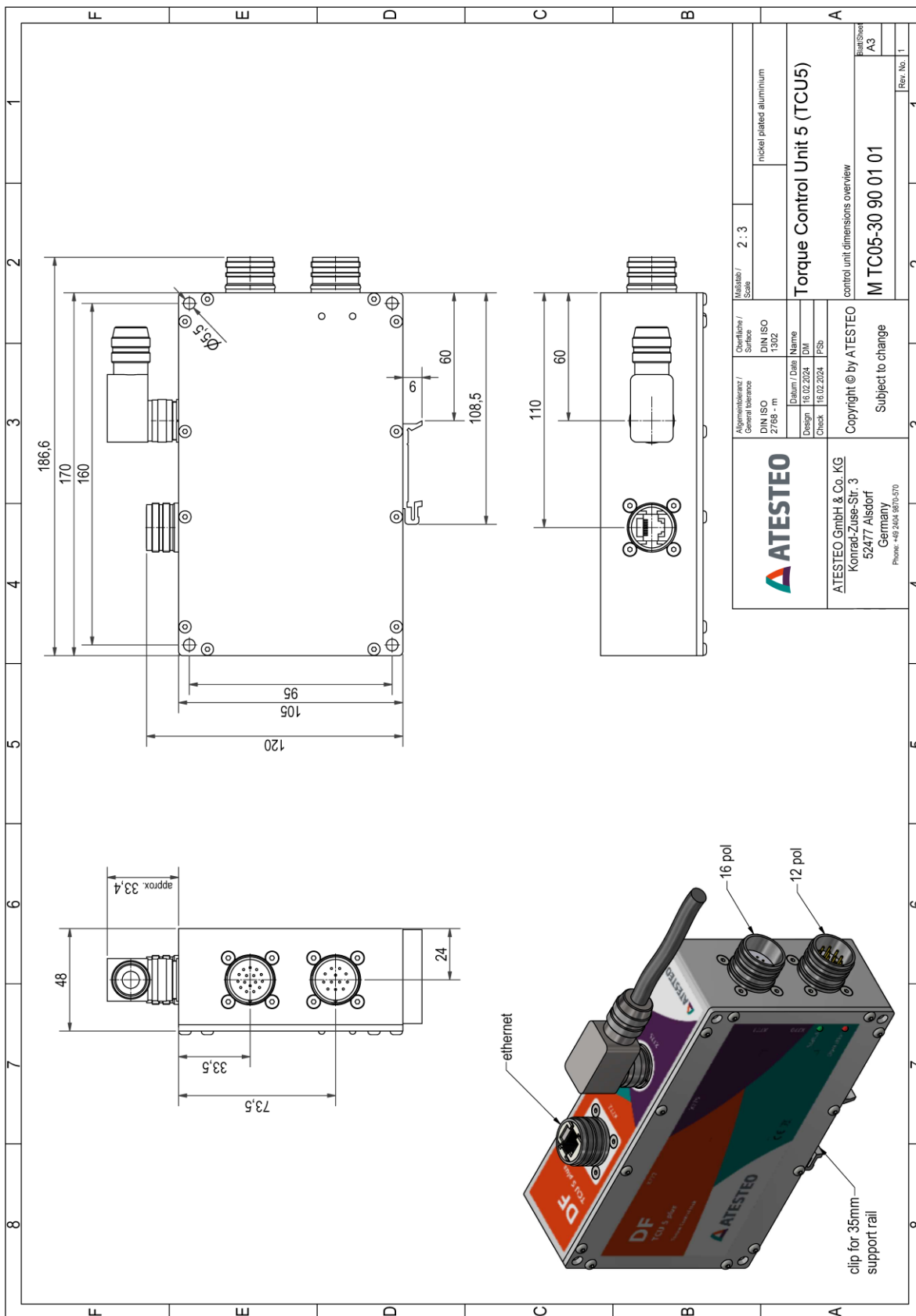
Stator

DF5 dual

Drawing



Drawing



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