

Data sheet

DF *plus* HS



Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000

Torque measuring system

Technology	-	Rotating				
Rated torque (Md _n) #1	Nm	500	1,000	2,000	3,000	4,000
Rated torque short measurement range (optional, minimum) (Md _{ns}) #2	Nm	N/A				
Accuracy class extended (for Md _n)	%	≤±0.03				
Outputs	-	Frequency, Voltage, CAN bus, Alert				
Test signal	-	see test report				

Mechanical dimensions #3

Outer diameter of rotor #4	mm	124				
Lengths (Rotor, without centering)	mm	88				
Pitch circle diameter #5	mm	105.0				

Speeds and speed measuring systems

Speed detection (integrated)	-	without				
Speed detection (optional)	-	without				
Maximum Speed without speed detection system	rpm	32,000				
Optional increased speed #6	rpm	40,000	40,000	N/A	N/A	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_n)

Frequency output	%	≤±0.04				
CAN output	%	≤±0.04				
Voltage output	%	≤±0.05				
Current output	%	N/A				
Frequency output (option higher accuracy)	%	≤±0.03				
CAN (option higher accuracy)	%	≤±0.03				

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000
Linearity deviation including hysteresis related to Md_n #7						
Frequency, 0%...30%	%	≤±0.010				
Frequency, 30%...60%	%	≤±0.020				
Frequency, 60%...100%	%	≤±0.030				
CAN, 0%...30%	%	≤±0.010				
CAN, 30%...60%	%	≤±0.020				
CAN, 60%...100%	%	≤±0.030				
Voltage output	%	≤±0.05				
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	%	≤±0.03				
CAN output	%	≤±0.03				
Voltage output	%	≤±0.05				
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	%	≤±0.05				
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	%	≤±0.05				
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	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000

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	μs	800				

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (M _{d,n})	Nm	500	1,000	2,000	3,000	4,000

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.	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) #8	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) #8	mm	N/A				
Nominal axial displacement (rotor - stator) #8	mm	N/A				
Tolerance to nominal axial displacement (rotor - stator)	mm	N/A				

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (M _{d,n})	Nm	500	1,000	2,000	3,000	4,000

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

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000
Temperature ranges						
Nominal temperature range (<i>Rotor</i>)	°C	0...80				
Operating temperature range (<i>Rotor</i>) #9	°C	-20...85				
Storage temperature range (<i>Rotor</i>)	°C	-30...85				
Nominal temperature range (<i>Stator</i>)	°C	0...80				
Operating temperature range (<i>Stator</i>) #10	°C	-20...85				
Storage temperature range (<i>Stator</i>)	°C	-30...85				
Nominal temperature range (<i>TCU</i>)	°C	0...70				
Operating temperature range (<i>TCU</i>)	°C	-20...70				
Storage temperature range (<i>TCU</i>)	°C	-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 #11						
Limit torque, related to Md _n	%	475	300	275	250	225
Breaking torque approx., related to Md _n	%	950	600	550	500	450
Axial limit force	kN	12.00	14.00	20.00	25.00	50.00
Lateral limit force	N	995.00	1,250.00	2,340.00	3,235.00	5,180.00
Bending limit torque	Nm	68.00	85.00	155.00	214.00	355.00

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Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000

Mechanical values						
Torsional stiffness	kNm/rad	296	382	674	857	1,280
Angle of twist at Md _n	°	0.097	0.150	0.170	0.200	0.179
Axial stiffness	kN/mm	602	707	1,045	1,275	1,685
Radial stiffness	kN/mm	62	79	146	202	304
Bending stiffness	kNm/°	3.50	4.50	8.50	11.50	17.50
Deflection at axial limit force	mm	<0.03	<0.03	<0.03	<0.03	<0.04
Additional radial deviation at lateral limit force	mm	<0.02				
Parallel deviation at bending limit torque	mm	<0.04	<0.04	<0.04	<0.04	<0.05
Inherent frequency	Hz	1,400	1,500	2,100	2,400	3,100
Balance quality-level (DIN ISO 1949)	-	G2.5				
Inertia of rotor	kgm ²	0.0031	0.0031	0.0031	0.0032	0.0032
Max. limits for relative shaft vibration (peak to peak) #12	μm	$S_{(p-p)} = \frac{9000}{\sqrt{n}}$				

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (Md _n)	Nm	500	1,000	2,000	3,000	4,000
Weight approx.						
Rotor #13	kg	1.7	1.7	1.8	1.8	1.9
Stator (without speed encoder) #13	kg	0.60				
Mounting distances (without optional speed detection system)						
Nominal radial displacement (rotor - stator)	mm	3				
Tolerance to nominal radial displacement (rotor - stator)	mm	+1/-2				
Nominal axial displacement (rotor - stator) #8	mm	30				
Tolerance to nominal axial displacement (rotor - stator)	mm	≤±1				
Flatness and concentricity tolerances rotor						
Circular run-out-axial tolerance #14	mm	0.01				
Circular run-out-radial tolerance #14	mm	0.01				
Power supply						
Nominal supply	V (DC)	24				
Supply range #15	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				

Technical data

Type	-	DF plus HS				
Accuracy class	%	≤±0.04				
Rated torque (M _{d,n})	Nm	500	1,000	2,000	3,000	4,000
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	-	16 * M12 (10.9)	16 * M12 (10.9)	16 * M12 (12.9)	16 * M12 (12.9)	16 * M12 (12.9)
CAN	-	2B				
Configuration interface	-	Ethernet				
Central hole	mm	N/A				
Material	-	Titanium				
Measuring range (related to M _{d,n})	%	110				
Compatible evaluation units (TCU)	-	TCU5				
Stator type	-	DF plus				
Sales information						
Article number	-	1000437 9	1000437 9	1000880 2	1000880 2	1000880 2
U.S. FCC certificate		No				

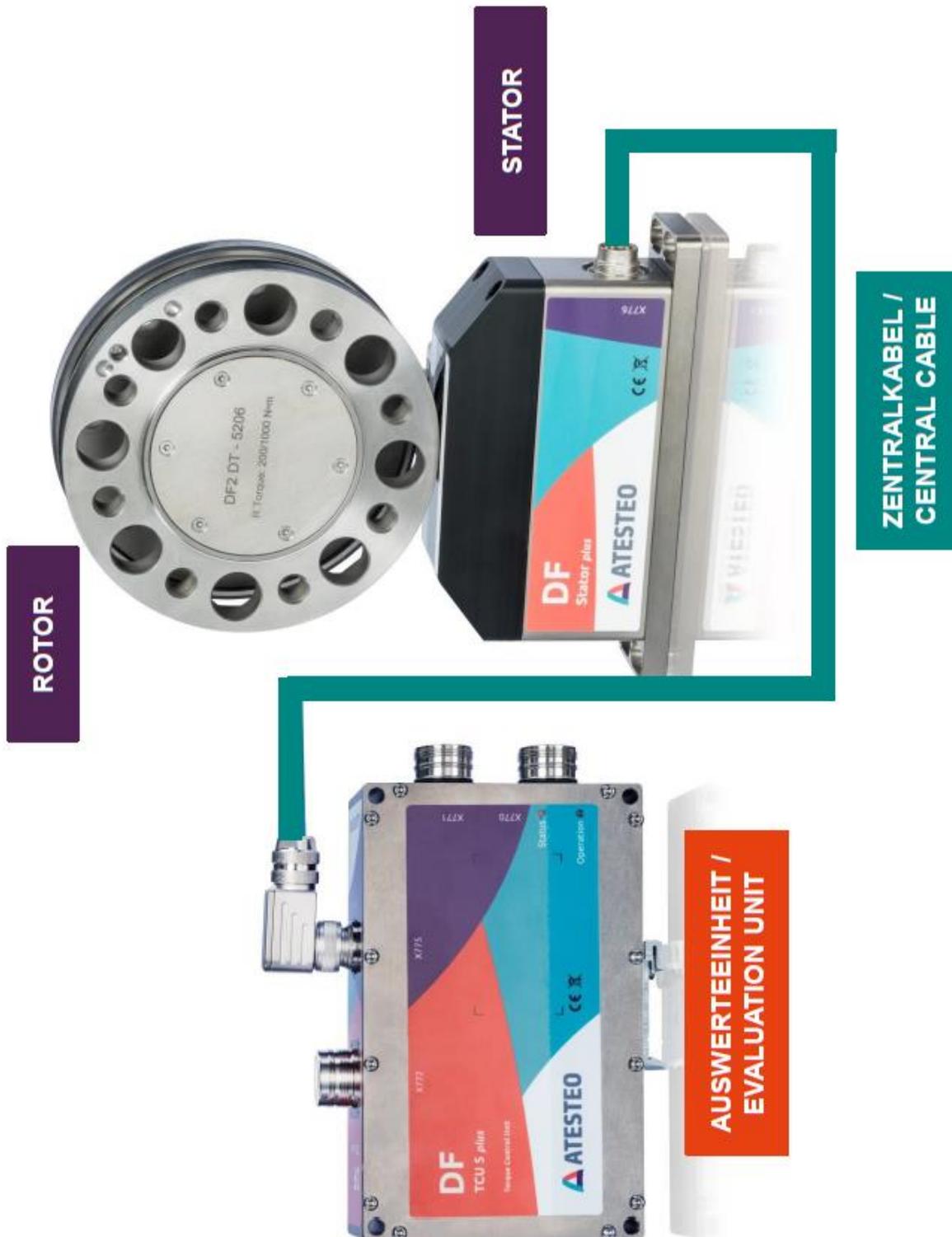
Remarks and information

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 ($M_{d_{HS}}$) 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	DF HS extended speed	DF HS 500 Nm and 1,000 Nm can have an extended maximum speed with slightly reduced accuracy class of 0.05%.
#7	Linearity	Values of Linearity deviation incl. Hysteresis can only be reached if positive and negative sensitivity values are used.
#8	Reference planes	Please check the drawings for information about the reference planes of this attribute.
#9	Temperature range (rotor)	No condensation allowed.
#10	Temperature range (stator)	No condensation allowed. Temperature related to housing ground point.

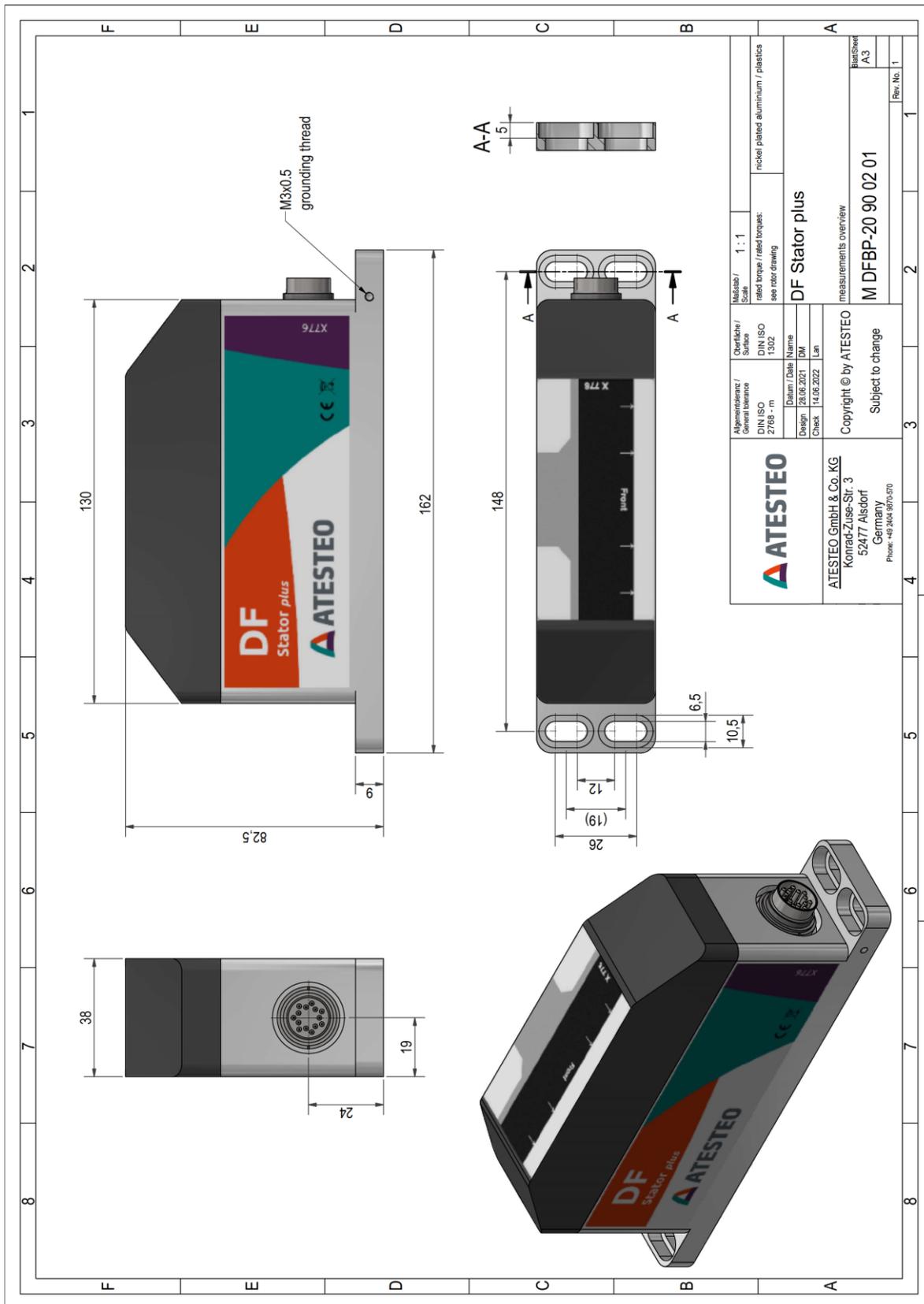
Remarks and information

Link no.	Topic	Remark
#11	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.
#12	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".
#13	Weights	Weights are related to components without options like speed detection system. Please contact us for exact weight information of options.
#14	Flatness and concentricity tolerances	The parameters of "Flatness and concentricity tolerances rotor" are manufacturing tolerances.
#15	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



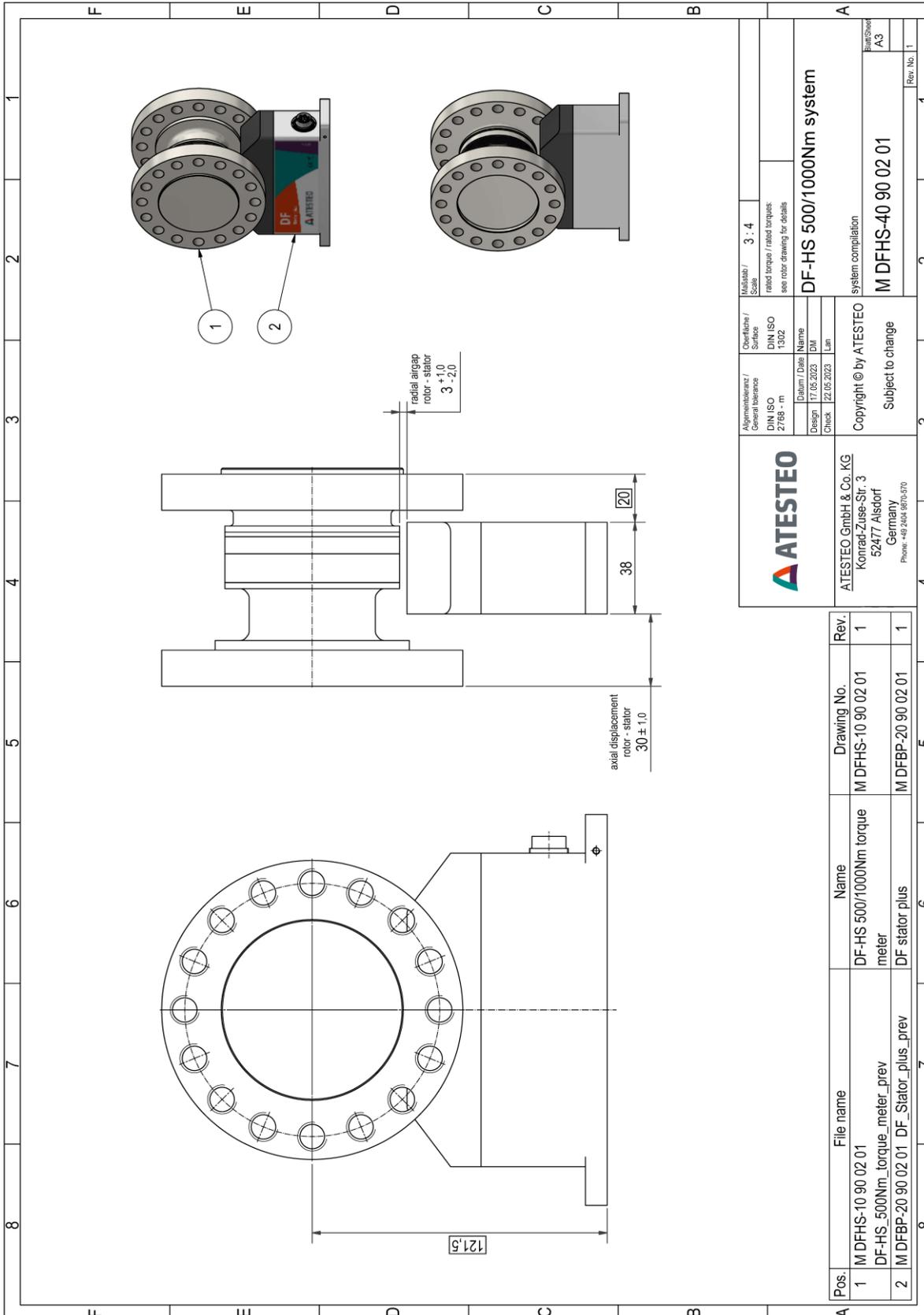
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DF plus HS 500/1k Nm System

DF plus HS

Drawing



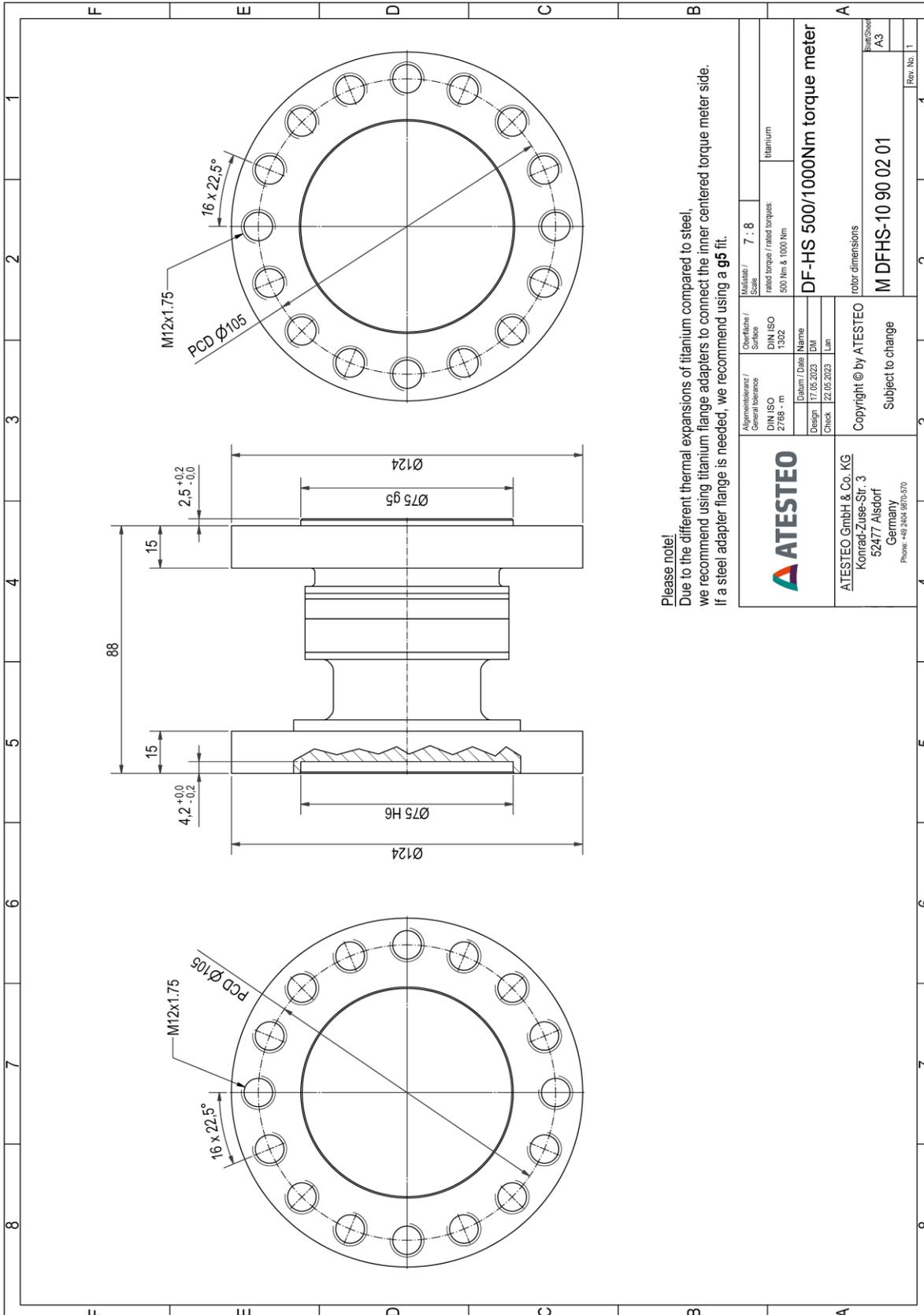
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DF plus HS 500/1k Nm Rotor

DF plus HS

Drawing



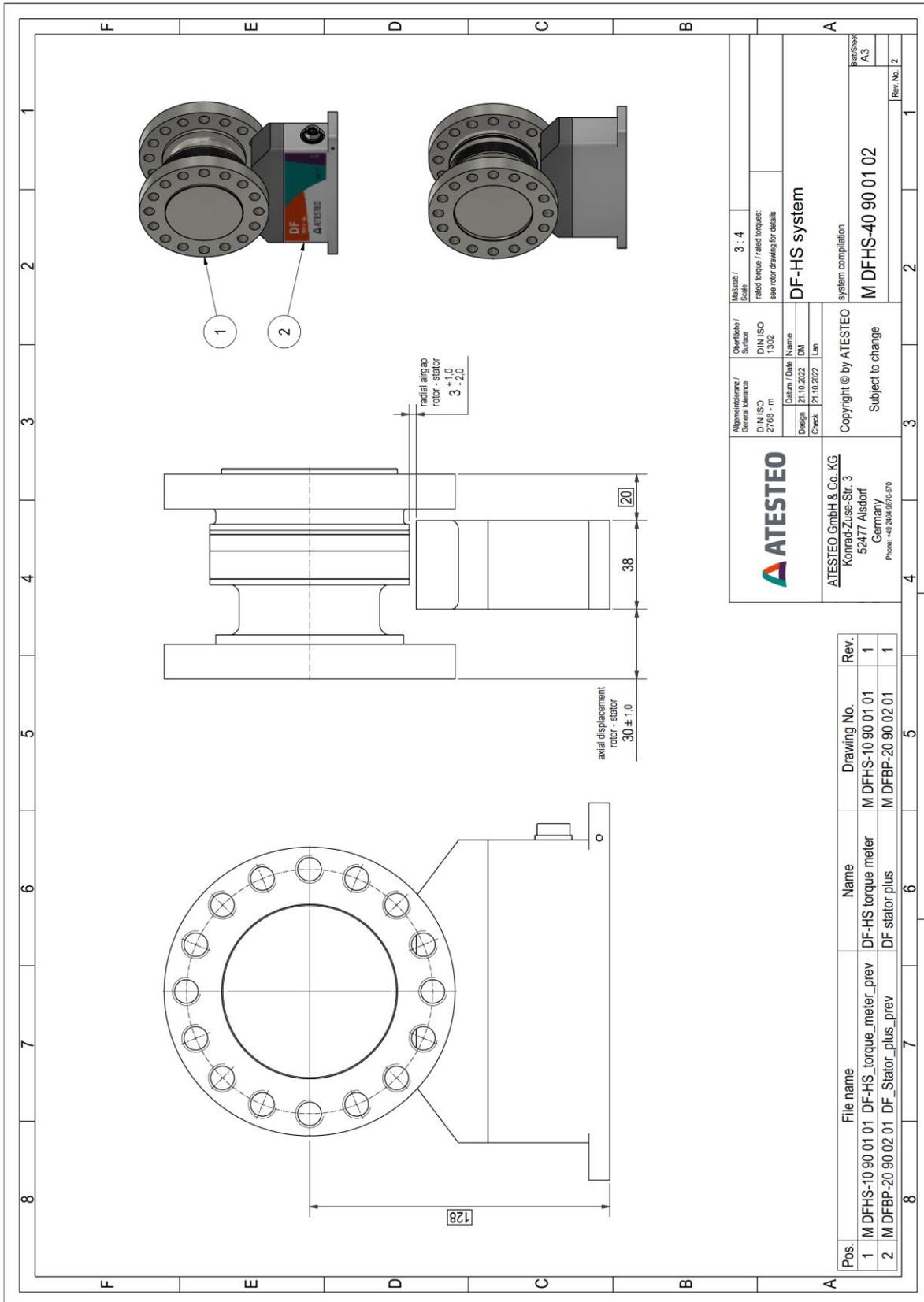
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DF plus HS 2k-4k Nm System

DF plus HS

Drawing



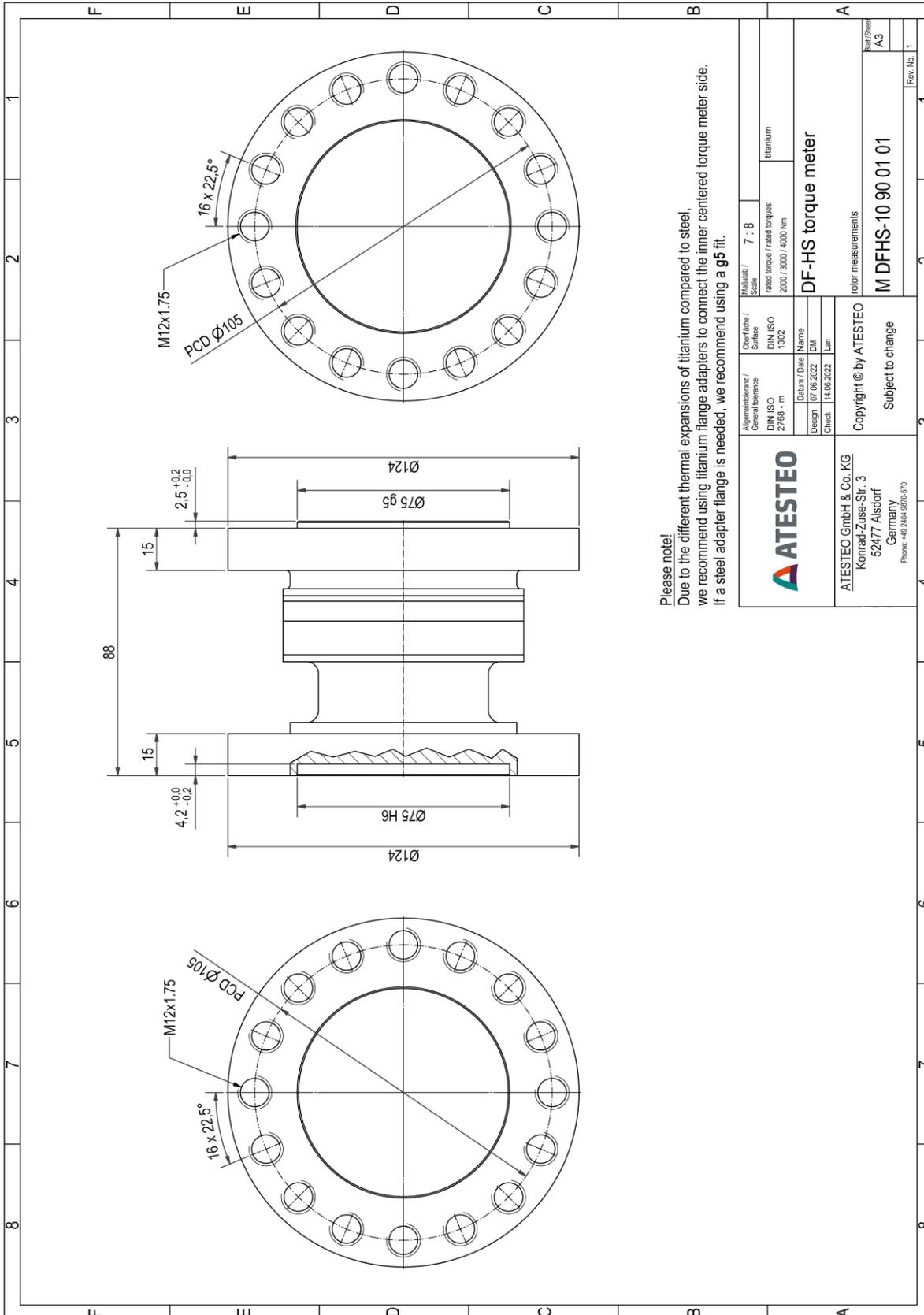
ATESTEO ATESTEO GmbH & Co. KG Konrad-Zuse-Str. 3 52477 Alsdorf Germany Phone: +49 204 910590		Manufacturer / General tolerance DIN ISO 2798 - m	Checker / Surface DIN ISO 1302	Magnification / Scale 3 : 4
Design [21.10.2022] DM		Datum / Date [21.10.2022] DM	Name Lan	rated torque / rated torque: see rotor drawing for details
Copyright © by ATESTEO Subject to change		DF-HS system system compilation		
M DFHS-40 90 01 02		BlankSheet A3		
Rev. No. 2		Rev. No. 2		

Pos.	File name	Name	Drawing No.	Rev.
1	M DFHS-10 90 01 01 DF-HS_torque_meter_prev	DF-HS torque meter	M DFHS-10 90 01 01	1
2	M DFBP-20 90 02 01 DF_Stator_plus_prev	DF stator plus	M DFBP-20 90 02 01	1

DF plus HS 2k-4k Nm Rotor

DF plus HS

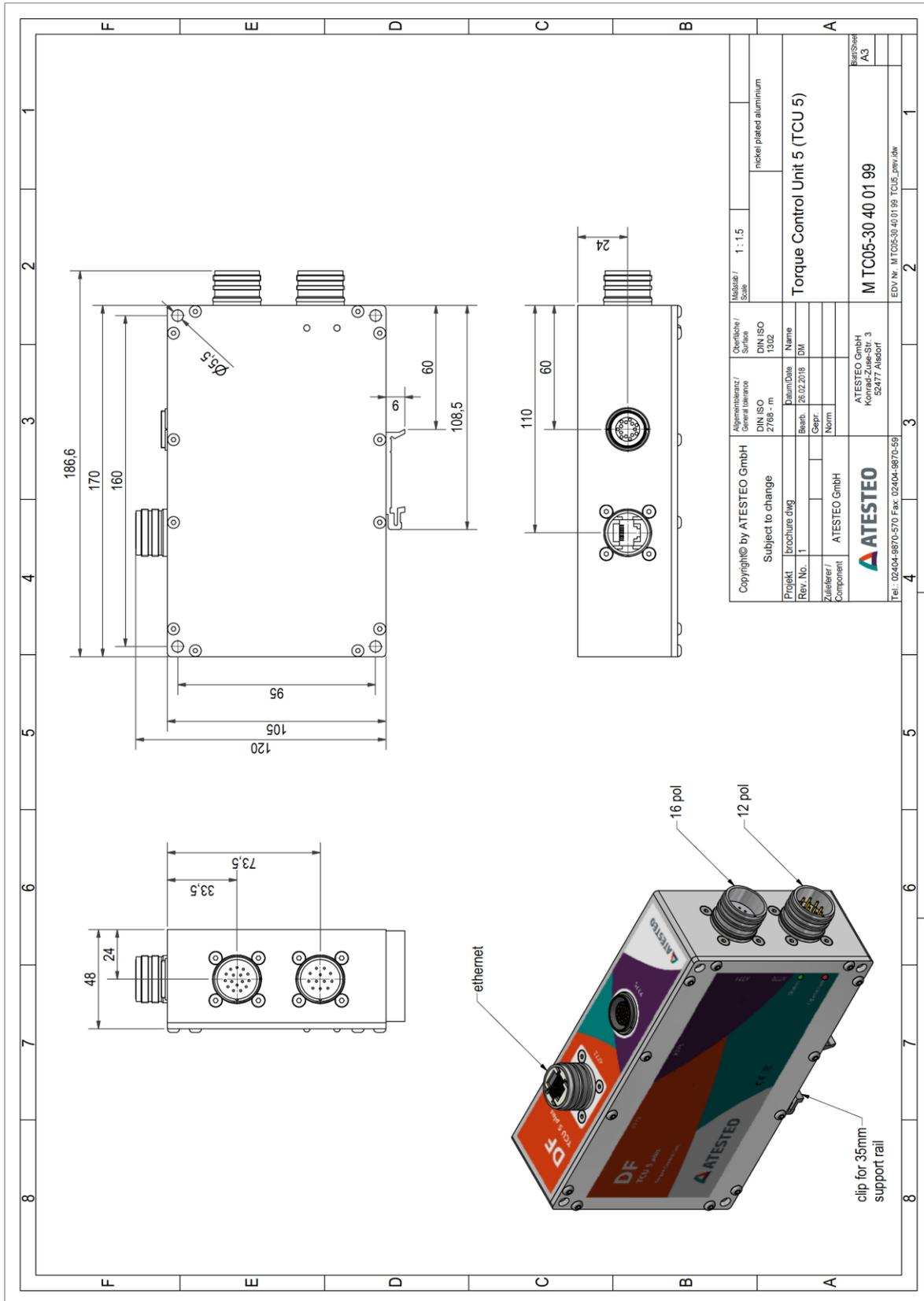
Drawing



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Drawing



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