

Data sheet

# RT1



## Technical data

Type		RT1eS-B ETP	RT1eS-B RW	
Accuracy class	%	$\leq \pm 0.03$		
Rated torque ( $M_{dN}$ )	Nm	5 10 15 20	5 10 15 20	

Torque measuring system				
Technology	-	Rotating		
Rated torque ( $M_{dN}$ ) #1	Nm	5 10 15 20	5 10 15 20	
Rated torque short measurement range (optional, minimum) ( $M_{dNs}$ ) #2	Nm	1 2 3 4	1 2 3 4	
Accuracy class (extended for $M_{dN}$ )	%	N/A		
Outer diameter of rotor #3	mm	77		
Lengths (Rotor, without centering)	mm	81		
Pitch circle diameter #4	mm	63.0		
Outputs	-	Frequency, Voltage, Current, CAN bus, Alert		
Test signal	-	see test report		

Speeds and speed measuring systems				
Speed detection (integrated)	-	without		
Speed detection (optional)	-	without		
Maximum Speed without optional speed detection system	rpm	25,000		
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	N/A		

Torque accuracy class per output type (related to $M_{dN}$ )				
Frequency output / CAN	%	$\leq \pm 0.03$		
Voltage output	%	$\leq \pm 0.10$		
Current output	%	$\leq \pm 0.10$		
Frequency output / CAN (option higher accuracy)	%	N/A		

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Rated torque ( $M_{d_n}$ )	Nm	5 10 15 20	5 10 15 20	

Linearity deviation including hysteresis related to  $M_{d_n}$  #5

Frequency / CAN, 0%...30%	%	$\leq \pm 0.010$		
Frequency / CAN, 30%...60%	%	$\leq \pm 0.020$		
Frequency / CAN, 60%...100%	%	$\leq \pm 0.030$		
Voltage output	%	$\leq \pm 0.10$		
Current output	%	$\leq \pm 0.10$		

Rel. standard deviation of the reproducibility according to DIN 1319, by reference to variation of the output signal (rel. to  $M_{d_n}$ )

Frequency output / CAN	%	$\leq \pm 0.03$		
Voltage output	%	$\leq \pm 0.10$		
Current output	%	$\leq \pm 0.10$		

Temperature influence per 10K in the nominal temperature range on the output signal related to the actual value of signal span (rel. to  $M_{d_n}$ )

Frequency output / CAN	%	$\leq \pm 0.03$		
Voltage output	%	$\leq \pm 0.10$		
Current output	%	$\leq \pm 0.10$		

Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to  $M_{d_n}$ )

Frequency output / CAN	%	$\leq \pm 0.03$		
Voltage output	%	$\leq \pm 0.10$		
Current output	%	$\leq \pm 0.10$		

## Long-term drift over 48h at reference temperature

Voltage output	mV	<1.0		
Current output	$\mu A$	<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		
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

Frequency output	$\mu$ s	10		
Voltage output	$\mu$ s	3,000		
CAN	$\mu$ s	1,000		

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Speed measuring system		Inductive (integrated 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) #6	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) #6	mm	N/A		
Nominal axial displacement (rotor - stator) #6	mm	N/A		
Tolerance to nominal axial displacement (rotor - stator)	mm	N/A		

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Temperature ranges				
Nominal temperature range <i>(Rotor)</i>		°C	0...80	
Operating temperature range <i>(Rotor)</i> #7		°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> #8		°C	-20...85	
Storage temperature range <i>(Stator)</i>		°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 #9				
Limit torque, related to Md <sub>n</sub>		%	500	
Breaking torque approx., related to Md <sub>n</sub>		%	1,000	
Axial limit force	kN	1.10	1.10	
		1.40	1.40	
		1.60	1.60	
		1.80	1.80	
Lateral limit force	N	20.00	20.00	
		36.00	36.00	
		50.00	50.00	
		62.00	62.00	
Bending limit torque	Nm	0.70	0.70	
		1.30	1.30	
		2.00	2.00	
		2.50	2.50	

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Mechanical values				
Torsional stiffness	kNm/rad	2.00 4.90 8.00 11.00	2.00 4.90 8.00 11.00	
Angle of twist at $M_{d_n}$	°	0.130 0.120 0.110 0.100	0.130 0.120 0.110 0.100	
Axial stiffness	kN/mm	59 72 83 92	59 72 83 92	
Radial stiffness	kN/mm	1.50 2.70 3.80 4.80	1.50 2.70 3.80 4.80	
Bending stiffness	kNm/°	0.04 0.07 0.10 0.13	0.04 0.07 0.10 0.13	
Deflection at axial limit force	mm	<0.03		
Additional radial deviation at lateral limit force	mm	<0.02		
Parallel deviation at bending limit torque	mm	N/A		
Inherent frequency	Hz	750 1,000 1,200 1,300	750 1,000 1,200 1,300	
Balance quality-level to DIN ISO 1949	-	G2.5		
Inertia of rotor	kgm <sup>2</sup>	0.0003		
Max. limits for relative shaft vibration (peak to peak) #10	µm	$S_{(p-p)} = \frac{9000}{\sqrt{n}}$		

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## Weight approx.

Rotor #11	kg	0.4	
Stator (without speed encoder) #11	kg	0.20	

## Mounting distances (without optional speed detection system)

Nominal radial displacement (rotor - stator)	mm	1.0	
Tolerance to nominal radial displacement (rotor - stator)	mm	$\leq \pm 0.2$	
Nominal axial displacement (rotor - stator) #6	mm	0	
Tolerance to nominal axial displacement (rotor - stator)	mm	$\leq \pm 1.0$	

## Flatness and concentricity tolerances rotor

Circular run-out-axial tolerance #12	mm	0.01	
Circular run-out-radial tolerance #12	mm	0.01	

## Power supply

Nominal supply	V (DC)	24	
Supply range #13	V (DC)	23...25	
Max. current consumption in measuring mode	A	<0.70	
Max. current consumption in start-up mode	A	<1	
Nominal power consumption	W	<17	

## Load resistance

Frequency output	-	RS422	
Voltage output	kOhm	$\geq 5$	

## Dynamic

Frequency output	kHz	$\leq 7$	
Voltage output	kHz	$\leq 1$	
Current output	kHz	$\leq 1$	
CAN output conversation rate	1/s	$\leq 1,000$	



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Miscellaneous				
Protection class (rotor)	-	IP54		
Protection class (stator)	-	IP54		
Protection class (rotor, extended)	-	N/A		
Protection class (stator, extended)	-	On request		
Pitch circle screw information	-	8 * M6 (8.8)		
CAN	-	2B		
Configuration interface	-	RS232		
Central hole	mm	N/A		
Material	-	Steel		
Measuring range (related to Md <sub>n</sub> )	%	120		
Matching evaluation units	-	TCU2		
Stator type	-	eS		
Sales information				
Article number	-	10001074	10004322	

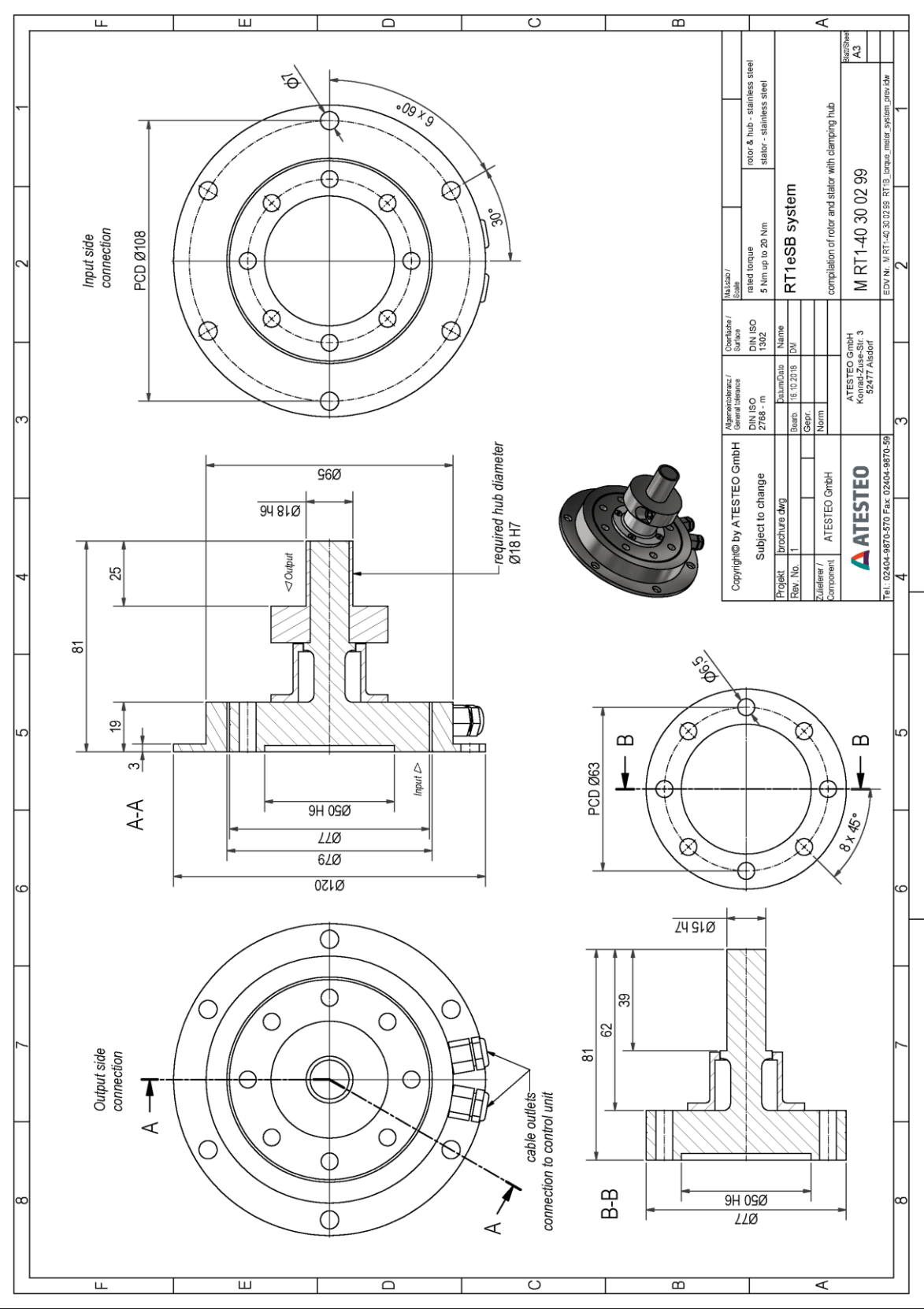
## Remarks and information

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	<p>The written second nominal torque value (<math>M_{d_{ns}}</math>) is the smallest possible. Greater second torque ranges can be chosen on demand.</p> <p>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.</p>
#3	Detail in the drawings	Value can vary by optional components. Please find details to this attribute in the integrated drawings.
#4	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.
#5	Linearity	Values of Linearity deviation incl. Hysteresis can only be reached if positive and negative sensitivity values are used.
#6	Reference planes	Please check the drawings for information about the reference planes of this attribute.
#7	Temperature range (rotor)	No condensation allowed.
#8	Temperature range (stator)	No condensation allowed. Temperature related to housing ground point.
#9	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.
#10	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".

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

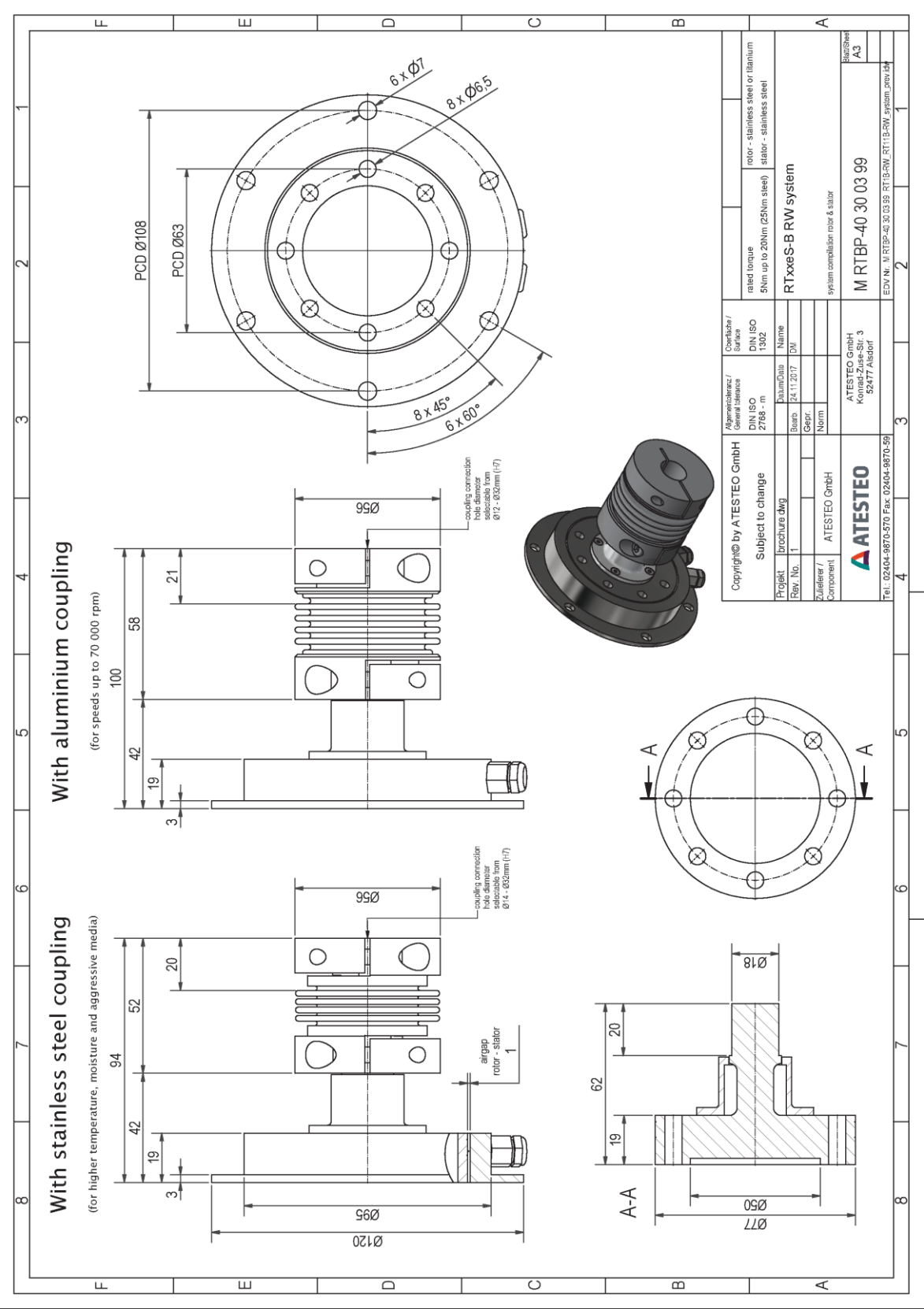
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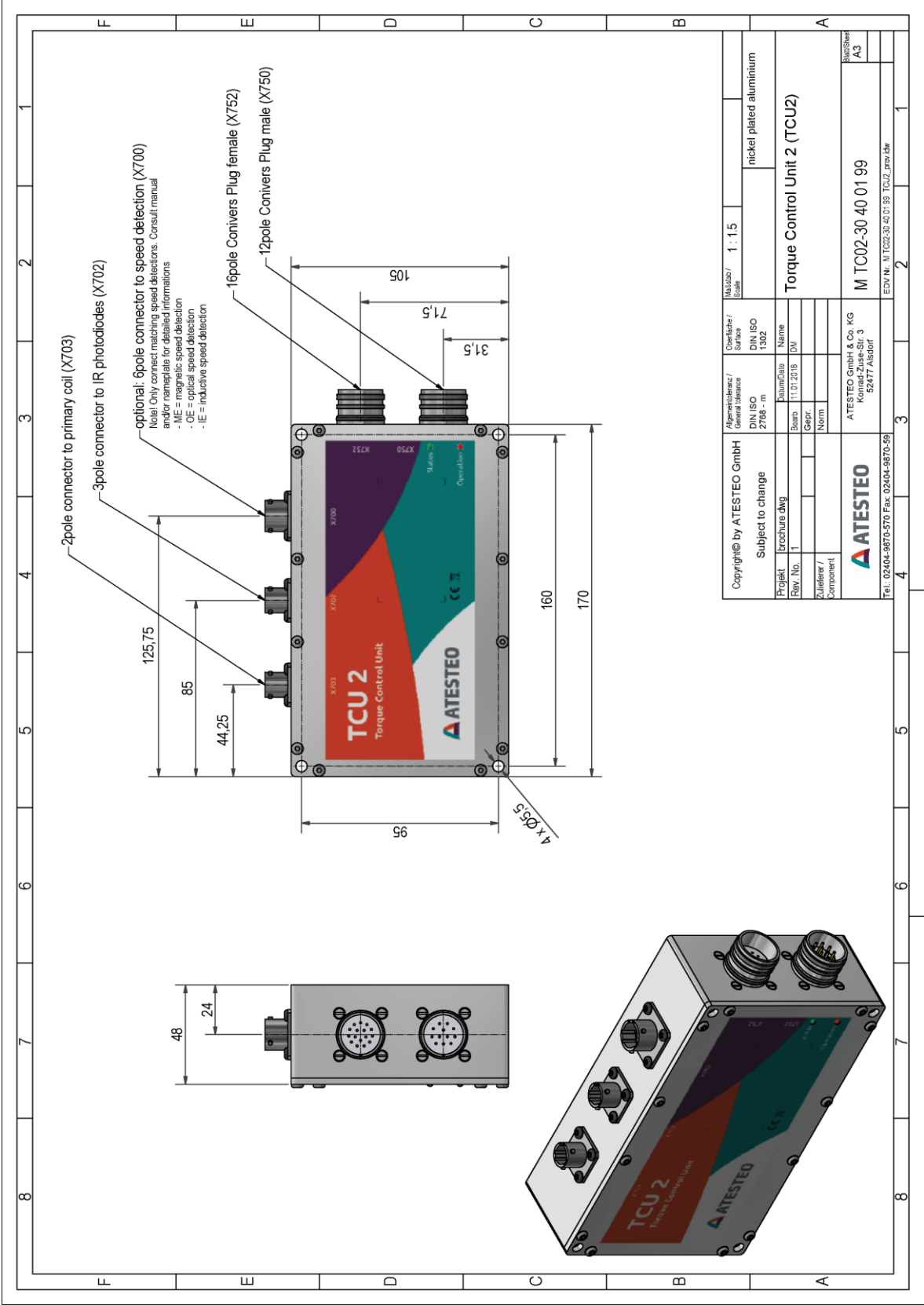
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Drawing



Drawing



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