

Data sheet

FxiS / FxeS



Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ≤±0.05 | | | |
| Rated torque (Md _n) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

| Torque measuring system | | | | | |
|---|----|---|--------------|------------------|--------------|
| Technology | - | Rotating | | | |
| Rated torque (Md _n) #1 | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |
| Rated torque short measurement range (optional, minimum) (Md _{ns}) #2 | Nm | 20 20 40 | 100 200 | 20 20 40 | 100 200 |
| Accuracy class extended (for Md _n) | % | ≤±0.03 | | | |
| Outputs | - | Frequency, Voltage, Current, CAN bus, Alert | | | |
| Test signal | - | see test report | | | |

| Mechanical dimensions #3 | | | | | |
|------------------------------------|----|------|--|--|--|
| Outer diameter of rotor #4 | mm | 94 | | | |
| Lengths (Rotor, without centering) | mm | 74 | | | |
| Pitch circle diameter #5 | mm | 75.0 | | | |

| Speeds and speed measuring systems | | | | | |
|--|-----|---------------------|--|--|--|
| Speed detection (integrated) | - | without | | | |
| Speed detection (optional) | - | inductive / optical | | | |
| Maximum Speed without speed detection system | rpm | 20,000 | | | |
| Optional increased speed | rpm | 25,000 | | | |
| Maximum speed with magnetic speed encoder | rpm | N/A | | | |
| Maximum speed with optical speed encoder #6 | rpm | up to 20,000 | | | |
| Maximum speed with inductive speed encoder | rpm | 20,000 | | | |

| Torque accuracy class per output type (related to Md _n) | | | | | |
|---|---|--------|--|--|--|
| Frequency output | % | ≤±0.05 | | | |
| CAN output | % | ≤±0.05 | | | |
| Voltage output | % | ≤±0.10 | | | |
| Current output | % | ≤±0.10 | | | |
| Frequency output (option higher accuracy) | % | ≤±0.03 | | | |
| CAN (option higher accuracy) | % | ≤±0.03 | | | |

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|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ≤±0.05 | | | |
| Rated torque (Md _n) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

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 | % | ≤±0.05 | | | |

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 | % | ≤±0.05 | | | |

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

Temperature influence per 10K in the nominal temperature range on the zero signal (rel. to Md_n)

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

Long-term drift over 48h at reference temperature

| | | | | | |
|----------------|----|-------|--|--|--|
| Voltage output | mV | <1.0 | | | |
| Current output | μA | <0.80 | | | |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ±0.05 | | | |
| Rated torque (Md _n) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

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 | | | |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ±0.05 | | | |
| Rated torque (M _{d1}) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

| Speed measuring system | | Inductive (track at rotor) | | | |
|--|------|--|--|--|--|
| Pulse per rev (PPR) | ppr. | 30 | | | |
| Maximum speeds (related to PPR) | rpm | 20,000 | | | |
| Max. output frequency (RS422) | kHz | 10 | | | |
| Minimum speed for sufficient pulse stability | rpm | >10.0 | | | |
| 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. | 240 / 360 / 400 | | | |
| Maximum speeds (related to PPR) | rpm | 20,000 / 16,000 / 15,000 | | | |
| Max. output frequency (RS422) | kHz | 80 / 96 / 100 | | | |
| Minimum speed for sufficient pulse stability | rpm | >1.3 / >0.8 / >0.8 | | | |
| Nominal radial displacement (rotor - stator) | mm | 1.5 | | | |
| Tolerated radial displacement (rotor - stator) #8 | mm | 1.4...1.6 | | | |
| Nominal axial displacement (rotor - stator) #8 | mm | 4.0 | | | |
| Tolerance to nominal axial displacement (rotor - stator) | mm | +0.5/-0.3 | | | |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ≤±0.05 | | | |
| Rated torque (M _{d1}) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

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

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ±0.05 | | | |
| Rated torque (Md _n) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

| Temperature ranges | | | | | |
|--|----|----------|----------|----------|----------|
| Nominal temperature range (Rotor) | °C | 0...80 | | | |
| Operating temperature range (Rotor) #9 | °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) #10 | °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 #11 | | | | | |
|---|----|----------------------------|----------------------|----------------------------|----------------------|
| Limit torque, related to Md _n | % | 400 300 300 | 300 | 400 300 300 | 300 |
| Breaking torque approx., related to Md _n | % | 800 600 600 | 600 | 800 600 600 | 600 |
| Axial limit force | kN | 6.00 7.60 12.40 | 29.00 56.50 | 6.00 7.60 12.40 | 29.00 56.50 |
| Lateral limit force | N | 211.00 298.00 617.00 | 2,150.00 6,250.00 | 211.00 298.00 617.00 | 2,150.00 6,250.00 |
| Bending limit torque | Nm | 7.90 12.50 24.40 | 86.00 227.00 | 7.90 12.50 24.40 | 86.00 227.00 |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ±0.05 | | | |
| Rated torque (Md _n) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

| Mechanical values | | | | | |
|---|------------------|-------------------------------------|------------------|-------------------------|------------------|
| Torsional stiffness | kNm/rad | 23 36 84 | 252 571 | 23 36 84 | 252 571 |
| Angle of twist at Md _n | ° | 0.120 0.160 0.140 | 0.110 0.100 | 0.120 0.160 0.140 | 0.110 0.100 |
| Axial stiffness | kN/mm | 202 253 414 | 970 1,880 | 202 253 414 | 970 1,880 |
| Radial stiffness | kN/mm | 13 18 38 | 134 391 | 13 18 38 | 134 391 |
| Bending stiffness | kNm/° | 0.30 0.45 0.90 | 3.00 8.00 | 0.30 0.45 0.90 | 3.00 8.00 |
| Deflection at axial limit force | mm | <0.04 | | | |
| Additional radial deviation at lateral limit force | mm | <0.02 | | | |
| Parallel deviation at bending limit torque | mm | <0.05 | | | |
| Inherent frequency | Hz | 600 750 1,000 | 1,900 3,000 | 600 750 1,000 | 1,900 3,000 |
| Balance quality-level (DIN ISO 1949) | - | G2.5 | | | |
| Inertia of rotor | kgm ² | 0.0012 | 0.0012 0.0013 | 0.0012 | 0.0012 0.0013 |
| Max. limits for relative shaft vibration (peak to peak) #12 | µm | $S_{(p-p)} = \frac{9000}{\sqrt{n}}$ | | | |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|---------------------------------|----|------------------|--------------|------------------|--------------|
| Accuracy class | % | ≤±0.05 | | | |
| Rated torque (Md _r) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |

Weight approx.

| | | | | | |
|------------------------------------|----|-------------------|------------|-------------------|------------|
| Rotor #13 | kg | 1.2 1.2 1.3 | 1.4 1.6 | 1.2 1.2 1.3 | 1.4 1.6 |
| Stator (without speed encoder) #13 | kg | 2.10 | 2.10 | 1.10 | 1.10 |

Mounting distances (without optional speed detection system)

| | | | | | |
|---|----|-------|--|--|--|
| Nominal radial displacement (rotor - stator) | mm | 2.1 | | | |
| Tolerance to nominal radial displacement (rotor - stator) | mm | ≤±0.1 | | | |
| Nominal axial displacement (rotor - stator) #8 | mm | 4 | | | |
| Tolerance to nominal axial displacement (rotor - stator) | mm | ≤±0.5 | | | |

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 | <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 | | | |

Technical data

| Type | - | F0iS | F0iS | F0eS | F0eS |
|--|----|-------------------|-------------------|-------------------|-------------------|
| Accuracy class | % | ≤±0.05 | | | |
| Rated torque (M _{d_n}) | Nm | 50 100 200 | 500 1,000 | 50 100 200 | 500 1,000 |
| 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 * M10 (10.9) | 8 * M10 (12.9) | 8 * M10 (10.9) | 8 * M10 (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 | - | 10000182 | 10000182 | 10000338 | 10000338 |
| 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 | Speed detection max speed | The maximum allowed speed of speed detection systems is depending on the number of pulses per rotation (PPR). High PPRs can reduce the maximum allowed speed. Details are shown within this data sheet in the description of the speed detection system. |
| #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. |

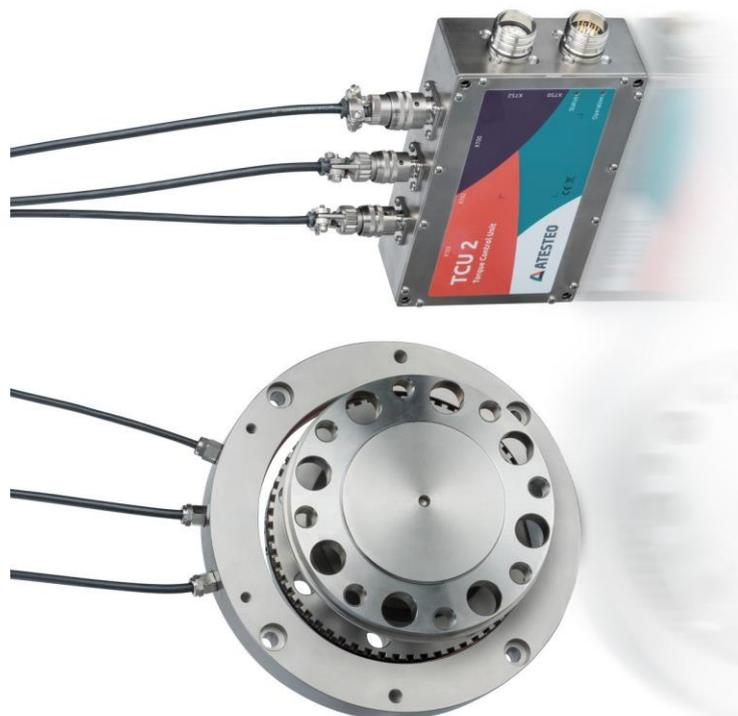
Drawing

iS



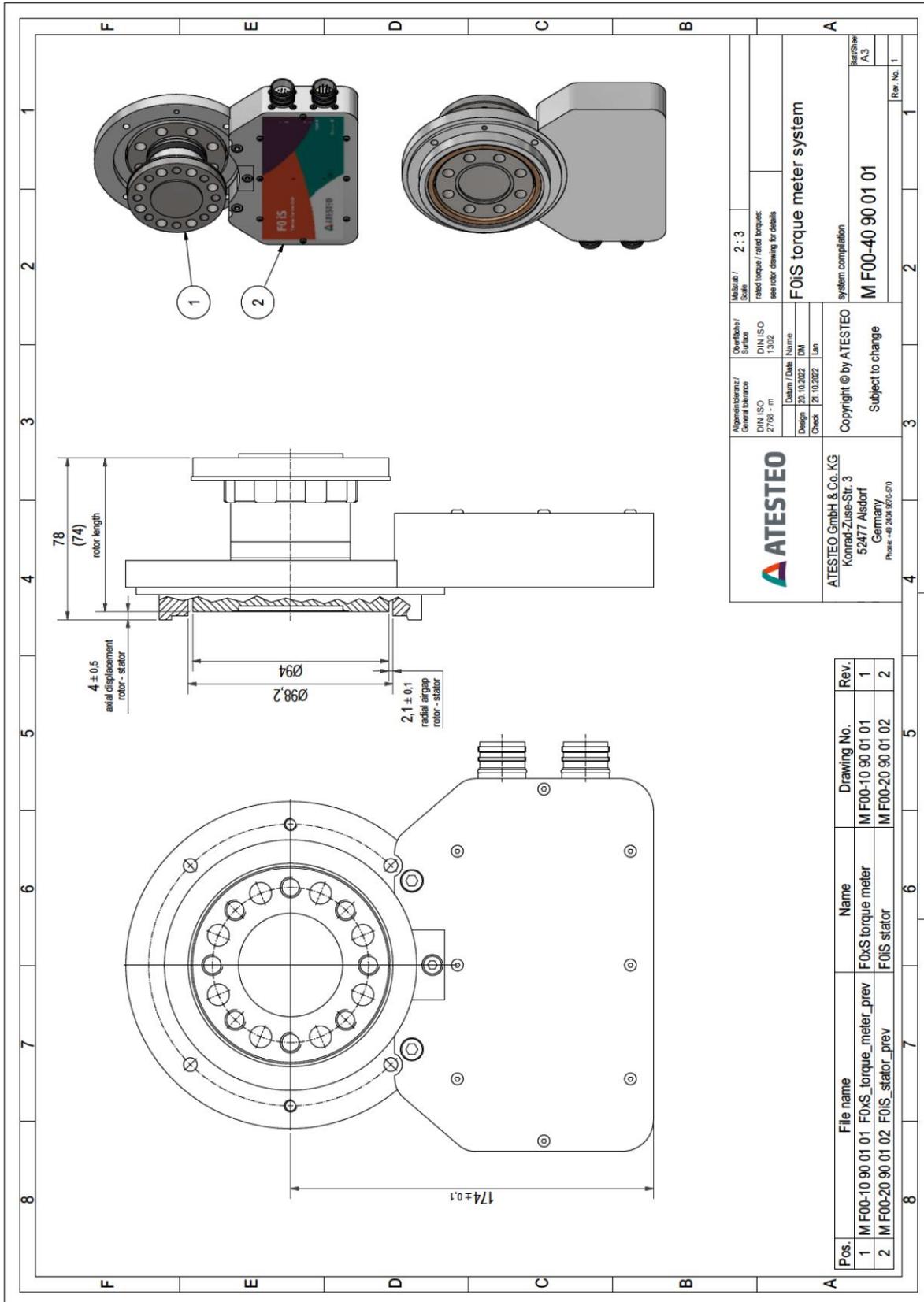
Rotor & stator with integrated evaluation unit (TCU)
Rotor & Stator mit integrierter Auswerteeinheit (TCU)

eS

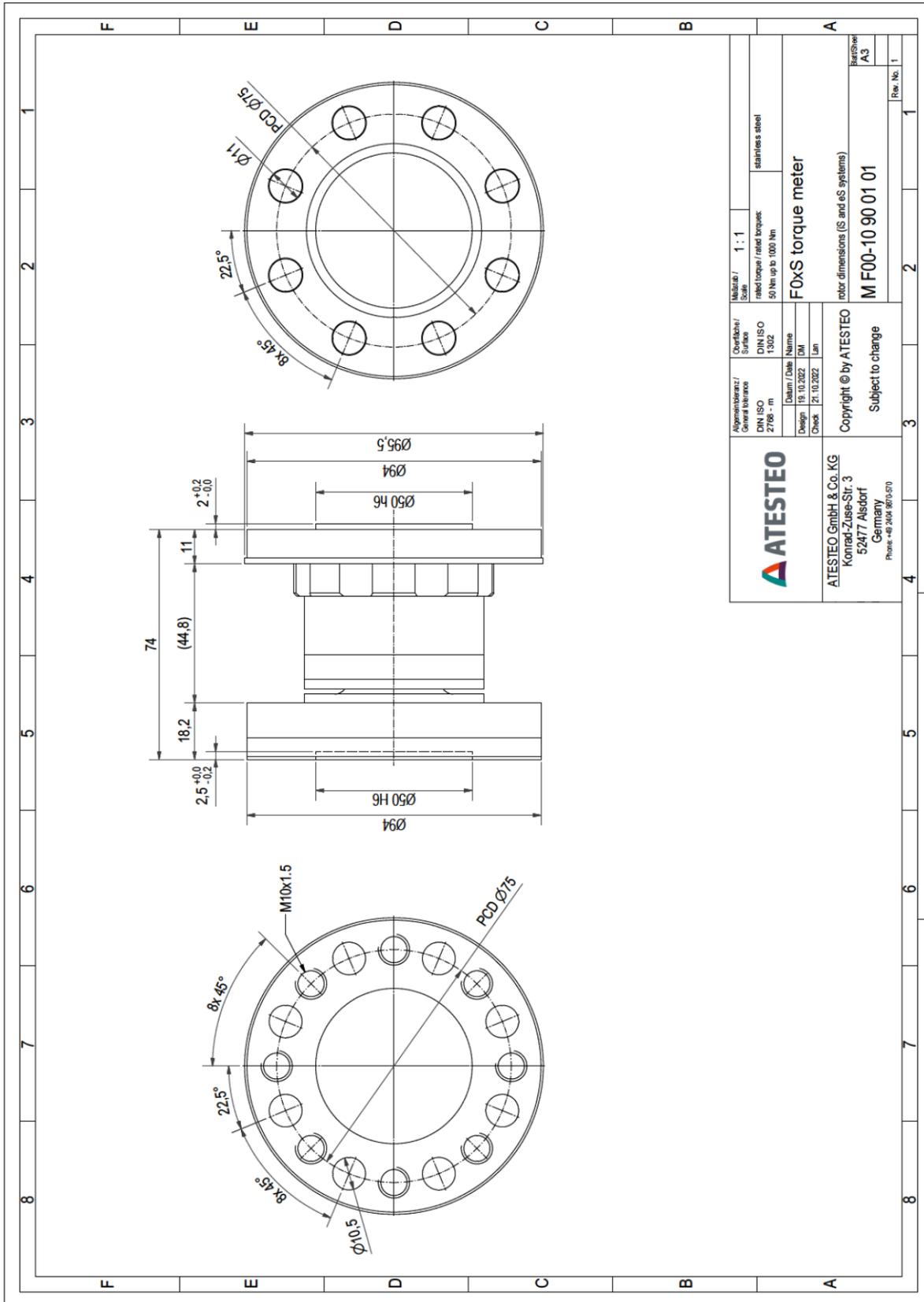


Rotor, ring stator & external evaluation unit (TCU)
Rotor, Ringstator & abgesetzte Auswerteeinheit (TCU)

Drawing



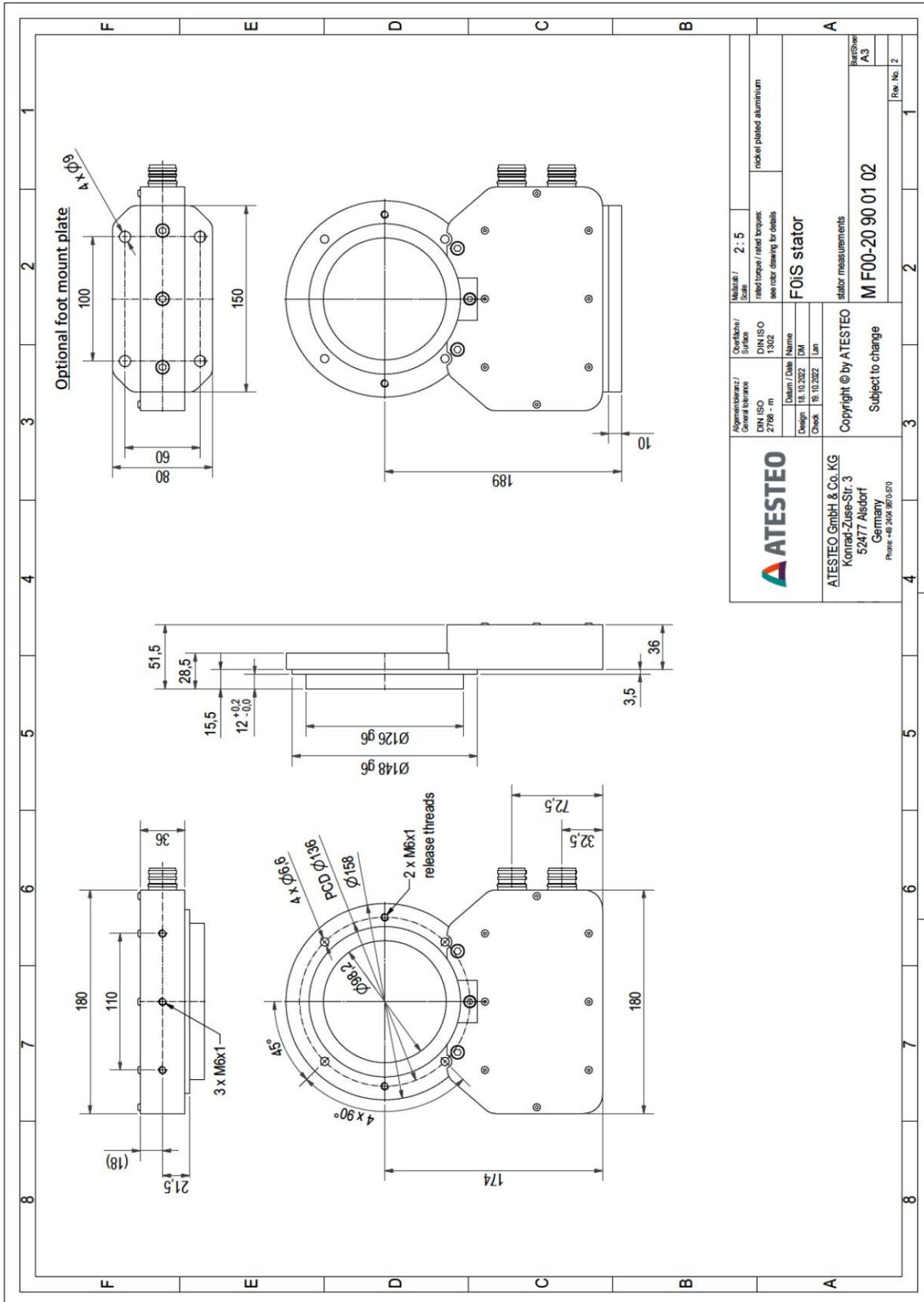
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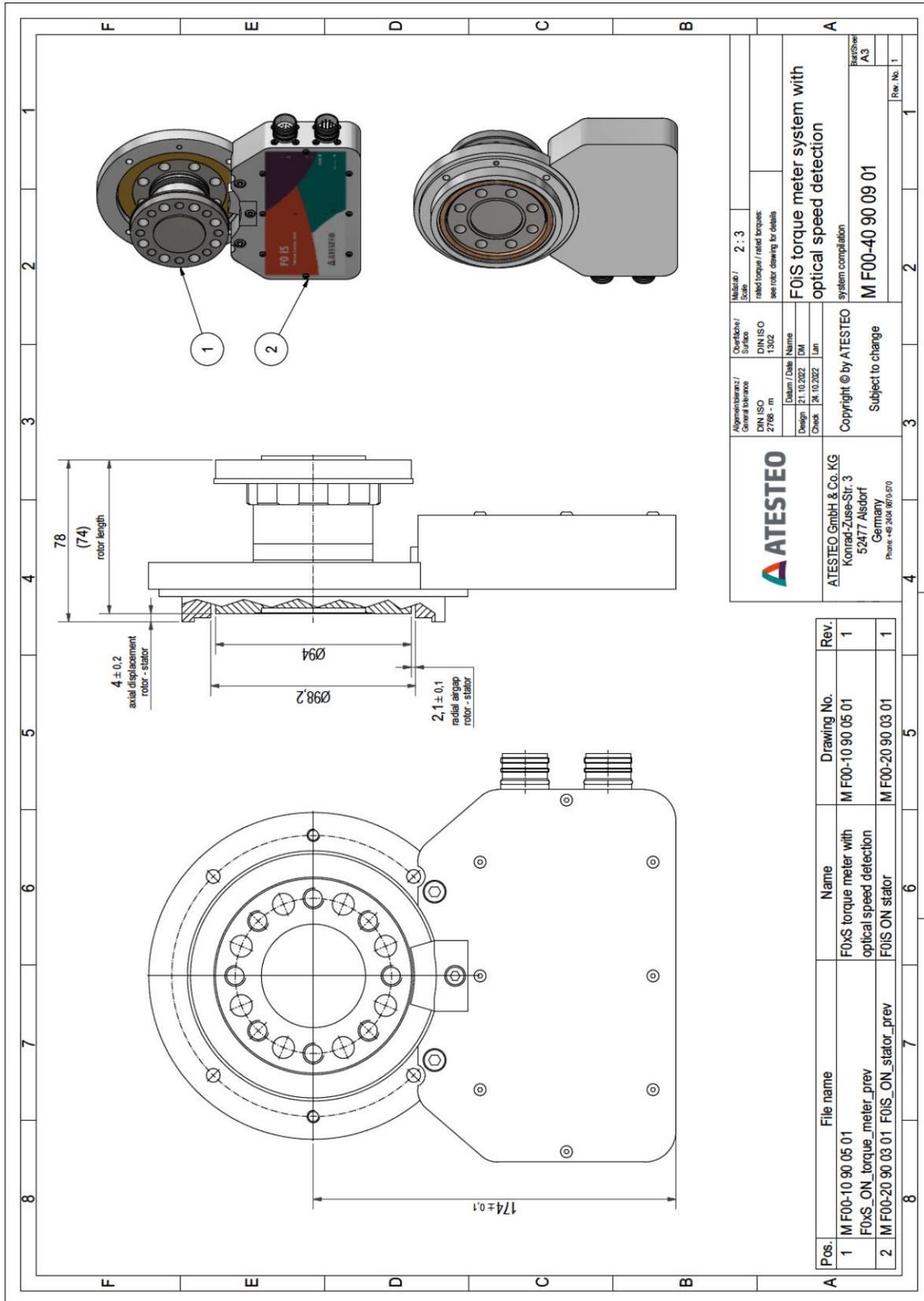
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F0iS System SPD_OPT

F0xS

Drawing



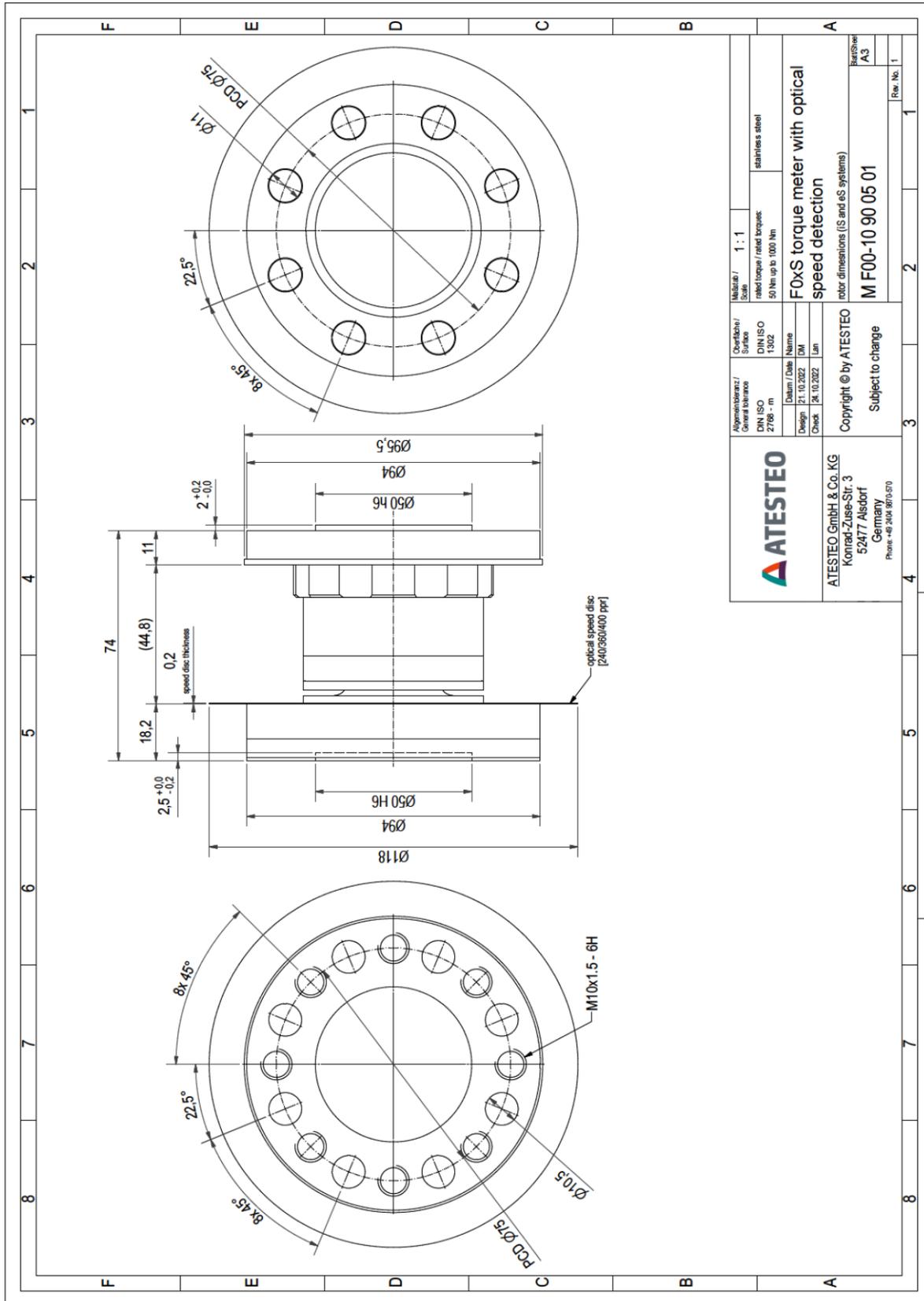
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F0iS Rotor SPD_OPT

F0xS

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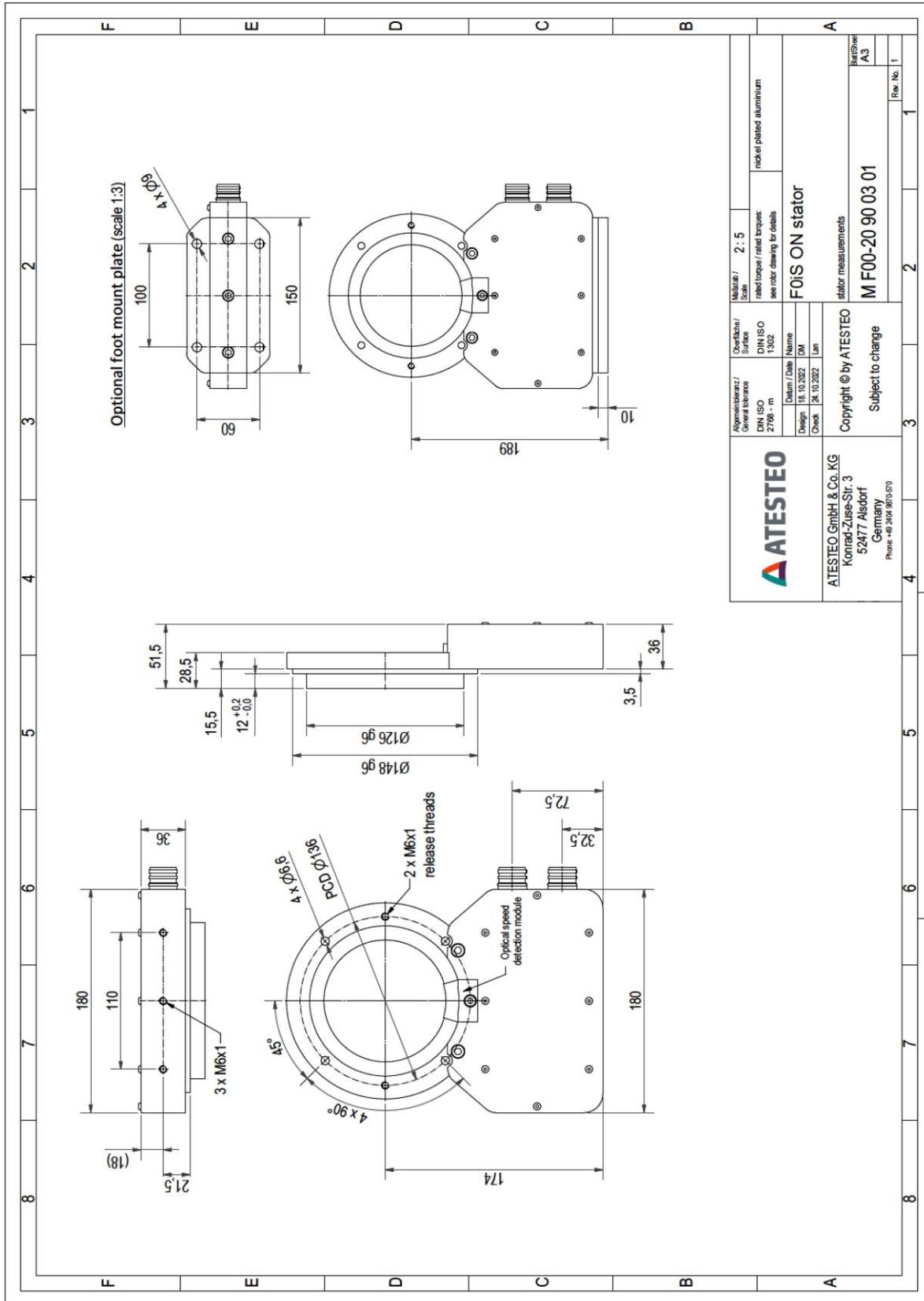
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F0iS Stator SPD_OPT

F0xS

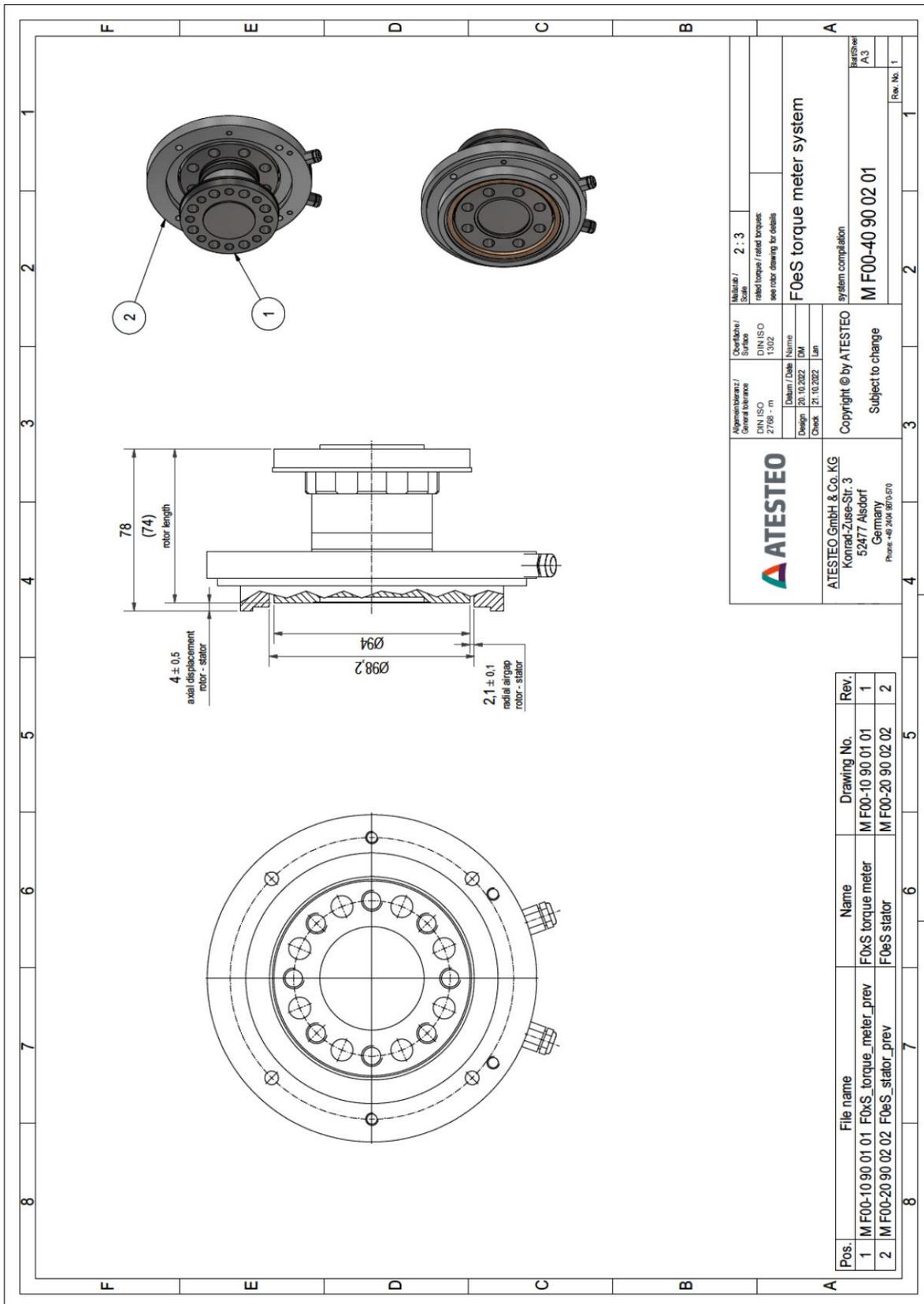
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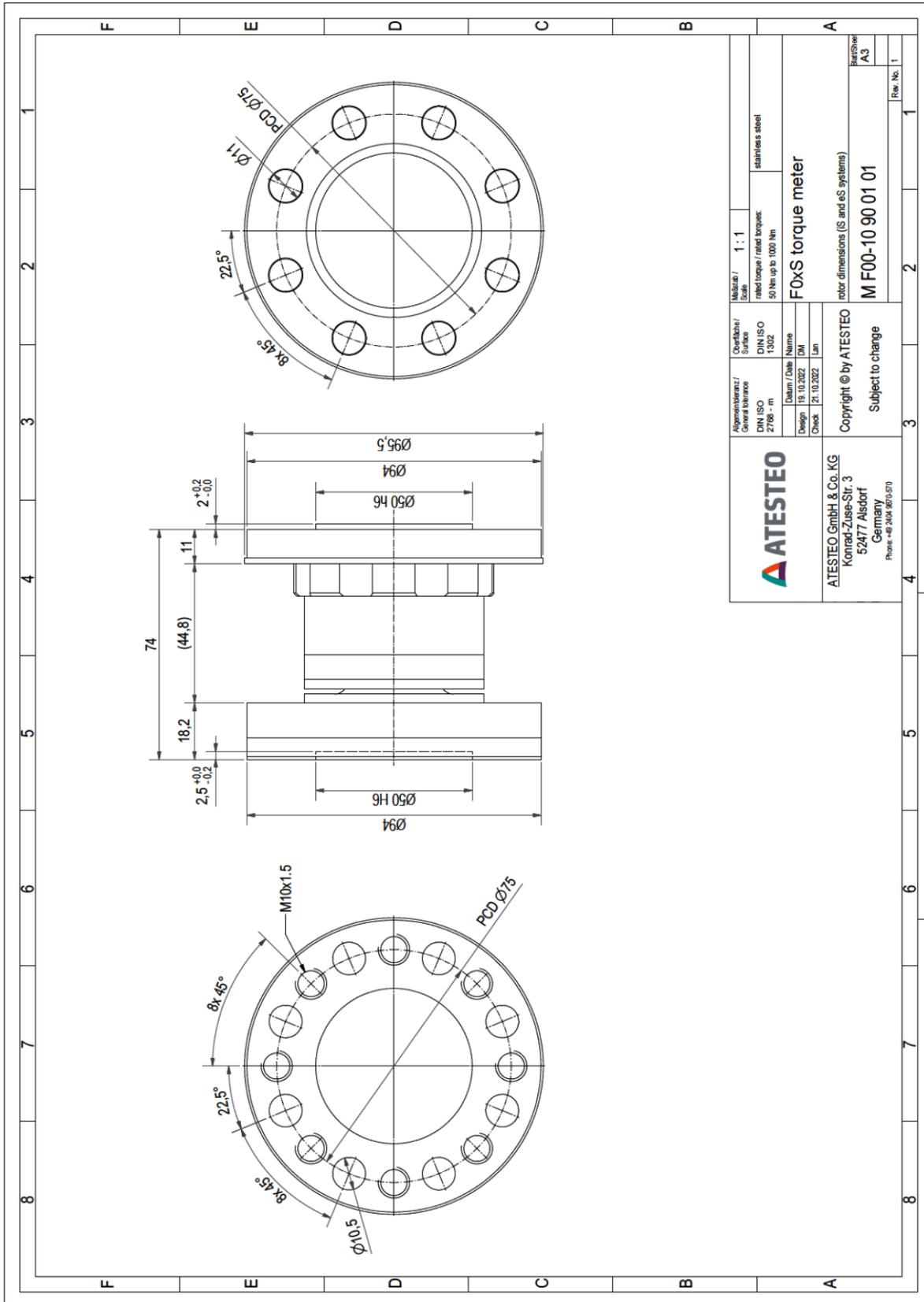
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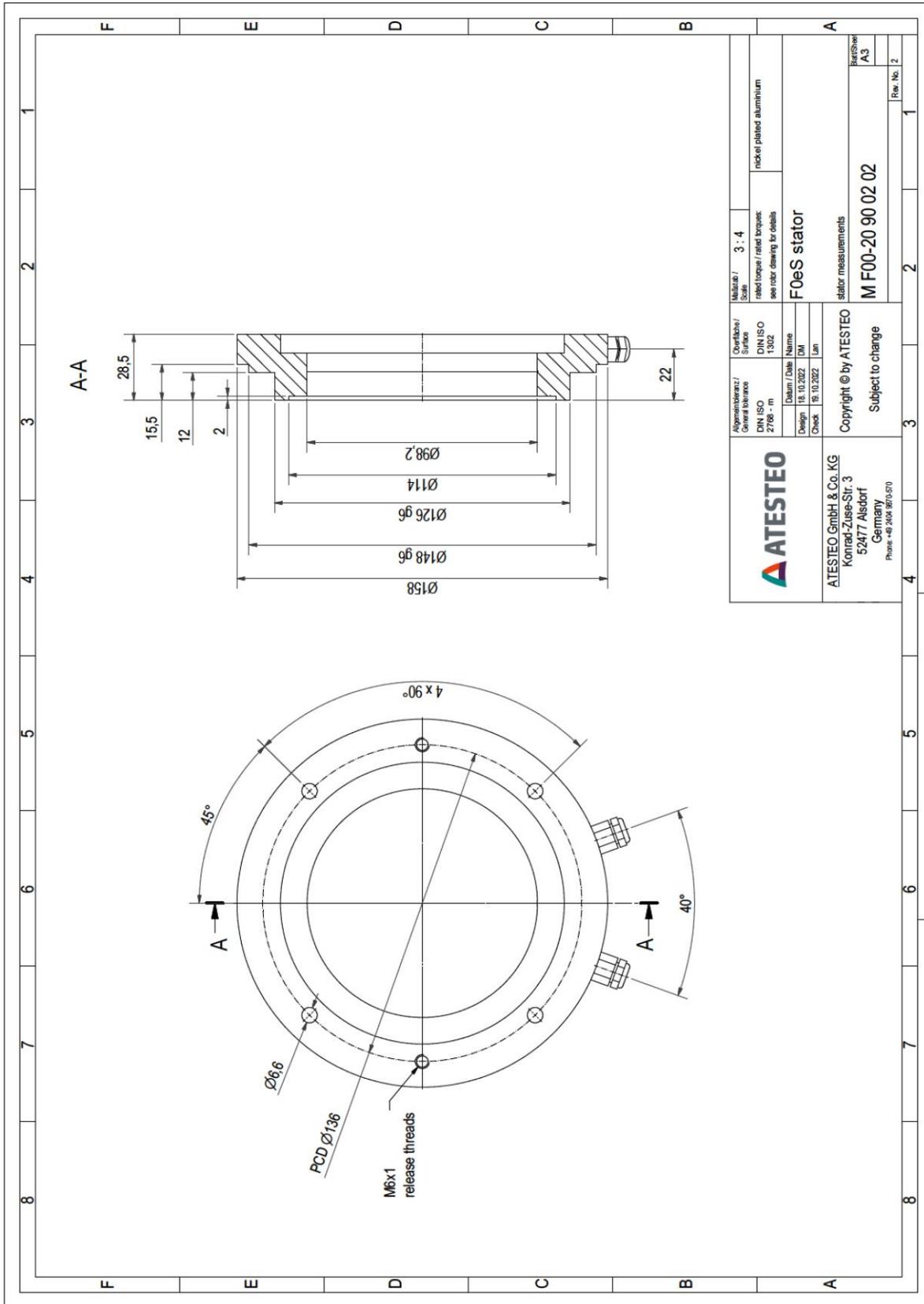
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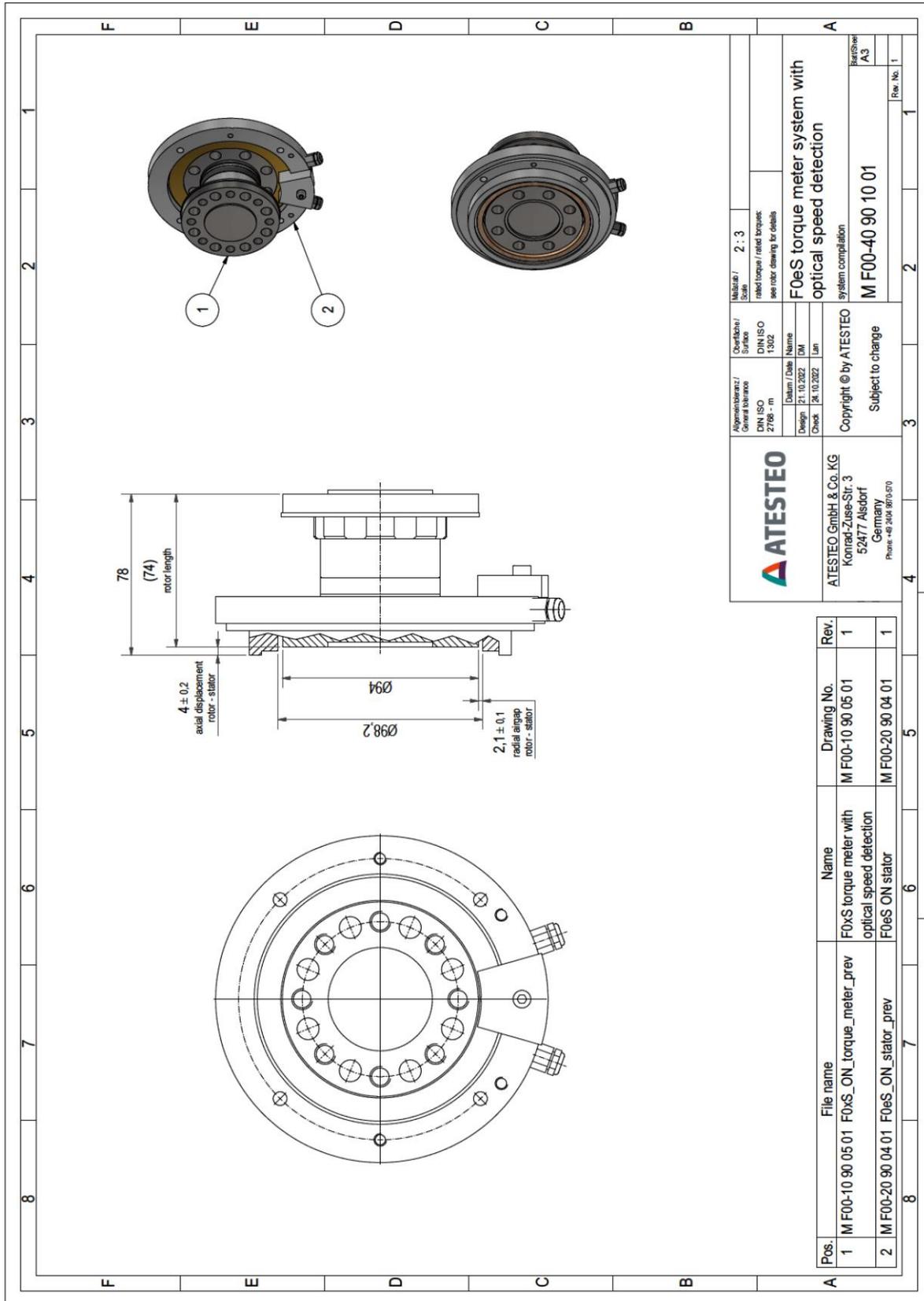
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F0eS System SPD_OPT

F0xS

Drawing



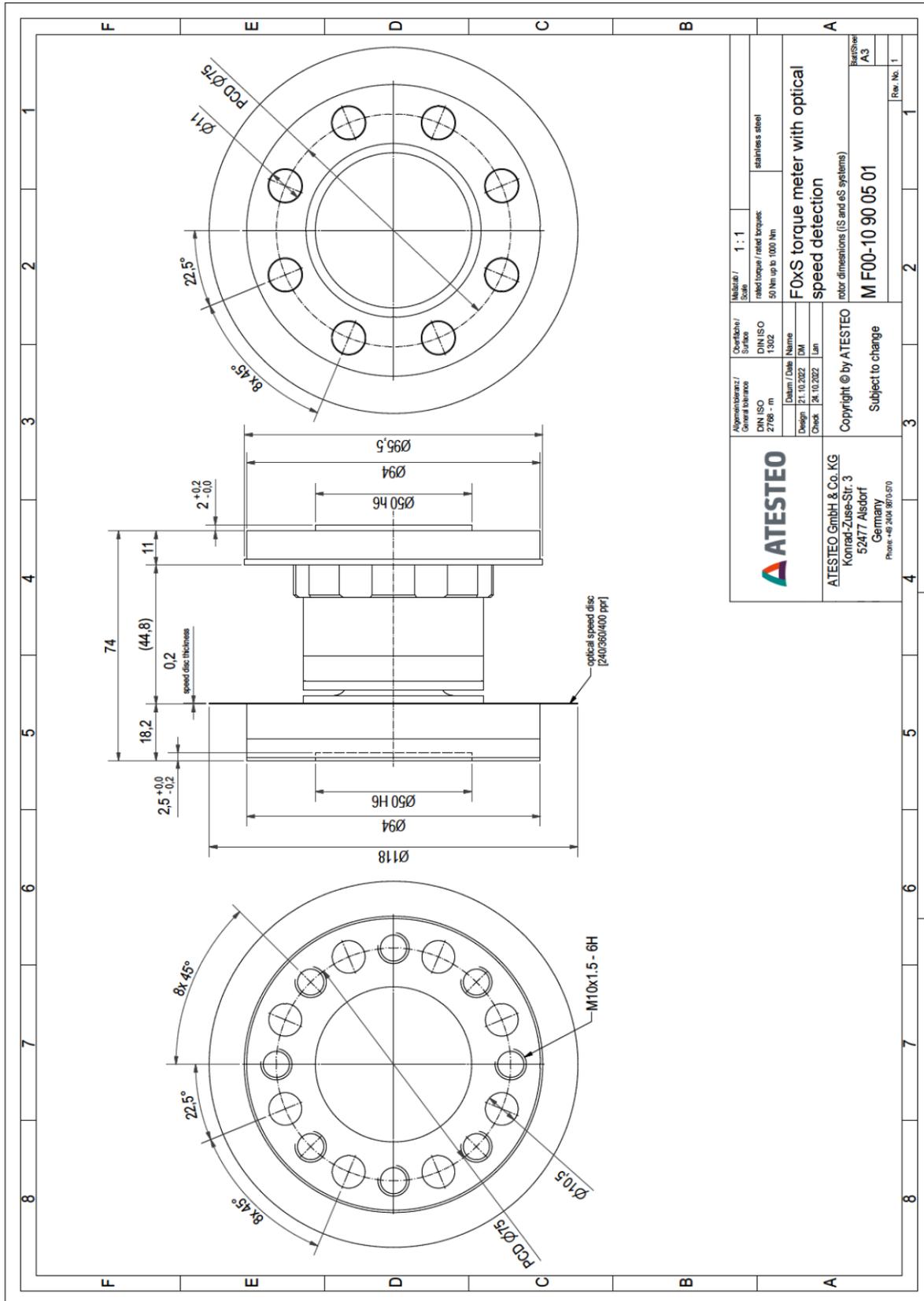
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F0eS Rotor SPD_OPT

F0xS

Drawing



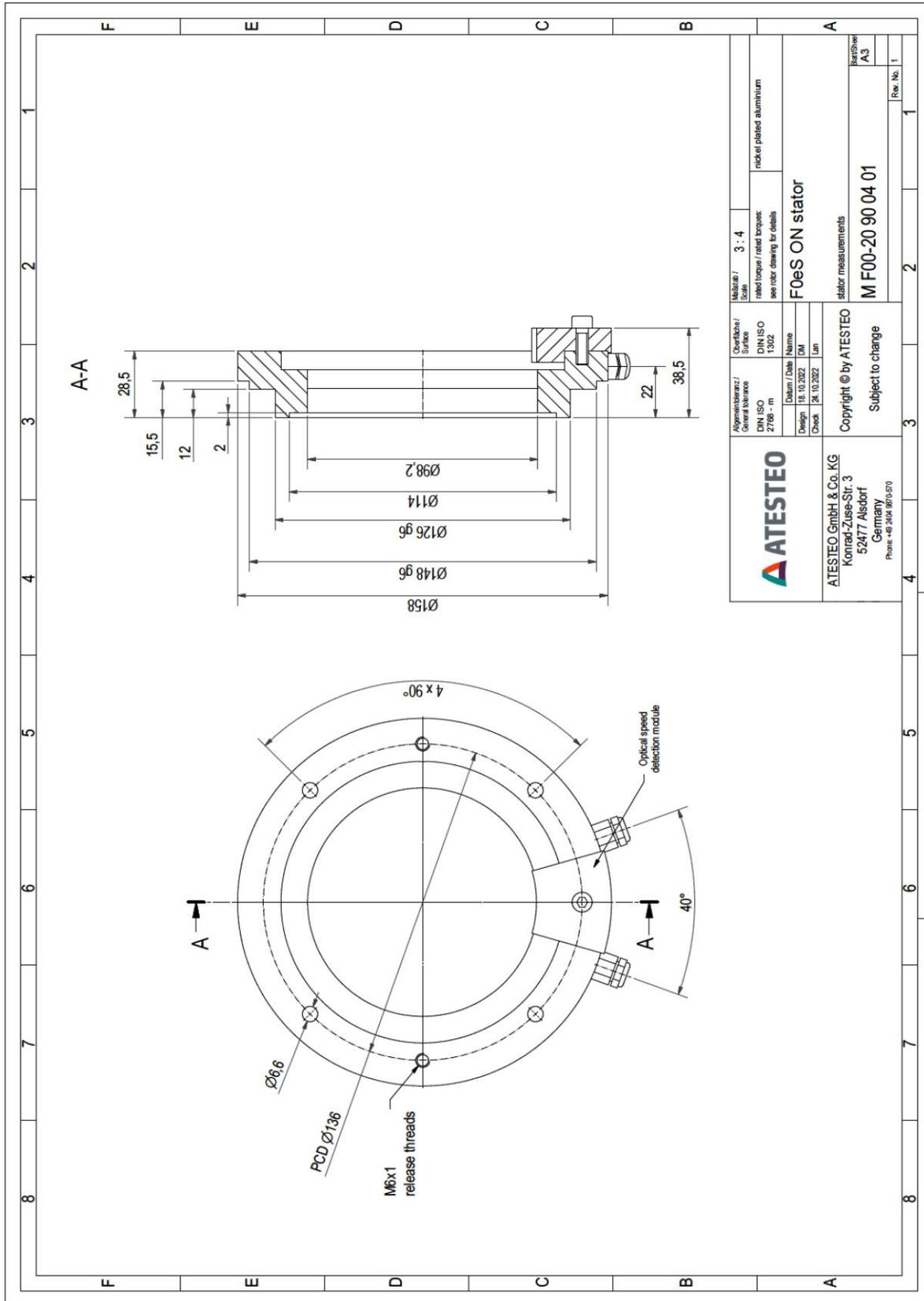
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F0eS Stator SPD_OPT

F0xS

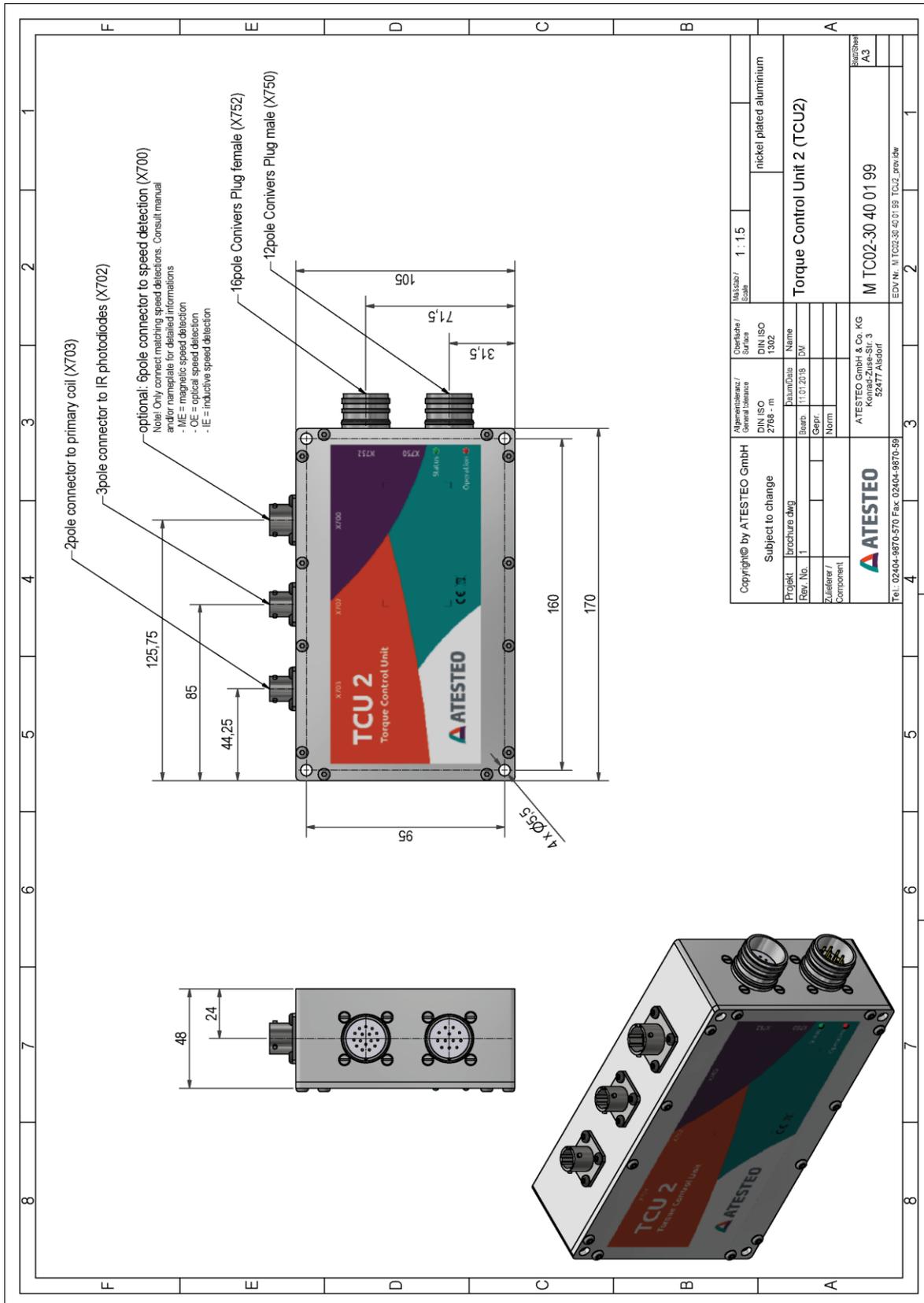
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