MANNER SENSORTELEMETRIE

Torque measuring flange XtreMAX

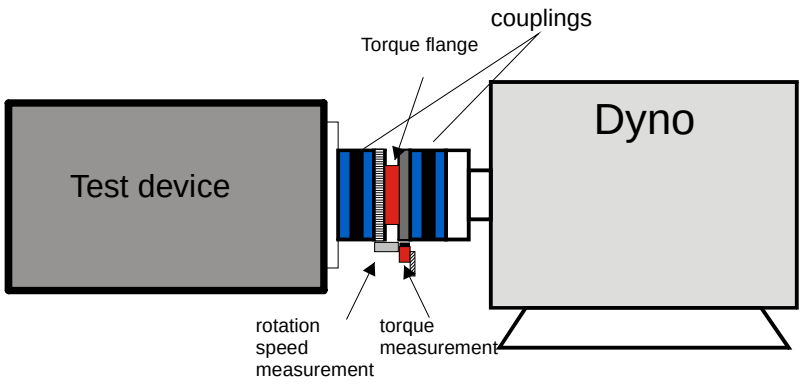
XTREMAX TORQUE

Characteristic features:

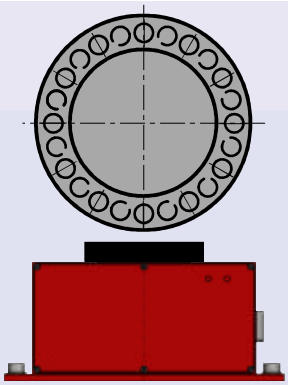
- ✓ Nominal (rated torques)

  15 kN·m; 20 Nk·m; 35 kN m; 50 kN·m; 100 kN·m; 200 kN·m; 300 kN·m; 500 kN·m; 800kN·m

- ✓ Nominal (rated) speeds up to 9 000 rpm (depending on measurement range)
- ✓ Accuracy class 0.1 (option 0.05)
- ✓ Large measuring frequency range up to 1 kHz (optional 10 kHz (-3dB)
- ✓ Low rotor weigths and moment of inertia
- ✓ Digital transmission of measured values
- ✓ Short design
- ✓ Clearance rotor - stator > 10 mm
- ✓ Temperature range -40..+160°C (optional)
- ✓ Integrated Speed acquistion (high resolution)



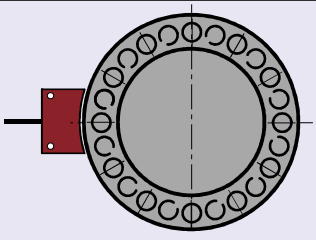
XTREMA TORQUE



integrated Pick Up

Topology

- Frequency(10+/-5kHz)
- Voltage (U) +/10V
- Current (I) 4..20mA
- Remote Control
- Energy
- Remote Shunt on/off



Torque flange with offsetted Pick Up

- Energy
- Remote Shunt on/off
- Torque (digital)
- Temperature (digital)
- Health Monitoring
- Remote Control

max. Distance: 100 m

Evaluation Unit

- Ethernet (digital)
- EtherCat (digital)
- USB (digital)
- Frequency 10+/-5kHz)
- Voltage (U) +/10V
- Current (I) 4..20mA
- Remote Control
- Rnergy
- Remote Shunt on/off

Technical Data

Torque measuring system

Type		XtreMAX								
Accuracy Class		0,1 (0,05 [1])								
Nominal (rated) torque M_{nom}	kN m	15	20	35	50	100	200	300	500	800
Nominal sensitivity (range between torque = zero and nominal torque)										
Voltage output 10 V	V	+/-10								
Frequency output 60 kHz [6]	KHz	+/-30								
Digital output EtherCat 16(20) Bit	dig. value	+/-29491 (117964[3])								
Digital output EtherNet TCP/IP 16(20) Bit	dig. value	+/-29491 (117964[3])								
Digital output CAN 16(20) Bit	dig. value	+/-29491 (117964[3])								
Sensitivity tolerance										
(deviation of the actual output value at M_{nom} of nominal sensitivity)	%	0,1 (0,05[1])								
Output signal at torque = zero										
Voltage output	V	0								
Frequency output 60 kHz [7]	kHz	60								
Digital output	dig. value	32768 (131072[3])								
Nominal output signal										
Voltage output										
with positive nominal torque	V	+10								
with negative nominal torque	V	-10								
Frequency Output 60 kHz [7]										
with positive nominal torque	kHz	15 (5V TTL 0/5V)								
with negative nominal torque	kHz	5 (5V TTL 0/5V)								
Digital output										
with positive nominal torque	dig. value	62258 (996126[3])								
with negative nominal torque	dig. value	3278 (52449[3])								
Load resistance										
Voltage output	kΩ	>2								
Frequency output 60 kHz [7]	kΩ	>10								
Long-term drift										
Voltage output	%	<+/-0.03 (0,012[1])								
Frequency output 60 kHz [7]	%	<+/-0.03 (0,012[1])								
Measurement frequency range (-3 dB)										
	kHz	1 (2[4] ,5[5] ,10[6])								
Group delay time										
	us	<400 (<250[4] ,<130[5] ,<40[6])								
Residual ripple voltage output	mV	<10								
Temperature influence per 10 °C in the nominal temperature range on the output signal, related to the actual value of signal range	mV									
Frequency output [7]	%	+/- 0,05								
Digital output	%	+/- 0,03								
Voltage output	%	+/- 0,1								
on the zero signal, related to the nom. sensitivity										
Frequency output [7]	%	+/- 0,05 (+/-0,01[2])								
Digital output	%	+/- 0,03 (+/-0,01[2])								
Voltage output	%	+/- 0,1 (+/-0,03[2])								
Max. modulation range										
Frequency output 60 kHz [7]	kHz	+/-33								
Digital output	digits	+/-32768(131072[5])								
Voltage output	V	+/-11.2								
Power supply										
Nominal supply (protective low voltage DC)	V	+20..28V								
Current consumption in measuring mode	A	< 0.7								
Current consumption in start-up mode	A	< 1 A								
Rated input power	W	< 5								
Max. Cable length	m	100								

1) Option accuracy class 0.05
2) Option zerodrift
3) Option signal resolution 20 Bit
4) Option measuring signal bandwidth 2 kHz
5) Option measuring signal bandwidth 5 kHz
6) Option measuring signal bandwidth 10 kHz
7) Option frequency output 60 kHz +/- 10kHz

Technical Data (Continuation 1)

Nominal torque M_{nom}	kN m	15	20	35	50	100	200	300	500	800
Linearity deviation including hysteresis, related to the nominal sensitivity										
Voltage output 10 V	%	< +/- 0,05 (0,02 [1)])								
Frequency output 10 kHz [7)]	%	< +/- 0,05 (0,02 [1)])								
Digital output	%	< +/- 0,05 (0,02 [1)])								
Rel. Standard deviation of repeatability according to DIN 1319 in relation to output signal change		<+/0,03								
Shunt signal		approx. 80 % of M_{nom}								
Tolerance of the shunt signal relative to M_{nom}	%	< +/- 0.02								
Nominal release voltage	V	5								
Limit tripping voltage	V	12								
Shunt signal on (active low)	V	< 1 (GND)								
Shunt signal	V	> 2,5								
Non-linearity including hysteresis related to nominal torque M_{nom}		Accuracy class: 0,1				Accuracy class: 0,05 [1)]				
based on 10 K temperature change (dig. output)										
60..100 % of M_{nom}	%	+/- 0,1				+/- 0,05				
20..60 % of M_{nom}	%	+/- 0,05				+/- 0,03				
0..20 % off M_{nom}	%	+/- 0,03				+/- 0,02				
General data										
EMC										
EME (Emission per EN61326−1, sec.7)	-									
RFI field strength		Class B								
Immunity from interference (EN 61326-1, table 2)										
Electromagnetic field AM	V/m	80								
Magnetic field	A/m	200								
Electrostatic discharge (ESD)										
Contact discharge	kV	20								
Air discharge	kV	10								
Fast transients (burst)	kV	1								
Shock (surge)	kV	1								
Conducted disturbances	V	10								
Degree of protection per EN 60529										
Standard		Ip54 (IP67[2)])								
Oil-resistant / waterproof [8)]										
Weight approx. Rotor	kg	12	18	18	38	77	79	145	148	430
approx. Stator	kg	0,2								
Reference temperature	°C	23								
Operating temperature range	°C	-10..+70								
extended temperature range[9)]	°C	-40..160								
Storage temperature range	°C	-50..+160								
mech. shock resistance according to EN 60068-2-27										
Number of impacts	n	100								
Duration	ms	3								
Acceleration	m/s^2	650								
Vibration load in 3 directions EN 60068-2-27										
Frequency range	Hz	10...2000								
Duration	h	2,5								
Acceleration (amplitude)	m/s^2	200								
Nominal speed	rpm	6000	4000	4000	3000	2000	2000	1700	1500	1200
Increased speed stability[10)]	rpm	9000	7000	7000	4000	3000	3000	2000	1700	1400
Limitations of liability[11)]										
Limit torque related M_{nom}	%	400								
Breaking torque relative to M_{nom}	%	800								
Axial limit force[11)]	kN	100	200	300	350	600	1000	1200	2000	4000
Laterial force limit[11)]	kN	100	120	200	220	400	800	800	1400	2000
Bending limit moment[11)]	kN·m	15	20	35	50	100	200	300	500	800

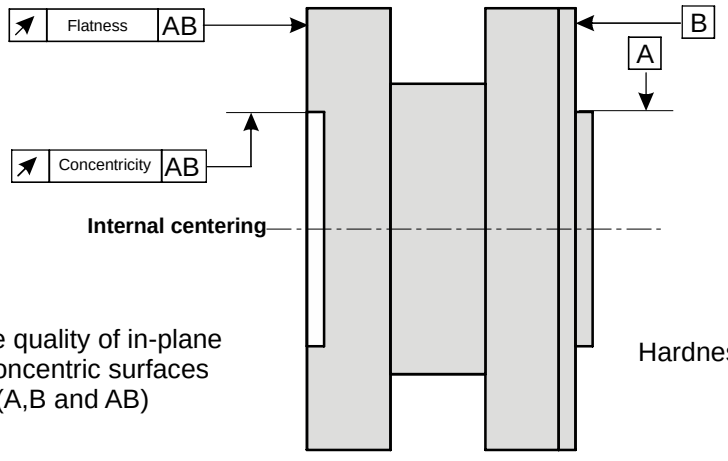
1) Option accuracy class 0.05
8) Option protection class IP67
9) Option extended service temperature range
10) Option increased speed stability
11) static and dynamic

Technical Data (Continuation 2)

Nominal torque M_{nom}	kN m	15	20	35	50	100	200	300	500	800
Effect of measured values by parasitic forces[14]										
Crosstalk bending moment M_B	kN m/kN m	< 0,002								
Crosstalk side force F_s	kN m/kN	< 0,0002								
Crosstalk axial force F_z	kN m/kN	< 0,00015								
Mechanical values										
Torsional stiffness c_T	kN m/rad	$7{,}44\cdot10^3$	$9{,}35\cdot10^4$	$1{,}35\cdot10^5$	$2{,}5\cdot10^5$	$5{,}3\cdot10^5$	$8{,}25\cdot10^5$	$1{,}3\cdot10^3$	$1{,}3\cdot10^3$	$3{,}94\cdot10^6$
Torsion angle at M_{nom}	Rad	$2{,}02\cdot10^{-3}$	$2{,}83\cdot10^{-4}$	$2{,}6\cdot10^{-4}$	$1{,}97\cdot10^{-4}$	$1{,}9\cdot10^{-4}$	$2{,}4\cdot10^{-4}$	$3\cdot10^{-4}$	$3\cdot10^{-4}$	$2{,}03\cdot10^{-4}$
Axial stiffness c_a	kN/mm	$9{,}24\cdot10^3$	$1{,}16\cdot10^4$	$1{,}2\cdot10^4$	$1{,}25\cdot10^4$	$1{,}72\cdot10^4$	$2{,}5\cdot10^4$	$2{,}5\cdot10^4$	$2{,}5\cdot10^4$	$3{,}63\cdot10^4$
Radial stiffness c_r	kN/mm	$1{,}95\cdot10^3$	$2{,}4\cdot10^3$	$2{,}39\cdot10^3$	$2{,}94\cdot10^3$	$4\cdot10^3$	$6{\cdot}67\cdot10^3$	$8\cdot10^3$	$8\cdot10^3$	$8{,}23\cdot10^3$
Stiffness with bending moment about a radial axis c_b	kN m/rad	$8{,}91\cdot10^4$	$1{,}91\cdot10^5$	$1{,}15\cdot10^5$	$3{,}31\cdot10^5$	$6{,}5\cdot10^5$	$9{,}72\cdot10^5$	$2{,}4\cdot10^6$	$2{,}4\cdot10^6$	$5{,}4\cdot10^6$
Max. deflection at axial limit force	mm	<0,08	<0,08	<0,045	<0,04	<0,05	<0,06	<0,15	<0,15	<0,15
Additional max. concentricity error at lateral limit force	mm	<0,02								
Additional planeparallel deviation at bending limit moment d_e	mm	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
Balance qualitylevel to DIN ISO 1940		G9.4								
Max. limits for relative shaft vibration (peakto peak)[13]										
Wave oscillations in the area of the connection flanges acc. to ISO 7919−3										
Normal mode (continuous operation)	um	$s_{(p\text{-}p)} = \frac{9000}{\sqrt{n}}$ (n in rpm)								
Start and Stop mode/resonance ranges (temporary)	um	$s_{(p\text{-}p)} = \frac{13200}{\sqrt{n}}$ (n in rpm)								
Mass moment of inertia of the rotor Lv Axis of rotation, without consideration of the flange screws	kg m^2	0,133	0285	0,285	1,14	3,52	3,52	14,71	14,71	81,7
Max. permissible static eccentricity Rotor - stator spacing	mm	5								
Max. permissible axial displacement between rotor and stator	mm	+/-2								

13) Influencing the vibration measurements by runout, shock, defects in shape, notches, grooves, local residual magnetism have to be separated from the actual wave vibration
14) Basis: only one parasitäric force type is applied

Flatness and concentricity tolerances



0,8 ▽ Surface quality of in-plane and concentric surfaces (A,B and AB)

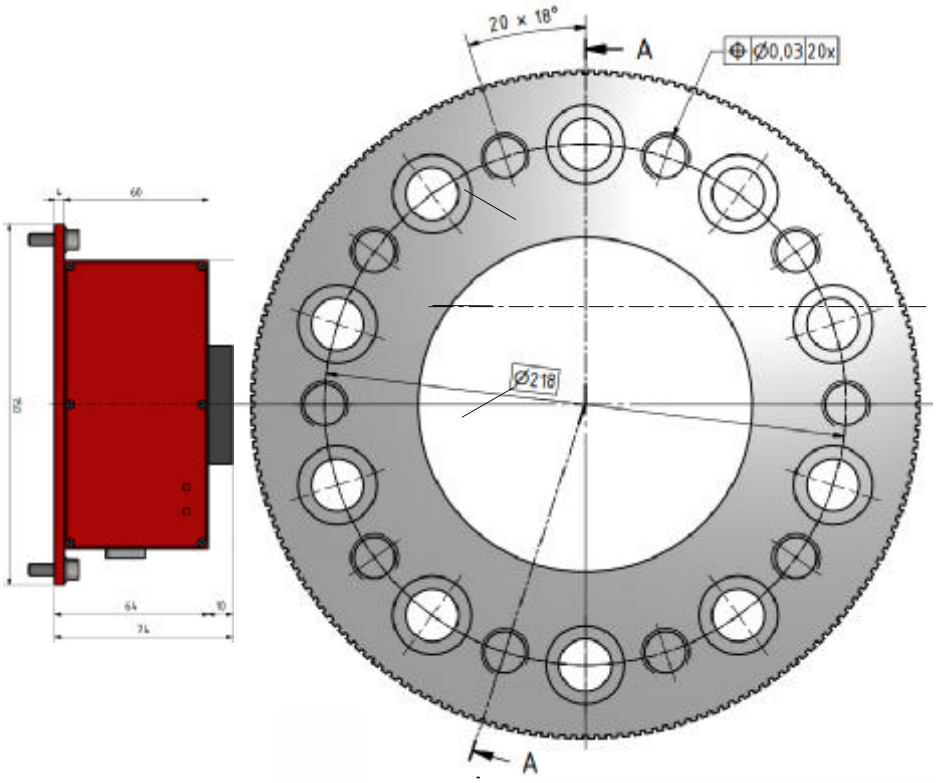
Hardness 46..54 HCR

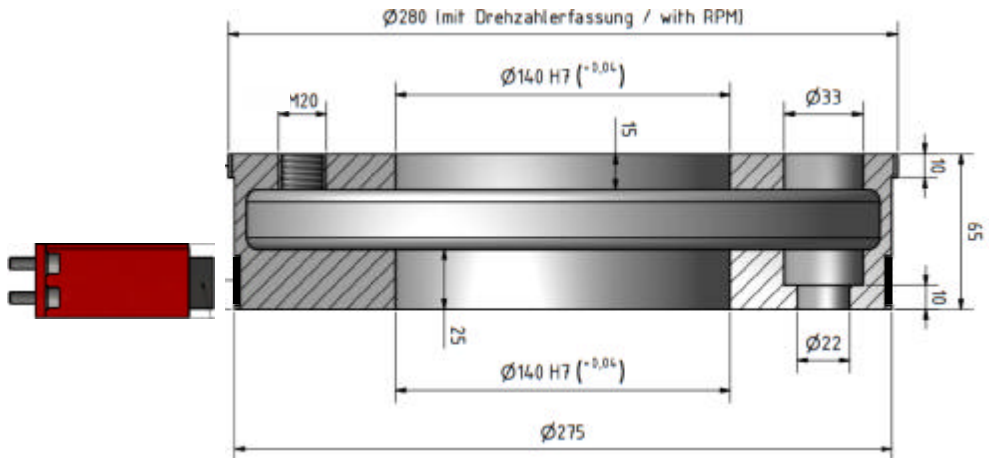
Rated torque M_{nom}	kN m	15	20	35	50	100	200	300	500	800
Flatness tolerances	mm	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
Concentricity tolerances	mm	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
Integrated Speed acquisition (Version induktive, IP67)										
Induktive (traces A/B)	pulses/turn	180	220	220	360	360	360	480	480	660
Distance Rotor - Pick Up	mm	0,8+/-0,4								
Integrated Speed acquisition (Version Laser, IP42)										
Opticial (trace A)	pulses/turn	420	420	500	660	660	660	1100	1100	1400
Distance Rotor - Pick	mm	20+/-19								

13) Option accuracy class 0.05

Dimensions XtreMAX 15kN·m

Receiver with integrated Pick Up

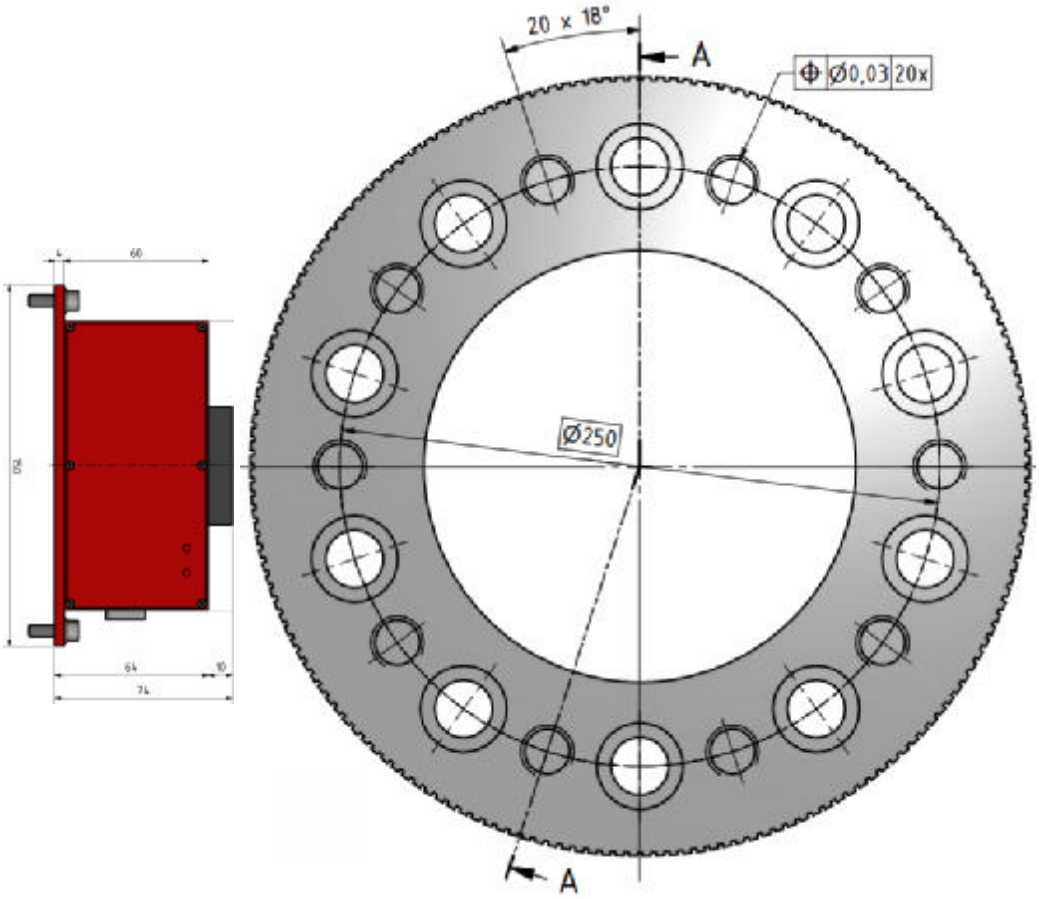


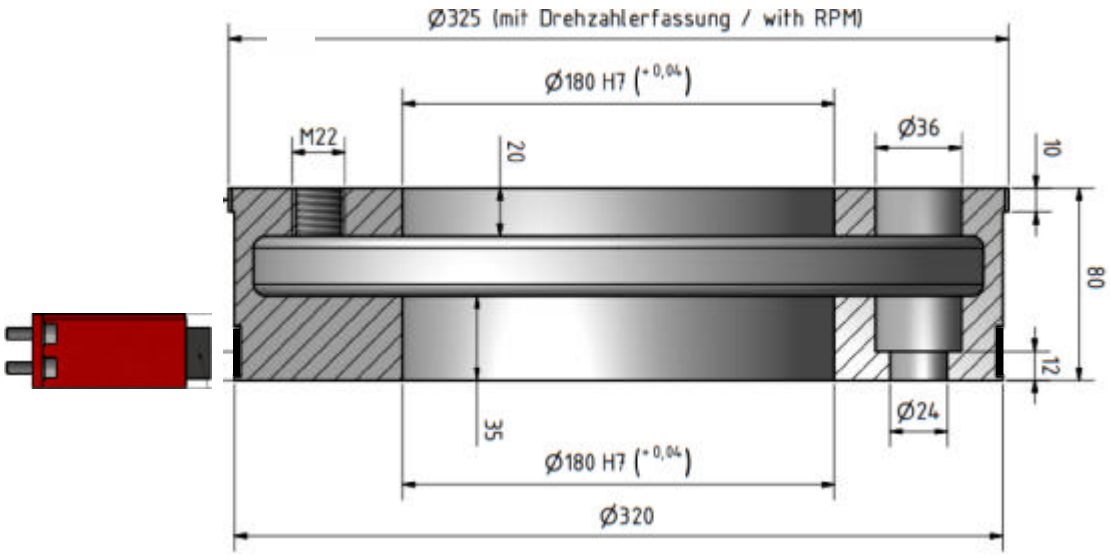


basis: gap = 5 mm

Dimensions XtreMAX 20kN·m, XtreMAX 35kNm

Receiver with integrated Pick Up

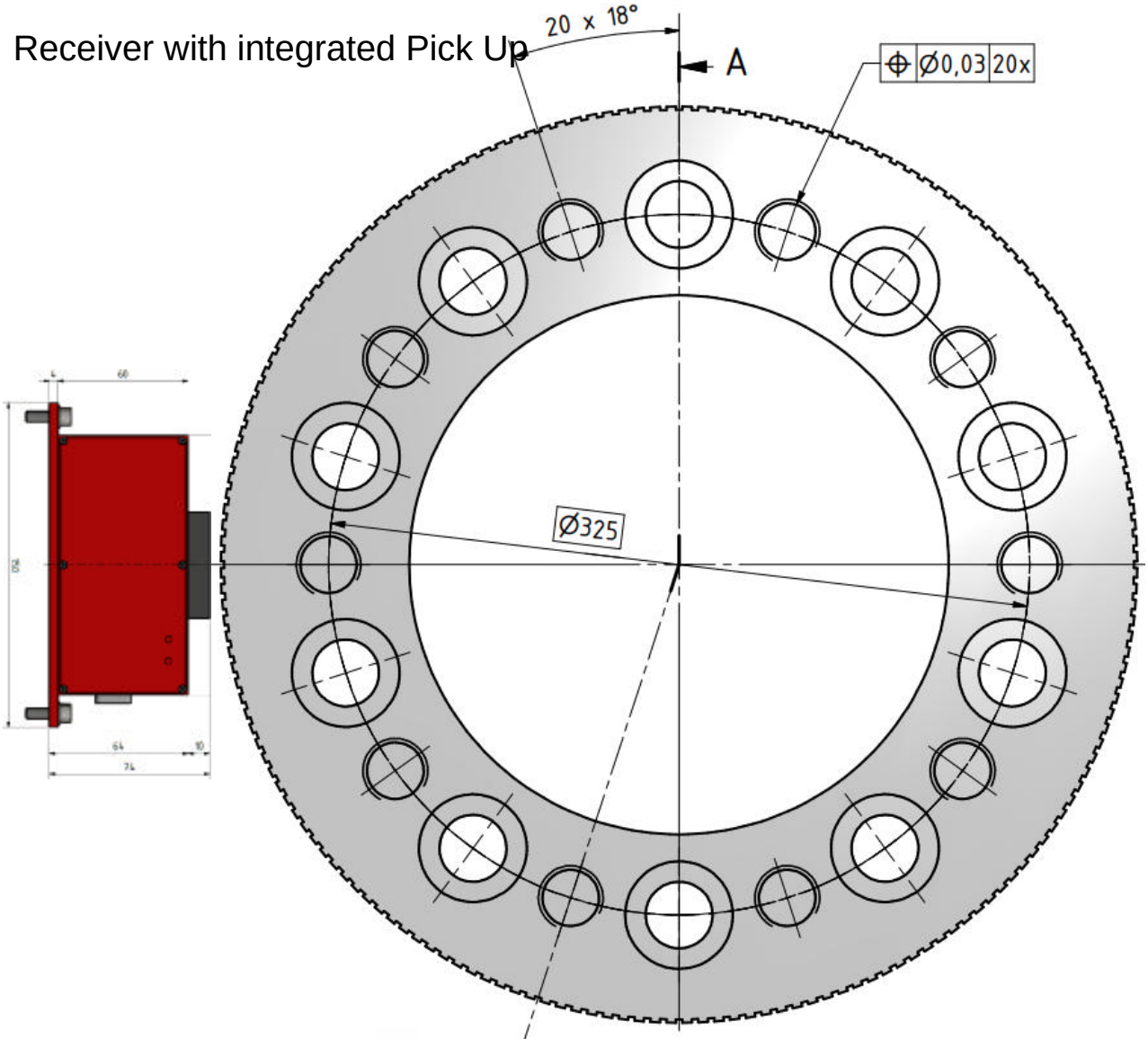


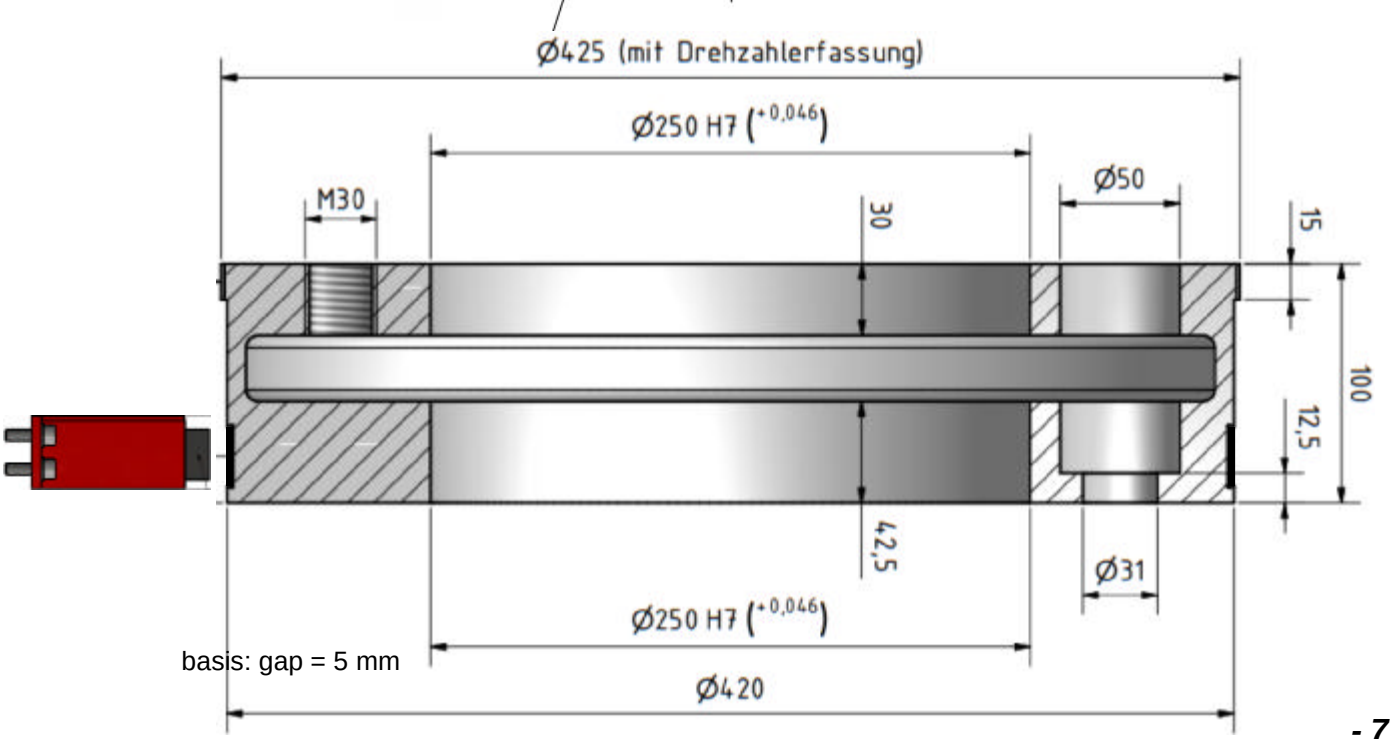


basis: gap = 5 mm

Dimensions XtreMAX 50kN·m

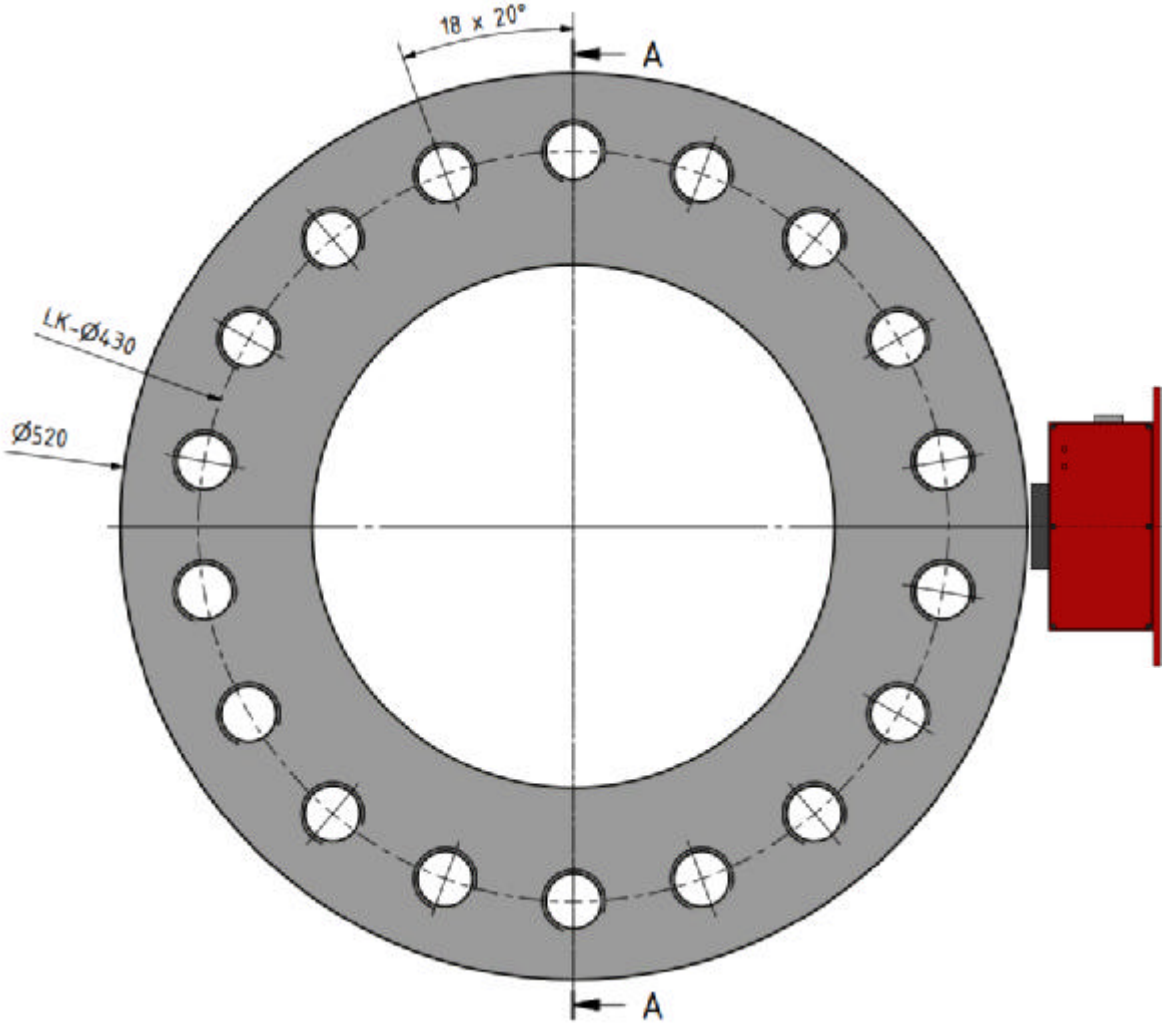
Receiver with integrated Pick Up

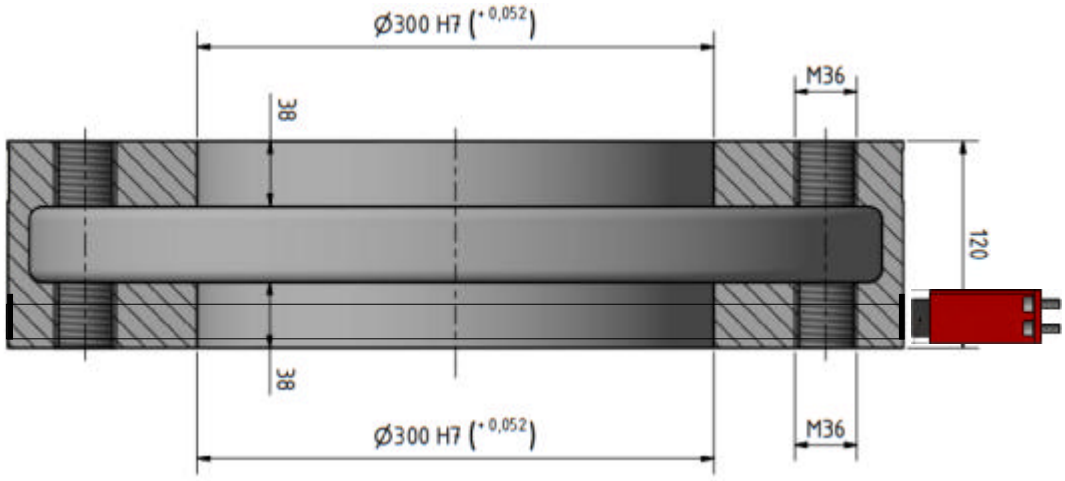




basis: gap = 5 mm

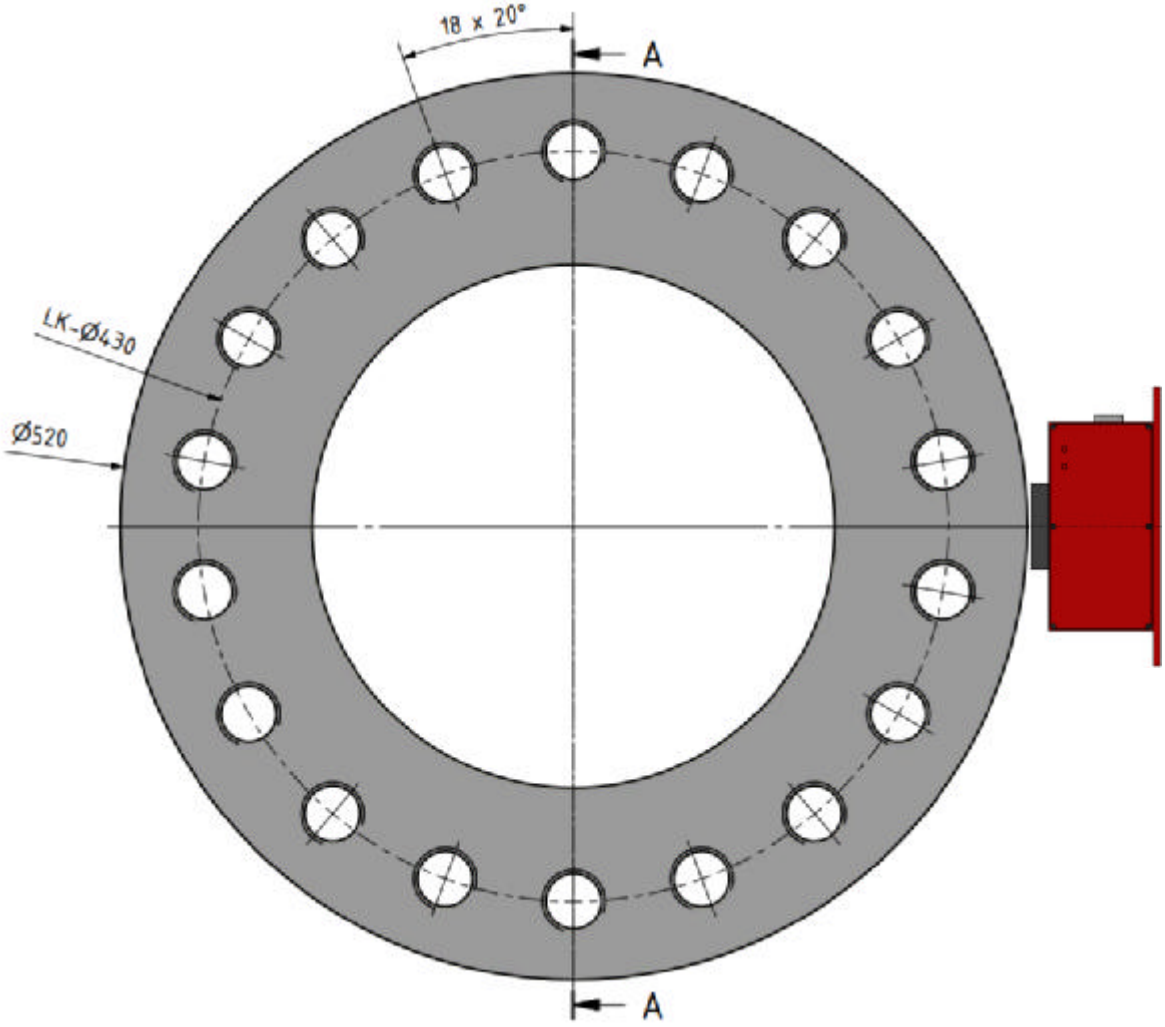
Dimensions XtreMAX 100kN·m

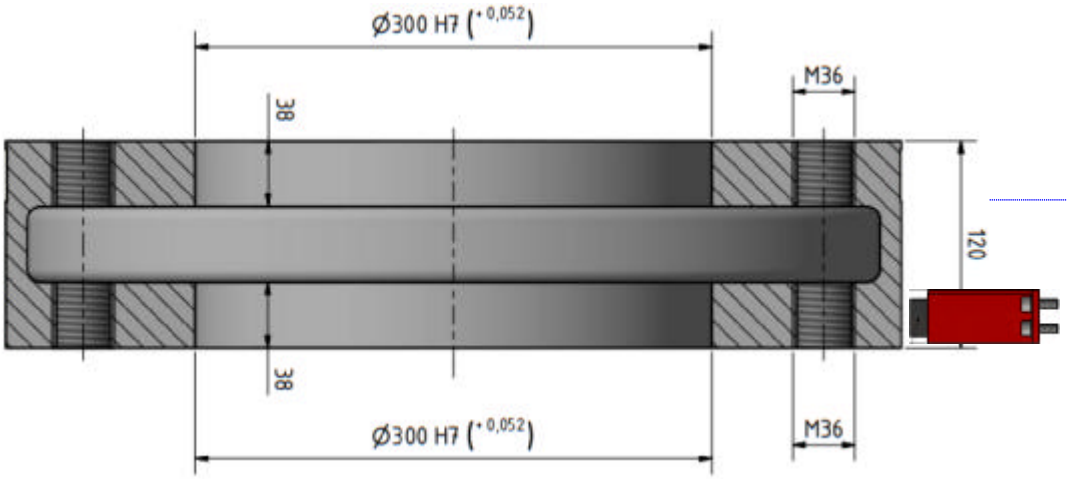




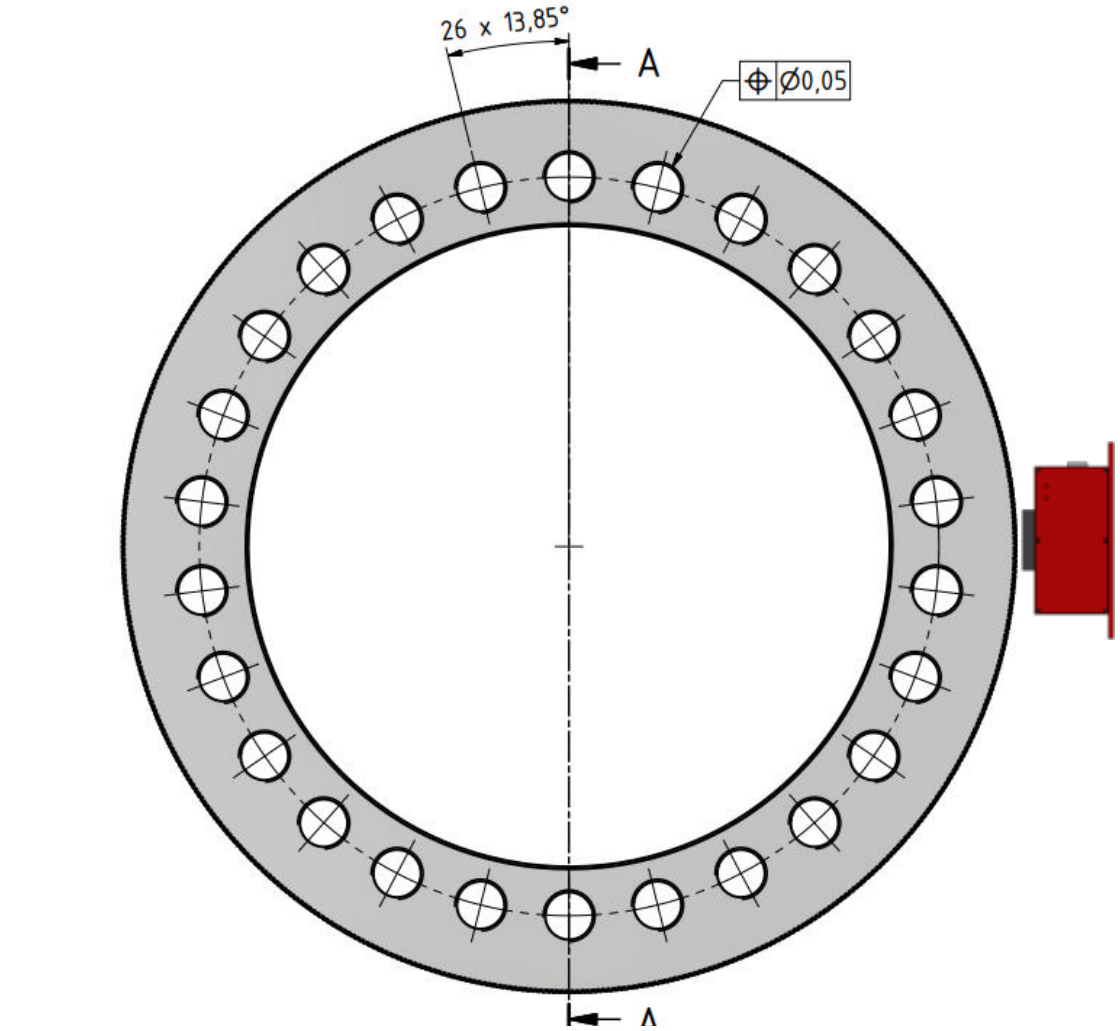
basis: gap = 5 mm

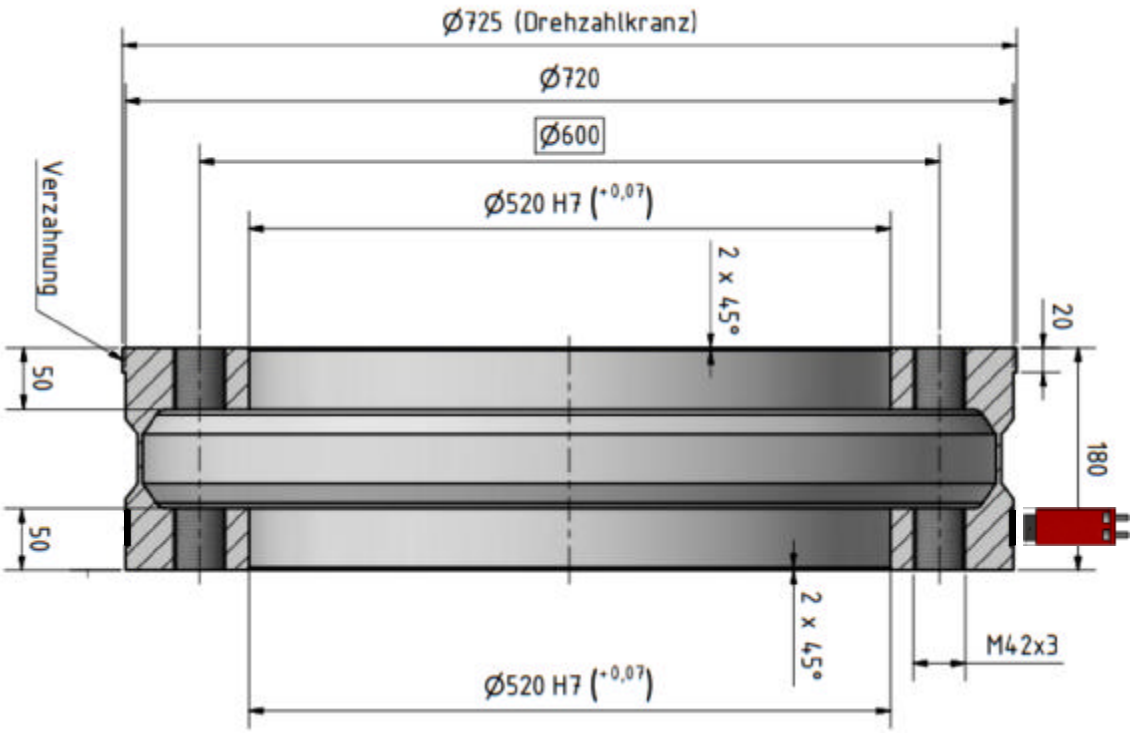
Dimensions XtreMAX 200kN·m



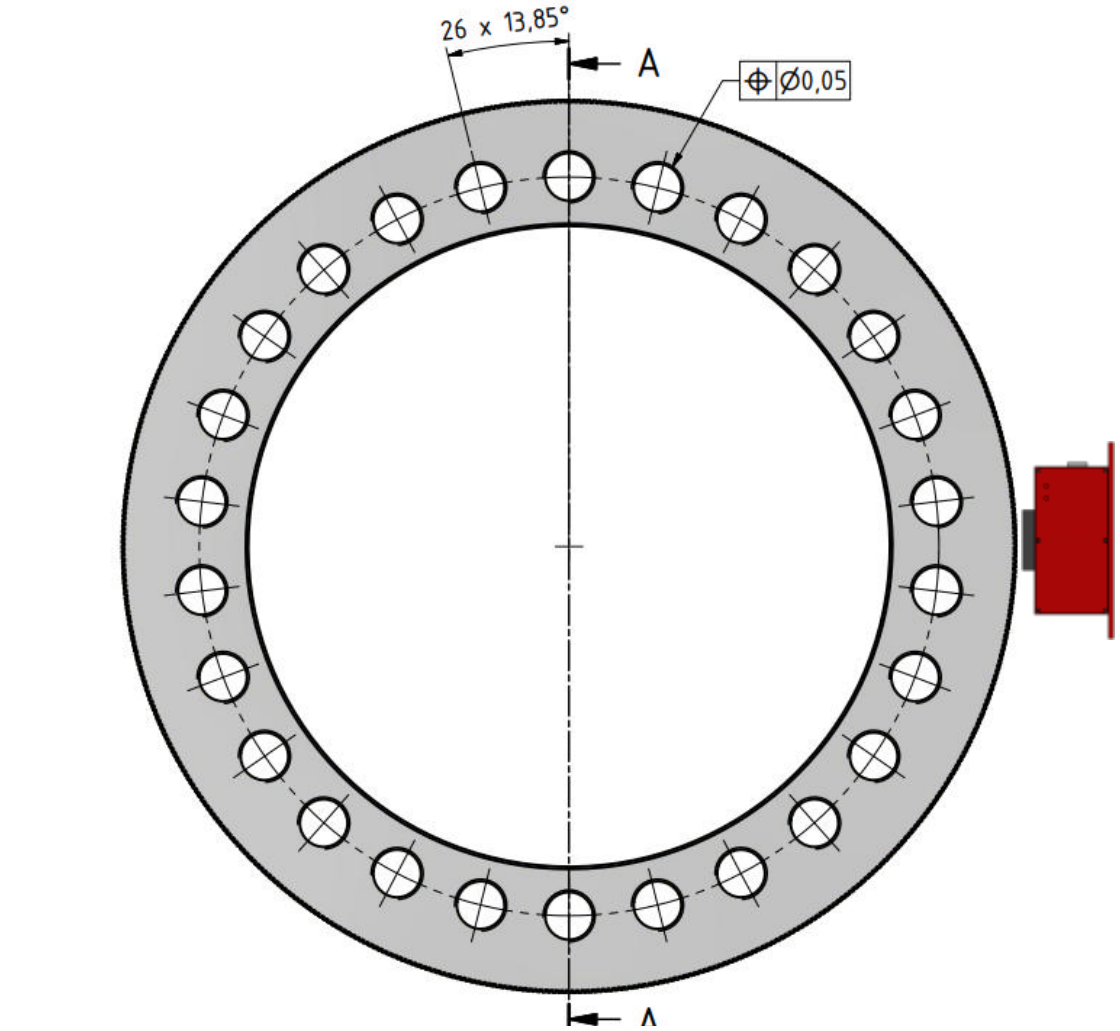


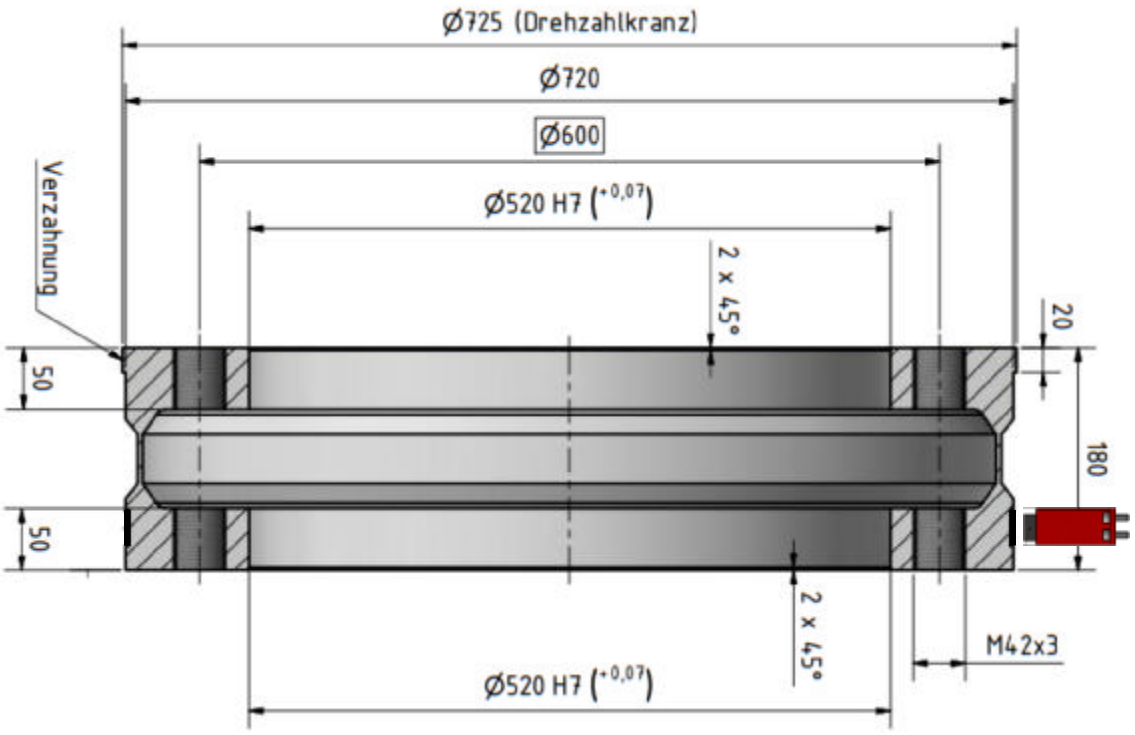
Dimensions XtreMAX 300kN·m



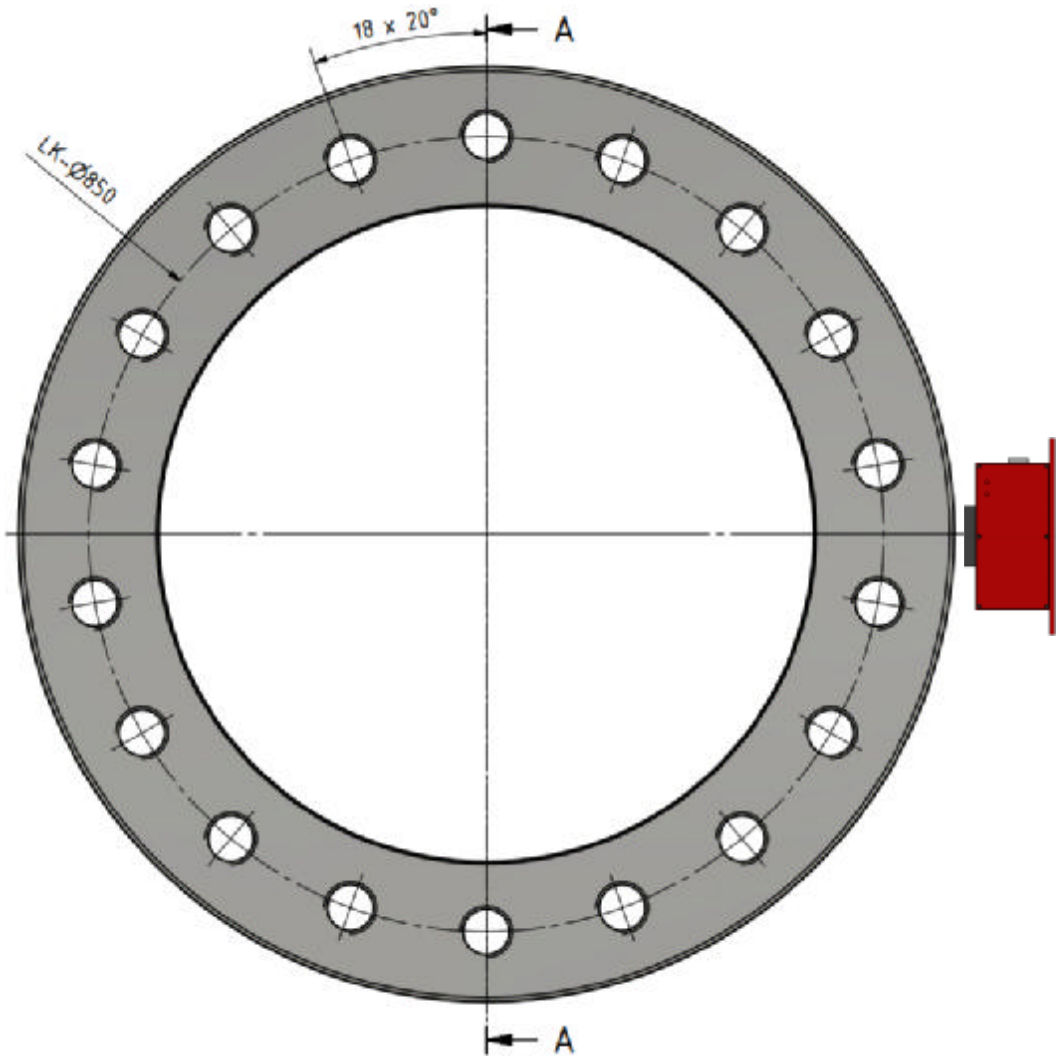


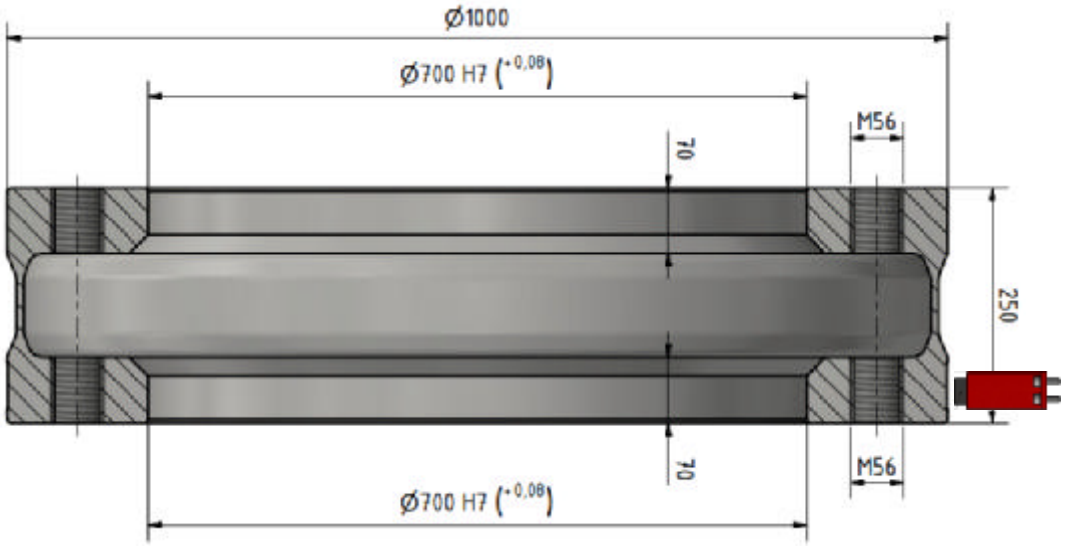
Dimensions XtreMAX 500kN·m



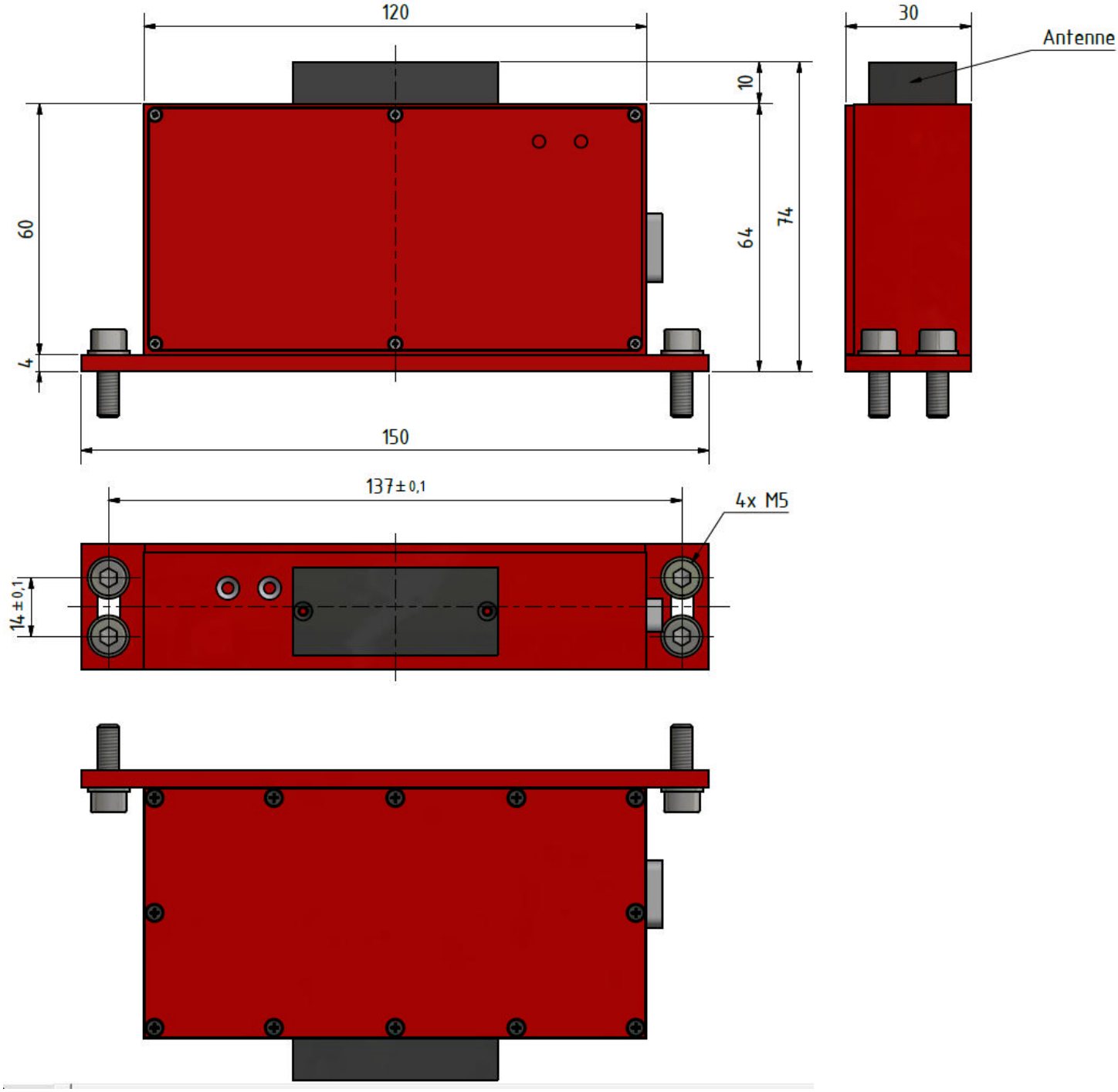


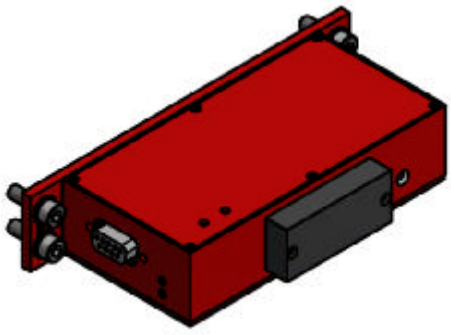
Dimensions XtreMAX 800kN·m

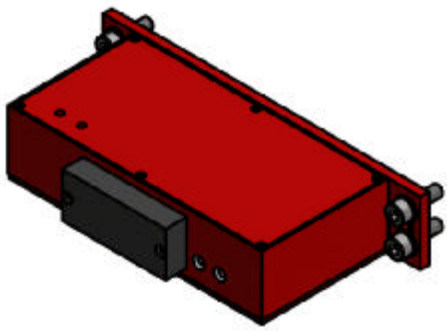




Geometry Receiver Typ MAnt integrated Pick UP







DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Kalibrierlaboratorium

Manner Sensortelemetrie GmbH
Eschenwasen 20, 78549 Spaichingen

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Kalibrierungen in folgenden Bereichen durchzuführen:

Mechanische Messgrößen
- **Drehmoment**

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 22.03.2019 mit der Akkreditierungsnummer D-K-20850-01. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 2 Seiten.

Registrierungsnummer der Urkunde: **D-K-20850-01-00**

Braunschweig,
22.03.2019

Im Auftrag Dr. Heike Manke
Abteilungsleiterin

Siehe Hinweise auf der Rückseite

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