

Technical data



- Nominal torque: 0 Nm to 3.000 Nm, bidirectional
- Rotational speed: ≤ 10.000 rpm
- Accuracy: $\leq \pm 0,1$ %
- Temperature range: $+10$ °C to $+100$ °C
- Protection class: IP54
- Output signals: 0-10 V
- Output frequency: 5.000 Hz

Your advantages

- Made in Germany (nearby Munich, Bavaria)
- Delivery upon request
- Best price-performance ratio
- Integrated electronic (Plug & Play)
- Contactless measurement system
- Including calibration certificate

Short description

The DML is a fully-fledged spindle bearing unit with high running smoothness, load capacity and stiffness. A torque sensor is fully integrated into the spindle bearing unit. With this torque sensor, the effective torque can be measured bidirectionally in real time both at rest and in rotation. The sensor is delivered as a complete unit with corresponding connection plugs. The transmitting shaft, the contact-free signal pick-up and the analogue signal processing are integrated into the sensor structure. The torque sensor is particularly characterised by the insensitivity of the measurement signal to transverse and longitudinal forces, by the very low power consumption, and by a high long-term stability. Due to the completely non-contact magnetoelastic measurement principle, the sensor is also stable and reliable under harsh ambient conditions.

Technical characteristics

Nr.	Typ		DML 100	DML 500	DML 3.000
	Accuracy class ¹		0,1	0,1	0,1
	Nominal torque M_{nom} (bidirectional)	Nm	100	500	3.000
	Speed range	rpm	0 to 10.000	0 to 10.000	0 to 8.700
	Output signal	Unit	Value		
1	Measurement frequency rang	Hz	5.000	5.000	5.000
2	Analogue signal	V	0 ... 10	0 ... 10	0 ... 10
3	Signal with torque = Zero ²	V	5,0	5,0	5,0
4	Signal at positive nominal torque ²	V	9,5	9,5	9,5
5	Signal at negative nominal torque ²	V	0,5	0,5	0,5
6	Nominal sensitivity	Nm/V	22,25	110,00	667,0
7	Sensitivity S	Nm/V	See label for calibration value		
8	Relative standard deviation of repeatability	%ME ³	< ±0,1	< ±0,1	< ±0,1
9	Linearity deviation		< ±0,1	< ±0,1	< ±0,1
10	Rotational Signal Uniformity (RSU)		< ±0,2	< ±0,2	< ±0,2
11	Output resistance	Ω	270	270	270
	Signal stability	Unit	Value		
12	Long-term drift over 48 h	mV	< 1	< 1	< 1
13	Zero drift over the temperature	%/10 K	±0,1	±0,1	±0,1
14	Output signal over temperature in service temperature range	%/10 K	0,5	0,5	0,5
	Energy supply	Unit	Value		
15	Power supply	VDC	16 ... 24	16 ... 24	16 ... 24
16	Maximum current consumption	mA	< 120	< 120	< 120
17	Start-up peak current consumption	mA	125 ... 150 (typically 135)	125 ... 150 (typically 135)	125 ... 150 (typically 135)
18	Rated power consumption	W	2,6	2,6	2,6
19	Minimum/maximum tolerable peak voltage	VDC	14 ... 30	14 ... 30	14 ... 30

¹ The accuracy class implies that taken separately both the linearity deviation as well as the rotational signal uniformity are either lower than or equal to the value of the accuracy class.

² Please check the exact data at the sensors calibration certificate.

³ %ME: related to a full scale measurement range.

		Unit	Value		
20	Degree of protection acc. to EN 60529	IP	54	54	54
21	Weight	kg	26,5	26,5	42
22	Reference temperature	°C	+23	+23	+23
23	Service temperature range	°C	+10 ... +100	+10 ... +100	+10 ... +100
24	Storage temperature range	°C	-20 ... +100	-20 ... +100	-20 ... +100
25	Ambient temperature ⁴	°C	0 ... +60	0 ... +60	0 ... +60
	EMC Interference immunity (DIN EN61000-6)	Unit	Value		
	Electromagnetic field				
26	Housing	V/m	10	10	10
27	Magnetic field	A/m	30	30	30
28	Burst	kV	1	1	1
29	ESD	kV	2	2	2
	Electromagnetic interference (EN55011; EM55022; EN55014)	Unit	Value		
30	Interference voltage	-	Class A	Class A	Class A
31	Radio interference power	-	Class A	Class A	Class A
32	Disturbance field strengths	-	Class A	Class A	Class A
	Shock resistance in accordance with DIN EN 60068-2-7	Unit	Value		
33	Quantity	n	6.000 1.000/direction	6.000 1.000/direction	6.000 1.000/direction
34	Directions	n	6 3 positive; 3 negative	6 3 positive; 3 negative	6 3 positive; 3 negative
35	Duration	ms	11	11	11
36	Acceleration (semi-sine)	g	65	65	65
	Resistance to vibration in accordance with DIN EN 60086-2-6	Unit	Value		
37	Frequency range	Hz	5 to 200	5 to 200	5 to 200
38	Duration	h	1,5/direction	1,5/direction	1,5/direction
39	Direction	n	3	3	3
40	Amplitude of displacement	mm	11	11	11
41	Amplitude of acceleration	g	5	5	5

⁴ Lower ambient temperatures can be released upon request, taking into account a starting cycle.

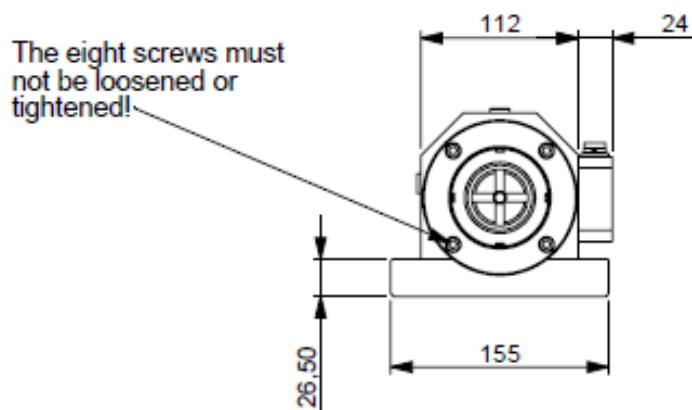
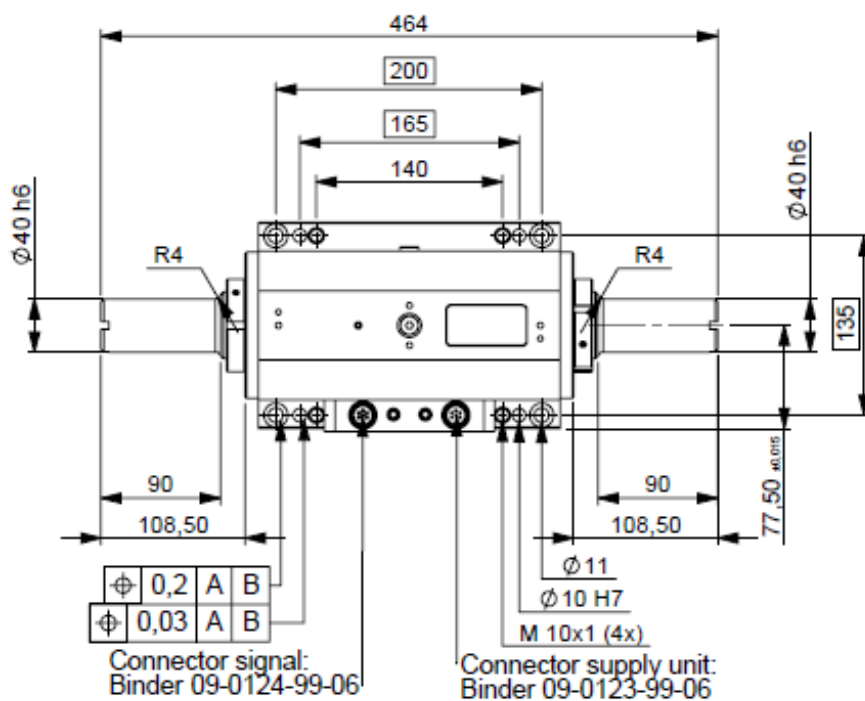
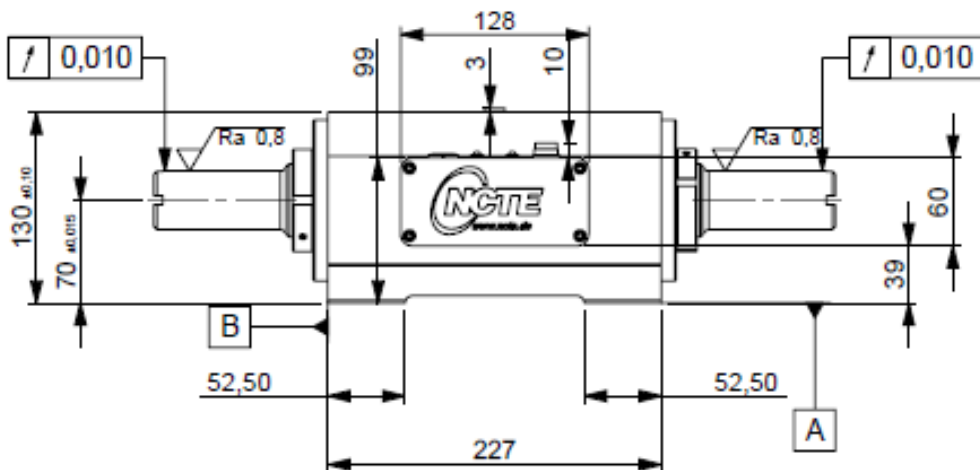
	Maximum loads ⁵	Unit	Value		
42	Maximum gaugeable torque	Nm	110	550	3300
43	Limit torque in terms of M_{nom}	%	300	400	5100
44	Breaking torque in terms of M_{nom}	%	400	590	7350
	Mechanical values	Unit	Value		
45	Torsional rigidity C_T	kNm/rad	12	84	423
48	Twisting angle in terms of M_{nom}	Grad	0,48	0,34	0,41
49	Balancing grade in accordance with DIN ISO 1940	G	2,5	2,5	2,5
50	Moment of inertia (centre of mass)	kg m ²	0,002	0,003	0,011
51	Maximum permitted static radial load (without consideration of other loads applied in the middle of the shaft ends)	N	1.290	1.290	2.370
52	Maximum permitted static axial load (without consideration of other loads)	N	500	500	500
	Exemplary load spectrum ⁶ Load values	Unit	Value		
53	Average speed of rotations	rpm	2.500	2.500	2.500
54	Axial force (nominal/amplitude dynamically increasing)	N	250/250	250/250	250/250
53	Radial force (middle of right shaft extension, dynamically alternating)	N	200	200	900
54	Radial force (middle of left shaft extension, dynamically alternating)	N	200	200	900
55	Torque (nominal / amplitude dynamically increasing)	Nm	100/20	500/100	3.000/600
56	Durability	h	approx. 20.000		

⁵ Due to the non-contact measuring principle, the torque sensor is largely insensitive to stresses of any kind. Only massive overloading of the sensor shaft leads to a permanent change in the sensor system. The limit torque and the breaking torque are valid for purely static loading and with no other applied loads. The permissible load spectrum always applies to the longitudinal and transverse forces (see section 5). The data on the accuracy of the output signal only applies to the rated torque, not to the maximum torque.

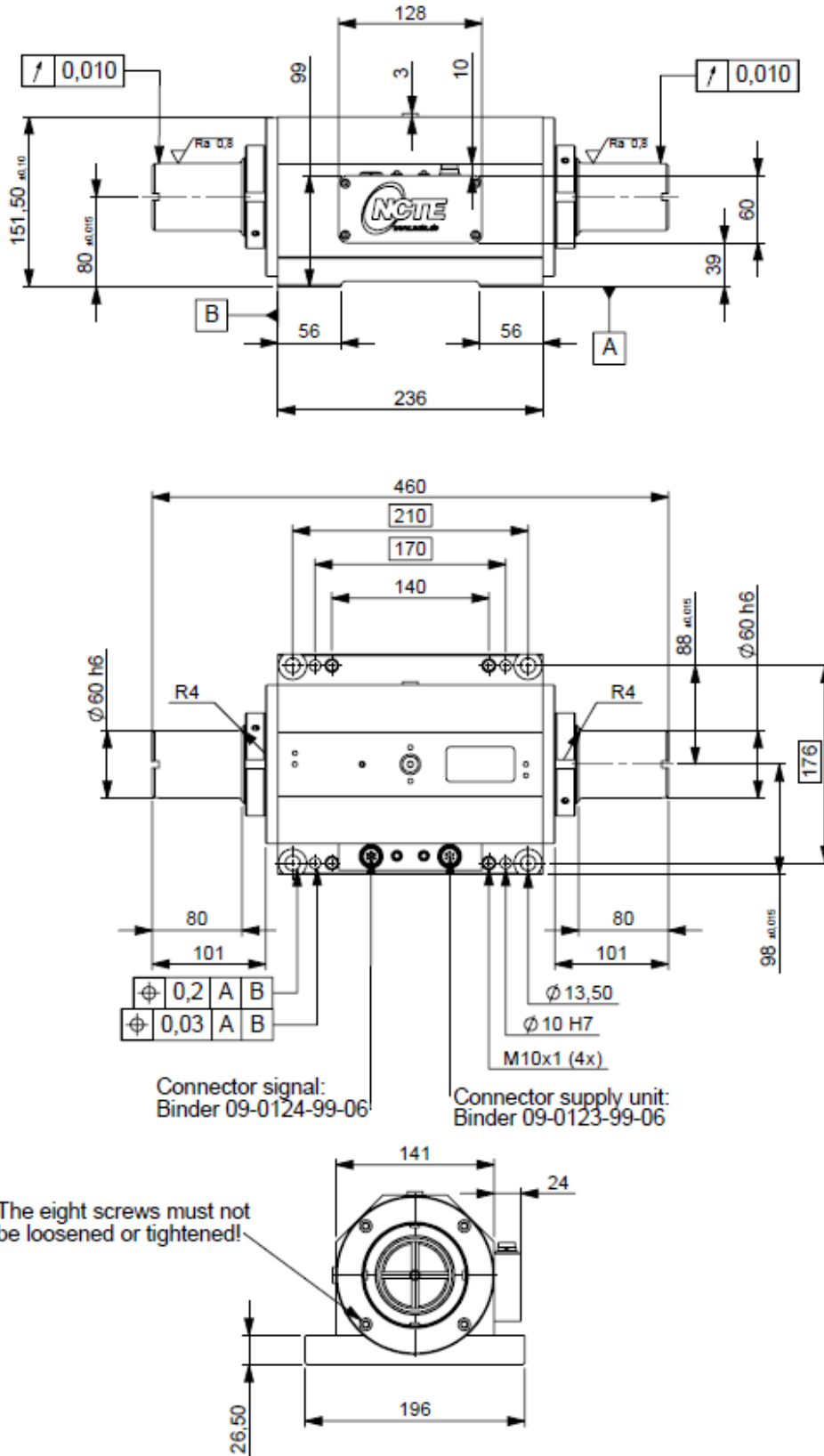
⁶ Load spectrums in which individual load components larger than the examples given here must be examined and approved by the manufacturer. We recommend on principle a review of the load spectrums. To this end please send all load data for intended use by email to: sales@ncte.de or give us a call +49 (0) 89 66 56 19 17.

Dimensions

DML 100/DML 500

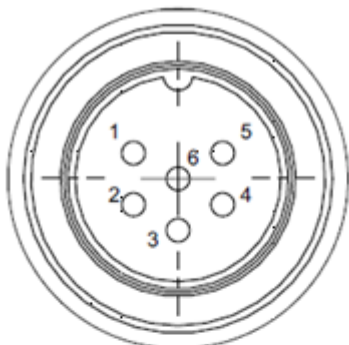


DML 3000



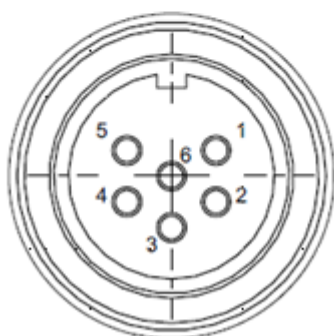
Connection plan

Binder 09-0123-99-06



Supply: 6-pin		
Typ	Model: Binder DIN M16 (Male) Item number: 09-0123-99-06	
Pin	Code	Description
1	V _{CC}	Supply voltage +
2	GND	Ground supply voltage
3	-	not assigned
4	-	not assigned
5	-	not assigned
6	-	not assigned

Binder 09-0124-99-06



Signal & communication: 6-pin		
Typ	Model: Binder DIN M16 Item number: 09-0124-99-06	
Pin	Code	Description
1	V _{out}	Output signal
2	V _{oref}	Reference ground
3	P1	Programming line 1
4	P2	Programming line 2
5	P3	Programming line 3
6	P4	Programming line 4

Condition monitoring system

To monitor the operating status of the bearing unit with an integrated torque sensor, the DML 100 can be optionally equipped with the bearing guard VB 1001 from IFM Electronic. The link for this system is provided on the upper side of the bearing block. More information can be obtained on request from NCTE.

Clutches

For DML overload protection, we recommend the use of a size 3 EAS-compact limiting clutch. With this overload clutch, an overloading of the DML due to excessive torque, which could lead to damage or the destruction of the sensor, can be avoided.

More information on the clutches is available from NCTE.

Status LEDs

Operation-/Errorcondition	Green LED	Red LED
DML not connected to power supply	Off	Off
DML operational	On	Off
Error condition 1 (Electrical connection failure)	On	2 flashes – Break – 2 flashes
Error condition 2 (Elektronik not initialised)	On	4 flashes – Break – 4 flashes



Status LEDs on the electronic box

Annotation::

If an error condition appears, the sensor must immediately be taken out of operation. Any signals generated by the sensor are invalid and must not be used.

Please contact the technical support at NCTE.

Please inform the service which error condition appeared.

Order options

DML 100		Price
DML 500		
DML 3000		
100	Nm Sensor including calibration certificate	
500	Nm Sensor including calibration certificate	
3.000	Nm Sensor including calibration certificate	

Please feel free to contact your Sales Team for additional information. Email: sales@ncte.de or Phone: +49 89 66 56 19 17.