Ring Torsion Load Cell

RTN 1 t …470 t

- **Legal-for-trade up to 5000 d and 7500 d for multi-interval scales**
- **Highly accurate, even in the partial load range**
- **Large output signal and thus high-resolution useful signal range**
- **Low power consumption for simple evaluation electronics**
- **ATEX, IECEx, EAC, USA, Canada, Korea**
- **Type of protection: up to IP68/IP69K**

Application

As a measuring transducer, the load cell converts the mechanical input variable 'force' proportionally into the electrical output variable 'voltage'.
The consistent optimization of the ring torsion load cell offers the user specific advantages:

- The extremely small frame size simplifies the use in almost all weighing device applications
- The durable design allows easy transportation, installation and operation, even in very rough ambient conditions (disturbing forces, temperature)

Structure

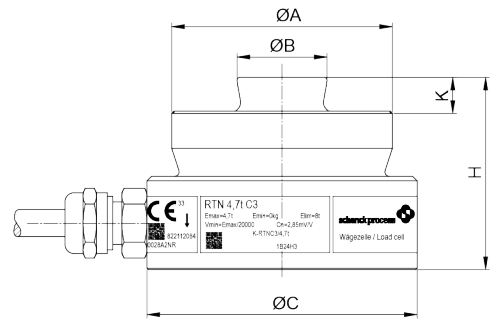
- Hermetically sealed encapsulation through laser welding (IP68)
- High corrosion protection thanks to electrolytically polished stainless steel
- All electrical components are located inside the load cell and thus are optimally protected
- The high quality and robust connecting cable is guided radially into the load cell
- In combination with adapter kits, the RTN load cells are compatible with former designs.

Function

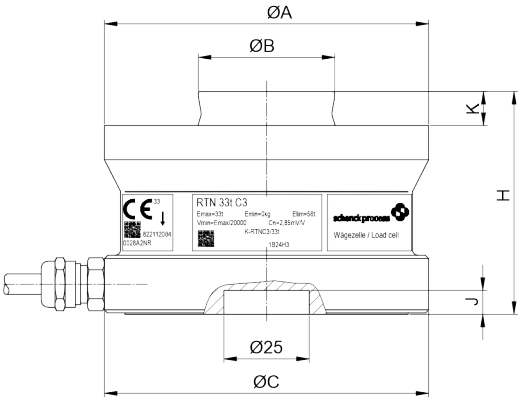
- High measuring sensitivity
- High reproducibility
- High long-term stability and therefore consistently high accuracy permanently
- Extremely small measured value influence as a result of lateral forces
- High functional safety, even with frequently unavoidable impact loads and constraining forces, as well as with electrical interferences
- Integrated overvoltage protection
- Torque-free force input/output as a result of the direct, vertical power train
- Plug variants for fast and inexpensive replacement of damaged cables

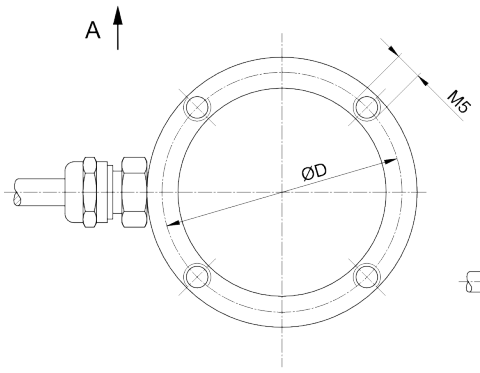
Dimensions and basic data

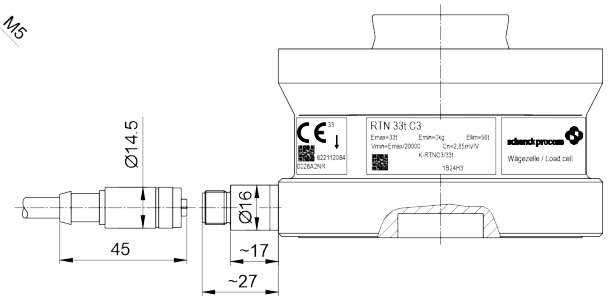
RTN 1 - 4,7



RTN 10 - 470 t







View A

RTN (Type)	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)	K (mm)	Nominal load E_{max} (t)	Limit load L_l (t)	Breaking load L_d (t)	Nominal measuring path h_n (mm)	Dead load (kg)
1 t	49	20	60	53	43	7.5	1	1.7	4	0.13	0.6
2.2 t	49	20	60	53	43	7.5	2.2	4	9	0.12	0.6
4.7 t	49	20	60	53	43	7.5	4.7	8	19	0.12	0.7
10 t	73	30	75	-	50	6.5	10	17	40	0.17	1.2
15 t	75	30	75	-	50	6.5	15	28	60	0.18	1.3
22 t	75	30	75	-	50	6.5	22	38	90	0.21	1.3
33 t	95	40	95	-	65	10	33	58	130	0.25	2.1
47 t	130	60	130	-	75	14	47	80	190	0.33	4.3
68 t	130	60	130	-	85	14	68	120	270	0.35	4.8
100 t	150	70	150	-	90	16	100	170	400	0.45	7.0
150 t	150	70	150	-	100	16	150	250	600	0.57	8.6
220 t	225	100	225	-	130	24	220	380	900	0.67	22.0
330 t	225	100	225	-	145	24	330	580	1200	0.85	29.0
470 t	270	120	270	-	170	28	470	700	1500	1.00	50.0

Allowed static transverse load $L_q = 0.5 (E_{max} – 0.8 L_z)$, however maximum $L_{qmax} = 0.2 L_z$; E_{max} = nominal load; L_z = Load in measuring direction. Allowed vibration stress acc. to DIN 50100: 70 % E_{max}. Here, the peak load value E_{max} may not be exceeded.
In combination with elastomer bearings, SEM must be observed that the reset force of the elastomer bearings of the self-aligning bearings already represents a transverse force.

Technical Data

Load cell

Nominal load	E_{max}	**1 t – 470 t**		**1 t – 100 t**	—
Accuracy class	—	0.05	C3	C5 / C4 Mi 7.5	Ref
Nominal characteristic value	C_n	2.85 mV/V ±2.85 µV/V			
Combined error	F_{comb}	0.05 %	0.02 %	0.01 %	C_n
Return to zero signal after load (30 min)	F_{dr}	±0.03 %	±0.016 %	±0.006 %	C_n
Creepage under load (30 min)	F_{cr}	±0.04 %	±0.024 %	±0.009 %	C_n
Temperature coefficient of the zero signal per 10 K	TK_0	±0.03 %	±0.007 %	±0.0058 %	C_n, B_{tn}
		±0.05 %	±0.02 %	±0.02 %	C_n, B_{tu}
Temperature coefficient of the characteristic value per 10 K	TK_c	±0.05 %	±0.008 %	±0.0062 %	C_n, B_{tn}
		±0.07 %	±0.02 %	±0.02 %	C_n, B_{tu}
Max. allowed number of verifiable division values	n_{LC}	—	3000	5000	—
For multi-divisional scales	Z	—	—	7500	—
Minimum division value OIML	V_{min}	—	E_{max}/20000	E_{max}/24000	
			E_{max}/10000 (1 t)	E_{max}/20000 (2.2 t)	—
				E_{max}/10000 (1 t)	
Minimum division value NTEP	V_{min}	E_{max}/14000			—
Max. application range	B_{amax}	$B_{amax} = E_{max}$			—
Input resistance	R_e	4450 Ω ±100 Ω			T_r
Output resistance	R_a	4010 Ω ±2 Ω	4010 Ω ±0.5 Ω		T_r
Zero Signal	S_0	±1 %			C_n
Max. supply voltage	U_{smax}	60 V			—
Nominal temperature range (relevant for legal-for-trade)	B_{tn}	-10 °C … +40 °C			—
Reference temperature	T_r	22 °C			—
Operating temperature range	B_{tu}	-40 °C … +80 °C		-40 °C … +80 °C	—
		-25 °C … +80 °C		-25 °C … +80 °C	
		(Plug optional)		(Plug optional)	
		Optional up to +110 °C [1)]			
Storage temperature range	B_{ts}	-50 °C … +85 °C			—
		-25 °C … +85 °C (plug optional)			
Type of protection	—	IP68, 1 m / 100 h Optional up to 110 °C: IP66		IP68, 1 m / 100 h	—
Material	—	Stainless steel			—
Corrosion protection	—	For details, see data sheet DDP8483			—

1) Plug variant must not be used for scales that can be used for legal for trade purposes

Load cell in Ex version (not available as connector version)

Operating temperature range ATEX, IECEx, EAC, KOSHA	B_{tu}	-30 °C … +70 °C	—
Operating temperature range FM Approval Canada and USA	B_{tu}	-30 °C … +40 °C	—
Type of protection	—	IP 67	—

2) Option 110 °C not possible in combination with C5 or ATEX

Cable

Type		**Firmly connected**	**Connecting cable (not available in ATEX)**
Nominal load	E_{max}	1 – 470	1 – 150
Accuracy class (OIML R60)	—	0.05 C3 C5 / C4 Mi 7.5 (1 – 100 t)	0.05 C3
Protection class according to EN_60_529 (IEC 529)	—	IP 68 / IP 69K	IP 67
Number of wires	—	4	8
Wire cross-section	mm^2	0.25	0.25
Outer diameter	mm	6.5 ± 0.2	5.9 ± 0.2
Smallest bending radius	mm	45 (movable 59)	45 (movable 59)
Plug weight, approx.	g	—	25
Standard cable lengths	m	5 (1 t – 15 t) and (150 t – 470 t) 15 (22 t – 100 t)	—
Optional cable lengths	m	15 (1 t – 15 t) and (150 t – 470 t) 25 (Check ATEX version on request) 50 (not for ATEX)	5 20
Nominal temperature	°C	-30 … +150	-20 … +80
Terminal allocation	—	black: input + blue: input - red: output + white: output - yellow: shielding	pink: input + blue: input - red: output + white: output - gray: sense + green: sense - yellow: shielding brown: not assigned
Material	—		
- Plug housing		-	TPU (injection-molded)
- Screw connection		Zinc die-cast, nickel-plated	Zinc die-cast, nickel-plated

Type	Firmly connected	Connecting cable (not available in ATEX)
- Plug sealing	NBR	NBR
- Wire insulation	PP	PP
- Cable sheath	TPE (silicone- / halogen-free), gray	PUR (halogen-free), black

Order numbers

Design	Accuracy class				
	0.05	**0.05 with plug**	**C3**	**C3[1] with plug[1]**	**C5 / C4 Mi 7.5**
RTN 1 t	D726173.04	D726173.79	D726173.02	D726173.80	D726173.10
RTN 2.2 t	D726174.04	D726174.79	D726174.02	D726174.80	D726174.10
RTN 4.7 t	D726175.04	D726175.79	D726175.02	D726175.80	D726175.10
RTN 10 t	D726176.04	D726176.79	D726176.02	D726176.80	D726176.10
RTN 15 t	D726177.04	D726177.79	D726177.02	D726177.80	D726177.10
RTN 22 t	D724781.04	D724781.79	D724781.02	D724781.80	D724781.10
RTN 33 t	D724754.04	D724754.79	D724754.02	D724754.80	D724754.10
RTN 47 t	D724782.04	D724782.79	D724782.02	D724782.80	D724782.10
RTN 68 t	D724783.04	D724783.79	D724783.02	D724783.80	D724783.10
RTN 100 t	D724784.04	D724784.79	D724784.02	D724784.80	D724784.10
RTN 150 t	D726178.04	D726178.79	D726178.02	D726178.80	not available
RTN 220 t	D726179.04	not available	D726179.02	not available	not available
RTN 330 t	D726180.04	not available	D726180.02	not available	not available
RTN 470 t	D726181.04	not available	D726181.02	not available	not available
Spare part connection cable for plug					
5 m			V090162.B10		
20 m			V090162.B11		

[1] Plug variant must not be used for scales that can be used for legal for trade purposes.

Options

- Model for operating temperature up to 110 °C
- Additional corrosion protection
- Other cable lengths
- Protection class IP69K
- Rodent-proof cable
- Mounting holes

Installation accessories

- **SENSiQ** Elastomer Mount (SEM)
- **SENSiQ** Secure Mount (SSM)
- **SENSiQ** Pendulum Mount (SPM)
- **SENSiQ** Fixed Mount (SFM)

EX approvals

	Intrinsically safe explosion-proof design			Not intrinsically safe explosion-proof design		
ATEX / IECEx	II 2G Ex ia IIC T4 Gb (Zone 1) II 2D Ex ia IIIC T125°C Db, IP67 (Zone 21)			II 3G Ex ec IIC T4 Gc (Zone 2) II 2D Ex tb IIIC T125 °C Db, IP67 (Zone 21)		
FM approval Canada	I / 0 / Ex ia / IIC / T4; -30°C < Ta < 40°C / Ga; 20 / Ex ia / IIIC / T125°C; -30°C < Ta < 40°C / Da; IP67.			not available		
FM approval USA	IS / I, II, III / 1 / A, B, C, D, E, F, G / T4; -30°C < Ta < 40°C, I / 0 / AEx ia / IIC / T4; -30°C < Ta < 40°C / Ga; 20 / AEx ia / IIIC / T125°C; -30°C < Ta < 40°C / Da; IP67.			not available		
EAC	1Ex ia IIC T4 Gb (Zone 1) Ex ia IIIC T125°C Db X (Zone 21)			2Ex nA II T4 Gc (Zone 2) Ex tb IIIC T125 °C Db X (Zone 21)		
KOSHA **(only RTN 1 t – 4.7 t)**	Ex ia IIC T4 Gb (Zone 1) Ex ia IIIC T125°C Db, IP67 (Zone 21)			Ex ec IIC T4 Gc (Zone 2) Ex tb IIIC T125 °C Db, IP67 (Zone 21)		
Accuracy class	0.05 2GD	C3 2GD	C5 / C4 Mi 7.5 2GD	0.05 2D, 3G	C3 2D, 3G	C5 / C4 Mi 7.5 2D, 3G
Design	Dxxxxxx .82	Dxxxxxx .81	Dxxxxxx .83	Dxxxxxx .86	Dxxxxxx .85	Dxxxxxx .87
Design KOSHA	D726173.92 (RTN 1 t) D726174.92 (RTN 2.2 t) D726175.94 (RTN 4.7 t)	not available	not available	D726173.96 (RTN 1 t) D726174.96 (RTN 2.2 t) D726175.96 (RTN 4.7 t)	not available	not available

Order example:
47 t, precision class C3, ATEX category 2D, 3G.
Type RTN 47 t C3 2D, 3G
Order number D724782.85

Load cells marked as intrinsically safe (Ex "i") are operated in an intrinsically safe manner regardless of the zone.
CAUTION! The verification of intrinsically safe circuit must be verified. New barriers are provided in particular for new systems. Verifications of intrinsic safety are available for all load cells and barriers.