

# Ring torsion load cell

## RTN 1 t ...470 t

- Legal-for-trade design according to OIML (up to 5000 d and 7500 d for multi-interval scales)
- High precision even for very small application ranges
- Large output signal and this high-resolution useful signal range
- Due to the low power consumption, multi-scale systems can also be realized using simple analysis electronics
- Approvals for potentially explosive areas available: ATEX, IECEx, EAC, USA, Canada, Korea
- Protective rating: up to IP68



### 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)

### Construction

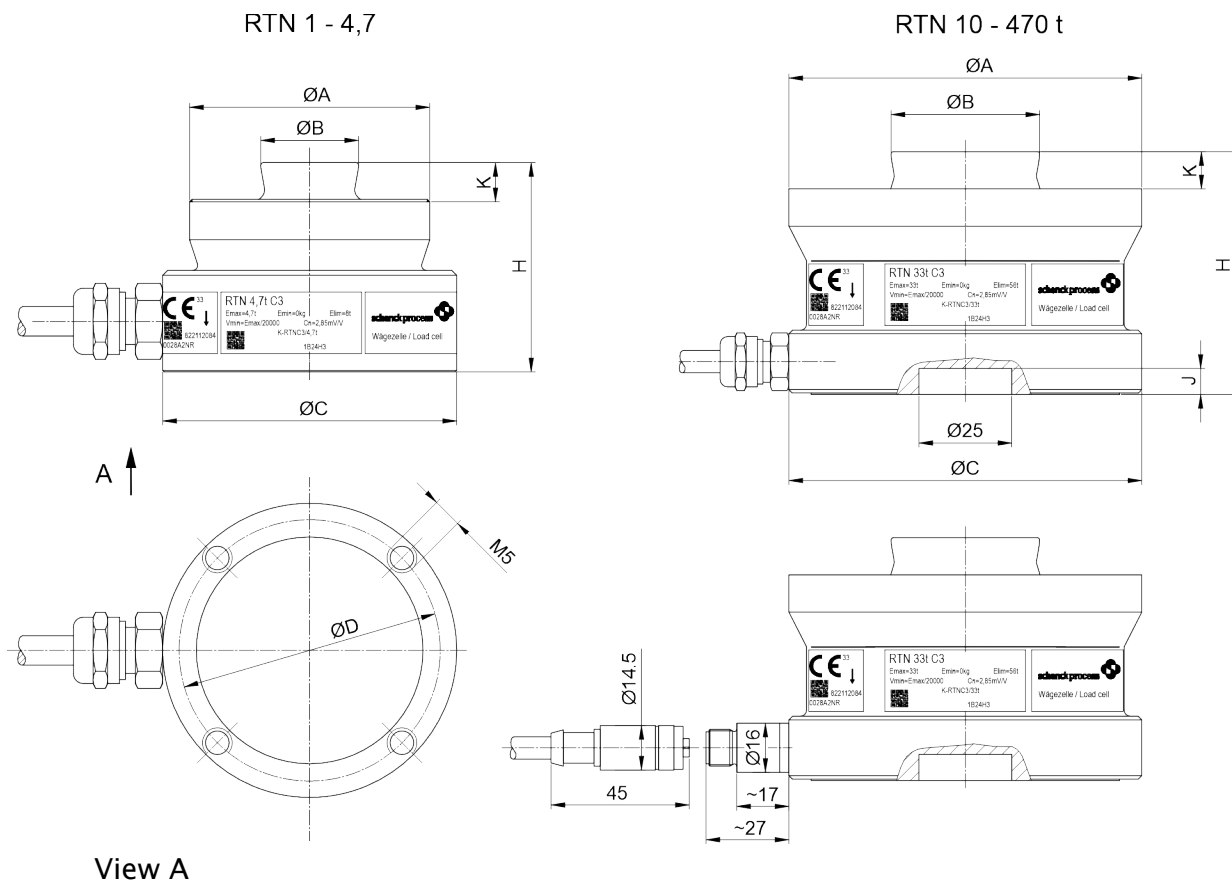
- Hermetically sealed encapsulation through laser welding (IP68)
- High corrosion protection thanks to electrolytically polished stainless steel
- All electrical components are located inside the load cell and thus are optimally protected

- 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



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)	Self-weight (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

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 $\pm$ 2.85 $\mu$ V/V			
Combined error	$F_{comb}$	0.05 %	0.02 %	0.01 %	$C_n$
Return to zero signal after load (30 min)	$F_{dr}$	$\pm$ 0.03 %	$\pm$ 0.016 %	$\pm$ 0.006 %	$C_n$
Creepage under load (30 min)	$F_{cr}$	$\pm$ 0.04 %	$\pm$ 0.024 %	$\pm$ 0.009 %	$C_n$
Temperature coefficient of the zero signal per 10 K	$TK_0$	$\pm$ 0.03 %	$\pm$ 0.007 %	$\pm$ 0.0058 %	$C_n, B_{tn}$
		$\pm$ 0.05 %	$\pm$ 0.02 %	$\pm$ 0.02 %	$C_n, B_{tu}$
Temperature coefficient of the characteristic value per 10 K	$TK_c$	$\pm$ 0.05 %	$\pm$ 0.008 %	$\pm$ 0.0062 %	$C_n, B_{tn}$
		$\pm$ 0.07 %	$\pm$ 0.02 %	$\pm$ 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)	
Minimum division value NTEP	$V_{min}$	$E_{max}/14000$			—
Max. application range	$B_{amax}$	$B_{amax} = E_{max}$			—
Input resistance	$R_e$	4450 $\Omega$ $\pm$ 100 $\Omega$			$T_r$
Output resistance	$R_a$	4010 $\Omega$ $\pm$ 2 $\Omega$	4010 $\Omega$ $\pm$ 0.5 $\Omega$		$T_r$
Zero Signal	$S_0$	$\pm$ 1 %			$C_n$
Max. supply voltage	$U_{smax}$	60 V			—
Nominal temperature	$B_{tn}$	-10 °C ... +40 °C			—
Reference temperature	$T_r$	22 °C			—
Operating temperature range	$B_{tu}$	-40 °C ... +80 °C, Option up to +110 °C <sup>1)</sup>			—
Operating temperature range explosion-proof design	—	-30 °C ... +70 °C (ATEX, IECEx, EAC, KOSHA)			—
		-30 °C ... +40 °C (FM-Approval Canada, USA)			
Storage temperature range	$B_{ts}$	-50 °C ... +85 °C			—
Type of protection	—	IP68, 1 m / 100 h; (Option 110 °C: IP66; Option plug: IP67)			—
Type of protection Explosion-proof design	—	IP67			—
Cable specification	—	TPE (gray) $\varnothing$ 6.5 mm, silicon and halogen-free, -30 °C ... +150 °C Length 5 m (for RTN 1 t - 15 t and RTN 150 t - 470 t) Length 15 m (for RTN 22 t - 100 t)			—
Cable specification plug model	—	PUR (black) $\varnothing$ 5.9 mm, halogen-free, -20 °C ... +80 °C Optional lengths: 5 m or 20 m 8-wire			—
Connection assignment	—	Black: Input + / blue: Input - red: Output + / white: Output - yellow: shielding			—
Material	—	Stainless steel			—
Corrosion protection	—	For details, see data sheet DDP8483			—

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

# Explosion-proof approvals

	Intrinsically safe explosion-proof design			Not intrinsically safe explosion-proof design		
<b>ATEX / IECEx</b>	II 2G Ex ia IIC T4 Gb (Zone 1) II 2D Ex ia IIIC T125°C Db, IP67 (Zone 21)			II 3G Ex nA IIC T4 Gc (Zone 2) II 2D Ex tb IIIC T125 °C Db, IP67 (Zone 21)		
<b>FM-Approval Kanada</b>	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		
<b>FM-Approval USA</b>	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		
<b>EAC</b>	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)		
<b>KOSHA</b>	Ex ia IIC T4 Gb (Zone 1)			Ex ec IIC T4 Gc (Zone 2)		
<b>(only RTN 1 t – 4.7 t)</b>	Ex ia IIIC T125°C Db, IP67 (Zone 21)			Ex tb IIIC T125 °C Db, IP67 (Zone 21)		
<b>Accuracy class</b>	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
<b>Design</b>	Dxxxxxx .82	Dxxxxxx .81	Dxxxxxx .83	Dxxxxxx .86	Dxxxxxx .85	Dxxxxxx .87
<b>Design KOSHA</b>	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

## Intrinsic safety:

Load cells marked as intrinsically safe - Ex 'i' - are always operated in an intrinsically safe manner regardless of the zone.

## CAUTION!:

The verifications of intrinsic safety must be checked. New barriers are provided in particular for new systems. Verifications of intrinsic safety are available for all load cells and barriers.

## Order example:

47 t, precision class C3, ATEX category 2D, 3G.

Type RTN 47 t C3 2D, 3G

Order number D724782.85

# Order Numbers

Design	Accuracy class				
	0.05	0.05 with plug	C3	C3 <sup>1)</sup> with plug <sup>1)</sup>	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: Service cable 5 m or 20 m for plug	V090162.B11				

<sup>1)</sup> Plug variant may not be used for verifiable scales.

#### 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)

