

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 accuracy, even for very small application areas
- Large output signal and this high-resolution useful signal range
- Because of the low power consumption, multi-scale systems can also be realized with simple control electronics
- Approval for hazardous zone: ATEX, IECEx, EAC, USA and Canada, Korea
- Protection class: up to IP68



Application

The load cell as transducer 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 robust construction allows problem-free transport, installation and operation, even under very rough ambient conditions (disturbance forces, temperature)

Construction

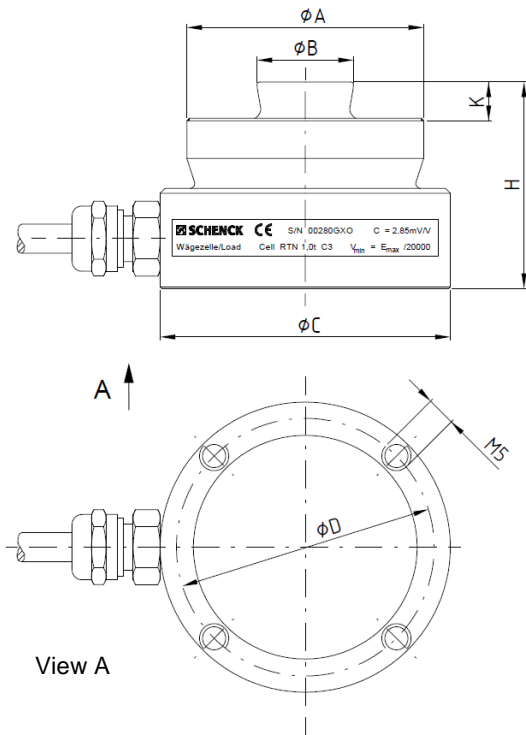
- Hermetically sealed encapsulation through laser welding (IP68)
- High corrosion protection through electrolytically polished stainless steel
- All electrical components are located inside the load cell and are therefore optimally protected

- The high quality and robust connecting cable is guided radially into the load cell
- In connection with adapter kits, the RTN load cells are compatible with previous designs

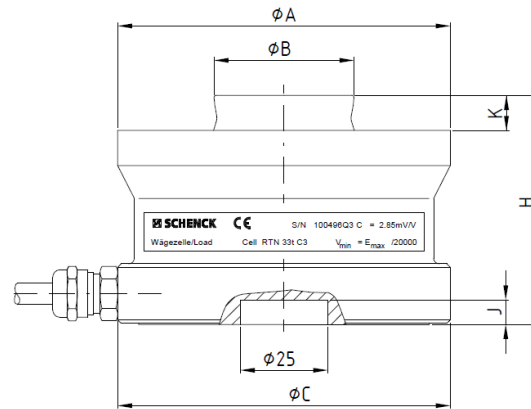
Function

- 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

RTN 1 - 4,7 t



RTN 10 - 470 t



Technical Data

| Nominal load E_{max} t | Limit load L_l t | Break load L_d t | Nominal measuring path h_n mm | Own weight kg |
|--------------------------|--------------------|--------------------|---------------------------------|---------------|
| 1 | 1.7 | 4 | 0.13 | 0.6 |
| 2.2 | 4 | 9 | 0.12 | 0.6 |
| 4.7 | 8 | 19 | 0.12 | 0.7 |
| 10 | 17 | 40 | 0.17 | 1.2 |
| 15 | 28 | 60 | 0.18 | 1.3 |
| 22 | 38 | 90 | 0.21 | 1.3 |
| 33 | 58 | 130 | 0.25 | 2.1 |
| 47 | 80 | 190 | 0.33 | 4.3 |
| 68 | 120 | 270 | 0.35 | 4.8 |
| 100 | 170 | 400 | 0.45 | 7.0 |
| 150 | 250 | 600 | 0.57 | 8.6 |
| 220 | 380 | 900 | 0.67 | 22.0 |
| 330 | 580 | 1200 | 0.85 | 29.0 |
| 470 | 700 | 1500 | 1.00 | 50.0 |

Dimensions

| Type | Dimensions (mm) | | | | | | |
|---------|-----------------|-----|-----|----|-----|-----|----|
| | A | B | C | D | H | K | J |
| RTN 1 t | 49 | 20 | 60 | 53 | 43 | 7.5 | - |
| 2.2 t | 49 | 20 | 60 | 53 | 43 | 7.5 | - |
| 4.7 t | 49 | 20 | 60 | 53 | 43 | 7.5 | - |
| 10 t | 73 | 30 | 75 | - | 50 | 6.5 | 7 |
| 15 t | 75 | 30 | 75 | - | 50 | 6.5 | 7 |
| 22 t | 75 | 30 | 75 | - | 50 | 6.5 | 7 |
| 33 t | 95 | 40 | 95 | - | 65 | 10 | 7 |
| 47 t | 130 | 60 | 130 | - | 75 | 14 | 7 |
| 68 t | 130 | 60 | 130 | - | 85 | 14 | 7 |
| 100 t | 150 | 70 | 150 | - | 90 | 16 | 7 |
| 150 t | 150 | 70 | 150 | - | 100 | 16 | 7 |
| 220 t | 225 | 100 | 225 | - | 130 | 24 | 10 |
| 330 t | 225 | 100 | 225 | - | 145 | 24 | 10 |
| 470 t | 270 | 120 | 270 | - | 170 | 28 | 10 |

Admissible static transverse loading $L_q = 0.5 (E_{max} - 0.8 L_z)$, but not more than $L_{qmax} = 0.2 L_z$; E_{max} = nominal load; L_z = load in measurement direction Permissible vibrational loading as defined by DIN 50100: 70 % E_{max} . Peak loading values may not exceed E_{max} .

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 μ V/V | | | |
| Combined error | F_{comb} | 0.05 % | 0.02 % | 0.01 % | C_n |
| Dead load return 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 0.05 % | \pm 0.007 % \pm 0.02 % | \pm 0.0058 % \pm 0.02 % | C_n, B_{tn} C_n, B_{tu} |
| Temperature coefficient of the characteristic value per 10 K | TK_c | \pm 0.05 % \pm 0.07 % | \pm 0.008 % \pm 0.02 % | \pm 0.0062 % \pm 0.02 % | C_n, B_{tn} C_n, B_{tu} |
| Max. admissible no. of legal-for-trade scale intervals | n_{LC} | | 3000 | 5000 | |
| For multi-interval scales | Z | | | 7500 | |
| Smallest scale interval | V_{min} | | $E_{max}/20000$ | $E_{max}/24000$ | |
| Max. application range | B_{amax} | $B_{amax} = E_{max}$ | | | |
| Input resistance | R_e | | 4450 Ω \pm 100 Ω | | T_r |
| Output resistance | R_a | 4010 Ω \pm 2 Ω | 4010 Ω \pm 0.5 Ω | | 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 *) | | | |
| Operating temperature range explosion-proof design | | -30 °C ... +70 °C (ATEX, IECEx, EAC, KOSHA) -30 °C ... +40 °C (FM-Approval Canada and USA) | | | |
| Storage temperature | B_{ts} | -50 °C ... +85 °C | | | |
| Type of protection | | IP68, 1 m / 100 h; (Option 110 °C: IP66) | | | |
| Type of protection Explosion-proof design | | IP67 | | | |
| Cable specification | | TPE (grey) \varnothing 6.5 mm, silicon-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 | | | |
| Connection assignment | | black: input red: output yellow: screening | + / + | blue: input white: output | - / - |
| Material | | stainless steel | | | |
| Corrosion protection | | see resistance table DDP8483 | | | |

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

Order Numbers

| Design | Accuracy Class | | |
|-----------|----------------|------------|----------------|
| | 0.05 | C3 | C5 / C4 Mi 7.5 |
| RTN 1 t | D726173.04 | D726173.02 | D726173.10 |
| RTN 2.2 t | D726174.04 | D726174.02 | D726174.10 |
| RTN 4.7 t | D726175.04 | D726175.02 | D726175.10 |
| RTN 10 t | D726176.04 | D726176.02 | D726176.10 |
| RTN 15 t | D726177.04 | D726177.02 | D726177.10 |
| RTN 22 t | D724781.04 | D724781.02 | D724781.10 |
| RTN 33 t | D724754.04 | D724754.02 | D724754.10 |
| RTN 47 t | D724782.04 | D724782.02 | D724782.10 |
| RTN 68 t | D724783.04 | D724783.02 | D724783.10 |
| RTN 100 t | D724784.04 | D724784.02 | D724784.10 |
| RTN 150 t | D726178.04 | D726178.02 | |
| RTN 220 t | D726179.04 | D726179.02 | |
| RTN 330 t | D726180.04 | D726180.02 | |
| RTN 470 t | D726181.04 | D726181.02 | |

Explosion-proof 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 nA 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) | | |
| 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 |
| Model | Dxxxxxx .82 | Dxxxxxx .81 | Dxxxxxx .83 | Dxxxxxx .86 | Dxxxxxx .85 | Dxxxxxx .87 |

| | Intrinsically Safe Explosion-proof Design | | | Not Intrinsically Safe Explosion-proof Design | | |
|-----------------------|--|-------------------------|-------------------------|---|-------------------------|-------------------------|
| KOSHA | 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 | | | 0.05 2D, 3G | | |
| Model | RTN 1 t D726173.92 | RTN 2,2 t D726174.92 | RTN 4,7 t D726175.94 | RTN 1 t D726173.96 | RTN 2,2 t D726174.96 | RTN 4,7 t D726175.96 |

Load cells marked as intrinsically safe - Ex "i" - are also operated intrinsically safely irrespective of the zone.

Attention: The verification of intrinsically safe circuit must be verified. New barriers are provided in particular for new systems. Verifications of intrinsically safe circuit are available for all load cells and barriers.

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

| Options | Installation accessories |
|---|--|
| <ul style="list-style-type: none"> Model for operating temperatures up to 110 °C Additional corrosion protection Other cable lengths Protection class IP69K Cable resistant to gnawing rodents Mounting holes | <ul style="list-style-type: none"> SENSiQ® Elastomer Mount (SEM) SENSiQ® Secure Mount (SSM) SENSiQ® Pendulum Mount (SPM) SENSiQ® Fixed Mount (SFM) |

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