



EN Operating instructions.pages 1 to 6
Original

Content

1 About this document

1.1 Function 1

1.2 Target group: authorised qualified personnel. 1

1.3 Explanation of the symbols used 1

1.4 Appropriate use 1

1.5 General safety instructions 1

1.6 Warning about misuse 1

1.7 Exclusion of liability 2

2 Product description

2.1 Ordering code 2

2.2 Special versions. 2

2.3 Purpose 2

2.4 Technical Data 2

2.5 Safety classification pull-wire emergency stop switch ZQ215/ZQ315 . . 3

3 Mounting

3.1 General mounting instructions 3

3.2 Mounting set-up 3

3.3 Pull wire system accessories 3

3.4 Dimensions 4

4 Electrical connection

4.1 General information for electrical connection. 5

4.2 Contact options 5

5 Set-up and maintenance

5.1 Functional testing. 5

5.2 Maintenance 5

6 Disassembly and disposal

6.1 Disassembly. 5

6.2 Disposal 5

7 EU Declaration of conformity

1. About this document

1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the safety switchgear. The operating instructions must be available in a legible condition and a complete version in the vicinity of the device.

1.2 Target group: authorised qualified personnel

All operations described in this operating instructions manual must be carried out by trained specialist personnel, authorised by the plant operator only.

Please make sure that you have read and understood these operating instructions and that you know all applicable legislations regarding occupational safety and accident prevention prior to installation and putting the component into operation.

The machine builder must carefully select the harmonised standards to be complied with as well as other technical specifications for the selection, mounting and integration of the components.

1.3 Explanation of the symbols used



Information, hint, note:

This symbol indicates useful additional information.



Caution: Failure to comply with this warning notice could lead to failures or malfunctions.

Warning: Failure to comply with this warning notice could lead to physical injury and/or damage to the machine.

1.4 Appropriate use

The Schmersal range of products is not intended for private consumers.

The products described in these operating instructions are developed to execute safety-related functions as part of an entire plant or machine. It is the responsibility of the manufacturer of a machine or plant to ensure the correct functionality of the entire machine or plant.

The safety switchgear must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules.



Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: products.schmersal.com.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

1.6 Warning about misuse



In case of improper use or manipulation of the safety switchgear, personal hazards or damages to machinery or plant components cannot be excluded.

1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden, the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

ZQ①②-③④-⑤-⑥ pull-wire emergency stop switch with snap action

| No. | Option | Description |
|-----|--------|--|
| ① | 215 | Metal enclosure, design to EN 50047 |
| | 215L | like 215 with elongated hole |
| | 315 | Metal enclosure, design to EN 50041 |
| ② | AL | Pulling direction of the towing eye upwards |
| | AR | Pulling direction of the towing eye to the left |
| | AR | Pulling direction of the towing eye to the right |
| ③ | 11 | 1 NO contact / 1 NC contact |
| | 02 | 2 NC contacts |
| | 12 | 1 NO contact / 2 NC contacts |
| ④ | | Silver flashed contacts (standard) |
| | A1 | Gold-plated contacts 0.3 µm |
| | A2 | Gold-plated contacts 1.0 µm |
| | A3 | Gold-plated contacts 3.0 µm |
| ⑤ | | without LED |
| | G | Status LED |
| ⑥ | | Cable entry M20 |
| | ST | Connector plug M12, 4-pole or 8-pole |
| | STM | Connector plug M12, metal, 4-pole or 8-pole |

TQ①②-③④-⑤-⑥ pull-wire switches slow action

| No. | Option | Description |
|-----|--------|---|
| ① | 215 | Metal enclosure |
| | 215L | like 215 with elongated hole |
| | 315 | Metal enclosure |
| ② | AL | Pulling direction of the towing eye upwards |
| | AR | Pulling direction of the towing eye to the left |
| | AR | Pulling direction of the towing eye to the right |
| ③ | 11 | 1 NO contact / 1 NC contact |
| | 02 | 2 NC contacts |
| | 12 | 1 NO contact / 2 NC contacts |
| | 11UE | 1 NO contact / 1 NC contact with overlapping contacts |
| ④ | | Silver flashed contacts (standard) |
| | A1 | Gold-plated contacts 0.3 µm |
| | A2 | Gold-plated contacts 1.0 µm |
| | A3 | Gold-plated contacts 3.0 µm |
| ⑤ | | without LED |
| | G | Status LED |
| ⑥ | | Cable entry M20 |
| | ST | Connector plug M12, 4-pole or 8-pole |
| | STM | Connector plug M12, metal, 4-pole or 8-pole |



Only if the information described in this operating instructions manual are realised correctly, the safety function and therefore the compliance with the Machinery Directive or Low-Voltage Directive is maintained.

2.2 Special versions

For special versions, which are not listed in the order code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

2.3 Purpose

Pull-wire emergency stop switches ZQ... or pull-wire switches TQ... are used on machinery and plants, where triggering the (emergency) stop command must be enabled at arbitrary points on the wire run. If the tensioned pull-wire is pulled or in case of wire breakage, the switching function of the pull-wire emergency stop switch or pull-wire switch is activated. (refer to image 1).

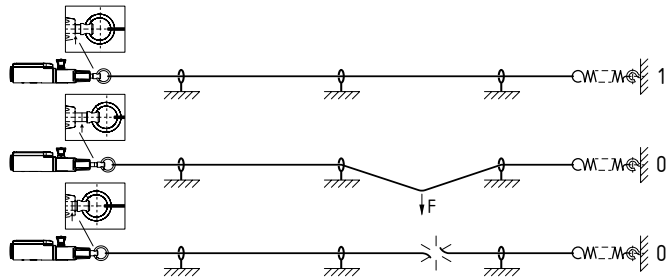


Image 1: Position indication and actuation

Design/operating principle

The switchgear is brought into the operational condition by the proper pre-tensioning of the wire. The inner switching element has 2 or 3 contacts; in a tensioned condition, the NC contacts are closed and the NO contacts are open.

After actuation of the emergency stop function on the pull-wire emergency stop switch ZQ..., a latching mechanism maintains the emergency stop command until the switch is released by pulling the blue release button.

Prior to the reset of the emergency stop signal, the reason why the switch has been actuated must be determined. The switch can only be reset if the switch is correctly pre-tensioned (position indication in central position, refer to image 1).



The pull-wire switch TQ... does not meet the requirements of EN ISO 13850 and EN 60947-5-5.



The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level.



The entire concept of the control system, in which the safety component is integrated, must be validated to the relevant standards.

2.4 Technical Data

Standards:

- ZQ215/315: EN 60947-5-1, EN 60947-5-5, EN ISO 13850

- TQ215/315: EN 60947-5-1

Enclosure: metal

Cover: metal

Degree of protection: IP66, IP67 according to EN 60529

Protection class: I

Degree of pollution: 3

Ambient temperature: -30 °C ... +80 °C

Wire length: 25 m depending in relation to the range of ambient temperature (see image 4)

Mechanical life: > 1 million operations

Tightening torque:

- Fixing screws: 2 Nm

- Cover screw: 2.6 Nm

- Contact screws: 0.6 ... 0.8 Nm

| | |
|--|---|
| Contact material: | Silver |
| - Ordering suffix A1, A2, A3: | gold-plated contacts 0.3 µm, 1 µm, 3 µm |
| Switching system: | change-over contact with double break, 1 to 2 NC contacts, snap action/slow action, positive break NC contact |
| Cable entry: | M20 |
| Termination: | screw terminals or connector plug M12 |
| Cable section: | 0.34 ... 1.5 mm ² |
| Utilisation category AC-15, DC-13 I _g /U _e : | 3 A / 240 VAC, 3 A / 24 VDC |
| - M12 connector, 4-pole: | 3 A / 50 VAC, 3 A / 24 VDC |
| - M12 connector, 8-pole: | 2 A / 30 VAC, 2 A / 24 VDC |
| Rated impulse withstand voltage U _{imp} : | 4 kV |
| - M12 connector, 4-pole or 8-pole: | 0.8 kV |
| Rated insulation voltage U _i : | |
| - Screw connection ZQ/TQ215 or 315: | 250 VAC or 300 VAC |
| - M12 connector, 4-pole/8-pole: | 50 VAC, 24 VDC |
| Thermal test current I _{the} : | |
| - Screw connection, 2 contacts or 3 contacts: | 10 A or 5 A |
| - M12 connector, 4-pole or 8-pole: | 4 A or 2 A |
| Max. fuse rating: | 6 A gG D-fuse |
| Required short-circuit current: | 400 A |
| B _{10D} NC contact for TQ215/315 to EN ISO 13849-1: | 2,000,000 |

UL **us** ZQ/TQ...-ST/STM: The power-source has to be an isolated limited voltage/limited current protected by maximum 3 A and maximum 30 VDC, 42.4 VDC peak.

2.5 Safety classification

pull-wire emergency stop switch ZQ215/ZQ315

| | |
|------------------------------|----------------|
| Standards: | EN ISO 13849-1 |
| B _{10D} NC contact: | 100,000 |
| Mission time: | 20 years |

$$MTTF_D = \frac{B_{10D}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

(Determined values can vary depending on the application-specific parameters h_{op}, d_{op} and t_{cycle} as well as the load.)

If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to the restricted error detection under certain circumstances.

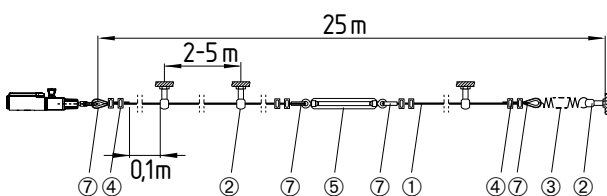


Image 2: Mounting of the components

3. Mounting

3.1 General mounting instructions



The installation may only be carried out with the system de-energised and by authorised personnel.

The switchgear is fitted by means of two (Z/TQ215) or four (Z/TQ315) screws, so that a release by hand can be enabled without hazard.

Mounting the pull-wire emergency stop switch ZQ215/315

The component must be fitted so that the entire length of the wire can be viewed from the position of the switch.



In accordance with EN 60947-5-5 (EN 620), the maximum perpendicular traction force to be exercised on the wire in order to activate the emergency pull-wire switch is 200 N (125 N), the maximum deflection is 400 mm (300 mm). Sufficient space must be provided so that the required actuating deflection can be reached. It must be ensured that when tensioned, the wire rope always follows a straight course and that it remains in the correct position at all times (including at the redirection point). External influences (temperature variations, ageing) can affect the properties of the wire rope. The information in EN ISO 13850 must be observed.

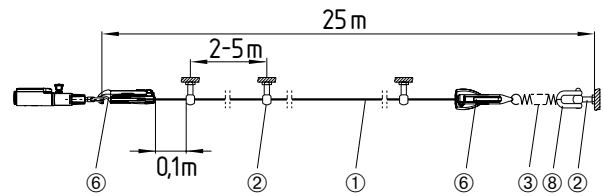
3.2 Mounting set-up

Wire supports are required at distances of 2 to 5 m.

To avoid resonance vibrations in the wire on machines with high vibrations, it is recommended to realise the individual support length differently. Assembly: refer to image 2.



Depending on the application, wire lengths over 25 m are possible. To ensure the safety function, the triggering of the pull-wire emergency stop switch ZQ215 / 315 must be tested and documented in accordance with EN 60947-5-5, section 6.4.2, after the installation has been completed.



3.3 Pull wire system accessories

| No. | | Designation | Ordering code | Description |
|-----|--|------------------------|---------------|--|
| ① | Wire rope | PWR-xM | on request | Red PVC sheath, steel core Ø 3 mm, Total diameter 5 mm |
| ② | Eyebolt (incl. nut) Anchoring hook (incl. 2 nuts and washers) | ACC-PWR-EBLT-BM8X70-A2 | 101192471 | Stainless steel, |
| | | ACC-PWR-EBLT-BM10X40 | 101084928 | Galvanised steel |
| | | ACC-EBLT-M8-RVA-5PCS | 103031496 | Stainless steel, 5 pieces |
| | | ACC-EBLT-M10-RVA-5PCS | 103031499 | Stainless steel, 5 pieces |
| | | ACC-EBLT-M8-5PCS | 103031495 | Galvanised steel, 5 pieces |
| ③ | Tensioning Jack | ACC-EBLT-M10-5PCS | 103031498 | Galvanised steel, 5 pieces |
| | | ACC-700-RZ173I | 103005863 | Stainless steel |
| ④ | Wire clamp | ACC-PWR-RC-3MM-NIRO | 101203477 | Stainless steel, Ø 3 mm |
| | | ACC-PWR-RC-5MM-NIRO | 101203478 | Stainless steel, Ø 5 mm |
| ⑤ | Tensioning Jack | ACC-TBLE-RVA | 103031494 | M8 (stainless steel), 180 ... 250 mm |
| | | ACC-PWR-TB-M6-2 | 101087930 | M6 (galvanised steel), 145 ... 225 mm |
| | | S 900 | 101186704 | Smooth and time-saving adjustment |
| ⑦ | Wire thimble | ACC-PWR-WT-3MM-NIRO | 101203472 | Stainless steel, Ø 3 mm |
| | | ACC-PWR-WT-5MM-NIRO | 101203476 | Stainless steel, Ø 5 mm |
| ⑧ | Shackle | ACC-PWR-SKL-A0,16-VA | 101186490 | Bracket with threaded bolt, stainless steel |



The components ④, ⑤ and ⑦ are not required if using the rope tensioner S 900.

We recommend the use of the ACC-700-RZ1731 tension spring to reduce the effects of temperature variations. Due to the thermal expansion behaviour of the wire, the maximum authorised length of wire is determined by the ambient temperature change (refer to image 4).



In order to ensure an optimal operation safety and to save time during fitting, we recommend using the wire rope and the combined fixing and tensioning system from Schmersal. Alternatively, wire thimbles and wire clamps can be used in conjunction with a tensioner. In this case, the red PVC sheet must be removed in the clamp area prior to installing the wire rope.

Further accessories

| Description | Designation | Ordering code |
|------------------|--------------------|---------------|
| Actuating handle | ACC-PWR-HDL | 103042171 |
| Pulley | ACC-PWR-PLY | 103037516 |
| Marking label | ACC-PWR-ESLB-50PCS | 103032469 |

As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned (see image 3).

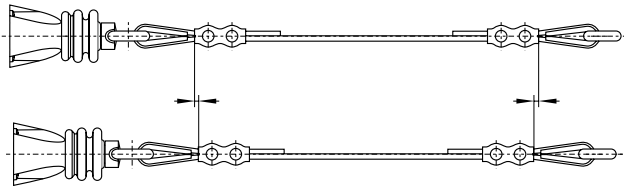
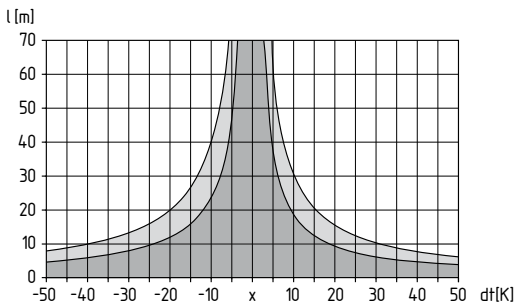


Image 3: Deformation of the wire thimbles

The correct operation of the product is directly related to the data presented in the graph. The maximum rope length depends on the temperature change to which the pull rope system is exposed. The corresponding rope length with and without an external tension spring is shown in the graph.



x reference temperature
 ■ without tension spring
 ■ with tension spring

Image 4: temperature-dependent maximum length of wire with or without tension spring

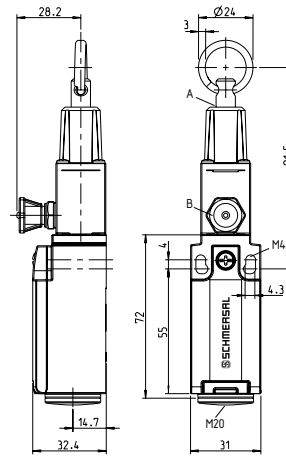
The pull-wire must be fixed to the ring and then be pre-tensioned until the position indication is in the central position (refer to image 1).

3.4 Dimensions

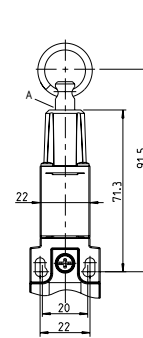
All measurements in mm.

Pulling direction of the towing eye upwards

ZQ215

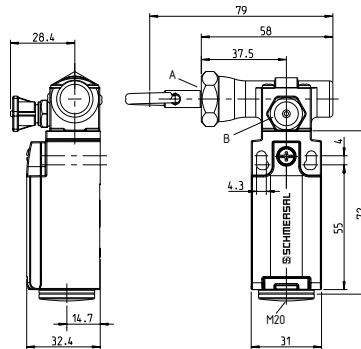


TQ215

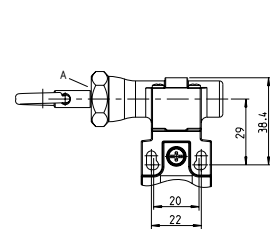


Pulling direction of the towing eye to the left

ZQ215AL

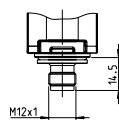


TQ215AL



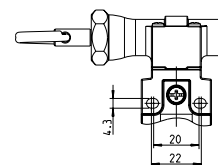
Connector plug M12

Z/TQ215-...-ST

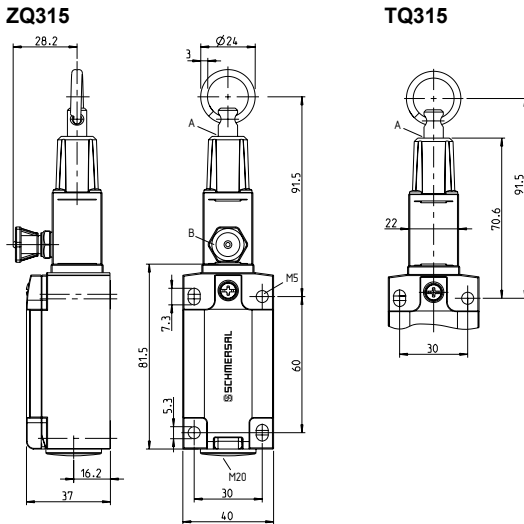


Elongated hole

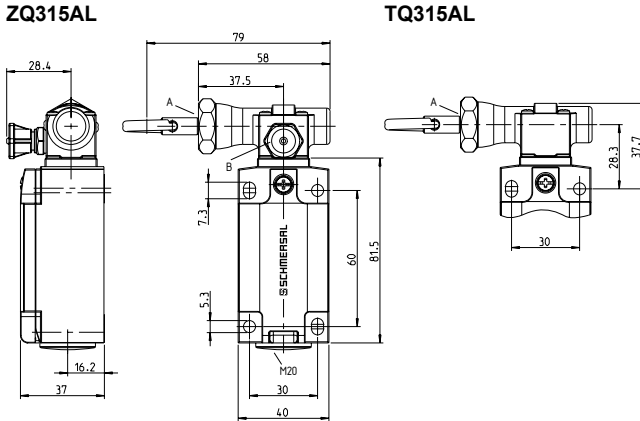
Z/TQ215L



Pulling direction of the towing eye upwards

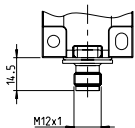


Pulling direction of the towing eye to the left



Connector plug M12

Z/TQ315-...-ST



Key

- A Position indication
- B Release button

4. Electrical connection

4.1 General information for electrical connection



The electrical connection may only be carried out by authorised personnel in a de-energised condition.



Enclosure without protective conductor

All electrical connections must be isolated from the mains either with safety transformers in accordance with IEC 61558-2-6 with output voltage limitation in the event of a fault or by equivalent insulation measures.

1. Cover screws must be loosened
2. Dust shield cap remove
3. Cable glands with an appropriate degree of protection must be used
4. The inside of the switch must be imperatively cleaned (e.g. removal of cable residues), considering that foreign bodies can affect the switching behaviour
5. The cover screws must be tightened uniformly (tightening torque 2.6 Nm)

Settle length x of the conductor: 5 ... 6 mm

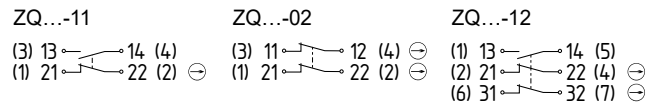


Cable glands with an appropriate degree of protection must be used.

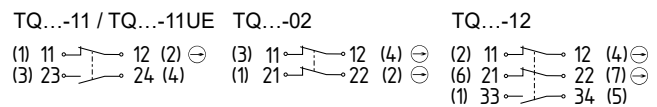
4.2 Contact options

Pin assignment of versions with M12 connector shown in brackets.

Pull-wire emergency stop switch with snap action



Pull-wire switch with slow action



Key

All NC contacts have positive break ⊖.

Connector ST/STM

4-pole



8-pole

(Pin 3: FE*)



* FE and diode only on versions with LED status display (ordering suffix G).

5. Set-up and maintenance

5.1 Functional testing

The safety function of the safety components must be tested. The following conditions must be previously checked and met:

1. Check the correct fitting of the pull-wire emergency stop switch or pull-wire switch
2. Check the integrity of the cable entry and connections
3. Check the switch enclosure for damage
4. Check the functionality of the switch by actuating the wire
5. Check the cable tensioning by means of the position indicator

5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:

1. Check the functionality of the switch by actuating the wire
2. Check the cable entries and the wire connections
3. Remove particles of dust and soiling
4. Check the wire tension through the wire position indication and check the wire and the wire guides for damages and proper fitting



Do not open the device when live.

Damaged or defective components must be replaced.

6. Disassembly and disposal


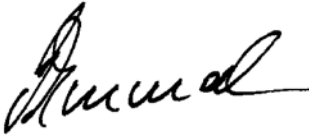
6.1 Disassembly

The safety switchgear must be disassembled in a de-energised condition only.

6.2 Disposal

The safety switchgear must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

7. EU Declaration of conformity

| | | |
|--|--|--|
| EU Declaration of conformity | |  |
| Original | K.A. Schmersal GmbH & Co. KG Möddinghofe 30 42279 Wuppertal Germany Internet: www.schmersal.com | |
| We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives. | | |
| Name of the component: | ZQ215 / ZQ315 ¹⁾ TQ215 / TQ315 ²⁾ | |
| Type: | See ordering code | |
| Description of the component: | Pull-wire emergency stop switch ZQ215 and ZQ315 ¹⁾ , Pull-wire switch TQ215 and TQ315 ²⁾ | |
| Relevant Directives: | ¹⁾ Machinery Directive 2006/42/EC ²⁾ Low Voltage Directive 2011/35/EU RoHS-Directive 2011/65/EU | |
| Applied standards: | EN 60947-5-1:2017 + AC:2020 ¹⁾ EN 60947-5-5:1997 + A1:2005 + A11:2013 + A2:2017 ¹⁾ EN ISO 13850:2015 | |
| Person authorised for the compilation of the technical documentation: | Oliver Wacker Möddinghofe 30 42279 Wuppertal | |
| Place and date of issue: | Wuppertal, April 26, 2023 | |
| ZTQ215-315-B-EN |  | |
| | Authorised signature Philip Schmersal Managing Director | |



The currently valid declaration of conformity can be downloaded from the internet at products.schmersal.com.

