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1. The operating manual

1.1 Information about document  
 This operating manual provides all the information required for installation, initial commissioning, operation, maintenance and disassembly. Keep this operating manual in an accessible place and keep them clearly legible.

1.2 Target Audience  
 This operating manual is intended for trained and authorized specialist personnel. Make sure that you have read and understood this operating manual before installing and operating the appliance and that you are familiar with the applicable regulations on occupational safety and accident prevention.

1.3 Symbol Key  
 Symbols are used in this operating manual to indicate special instructions:

**Failure to observe the warning may result in faults, malfunctions, personal injury or damage to the machine or system.**

1.4 Intended Application  
 The products described here have been developed to perform safety-related functions as part of an overall system or machine. A complete safety-related system usually contains sensors, control units, signaling devices and concepts for safe shutdowns. It is the responsibility of the manufacturer of a system or machine to ensure the correct overall function.

1.5 Safety Instructions  
 The installation, safety and accident prevention regulations applicable in your country as well as the safety instructions in this operating manual must be observed.

1.6 Warning against misuse

**Incorrect or improper use or manipulation of the devices described in this operating manual may result in danger to persons or damage to machines or system components.**

1.7 Disclaimer

Tapeswitch is not in a position to guarantee all properties of a complete system or machine that was not designed by Tapeswitch. The overall concept of the control system in which the device is integrated must be validated by the user. Tapeswitch also accepts no liability for recommendations given or implied by the following description. No new guarantee, warranty or liability claims over and above the general Tapeswitch delivery conditions can be derived from the following description.

2. Produktbeschreibung

2.1 Purpose and use

Ribbon Switches are signaling devices for tactile protective devices.

**A suitable control unit is required to evaluate the signals from the Ribbon Switch.**

When installed and operated correctly, the Ribbon Switch detects a person or part of their body when pressure is applied to the actuating surface. The Ribbon Switch is part of a protective device with proximity reaction (tactile NO contact). It is designed in such a way that, when used with a suitable control unit, it can prevent dangerous situations, such as being caught or crushed on edges in a danger zone. Typical areas of application are covers and doors on machines, medical devices, surgical robots, height-adjustable furniture such as tables or beds, as well as use as a switching element in an additional enclosure to realize an overtravel way (e.g. Tapeswitch Safety Edges and Safety Bumper).

2.2 Overtravel and limits

The maximum length of the Ribbon Switch or the series-connected Ribbon Switches including connection cable is up to max. 200 ohms in the best case, depending on the control unit and the line resistance of the connection cable. Further information on the short-circuit resistance of the Ribbon Switch can be found under 2.3 General technical data.

**Ribbon Switches offer no mechanical overtravel and are only suitable for crushing edge protection without overtravel. This must be observed.**

If overtravel is required for crushing edge protection, this must be realized by additional or other measures. For example, by using a suitable Tapeswitch Safety Edge.

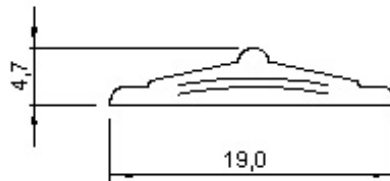
2.3 General technical data

Max. Voltage	30V
Max. Switching Current	1A
Typical Short-Circuit Resistance	0,7Ohm/m
Typical Inductance Value	1,3µH/m
Typical Capacity Value	0,3nF/m
MTTFd	305 years
B10	5,6 x 10 <sup>6</sup>
Airborne noise emission value	<70dB(A)

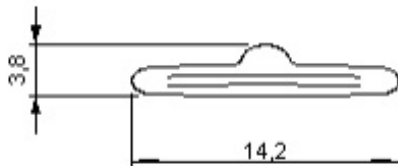
## 2.4 Product-specific technical data

Name not assembled	102A	102B	102BP(A)	102BPH	TS3	C	191S	107BPE(A)	107BPHE
Name assembled	131A	101B	121BP(A)	141BPH	TS3	C	191S	107BPE(A)	107BPHE
Dimensions (WxH) in mm	19 x 4,7	19 x 4,7	14,2 x 3,8	14,2 x 6,8	14,2 x 8,4	14,2 x 4,8	14,2 x 5,0	14,2 x 3,8	14,2 x 6,8
Colors	Grey	Yellow, Black	Green, Black	White, Red	Red, Yellow, Black, White	Blue, Black	Beige	Black gray	Black gray
Bending radius min.	50mm	40mm	4mm	25mm	50mm	5mm	Not flexible	4mm	25mm
Actuating force at 20°C (14 Ø mm test rod)	<26N	<10N gelb <12N schwarz	<5N BP <10N BPA	<8N	<90N	<5N	<5N	<5N BPE <10N BPEA	<7N
Outer material	PVC	PVC	PVC	PVC	PVC	PVC	PVC	MPR	MPR
Protection class	IP65	IP65	IP65	IP65	IP65	IP65	IP65	IP67	IP67
Operating temperature from to, in °C	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-30 to +90	-30 to +90
Weight per metre	75g	75g	65g	100g	120g	68g	50g	75g	100g

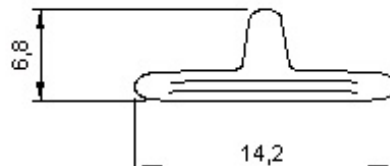
Sketched cross-sections of the Ribbon Switch types (in mm +/- 0.6)



102A, 102B



102BP(A), 107BPE(A), C



102BPH, 107BPHE



TS3

## 2.5 Chemical resistance

Ribbon Switch made of	PVC	MPR
Acetone	-	+
Sodium hydroxide	+/-	+
Diesel oil	-	-
Formaldehyde	+/-	+
Ozone	+/-	+
Acid	+	+
Water	+	+
Benzene	-	-
Mineral oil	+/-	+/-

Values based on 22°C over a period of 24 hours

No liabilities can be derived from this information.

Whether the products are suitable for the specific application and its chemical environmental influences must always be determined by the user's own on-site testing.

## 2.6 Order code

Ribbon Switch Type e.g. 101B / 1 / 2 / 3 / 4 / 5 / 6

1. Length of Ribbon Switch in mm

2. Cable Wiring

Both Ends = FS = Fail-Safe for safety applications

One End = SL = Single Lead no safety applications

3. Length of cable 1 in mm

(standard 500mm)

4. Length of cable 2 in mm

(if FS standard 500mm, otherwise -)

5. Color of Ribbon Switch

Note available colors of the types

(W - white, R - red, BK - black(-gray), Y - yellow, GN - green, GY - gray, BL - blue, BG - beige)

6. Special version

SA = Special version (otherwise empty)

Separate specification of special version

e.g. \* 6,8kOhm, 8,2kOhm or 1,2kOhm resistor fitted \* or \* Diode 1N4006 fitted \* or \* Double adhesive tape fitted \* or \* Fitted Connector(s)

\* or \* .....

Example of an order code: 121BP/1500/FS/0500/0500/GN

### 3. Installation instructions

#### 3.1 General information

Ribbon Switches must always be mounted on a solid surface and can be attached using a suitable adhesive, suitable double-sided industrial adhesive tape or the mounting rails offered for this purpose. The following table shows the available mounting rails for the various Ribbon Switches:

Ribbon Switch Type	Mounting Rail Type
131A	106 Alu
101B	106 Alu
121BP / 121BPA	104 Alu
141BPH	104 Alu
TS3	n/a
C	104 Alu
191S	n/a
107BPE / 107BPEA	104 Alu
107BPHE	104 Alu

If you use mounting rails, we recommend using lubricants such as talcum powder or glycerine when inserting the Ribbon Switch into the mounting rail. In general, improper handling can result in damage to the Ribbon Switch if the Ribbon Switch is inserted incorrectly into the mounting rails.

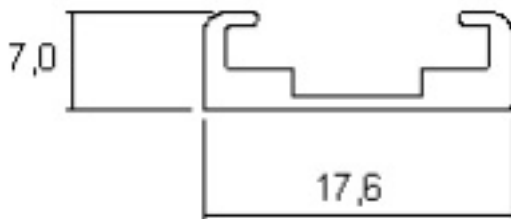


**The connections of the Ribbon Switch do not have any strain relief and are not designed for mechanical loads. The connection cables must be laid securely and strain relief must be provided on site.**

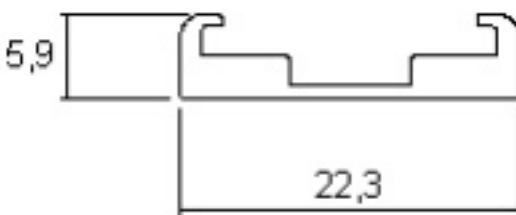
When unpacking, handling, installing and using the Ribbon Switches, always ensure that no mechanical loads are exerted on the connections of the products.

#### 3.2 Dimensions

Mounting rail 104 made of Aluminum:



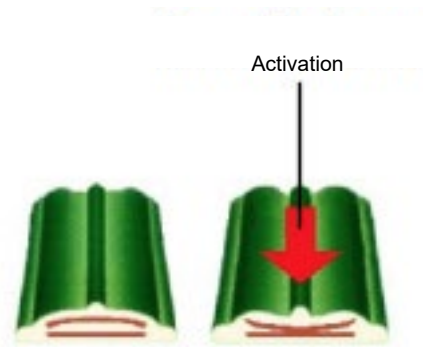
Mounting rail 106 made of Aluminum:



### 4. Electrical connection

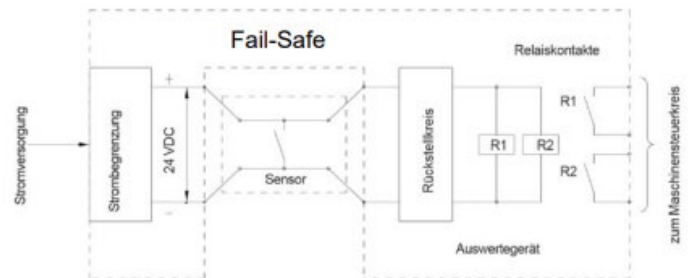
#### 4.1 Overview

Ribbon Switches are based on the decades-old proven switching principle of a closing contact of any length. The Ribbon Switch consists of two copper-plated metal strips that are kept apart by an insulator. Pressure from above causes the two metal strips to touch, resulting in a closed contact.



#### 4.2 The principle of Fail-Safe wiring

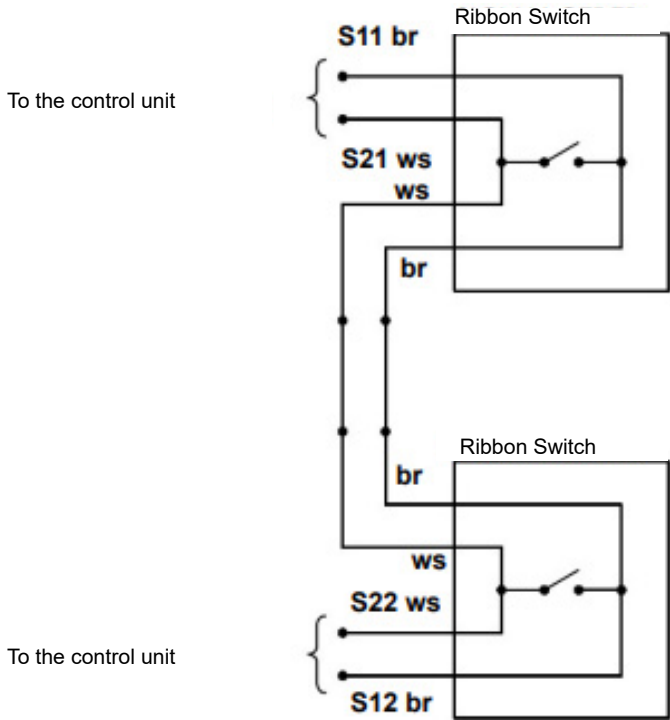
Ribbon Switches that are used for safety-relevant applications must always have fail-safe cable connections. These Ribbon Switches have a cable outlet at both ends. Both cables must be connected to a Tape-switch control unit from the PRSU/-R. series with monitored reset input or PRSU/... with non-monitored reset input, e.g. for automatic resetting. Mode of operation: 24V are supplied to one end of the sensor via a supply voltage with built-in current limitation. From the other end of the sensor, the 24V is fed back to the control unit to the coils of the safety relays. The positively driven contacts of these safety relays are closed when the 24V is applied to the coils of the safety relay via the sensor. If the sensor is actuated, the excitation coils of the safety relay are short-circuited. The relay contacts drop out. The same applies in the event of a power failure or line damage, e.g. due to a short circuit or interruption. In order for the safety contacts to close, the control unit must first be reset.



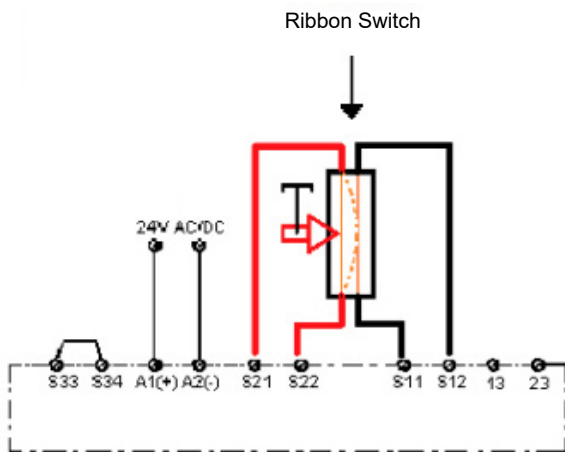
#### 4.3 Series connection

Several Ribbon Switch are connected in series. Several Ribbon Switches can be connected in series and then connected to a control unit. Further information on applicable limits can be found in this operating manual under point 2.2.

When combining several Ribbon Switches, only Ribbon Switches with two 2-wire cables (fail-safe) should be used. To ensure the safety function, the Ribbon Switches are connected in series so that the control unit effectively sees a single open switch. One cable could be regarded as the input cable and the other as the output cable. When several Ribbon Switches are connected together, the output cable of the Ribbon Switch is connected to the input cable of the subsequent Ribbon Switch. This results in a 2-wire input to the first Ribbon Switch and a 2-wire output from the last Ribbon Switch, each of which is connected to the control unit, as shown in the figure below.



#### 4.4 Connection example



The illustration shows the connection of the Ribbon Switch to a control unit type PRSU/2 or PRSU/4. For further information, please refer to the operating instructions for the control unit you are using.

**⚠ The electrical connection must be carried out by authorized specialist personnel.**

### 5. Testing and maintenance

#### 5.1 Function test

Check regularly by manual operation for correct function and visually for damage. Ensure that the Ribbon Switch is securely installed and check the supply cables and strain reliefs for damage.

#### 5.2 Maintenance

The Ribbon Switch is maintenance free.

### 6. Packaging and storage

#### 6.1 Packaging

The Ribbon Switches are usually delivered in disposable cardboard boxes. When unpacking, take care not to damage the Ribbon Switches. For cable lengths over 200 mm, these must be held separately so that no mechanical load can act on the connection points of the Ribbon Switch.

#### 6.2 Storage

We recommend storage in the delivered condition (mostly disposable boxes). Ensure that no heavy goods are placed on the packaging. If it is necessary to repack the Ribbon Switches for storage, adopt the condition from the original delivery (e.g. diameter for rolled Ribbon Switches or storage lengthwise if delivered as such).

### 7. Dismantling and disposal

#### 7.1 Dismantling

Always dismantle the Ribbon Switch when it is de-energized.

#### 7.2 Disposal

Dispose of the Ribbon Switch properly in accordance with your national regulations.



## EG-Konformitätserklärung – Original EC Declaration of conformity – Original

Hersteller: Tapeswitch GmbH  
Manufacturer: Werner-von-Siemens-Str. 14  
D-30982 Pattensen  
Germany

Produktbezeichnung: Bandschalter mit Auswertegerät  
Product description: Tapeswitch with control unit

Bandschalter/Tapeswitch Typ: **101BS, 102A/B, 102BP, 102BPH, 170IS, C, TS3**  
Trägermaterial/Carrier material: PVC  
Bandschalter/Tapeswitch Typ: **107BP, 107BPH, 107SRS, 107BPE, 107BPHE**  
Trägermaterial/Carrier material: Evoprene, Nitrile, Sarlink, MPR, Polyurethane  
Auswertegeräte/Safety relay: **PRSU/2, PRSU/4, PRSU/4-R, PRSU/5**

Der ermittelte MTTFd Wert für die Bandschalter allein = 305 Jahre  
The determined key figure MTTFd of Tapeswitches alone = 305 Years

Der B10 Wert für die Bandschalter allein ist  $5,6 \times 10^6$   
The B10 value for switches alone is  $5,6 \times 10^6$

Die bezeichneten Produkte stimmen mit den grundlegenden Anforderungen der EG-Richtlinie 2006/42/EG überein.  
The designated products comply with the essential requirements of EC Directive 2006/42/EC.

Prüfgrundlagen: EN ISO 13849-1:2015  
Basis of Testing: EN ISO 13856-2:2013

Die genannten Produkte wurden gemäß dem unten genannten Zertifizierungsprogramm bewertet. Sie erfüllen die Anforderungen der spezifizierten Zertifizierungsgrundlage und den o.g. Prüfgrundlagen.  
The mentioned products have been assessed according to the certification program mentioned below. They meet the requirements of the specified certification basis and the above-mentioned test principles.

Zertifizierungsprogramm: P14.1VA001  
Certification program:

Durchgeführt durch: TÜV NORD CERT GmbH  
Performed by: Am TÜV 1  
D-45307 Essen  
[www.tuev-nord-cert.de](http://www.tuev-nord-cert.de)

Benannte Stelle/ Notified Body 0044  
Registrier-Nr./ Registered No. 44 799 14050001-001  
Prüfbericht Nr. / Test report No. 3537 4168

Unterszeichnet im Namen der Tapeswitch GmbH Pattensen 12.06.2024  
Signed on behalf of Tapeswitch GmbH Datum / date:

Holger Freund  
Geschäftsführer und Unterlagenbevollmächtigter  
Managing Director and documentation commissioner

Diese Original – Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der Produktdokumentation sind zu beachten.  
This original declaration confirms the conformity of the mentioned directives but does not comprise any guarantee of the product characteristics. The safety directives of the product documentation are to be considered