



**Application**

Position switches are used wherever moving parts on machinery and plants need to be positioned, controlled and monitored. The design details in relation to body dimensions, materials, electrical loading capacity, rated values and quality characteristics are to a great extent determined by the variety of application, from precision mechanics to heavy engineering.

Design and mode of operation

The gear-switches are suitable for use in the most varied application. In studios and on stages, applications include the control and positioning of carriages, portals and bridges. An important field of application is for the monitoring and control of outriggers, trolleys and lifting movements for cranes. On industrial ovens, gear-switches are used on door and gate control systems. Further applications are to be found on waterways (control of weirs and locks), in environmental protection (sewage plants, flue gas treatment plants), greenhouses and sport stadiums (roof controls).

The belt alignment and slack-wire switches are suitable for use on material handling equipment.

The pull-wire switches are used to give signals to start machines and to open or close electrically driven doors, gates and barriers.

The switches of the special ranges are available with snap or slow action.

On the gear-switches, the cams mounted on the gear shaft actuate the individual contact blocks. By means of the cam movement, the NO contacts are closed and the NC contacts opened.

The belt alignment switches are actuated, when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can be used to switch the equipment off or to provide automatic correction of the belt alignment.

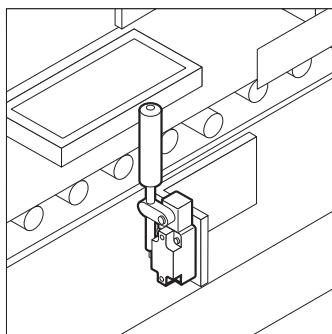
The slack-wire switches monitor the wire rope tension. With correct tension present, the switch is actuated.

The pull-wire switches are manually operated by pulling.

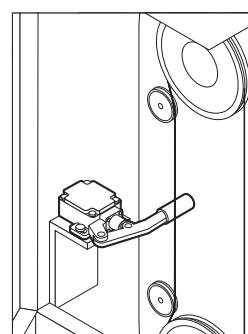
12. Special ranges limit and position switches

Gear-switches	Slack-wire switches	Pull-wire switches
G50/150	<ul style="list-style-type: none"> • 8 contacts, snap or slow action • Metal enclosure with impact-resistant plastic hood • Version G 50-2047, safety gear-switch for stages and studios for example • IP 65 	T/M 441 <ul style="list-style-type: none"> • 2 contacts, slow action • 2 contacts, snap action • Metal enclosure • 2 cable entries • Various lengths of roller on enquiry • IP 65
	Belt alignment switches	ES/EM 41 Z
	M 330 <ul style="list-style-type: none"> • 2 contacts, self-cleaning snap action contacts • Metal enclosure • Mounting details to EN 50041 • Available with LED • 1 cable entry • IP 65 	ES/EM 51 Z <ul style="list-style-type: none"> • 2 contacts, slow action • 2 contacts, snap action • Metal enclosure • Compact design • 1 cable entry • IP 65
	T/M 441	ES/EM 61 Z
	<ul style="list-style-type: none"> • 2 contacts, slow action • 2 contacts, snap action • Metal enclosure • 2 cable entries • Various lengths of roller on enquiry • IP 65 	ES/EM 61 Z-EX <ul style="list-style-type: none"> • 2 contacts, slow action • 2 contacts, snap action • Metal enclosure • 3 cable entries • EEx version available • IP 65
	T/M 250	TQ 441
	<ul style="list-style-type: none"> • 4 contacts, slow action • 4 contacts, snap action • Metal enclosure • 2 cable entries • IP 67 	<ul style="list-style-type: none"> • 2 contacts, slow action • Metal enclosure • 2 cable entries • IP 65/54
		Note
		Technical data for these position and limit switches are shown in tabular form in 12.5

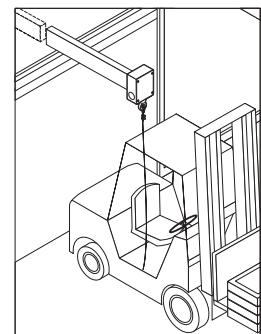
Applications Belt alignment switch



Slack-wire switch



Pull-wire switch



12. Special ranges limit and position switches

Type of switch	Gear-switches	Safety gear-switches	Belt alignment switches	Slack-wire switches	Pull-wire switches
Number of contacts	8	4	2	4	2
Snap action	G 50 12.1.1 G150 12.1.1	G 50-2047 12.1.1	M 441 12.3.1 M 330 12.3.2 M 250 12.3.3	M 250 12.3.3	M 441 12.2.1 EM 41 Z 12.4.1 EM 51 Z 12.4.2 EM 61 Z 12.4.3 EM 61 Z-EX 14.3.1
Slow action			T 441 12.3.1 T 250 12.3.3	T 250 12.3.3	T 441 12.2.1 ES 41 Z 12.4.1 ES 51 Z 12.4.2 ES 61 Z 12.4.3 ES 61 Z-EX 14.3.1 TQ 441 12.4.4

12. Special ranges limit and position switches

**12.1 Gear-switches and
safety gear-switches**

12.1.1 G 50/150

12.1.2 Accessories

12.1.3 Ordering details

12.2 Slack-wire switches

12.2.1 T/M 441

12.3 Belt alignment switches

12.3.1 T/M 441

12.3.2 M 330

12.3.3 T/M 250

12.4 Pull-wire switches

12.4.1 ES/EM 41 Z

12.4.2 ES 51 Z

12.4.3 ES/EM 61 Z and ES/EM 61 Z-EX

12.4.4 TQ 441

12.5 Technical data

12. Special ranges limit and position switches

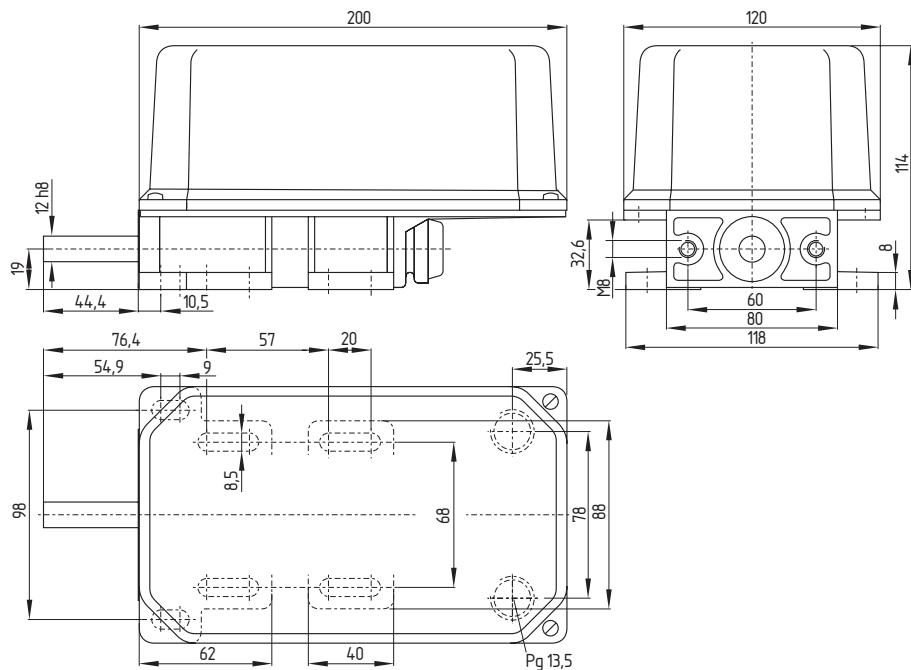
12.1 Gear-switches and safety gear-switches

12.1.1 G 50/150 gear-switches

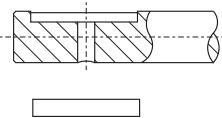


Features

- Snap or slow action
- Metal enclosure with impact-resistant plastic hood
- Version G 50-2047, safety gear-switch for stages and studios to VBG 70
- Various cam shapes for varying switching strokes
- Available for easy adjustment of switching points by setting disk cams from front
- Connecting flange available
- 2 cable entries
- IP 65



Shaft with slot and key



- Ordering suffix -1368-3

Note

Only type G 50 is approved to VBG 70 as safety gear-switch for stages and studios, ordering suffix -2047

Info

- With M 20 x 1.5 cable entry, ordering suffix -M20

Ordering details

A G 50 range gear-switch with gear ratio 1:35, slow action with two contact blocks, each with one NO and one NC contact, on the left and right-hand side and pointed cam:
G 50-035-T22/22y

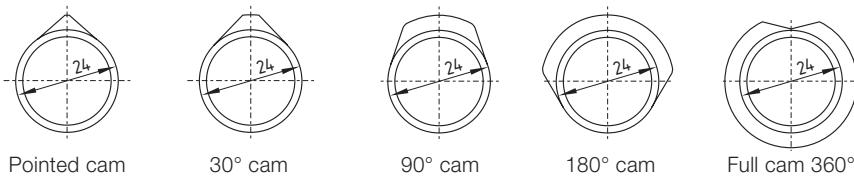
12. Special ranges limit and position switches

12.1 Gear-switches and safety gear-switches

12.1.1 G 50/150 gear-switches

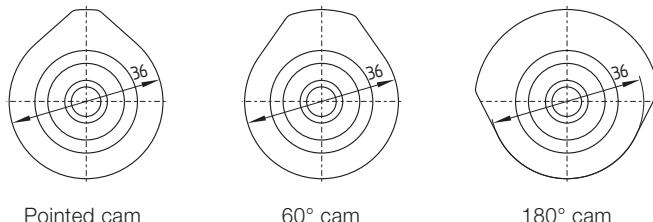
Cam forms

Ø 24 mm



- Standard cam forms: Pointed, 90° and 360° cam
- Max. 8 contact blocks possible
- Suitable for setting from front

Ø 36 mm

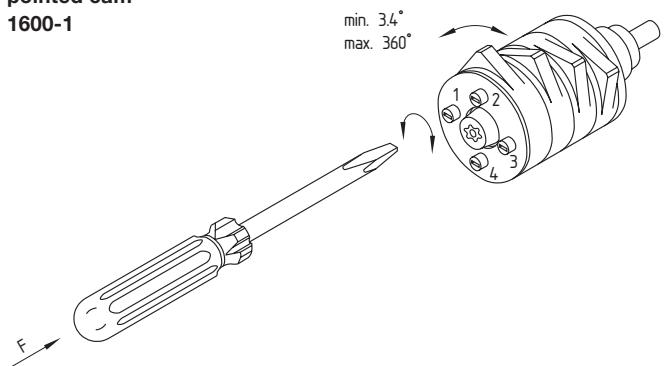


- Max. 4 contact blocks possible

Setting disk cams from front

- Possible on all Ø 24 mm cams
- Min. adjustment 3.4°
- Max. adjustment 360°
- Example with 4 pointed cams
- Other cam combinations on enquiry

Front-setting pointed cam 1600-1



Note

Do not adjust against the switch plunger!

- Max. 4 contact blocks possible with contact block Z 6881, ordering suffix Z and T 6881, ordering suffix T11
- Max. 8 contact blocks possible with contact block M 697, ordering suffix M and T 697, ordering suffix T01

Pointed cam Ø 24 mm

Type/ Gear ratio	Working revolutions				After-travel revolutions				Hysteresis revolutions		Cam move- ment per revolution of shaft	Shaft move- ment per 1° on cam	Drive speed r.p.m.	
Contact block	M	Z	T11	T01	M	Z	T11	T01	M	Z			Min.	Max.
G 50 1:17	16.1	15.4	15.9	16.1	0.9	1.6	1.1	0.9	0.14	0.2	21.20°	17°	0.6	600
G 50 1:25	23.6	22.8	23.4	23.6	1.4	2.2	1.6	1.4	0.2	0.3	14.40°	25°	0.9	600
G 50 1:35	33.1	31.7	32.8	33.1	1.9	3.3	2.2	1.9	0.3	0.5	10.30°	35°	1.2	600
G 50 1:50	47.3	45.3	46.8	47.3	2.7	4.7	3.2	2.7	0.4	0.7	7.20°	50°	1.7	600
G 150 1:75	71.0	68.0	70.2	71.0	4.0	7.0	4.8	4.0	0.6	1.0	4.80°	75°	2.5	600
G 150 1:100	94.5	90.6	93.6	94.5	5.5	9.4	6.4	5.5	0.8	1.3	3.60°	100°	3.4	600
G 150 1:150	141.7	136.0	140.4	141.7	8.3	14.0	9.6	8.3	1.2	2.0	2.40°	150°	5.0	600
G 150 1:220	208.0	199.4	206.0	208.0	12.0	20.6	14.0	12.0	1.8	3.0	1.64°	220°	7.3	600
G 150 1:300	283.5	272.0	280.8	283.5	16.5	28.0	19.2	16.5	2.4	4.0	1.20°	300°	10.0	600
G 150 1:450	425.2	407.9	421.2	425.2	24.8	42.1	28.8	24.8	3.6	6.0	0.80°	450°	15.0	600

12. Special ranges limit and position switches

12.1 Gear-switches and safety gear-switches

12.1.1 G 50/150 gear-switches

90° cam Ø 24

Type/ Gear ratio	Working revolutions				After-travel revolutions				Hysteresis revolutions		Cam move- ment per revolution of shaft	Shaft move- ment per 1° on cam	Drive speed r.p.m.	
	Contact block		M	Z	T11	T01	M	Z	T11	T01	M	Z	Min.	Max.
G 50 1:17		13.2	12.5	13.1	13.2	3.8	4.6	4.0	3.9	0.14	0.2	21.20°	17°	0.6 600
G 50 1:25		19.4	18.4	19.2	19.4	5.6	6.7	5.9	5.8	0.2	0.3	14.40°	25°	0.9 600
G 50 1:35		27.2	25.8	26.9	27.2	7.9	9.4	8.2	8.0	0.3	0.5	10.30°	35°	1.2 600
G 50 1:50		38.9	36.9	38.4	38.9	11.3	13.4	11.7	11.6	0.4	0.7	7.20°	50°	1.7 600
G 150 1:75		58.3	55.3	57.6	58.3	16.9	20.0	17.6	17.4	0.6	1.0	4.80°	75°	2.5 600
G 150 1:100		77.7	73.8	76.8	77.7	22.6	26.8	23.5	23.2	0.8	1.3	3.60°	100°	3.4 600
G 150 1:150		116.6	110.7	115.2	116.6	34.0	40.0	35.0	34.0	1.2	2.0	2.40°	150°	5.0 600
G 150 1:220		171.0	162.3	169.0	171.0	50.0	59.0	52.0	51.0	1.8	3.0	1.64°	220°	7.3 600
G 150 1:300		233.0	221.3	230.4	233.0	68.0	80.0	71.0	70.0	2.4	4.0	1.20°	300°	10.0 600
G 150 1:450		349.7	332.0	345.6	349.7	102.0	121.0	106.0	105.0	3.6	6.0	0.80°	450°	15.0 600

180° cam Ø 24

Type/ Gear ratio	Working revolutions				After-travel revolutions				Hysteresis revolutions		Cam move- ment per revolution of shaft	Shaft move- ment per 1° on cam	Drive speed r.p.m.	
	Contact block		M	Z	T11	T01	M	Z	T11	T01	M	Z	Min.	Max.
G 50 1:17		8.5	7.9	8.4	8.5	8.5	9.1	8.6	8.5	0.14	0.2	21.20°	17°	0.6 600
G 50 1:25		12.6	11.6	12.3	12.6	12.4	13.4	12.7	12.4	0.2	0.3	14.40°	25°	0.9 600
G 50 1:35		17.6	16.2	17.3	17.6	17.4	18.8	17.7	17.4	0.3	0.5	10.30°	35°	1.2 600
G 50 1:50		25.1	23.2	24.7	25.1	24.9	26.8	25.3	24.9	0.4	0.7	7.20°	50°	1.7 600
G 150 1:75		37.7	34.7	37.0	37.7	37.3	40.3	38.0	37.3	0.6	1.0	4.80°	75°	2.5 600
G 150 1:100		50.2	46.3	49.3	50.2	49.8	53.7	50.7	49.8	0.8	1.3	3.60°	100°	3.4 600
G 150 1:150		75.4	69.5	74.0	75.4	74.6	80.5	76.0	74.6	1.2	2.0	2.40°	150°	5.0 600
G 150 1:220		110.5	101.9	108.5	110.5	109.5	118.1	111.5	109.5	1.8	3.0	1.64°	220°	7.3 600
G 150 1:300		150.7	139.0	148.0	150.7	149.3	161.0	152.0	149.3	2.4	4.0	1.20°	300°	10.0 600
G 150 1:450		226.1	208.4	221.9	226.1	223.9	241.6	228.1	223.9	3.6	6.0	0.80°	450°	15.0 600

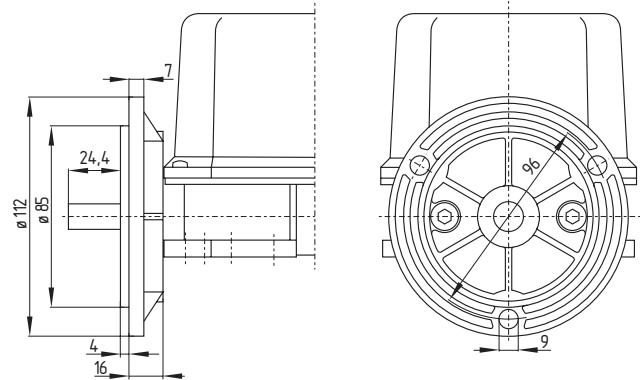
360° cam Ø 24

Type/ Gear ratio	Working revolutions				After-travel revolutions				Hysteresis revolutions		Cam move- ment per revolution of shaft	Shaft move- ment per 1° on cam	Drive speed r.p.m.	
	Contact block		M	Z	T11	T01	M	Z	T11	T01	M	Z	Min.	Max.
G 50 1:17		1.6	1.0	1.5	1.6	15.4	16.0	15.5	15.4	0.14	0.2	21.20°	17°	0.6 600
G 50 1:25		2.4	1.5	2.2	2.4	22.6	23.5	22.8	22.6	0.2	0.3	14.40°	25°	0.9 600
G 50 1:35		3.4	2.1	3.1	3.4	31.6	32.9	31.9	31.6	0.3	0.5	10.30°	35°	1.2 600
G 50 1:50		4.8	3.0	4.4	4.8	45.2	47.0	45.6	45.2	0.4	0.7	7.20°	50°	1.7 600
G 150 1:75		7.3	4.5	6.6	7.3	67.7	70.5	68.4	67.7	0.6	1.0	4.80°	75°	2.5 600
G 150 1:100		9.7	6.0	8.8	9.7	90.3	94.0	91.2	90.3	0.8	1.3	3.60°	100°	3.4 600
G 150 1:150		14.5	9.0	13.2	14.5	135.5	141.0	136.8	135.5	1.2	2.0	2.40°	150°	5.0 600
G 150 1:220		21.3	13.1	19.4	21.3	198.7	206.9	200.6	198.7	1.8	3.0	1.64°	220°	7.3 600
G 150 1:300		29.0	17.9	26.5	29.0	271.0	282.1	273.5	271.0	2.4	4.0	1.20°	300°	10.0 600
G 150 1:450		43.5	26.9	39.7	43.5	406.5	423.1	410.3	406.5	3.6	6.0	0.80°	450°	15.0 600

12. Special ranges limit and position switches
12.1 Gear-switches and safety gear-switches
12.1.2 Accessories for G 50/150 gear-switches

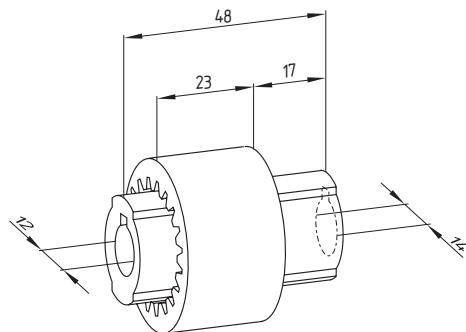
Flange FL 1

Ordering suffix -FL1



Bowex coupling

- Shaft diameters $d_1 = 12$ mm and $d_2 = 14$ mm, ordering suffix -1368-2
- Also available for shaft diameters $d_1 = 12$ mm and $d_2 = 12$ mm, ordering suffix -1368-4



12. Special ranges limit and position switches
12.1 Gear-switches and safety gear-switches
12.1.3 Ordering details

		Side mounted Left/Right
Gear-switch		G 50- G 150-
Gear ratio i, e.g. 1:100		100-
Switching system: Snap action M	M M	
Snap action, positive break Z	Z Z	
Slow action, positive break T	T T	
Number of contacts, 1st numeral NO		
2nd numeral NC		
Left-hand side (seen from shaft end)	22	
Right-hand side (seen from shaft end)	22	
Protection class IP 65		y
Connecting flange: FL 1, FL 2		-FL1
Cam form, e.g. front-setting pointed cam		-1600-1
		G 150-100-M22/Z22y-FL1-1600-1
Ordering details	G 150 range gear-switch with gear ratio 1:100, snap action with two contact blocks, each with one NO and one NC contact, on the left and on the right- hand side, pointed cam and IP 65	G 150-100-M22/22y
	G 50 range gear-switch with gear ratio 1:35, slow action with two contact blocks, each with one NO and one NC contact, on the left and on the right- hand side, pointed cams and IP 65	G 50-035-T22/22y
	G 150 range gear-switch with gear ratio 1:100, positive break, snap action with two contact blocks, each with one NO and one NC contact, on the left- hand side and snap action with two contact blocks, each with one NO and one NC contact, on the right- hand side, protection class IP 65, with FL 1 connecting flange and front-setting pointed cams	G 150-100-Z22/M22y-FL1-1600-1
	G 50 range gear-switch with gear ratio 1:50, positive break, snap action with one contact block (with one NO and one NC contact) in positive break slow action and with one contact block (with one NO and one NC contact) in snap action on the left-hand side and with two contact blocks (each with one NO and one NC contact) in positive break snap action on the right-hand side, protection class IP 65 and front- setting pointed cams	G 50-050-T11/M11/Z22y-1600-1

12.

Special ranges limit and position switches

12.2

Slack-wire switches

12.2.1

T/M 441 range

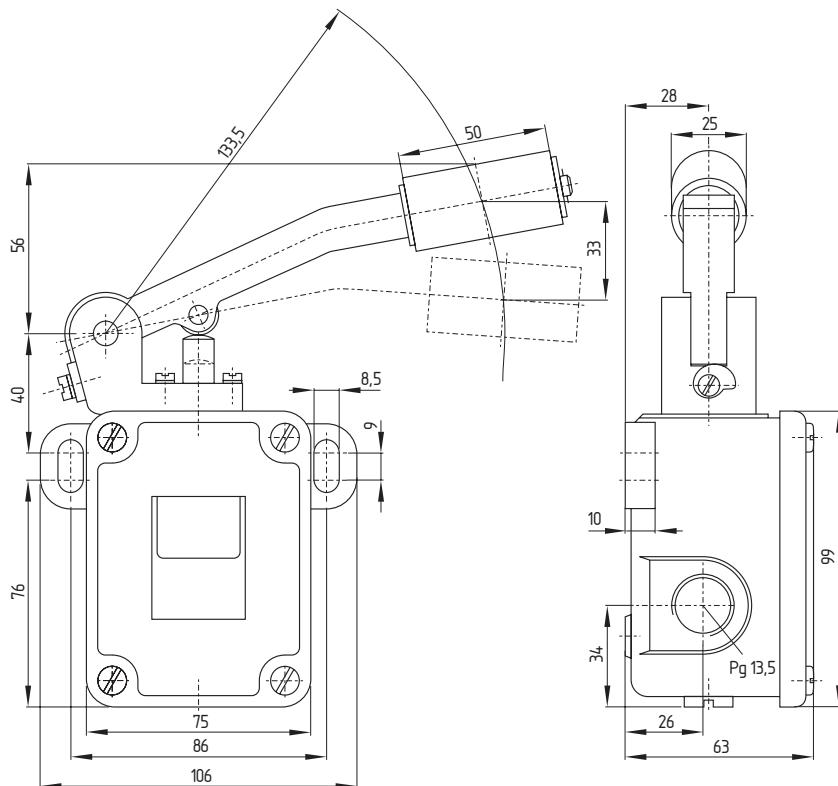


Features

- Metal enclosure
- Slow action,
1 change-over contact, double break
- Snap action,
1 change-over contact, double break
- 2 cable entries
- IP 65
- Suitable for heavy duty

Info

- Tropical version with ceramic insulation, ordering suffix k
- Temperature-resistant and tropical version, ceramic insulation for $-40^{\circ}\text{C}...+200^{\circ}\text{C}$, ordering suffix t
- Available with overlapping contacts, ordering suffix ü
- With gold-plated contacts (0.3 μm), ordering suffix -1276

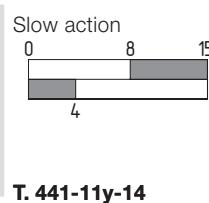


Contacts/
Switch travel

1 NO
1 NC



1 NO
1 NC



12. Special ranges limit and position switches
12.3 Belt alignment switches
12.3.1 T/M 441 range

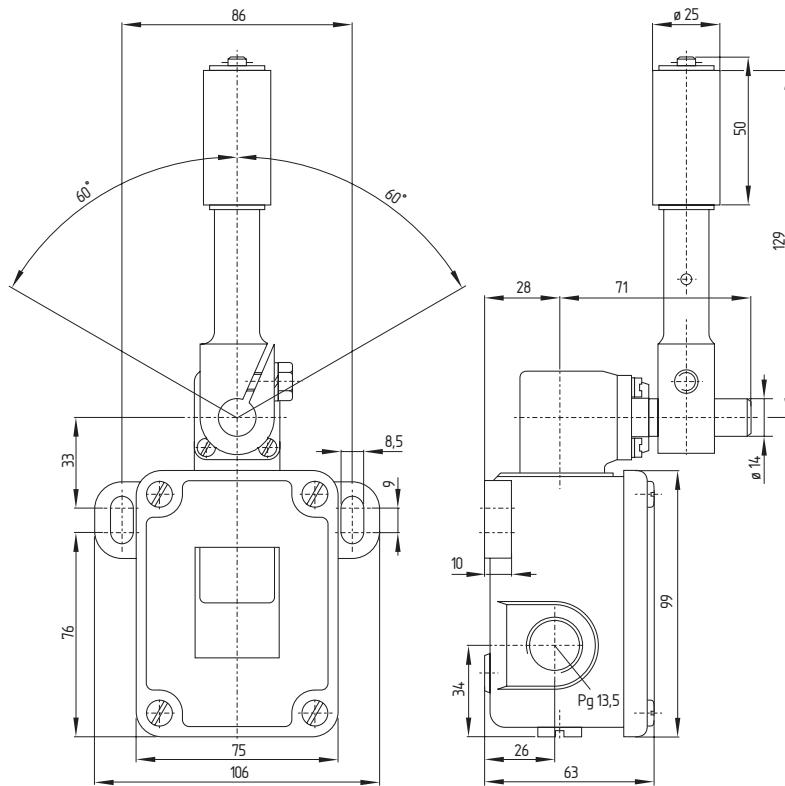


Features

- Metal enclosure
- Slow action,
1 change-over contact, double break
- Snap action,
1 change-over contact, double break
- 2 cable entries
- IP 65
- Suitable for heavy duty

Info

- Tropical version with ceramic insulation, ordering suffix k
- Temperature-resistant and tropical version, ceramic insulation for $-40^{\circ}\text{C}...+200^{\circ}\text{C}$, ordering suffix t
- Available with overlapping contacts, ordering suffix ü
- With gold-plated contacts (0.3 μm), ordering suffix -1276

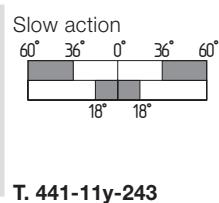
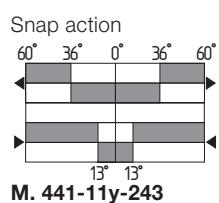


**Contacts/
Switch travel**

**1 NO
1 NC**



**1 NO
1 NC**



12. Special ranges limit and position switches
12.3 Belt alignment switches
12.3.2 M 330 range

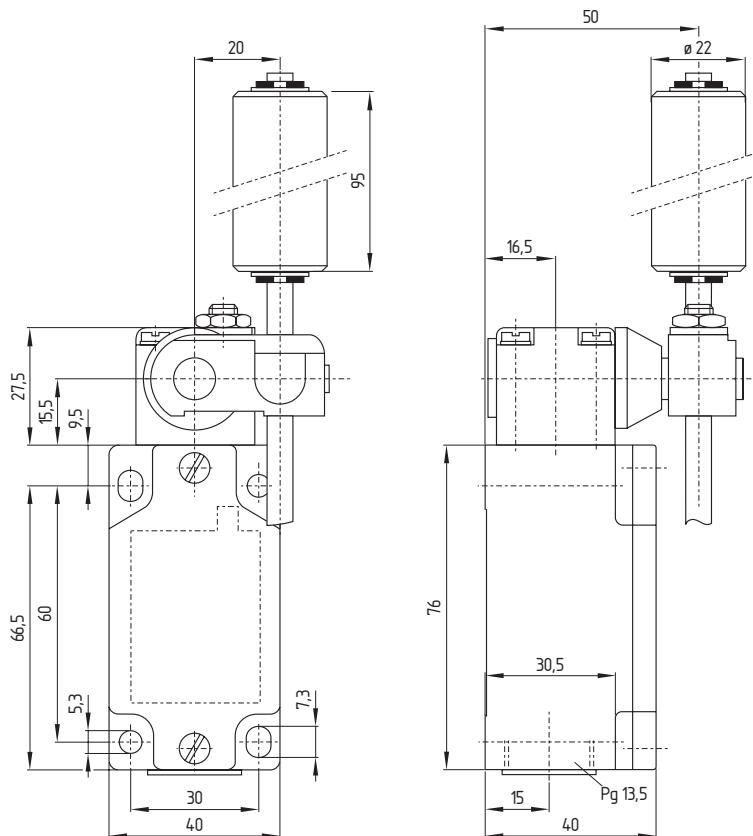


Features

- Metal enclosure
- 2 contacts
- Snap action self-cleaning contacts
- Mounting details to EN 50041
- Adjustable-length rod lever with nylon roller
- Available with LED's
- 1 cable entry
- IP 65
- For light to medium duty
- Patented low-wear actuator head

Info

- With M 20 x 1.5 cable entry, ordering suffix -M20



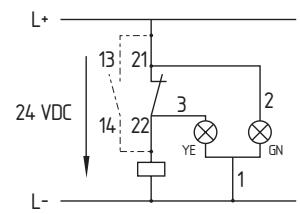
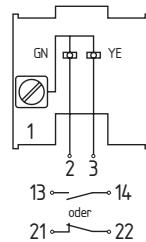
12. Special ranges limit and position switches

12.3 Belt alignment switches

12.3.1 M 330 range

LED version

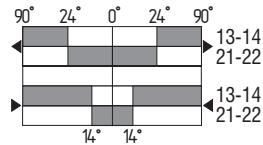
- Power supply on, green (GN)
- Switch position indication, yellow (YE)
- Protected against incorrect polarity and voltage spikes, ordering suffix G24



Contacts/ Switch travel

1 NO
1 NC

13-14
21-22



Snap action

MV10H 330-11y-1348

12. Special ranges limit and position switches
12.3 Belt alignment switches
12.3.3 T/M 250 range



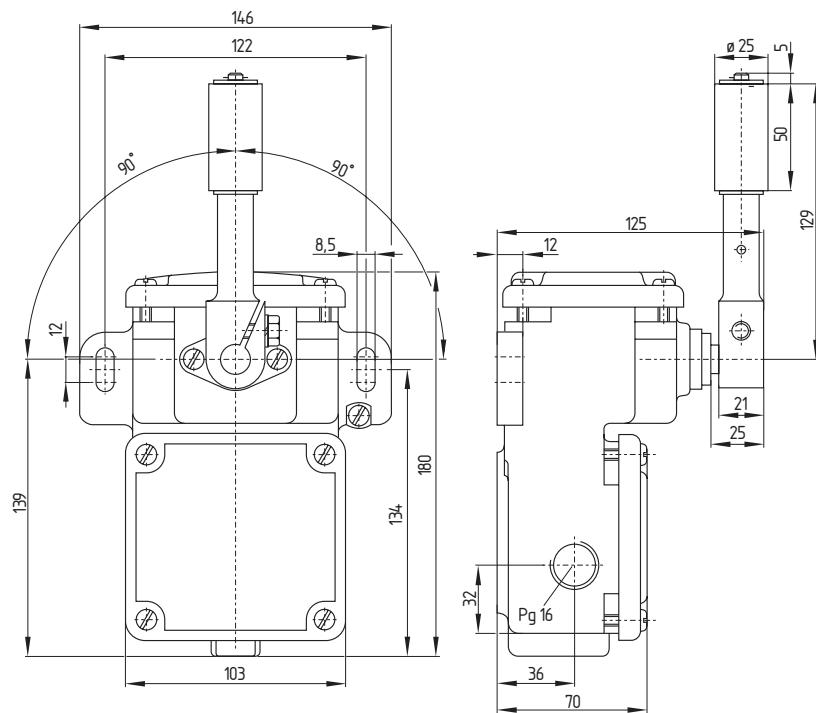
Features

- Metal enclosure
- Slow action, change-over contact, double break
- Snap action, change-over contact, double break
- 2 cable entries
- Lever available with various lengths of roller
- IP 67

Info

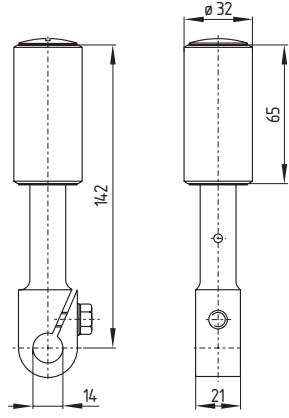
- Tropical version with ceramic insulation, ordering suffix k
- Temperature-resistant and tropical version, ceramic insulation for $-40^{\circ}\text{C}...+200^{\circ}\text{C}$, ordering suffix t
- Available with overlapping or staggered contacts
- With gold-plated contacts ($0.3\ \mu\text{m}$), ordering suffix -1276

with belt alignment lever 243

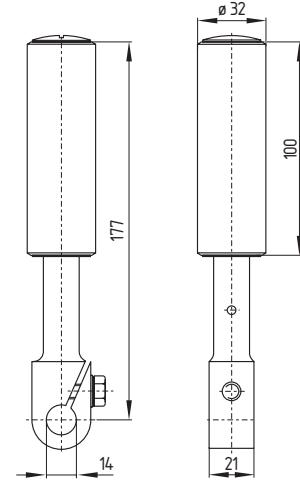


12. Special ranges limit and position switches
12.3 Belt alignment switches
12.3.3 T/M 250 range

Belt alignment lever 966



Belt alignment lever 1224



Ordering details

T/M 250 range alignment switch for conveyor belts, snap action with two NO and two NC contacts and lever 966:
M.250-22z-966

**Contacts/
Switch travel**

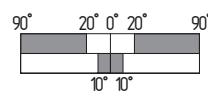
1 NO
1 NC



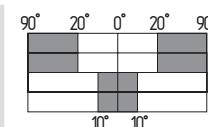
2 NO
2 NC



Slow action

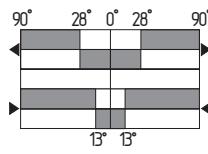


T. 250-11z-243

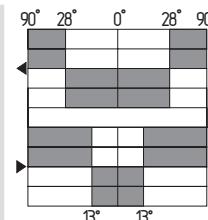


T. 250-22z-243

Snap action



M. 250-11z-243



M. 250-22z-243

12. Special ranges limit and position switches
12.4 Pull-wire switches
12.4.1 ES/EM 41 Z range

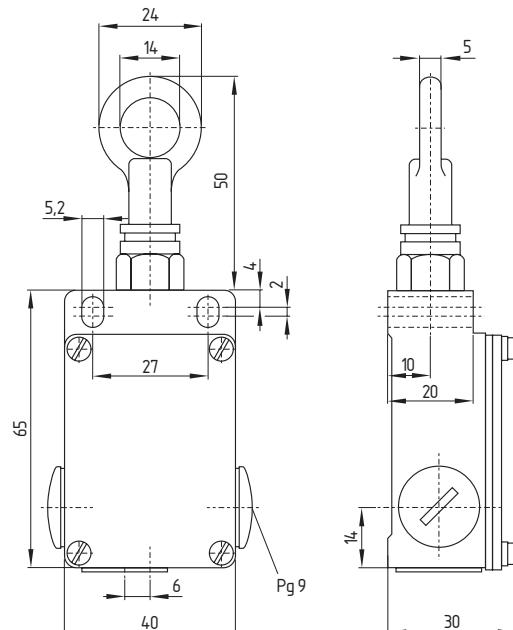


Features

- Metal enclosure
- Slow action with 2 contacts
- Snap action with 2 contacts
- 3 cable entries
- External watertight collar available
- IP 65

Info

- Plastic cover available
- Available in various spring pressure (actuating force) variants
- EEx version available



**Contacts/
Switch travel**

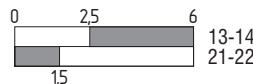
**1 NO
1 NC**

13—
21—
14—
22—

2 NO

13—
23—
14—
24—

Slow action



Standard version
With watertight collar

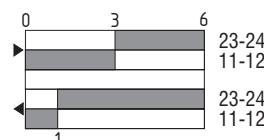
**ES 41 Z
ES 41 WZ**

**ES 41 Z 2S
ES 41 WZ 2S**

**1 NO
1 NC**

23—
11—
24—
12—

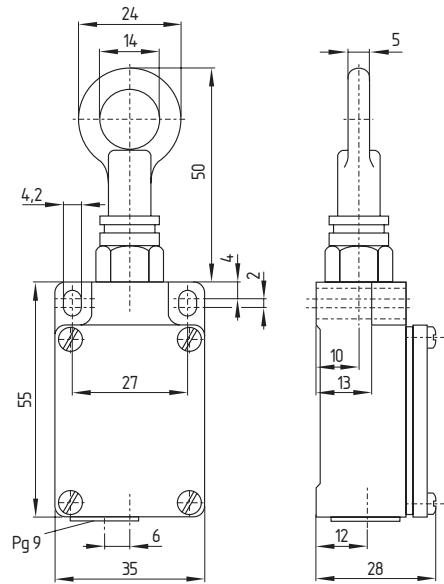
Snap action



Standard version
With watertight collar

**EM 41 Z
EM 41 WZ**

12. Special ranges limit and position switches
12.4 Pull-wire switches
12.4.2 ES 51 Z range



Features

- Metal enclosure
- Slow action with 2 contacts
- Small design
- 1 cable entry
- External watertight collar available
- IP 65

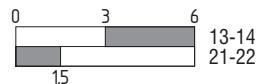
Info

- Available in various spring pressure (actuating force) variants

**Contacts/
Switch travel**

1 NO	13— 14
1 NC	21— 22

Slow action



Standard version
With watertight collar

ES 51 Z
ES 51 WZ

12. Special ranges limit and position switches
12.4 Pull-wire switches
12.4.3 ES/EM 61 Z and ES/EM 61 Z-EX range

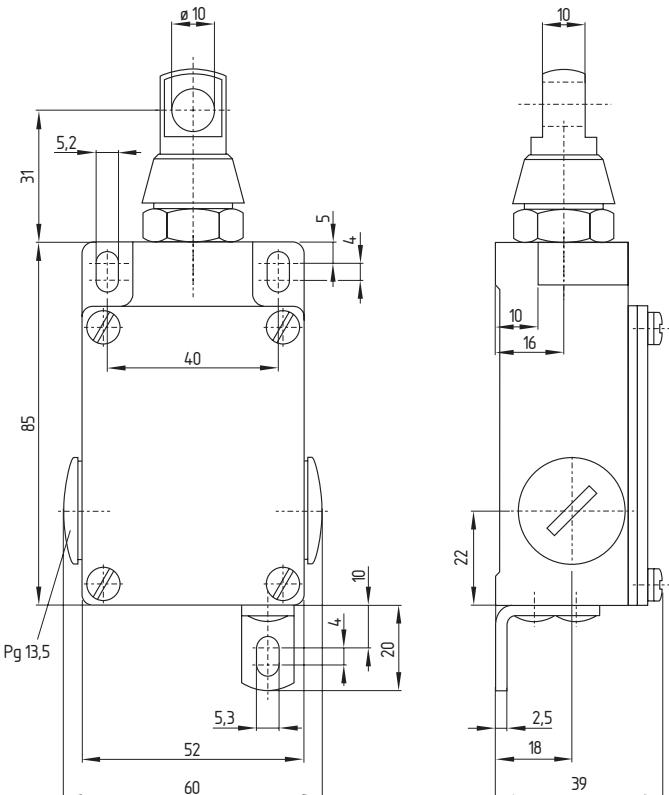


Features

- Metal enclosure
- Slow action with 2 contacts
- Snap action with 2 contacts
- ES/EM 61 Z: 3 cable entries
- ES/EM 61 Z-EX: connecting cable 3 m long
- IP 65

Info

- Available in various spring pressure (actuating force) variants
- Additional mounting angle available



**Contacts/
Switch travel**

**1 NO
1 NC**

13—
21—
14
22

2 NO

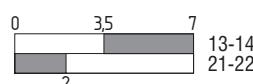
**1 NO
1 NC**

13—
23—
14
24

1 NO

BN 23—
BK 11—
24 BU
12 BK

Slow action



Standard version

ES 61 Z

ES 61 Z 2S

ES 61 Z-EX



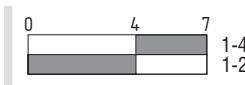
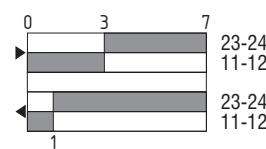
**1 NO
1 NC**

23—
11—
24
12

**Change-over
contact**

4 BN
1 BU—
2 BK

Snap action



Standard version

EM 61 Z

EM 61 Z-EX



12. Special ranges limit and position switches
12.4 Pull-wire switches
12.4.3 ES/EM 61 Z and ES/EM 61 Z-EX range



With watertight collar

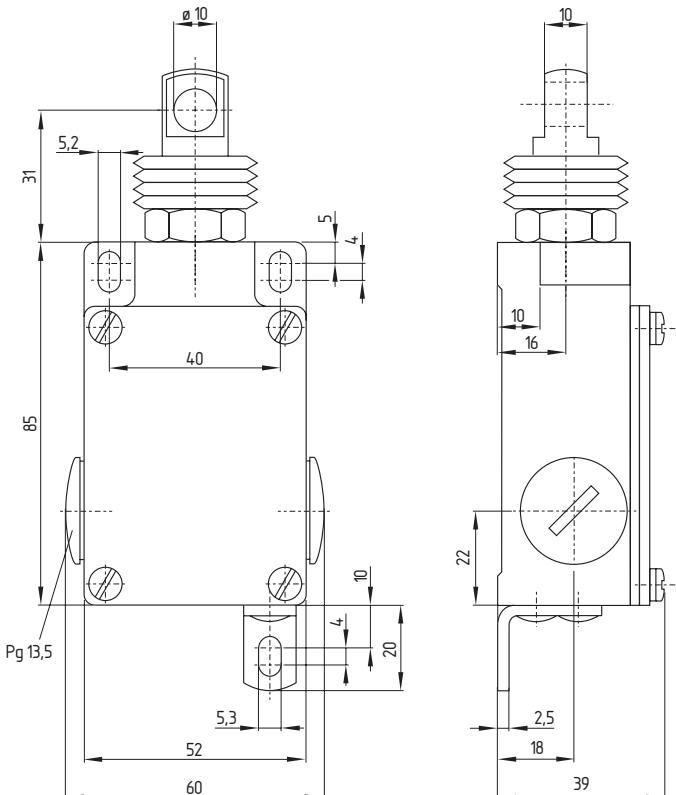


Features

- Metal enclosure
- Slow action with 2 contacts
- Snap action with 2 contacts
- ES/EM 61 Z: 3 cable entries
- ES/EM 61 Z-EX: connecting cable 3 m long
- Collar to protect against the entry of foreign bodies
- IP 65

Info

- Available in various spring pressure (actuating force) variants
- Additional mounting angle available



**Contacts/
Switch travel**

1 NO
1 NC

13—
21—
14—
22—

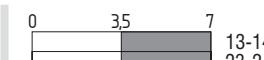
2 NO

13—
23—
14—
24—

1 NO
1 NC

BN 23—
BK 11—
24 BU
12 BK

Slow action



Standard version

ES 61 WZ

ES 61 WZ 2S

ES 61 WZ-EX



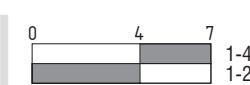
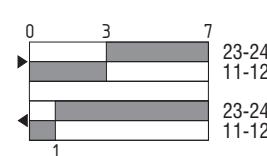
Snap action

1 NO
1 NC

23—
11—
24—
12—

**Change-over
contact**

1 BN
BU—
2 BK



Standard version

EM 61 WZ

EM 61 WZ-EX

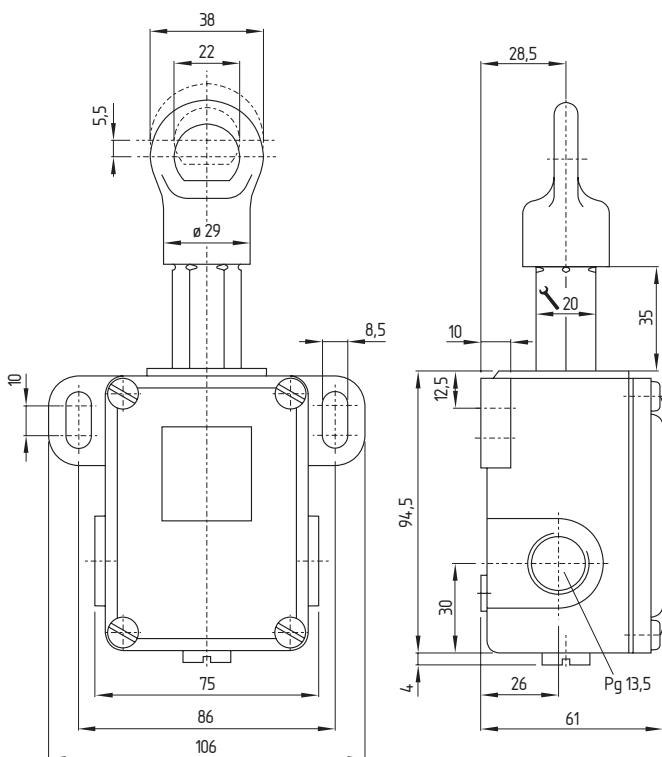


12. Special ranges limit and position switches
12.4 Pull-wire switches
12.4.4 TQ 441 range



Features

- Metal enclosure
- 2 contacts
- 2 cable entries
- Wire up to 25 m long
- Push button or key reset possible
- Available for various actuating forces

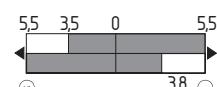


**Contacts/
Switch travel**

**1 NO
1 NO**



Standard version,
without latching
Latching, push button reset
Latching, key reset



TQ 441-01/01 yü
TQ 441-01/01 yür
TQ 441-01/01 xürs

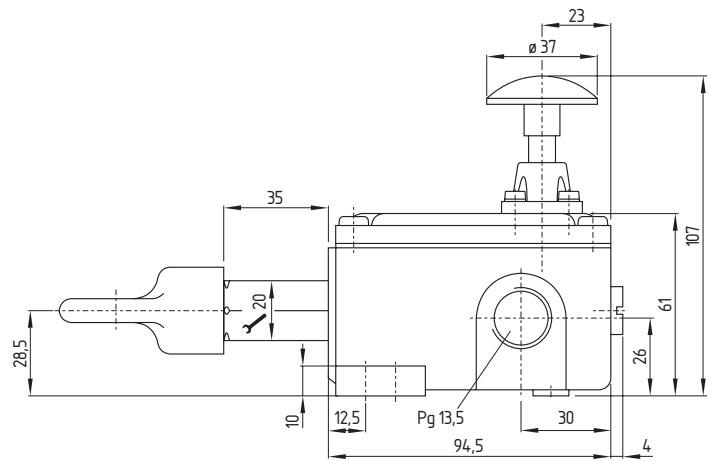
12. Special ranges limit and position switches

12.4 Pull-wire switches

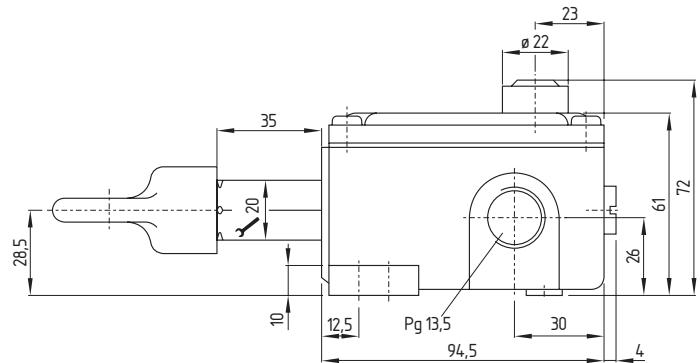
12.4.4 TQ 441 range



**Push button
reset**



Key reset



Accessories Accessories for the pull-wire switches are shown in 6.1.3

Ordering details TQ 441 range pull-wire switch, key reset type, with one NO and one NC contact:
TQ 441-01/01 xürs

12. Special ranges limit and position switches

12.5 Technical data

G 50/G 150

Standards:	IEC/EN 60947-5-1; VBG 70
Enclosure material:	Light alloy die-casting
Cover:	Polyester
Protection class:	IP 65 to IEC/EN 60529
Contact material:	Silver
Rough switching point setting:	Standard: 4° steps to 360° on the disk cams; Front setting: 3.4° steps
Fine switching point setting:	Max. 0.5 turns
Gear ratio:	G 50: 1:50, 1:35, 1:25, 1:17 G 150: 1:150, 1:75, 1:100, 1:220, 1:300, 1:450
Contact blocks:	Max. 8 on M/T 697; Max. 4 with cams Ø 36 mm G 50-050 and G 150-150: Z/T 6881 (otherwise additional 1:1 ratio required)
Contact type:	M 697: 1 Change-over contact T 697: 1 NC, double break Z/T 6881: Change-over contact \ominus with galvanically separated contact bridges \ominus
Switching system:	Snap and slow action
Termination:	M/T 697: Screw terminals M 3 Z/T 6881: Screw terminals M 3.5
Cable size:	Max. 2.5 mm ² (incl. conductor ferrules)
Rated impulse withstand voltage U _{imp} :	4 kV
Rated insulation voltage U _i :	250 V
Thermal test current I _{th} :	M/T 697: 6 A, Z/T 6881: 10 A
Rated operating current/voltage I _e /U _e :	M/T 697: 4 A/230 VAC Z/T 6881: 2.5 A/230 VAC
Utilisation category:	AC-15
Max. fuse rating:	M/T 697: 10 A (slow blow), 16 A (quick blow) Z/T 6881: 6 A gL/gG D-fuse
Switchover time:	M 697: \leq 10 ms Z 6881: \leq 5 ms
Bounce duration:	–
Ambient temperature:	– 30 °C ... + 80 °C
Mechanical life:	M/T 697: 30 million operations Z/T 6881: > 1 million operations
Switching frequency:	M/T 697: 10,000/h Z/T 6881: 3,000/h

CE

12. Special ranges limit and position switches

12.5 Technical data

	M 330	T/M 441	T/M 250
Standards:	IEC/EN 60947-5-1		
Enclosure and cover material:	Light alloy die-casting, chromated and painted	Cast iron, galvanised, chromated and painted	
Protection class:	IP 65 to IEC/EN 60529		IP 67
Contact material:	Silver		
Contact type:	1 Change-over contact, double break with 2 separate contact bridges, same potential	Snap action: 1 Change-over contact, Slow action: Positive break NC contact \ominus , double break with 2 separate contact bridges	
Switching system:	Snap action with self-cleaning contacts	Snap and slow action	
Termination:	Screw terminals M 3.5	Screw terminals M 4	
Cable size:	Max. 2.5 mm ² (incl. conductor ferrules)		
Rated impulse withstand voltage U _{imp} :	4 kV	6 kV	
Rated insulation voltage U _i :	250 V	400 V	500 V
Thermal test current I _{th} :	6 A	16 A	
Rated operating current/voltage I _e /U _e :	2.5 A/230 VAC	4 A/400 VAC	
Utilisation category:	AC-15		
Max. fuse rating:	10 A (slow blow), 16 A (quick blow)	25 A (slow blow), 16 A (slow blow) as positive break position switch	
Contact break:	Max. 2 x 0.5 mm	Snap action: Max. 2 x 2.5 mm Slow action: Max. 2 x 6 mm	Snap action: Max. 2 x 2.5 mm Slow action: Max. 2 x 2 mm
Switchover time:	\leq 10 ms (with actuating speed of 10 mm/min on plunger)	\leq 35 ms	
Bounce duration:	\leq 1.5 ms	\leq 5 ms	
Ambient temperature:	- 30 °C ... + 90 °C		
Mechanical life:	> 30 million operations	10 million operations	
Switching frequency:	Max. 3,000/h		
Repeat accuracy of switching points:	± 0.02 mm on plunger	-	-

CE

12. Special ranges limit and position switches

12.5 Technical data

	ES/EM 41 Z	ES 51 Z	ES/EM 61 Z	TQ 441
Standards:	IEC/EN 60947-5-1			
Enclosure material:	Light alloy die-casting, painted			
Cover:	Steel, painted			
Protection class:	IP 65 to IEC/EN 60529			IP 65; key reset: IP 54
Contact material:	Silver			
Contact type:	1 Change-over contact, double break with 2 separate contact bridges, positive break NC contacts \ominus			
Switching system:	Slow or snap action	Slow action with self-cleaning contacts	Slow or snap action	Slow action, positive break \ominus
Termination:	Screw terminals M 3.5	Screw terminals M 3	Screw terminals M 3.5	Screw terminals
Cable size:	Max. 2.5 mm ² (incl. conductor ferrules)			Max. 4 mm ² (incl. conductor ferrules)
Rated impulse withstand voltage U_{imp} :	4 kV	–	6 kV	4 kV
Rated insulation voltage U_i :	400 V			
Thermal test current I_{th} :	10 A			
Rated operating current/voltage I_e/U_e :	6 A/400 V	4 A/400 V	ES 61 Z: 16 A/400 V EM 61 Z: 10 A/400 V	4 A/380 V
Utilisation category:	AC-15			
Max. fuse rating:	6 A (slow blow)	4 A (slow blow)	ES 61 Z: 16 A (slow blow) EM 61 Z: 10 A (slow blow)	25 A (slow blow)
Contact break:	–			
Switchover time:	–			
Bounce duration:	–			
Ambient temperature:	– 20 °C ... + 80 °C			– 30 °C ... + 90 °C
Mechanical life:	> 10 million operations			30,000 operations
Switching frequency:	3,600/h			
Repeat accuracy of switching points:	–			
CE				