Safety Edges

Contents

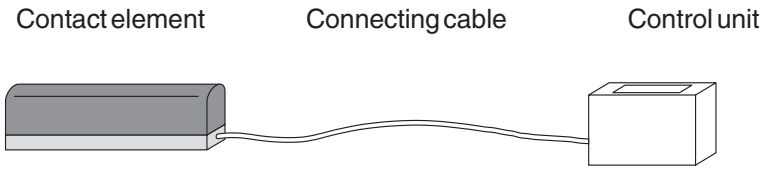
MAYSER Polymer Electric P.O. Box 30 48 89020 Ulm Germany Tel. +49 731 2061-0 Fax +49 731 2061-222

Proven Safety

Safety Edges Definitions

2.1.1

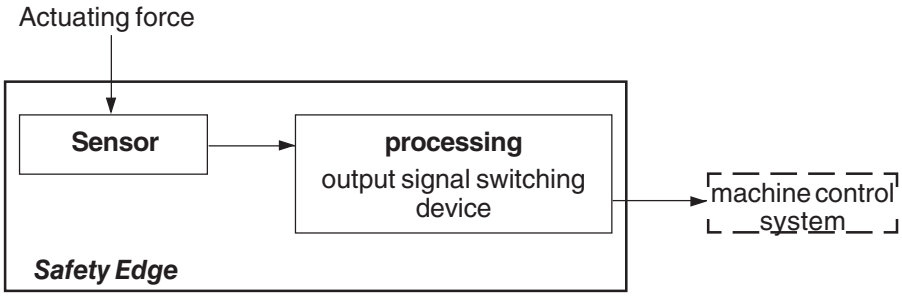
Safety Edges
Safety Edges are protective devices comprising sensor, signal transmission, signal processing and signal switching.



The control unit is made up of control device and output signal switching device(s).

Sensor
The sensor is that part of the Safety Edge which produces the control command when the actuating force is applied. The sensor of the Safety Edge constitutes a line. Mayser Safety Edges have a sensor whereby the actuating surface is deformed locally, eg. it is made of rubber.

Signal processing
The signal processing is that part of the Safety Edge which converts the signal from the sensor.
Signal transmission
The signal transmission is that part of the Safety Edge which produces the control command.



The following points should be considered when choosing the sensors:
- temperature range
- response time
- protection (standard: IP65)
- environmental considerations (oil, coolant, ...)

ATTENTION:
The certification of design becomes invalid if our products are used with control units which do not comply with the tested types.

Subject to technical modifications.

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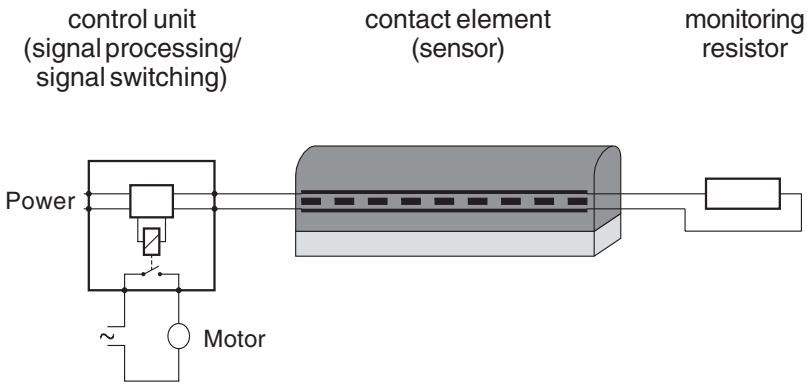
Safety Edges 2.2.1
Functional principle

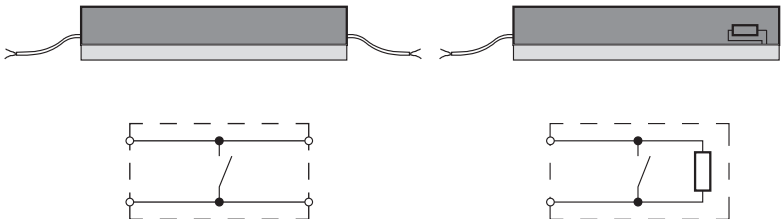
2-wire-connection-system
(with monitoring resistor)



The Safety Edge comprises contact element (sensor), connecting cable (signal transmission), signal processing and signal switching. The signal processing and the signal switching are combined in the control unit.

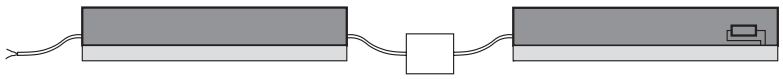
Monitoring resistor

SL/BK through contact element with cable exit on both ends
or for connecting up a monitoring reistor externally
SL/W with integrated monitoring resistor

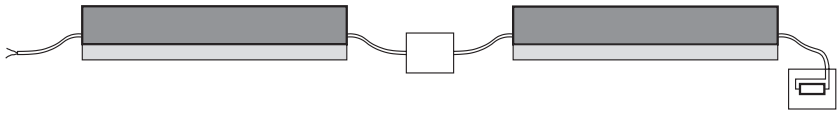


For your safety:
The contact elements and the connecting cable are constantly monitored for function.
A control function is attained by bridging the conductive areas with a monitoring resistor.

Combination of contact elements



Combination:
- connection of several sensors
- only one control unit necessary



Model with external resistor, thus avoiding variety in type

Cable connection

- length of cable: 2 m
  extra cable possible
- cable ends without plug/socket
  option: cable ends can be supplied with plug/socket

Subject to technical modifications.

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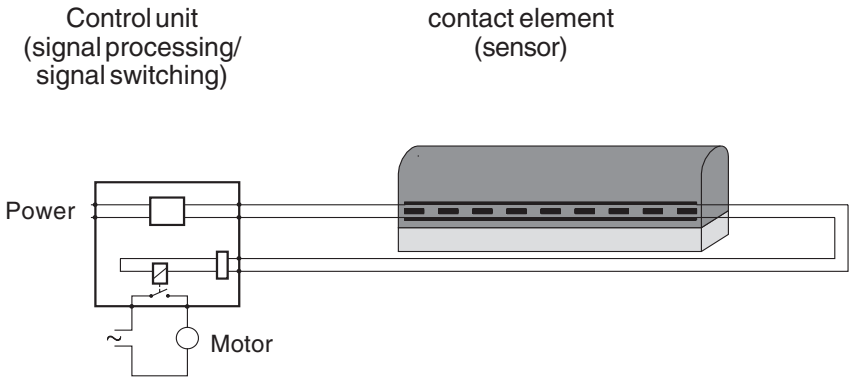
Safety Edges 2.2.2
Functional principle

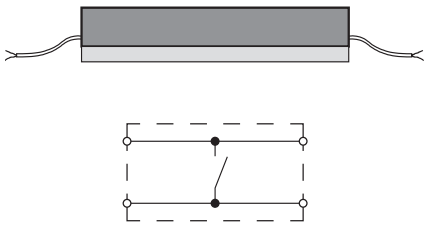
4-wire-connection-system
(without monitoring resistor)



The Safety Edge comprises contact element (sensor), connecting cable (signal transmission), signal processing and signal switching. The signal processing and the signal switching are combined in the control unit.

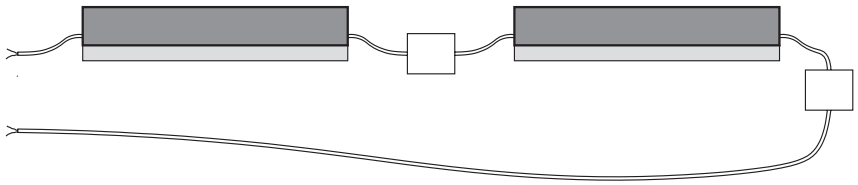
Type

SL/BK Through contact element with cable exit on both ends



For your safety:
The closed circuit current principle constantly monitors the contact element and the connecting cable for function.
The monitoring resistor is not required due to signal transmisson feedback.

Combination of contact elements



Combination:
- connection of several sensors
- only one control unit necessary
- connection to Safety Mats and Safety Bumpers possible

Cable connection (Standard)

- length of cable: 2 m
  extra cable possible
- cable ends without plug/socket
  option: cable ends can be supplied with plug/socket

Note:
The 4-wire-connection-system can only be applied using the control unit SG-SUE 41X2 NA.

Subject to technical modifications.

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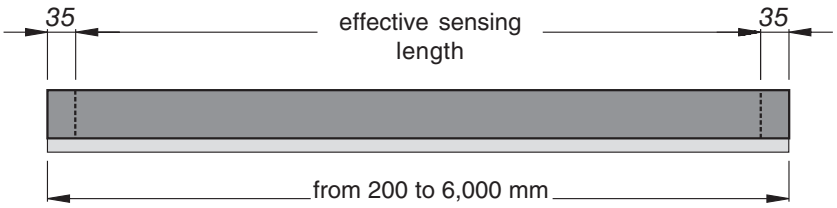
Safety Edges Standard Range 2.3.1

Available lengths

The contact elements can be supplied in lengths between 200 und 6,000 mm. Custom-built Edges on request.
In the case of the standard Safety Edge both ends have a non-sensitive area 35 mm long.



Chemical resistance

Rubber Profile GP	**EPDM**	**NBR**	**CR**
Identification rills on side of profile	v	vv	vvv
Material Rating			
Shore A-hardness	55 ±5	60 ±5	60 ±5
Application area	Doors/Gates	Machines	Machines
Chemical resistance			
Acetone	+	±	+
Formic acid	+	+	+
Ammonia	+	+	+
ASTM-Oel Nr. 1/ 2/ 3	-	+	+
Fuel	-	+	±
Brake fluid	±	±	±
Chloride solution	+	+	+
Diesel oil	-	+	+
Fats	-	+	+
Isopropyl alcohol	+	+	+
Methanol	+	+	±
Mineral oils	-	+	+
Ozone + meteorlogical conditions	+	-	+
Hydrochloric acid 10%	+	+	+
Spirit (ethyl alcohol)	+	+	+
Carbon tetrachloride	-	+	-
Water and frost	+	-	±
Hydrogen peroxide 10%	+	+	-
Household and sanitary Cleaning agents	+	+	+

Tests were done at 23°C room temperature

Key to symbols:
+ = resistant
± = limited resistance
- = not resistant

The above data are results of tests which were done in our laboratory to the best of our knowledge and belief. We cannot accept any obligations being deduced from them. You must always test the suitability of our products for your special application purpose under practical conditions.

Subject to technical modifications.

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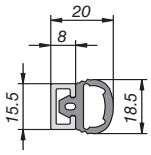
Dimensions and switching distances

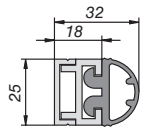
Safety Edges Standard Range 2.3.2

Actuating force: < 150 N (at 23 °C and with testpiece Ø 80 mm)
Dimensional tolerances: DIN 7715 - E2/L2



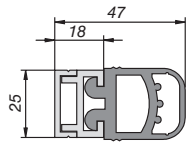
GP 15 **NBR**

Actuation distance:	
- at 10 mm/s	2 - 4 mm
Overtravel:	-
AL-rail type:	C15



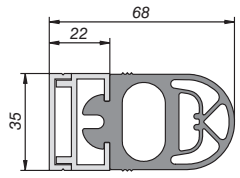
GP 22 **NBR**

Actuation distance:	
- at 10 mm/s	5 mm
Overtravel:	
- at 10 mm/s	1 mm
Al-rail type:	C 25



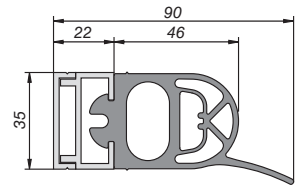
GP 39 **EPDM *)** **NBR**

Actuation distance:		
- at 10 mm/s	4 mm	8 mm
Overtravel:		
- at 10 mm/s	2 mm	9 mm
Al-rail type:	C 25	C 25



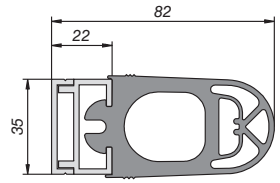
GP 50 **EPDM *)** **CR *)**

Actuation distance:		
- at 10 mm/s	9 mm	7 mm
- at 100 mm/s	15 mm	8 mm
Overtravel:		
- at 10 mm/s	13 mm	5 mm
- at 100 mm/s	5 mm	4 mm
Al-rail type:	C 35	C 35



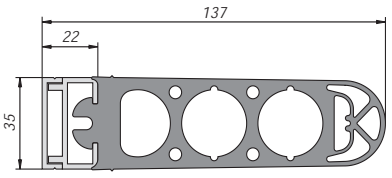
GP 50 L **EPDM**

Actuation distance:	
- at 10 mm/s	20 mm
Overtravel:	
- at 10 mm/s	12 mm
Al-rail type:	C 35



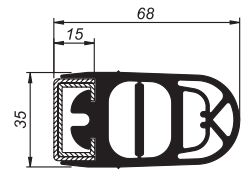
GP 60 **EPDM *)** **CR *)**

Actuation distance:		
- at 10 mm/s	7 mm	8 mm
- at 100 mm/s	10 mm	9 mm
Overtravel:		
- at 10 mm/s	20 mm	7 mm
- at 100 mm/s	16 mm	6 mm
Al-rail type:	C 35	C 35



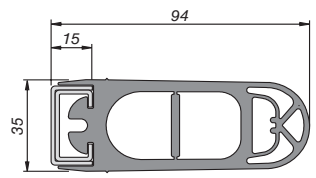
GP 120 **EPDM**

Actuation distance:	
- at 10 mm/s	11 mm
Overtravel:	
- at 10 mm/s	ca. 45 mm
Al-rail type:	C 35



GP 301 **EPDM *)**

Actuation distance:	
- at 10 mm/s	12 mm
- at 100 mm/s	12 mm
Overtravel:	
- at 10 mm/s	14 mm
- at 100 mm/s	8 mm
Steel rail type:	C 27



GP 302 **EPDM *)**

Actuation distance:	
- at 10 mm/s	10 mm
- at 100 mm/s	12 mm
Overtravel:	
- at 10 mm/s	25 mm
- at 100 mm/s	22 mm
Steel rail type:	C 27

All given data marked with *) are verified by EEC-type-examination certificates.

Subject to technical modifications.

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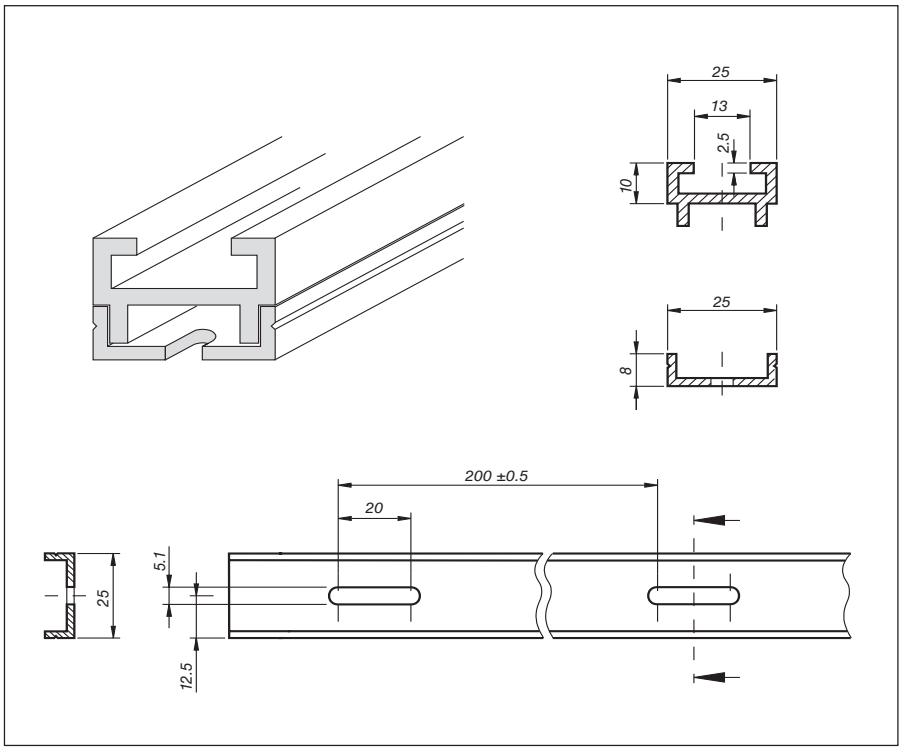
Dimensions of Aluminium Rails C 25

Safety Edges Standard Range 2.3.3

Rail for GP 22 / GP39

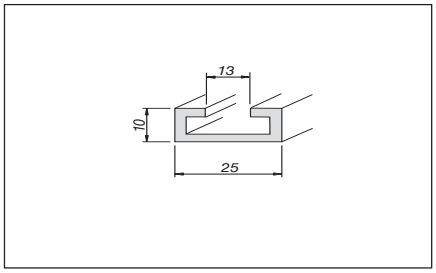


Al-Rail C 25 M

Width:	25 mm
Height:	18 mm
Thickness:	
- top rail	2.5 mm
- bottom rail	2.0 mm

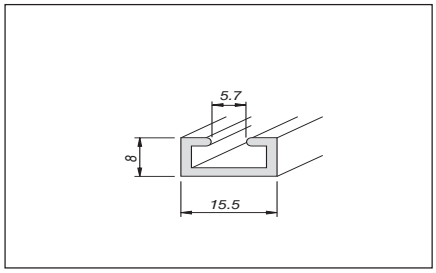
Fix upper part

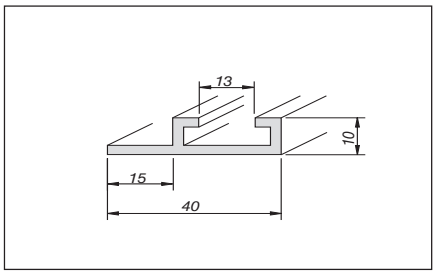
to the lower part using self-tapping M3X8 DIN 7500 countersunk screws in pre-drilled positions



Al-Rail C 25

Width:	25 mm
Height:	10 mm
Thickness:	2.5 mm





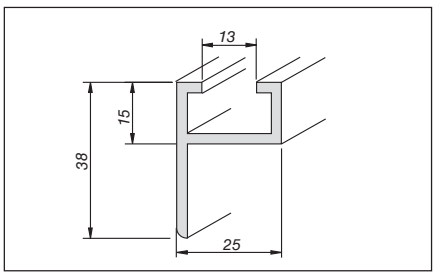
Al-Rail C 25 S

Width:	40 mm
Height:	10 mm
Thickness:	2.5 mm

As Al-Rail C 25 except for side mounting flange

Al-Rail C 15 (for GP 15)

Width:	15.5 mm
Height:	8 mm
Thickness:	2 mm



Al-Rail C 25 L

Width:	25 mm
Height:	15 mm
Height of mounting flange:	23 mm
Thickness:	2.5 mm

As Al-Rail C 25 except for rear mounting flange

Al-Rails: dimensional variation DIN 17615 (Part 3)

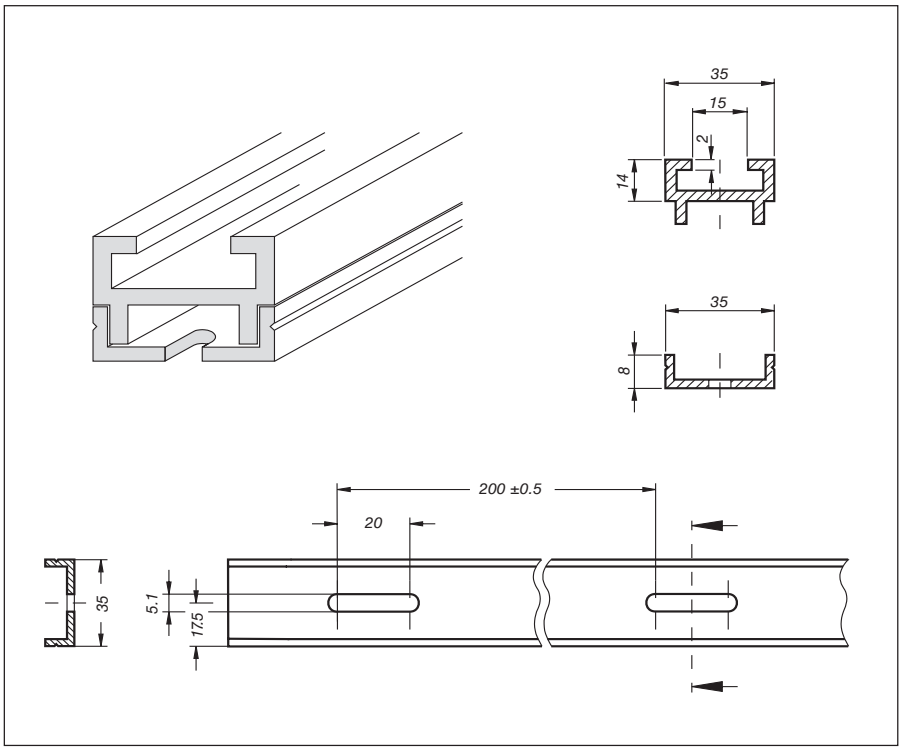
Subject to technical modifications.

MAYSER Polymer Electric P.O. Box 30 48 89020 Ulm Germany Tel. +49 731 2061-0 Fax +49 731 2061-222

Dimensions of Aluminium Rails C 35

Safety Edges Standard Range 2.3.4

Rail for GP 50 / GP 60 / GP 120

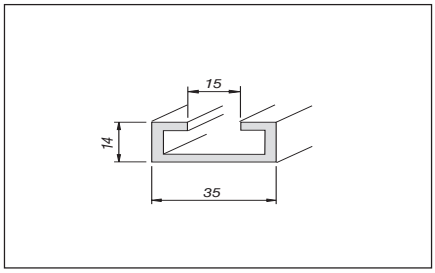


Al-Rail C 35 M

Width:	35 mm
Height:	22 mm
Thickness:	
- top rail	2 mm
- bottom rail	2 mm

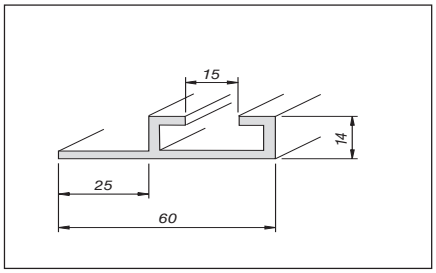
Fix upper part

to the lower part using self-tapping M3X8 DIN 7500 countersunk screws in pre-drilled positions



Al-Rail C 35

Width:	35 mm
Height:	14 mm
Thickness:	2 mm



Al-Rail C 35 S

Width:	60 mm
Height:	14 mm
Thickness:	2 mm
Thickness of mounting flange:	2.5 mm

As Al-Rail C 35 except for side mounting flange

Al-Rails: dimensional variation DIN 17615 (Part 3)

Subject to technical modifications.

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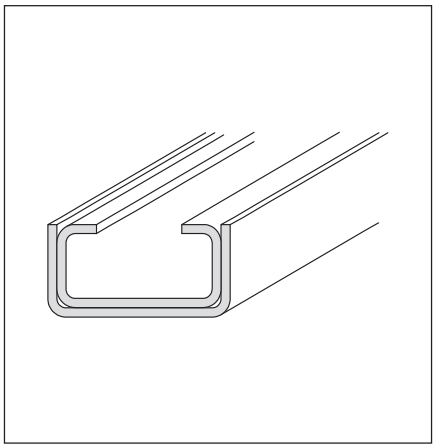
Dimensions - Steel Rail C 27 / U 27

Safety Edges Standard Range 2.3.5

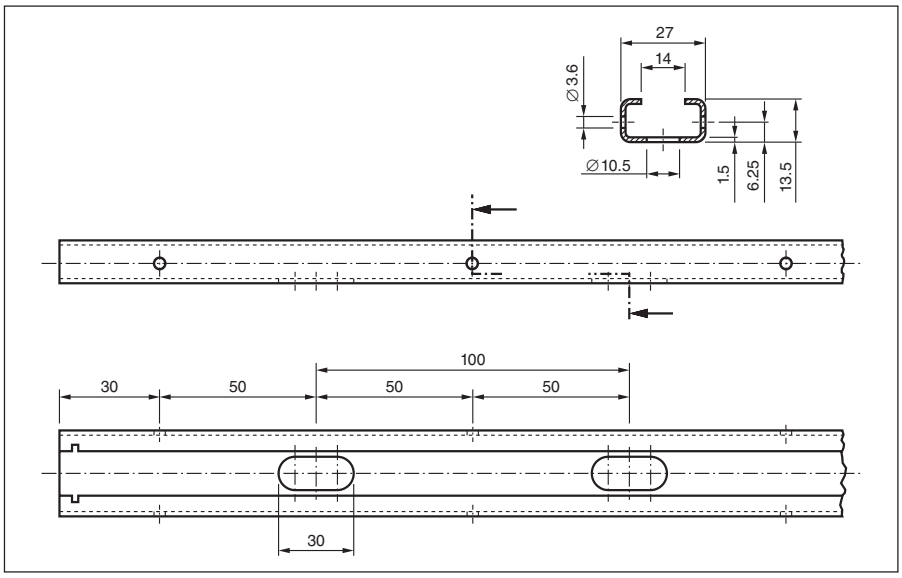
Rail for GP 301 / GP 302



Steel Rail C 27 / U 27

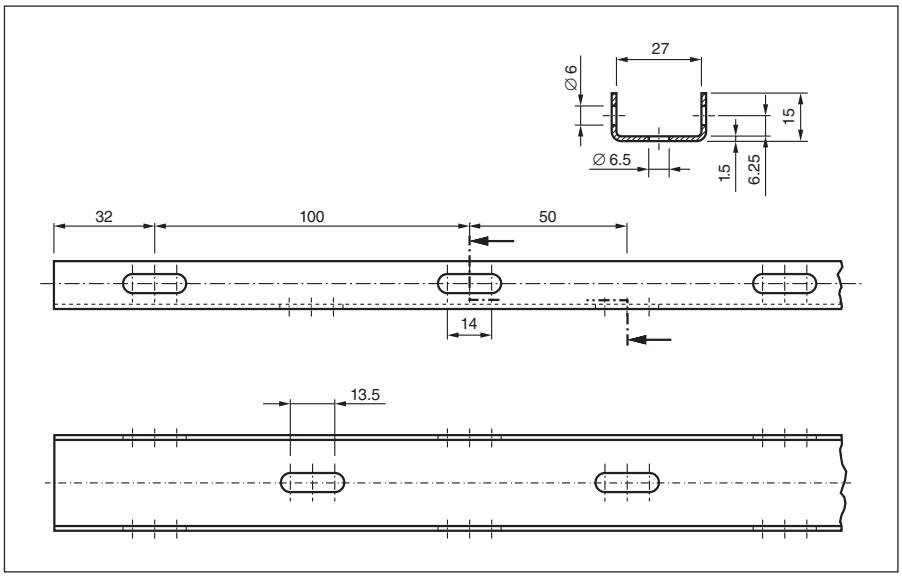
Width:	30 mm
Height:	15 mm
Thickness:	1.5 mm

Fix the C-Rail
to the U-Profile using self-tapping SK M4X10 DIN 7500 countersunk screws in pre-drilled positions



Steel Rail C 27

Width:	27 mm
Height:	13.5 mm
Thickness:	1.5 mm



Steel Rail U 27

Outside width:	30 mm
Inside width:	27 mm
Height:	15 mm
Thickness:	1.5 mm

Subject to technical modifications.

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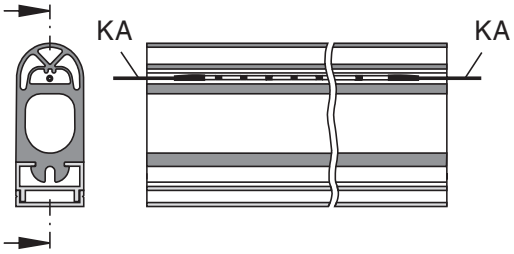
Cable exits KA
some with cable sleeves KT

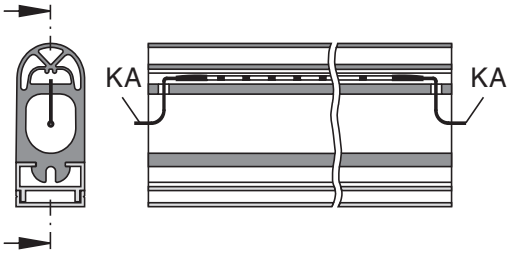
Safety Edges 2.3.6
Standard Range

Safety Edge Type BK
cable on both ends

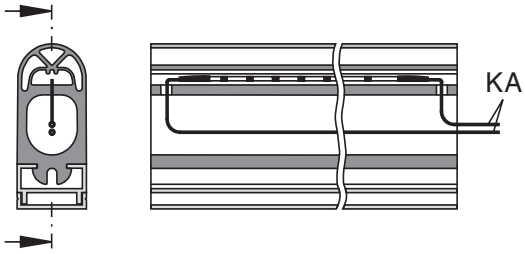
Version 1 - for GP 15, 22, 39, 50, 60, 120, 301, 302



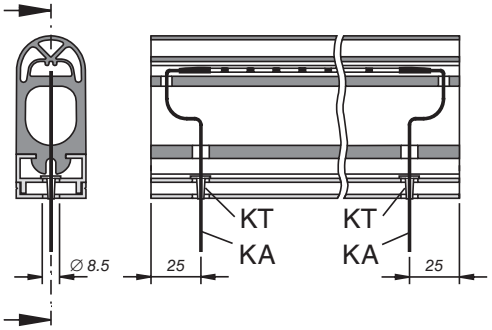
Version 3 - for GP 39, 50, 60, 120, 301, 302



Version 4 - for GP 39, 50, 60, 120, 301, 302

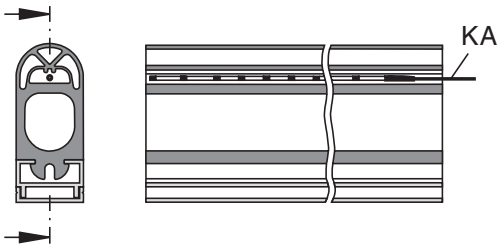


Version 5 - for GP 39, 50, 60, 120, 301, 302

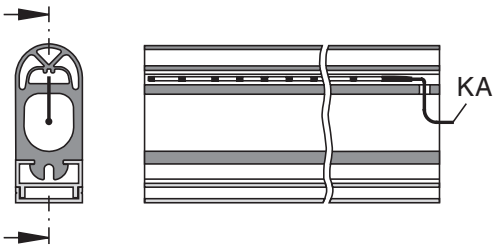


Safety Edge Type W
with integrated resistor

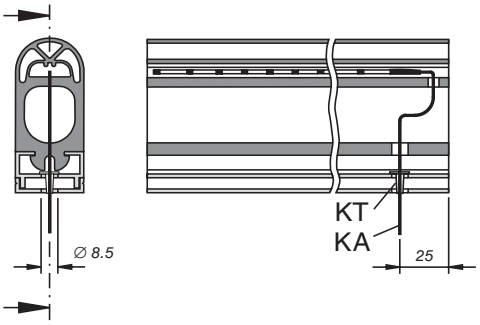
Version 9 - for GP 15, 22, 39, 50, 60, 120, 301, 302



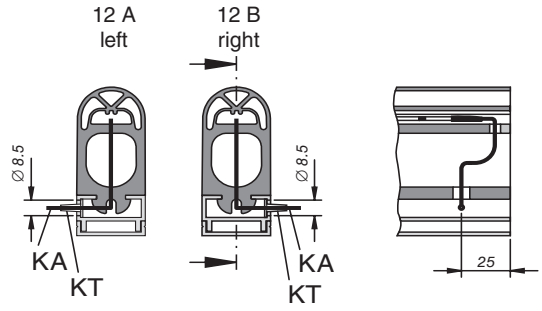
Version 10 - for GP 39, 50, 60, 120, 301, 302



Version 11 - for GP 39, 50, 60, 120, 301, 302



Version 12 - for GP 39, 50, 60



other variations
(e.g. smaller non-sensitive areas on ends)
on enquiry

Note: **non-sensitive area on both ends**
standard c. 35 mm
for GP 15 c. 50 mm

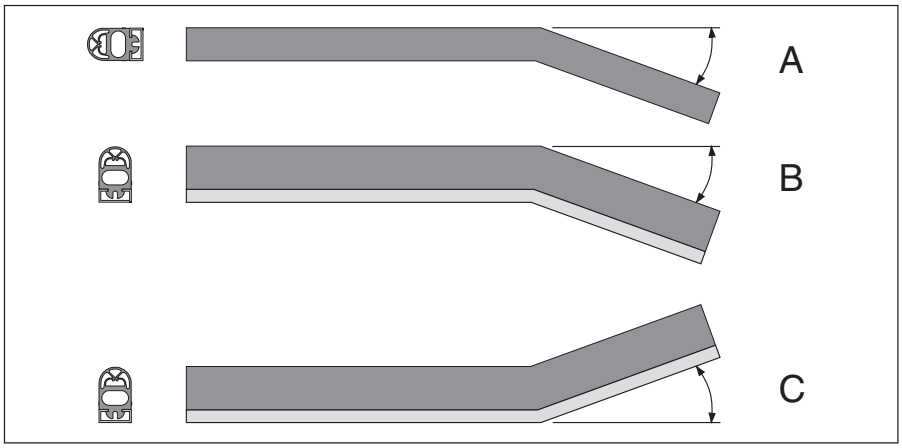
Subject to technical modifications.

290900

Safety Edges 2.7.1
Customised items

Lateral bends and radii

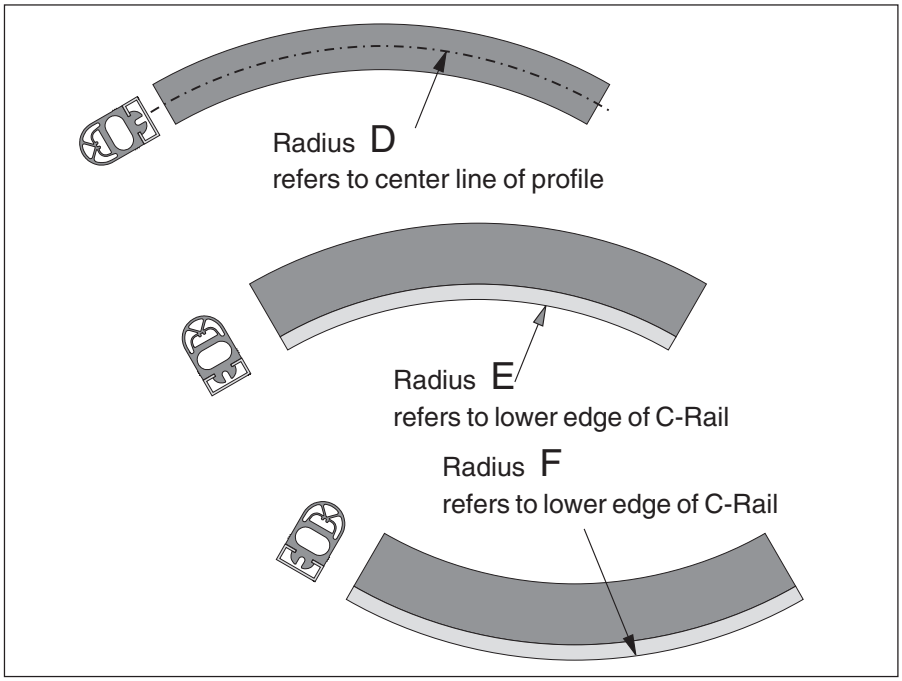
Lateral bends
All C 25 and C 35 Al-rails can be bent laterally to suit in our factory.



Maximum lateral bend

Bend type:	A	B	C
GP 22	30°	25°	10°
GP 39	25°	20°	5°
GP 50	20°	20°	15°
GP 60	16°	15°	10°
GP 120	15°	15°	5°

Radii
Safety Edges with a radius are only available with C 25 and C 35 Al-rails. The Al-rails have to be bent in our factory.



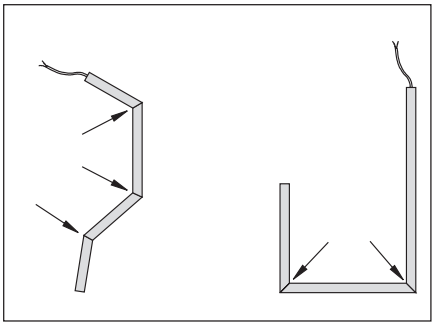
Minimum radius in mm

Radius type:	D	E	F
GP 22	300	300	350
GP 39	300	300	350
GP 50	350	400	400
GP 60	350	450	550
GP 120	500	–	–

Please note:
Lateral bends and radii are not covered by the EC-certification of design.

Custom-built Safety Edges

- temperature resistant
  short term up to 120 °C
  long term up to 100 °C
  Protection class: IP 50
- angled Safety Edges with sensitive zones in problem areas
- all Safety Edges can be supplied with sensitive ends except those with GP 15 or GP 22



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Overall view of combinations

Safety Edges Overview

2.8.1

Safety Edges SL	GP 15	GP 22	GP 39	GP 50	GP 60	GP 120	GP 301	GP 302	GP 302
Material									
NBR	●	●	●						
EPDM			●	●	●	●	●	●	
CR					●		●		
Mounting									
C 15	●								
C 25 M / S / L		●	●	●					
C 35 M / S					●	●	●		
C 27 / U 27								●	
Monitoring resistor									
1.2 kΩ	●	●	●	●	●	●	●	○	
8.2 kΩ	○	○	○	○	○	○	○	○	
22.1 kΩ	○	○	○	○	○	○	○	●	
Control Unit									
SG-EFS 1X4 ZK2/1	●	●	●	●	●	●	●	○	
SG-SLE 04-0X1	○	○	○	○	○	○	○	●	
SG-SUE 41X4 NA	○	○	○	○	○	○	○	○	

● = Standard ○ = Option

How to order:

Example 1 - *Fully assembled Safety Edge without control unit:*
SL/BK 2,250 mm GP 50 NBR + C 35 M al-rail
Cable 10 m, Version 4 (see 2.3.6)

Example 2 - *Fully assembled Safety Edge with control unit (230 V):*
SL/W 3,700 mm GP 60 EPDM + C 35 M al-rail
Cable 5 m, Version 11 (see 2.3.6)
Control unit SG-EFS 134 ZK 2/1 (1.2 kΩ)

Example 3 - Fully assembled Safety Edge, 4-wire-connection system with control unit (230V):
SL/BK 1,650 mm GP 39 NBR + C 25 M al-rail
Cable 2 m, Version 3 (see 2.3.6)
Control unit SG-SUE 4134 NA

Subject to technical modifications.

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Data Sheet

Safety Edges 2.9.1
Data sheet

Safety Edge comprising sensor SL/W and SL/BK assembled in rubber profile GP 39/50/60 with mounting rail and control unit

1.	Protection class sensor *)	IP 65			IP 65		
2.	Switching operations sensor *)	> 10^5			> 10^5		
3.	Switching times	**GP 39 EPDM**	**GP 50 EPDM**	**GP 60 EPDM**	**GP 50 CR**	**GP 60 CR**	**GP 50 EPDM**
	Control unit SG-	EFS 1X4 ZK2/1			EFS 1X4 ZK2/1SLE 04-0X1		
3.1	Response time *)	38 ms	144 ms	95 ms	72 ms	82 ms	575 ms
	Test speed	100 mm/s	100 mm/s	100 mm/s	100 mm/s	100 mm/s	10 mm/s
3.2	Reset	manual or automatic			manual / automatic		automatic
4.	Actuating force, actuating distance, overtravel and switching angle						
	Testing basis:						
	prEN 1760-2	–	–	–	yes	yes	–
	DIN V 31006 T2, Type	A	B	B	A	A	A
	GS-BE-17	yes	yes	yes	yes	yes	–
4.1	Actuating force *)	< 150 N	< 150 N	< 150 N	< 150 N	< 150 N	< 150 N
4.2	Actuating distance *)						
	at 10 mm/s	4 mm	9 mm	7 mm	7 mm	8 mm	11 mm
	at 100 mm/s	4 mm	15 mm	10 mm	8 mm	9 mm	–
4.3	Overtravel *)						
	at 10 mm/s	2 mm	13 mm	20 mm	5 mm	7 mm	11 mm
	at 100 mm/s	1 mm	5 mm	16 mm	4 mm	6 mm	–
4.4	Effective switching angle *)	45°	90°	90°	90°	90°	40°
5.	Behaviour in fault instance	EN 954 Category 3			EN 954 Category 3		
6.	Operating and environmental conditions						
6.1	Ambient temperature sensor *)						
	GS-BE-17	- 20 °C to + 55 °C			- 20 °C to + 55 °C		
	DIN V 31 006 T2, Type A	- 20 °C to + 55 °C			+ 5 °C to + 55 °C		
	DIN V 31 006 T2, Type B	+ 5 °C to + 55 °C			–		

7.	Operation – Maintenance	
7.1	Maintenance	The sensor is maintenance free.
7.2	Monitoring	The control unit aids monitoring.
7.3	Expert inspection (once per year) per ZH 1/494	• Depending on the working rate, the sensors should be tested for function at regular intervals either manually or by applying the relevant testpiece. A visual examination for damages should also be carried out. • Test to insure that the rubber profile is sitting properly in the aluminium retaining rail.
8.	Chemical resistance	The sensor is resistant to customary chemical influences such as diluted acids, alkaline solutions and alcohol for an exposure duration of 24 hours.
9.	Dimensional tolerances	• Length of SL per DIN 7715-L2 • Distances per DIN ISO 2768-v

All given data marked with *) are verified by EEC-type-examination certificates.

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Data Sheet

Safety Edges 2.9.2
Data sheet

Safety Edge comprising sensor SL/W and SL/BK assembled in rubber profile GP 301/302 with mounting rail and control unit

1.	Protection class sensor *)	IP 65		IP 65	
2.	Switching operations sensor *)	> 10^4		> 10^4	
3.	Switching times	**GP 301 EPDM**	**GP 302 EPDM**	**GP 301 EPDM**	**GP 302 EPDM**
	Control unit	SG-EFS 1X4 ZK2/1		SG-SLE 04-0X1	
3.1	Response time *)	124 ms	125 ms	112 ms	113 ms
	Test speed	100 mm/s	100 mm/s	100 mm/s	100 mm/s
3.2	Reset	manual or automatic		automatic	
4.	Actuating force, actuating distance, overtravel and switching angle				
	Testing basis:	prEN 1760-2, GS-BE-17		prEN 1760-2, GS-BE-17	
4.1	Actuating force *)	< 150 N	< 150 N	< 150 N	< 150 N
4.2	Actuating distance *)				
	at 10 mm/s	12 mm	13 mm	13 mm	10 mm
	at 100 mm/s	12 mm	12 mm	12 mm	12 mm
4.3	Overtravel *)				
	at 10 mm/s	14 mm	25 mm	8 mm	25 mm
	at 100 mm/s	8 mm	22 mm	6 mm	22 mm
4.4	Effective switching angle *)	90°	90°	90°	90°
5.	Behaviour in fault instance	EN 954 Category 3		EN 954 Category 3	
6.	Operating and environmental conditions				
6.1	Ambient temperature sensor *)				
	GS-BE-17	- 20 °C to + 55 °C		- 20 °C to + 55 °C	
	DIN V 31 006 T2, Type A	0 °C to + 55 °C		0 °C to + 55 °C	

7.	Operation – Maintenance	
7.1	Maintenance	The sensor is maintenance free.
7.2	Monitoring	The control unit aids monitoring.
7.3	Expert inspection (once per year) per ZH 1/494	• Depending on the working rate, the sensors should be tested for function at regular intervals either manually or by applying the relevant testpiece. A visual examination for damages should also be carried out. • Test to insure that the rubber profile is sitting properly in the aluminium retaining rail.
8.	Chemical resistance	The sensor is resistant to customary chemical influences such as diluted acids, alkaline solutions and alcohol for an exposure duration of 24 hours.
9.	Dimensional tolerances	• Length of SL per DIN 7715-L2 • Distances per DIN ISO 2768-v

All given data marked with *) are verified by EEC-type-examination certificates.

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Fax: +49-(0)7 31 / 20 61-222

MAYSER®
Polymer Electric

Safety Edges Request For Quotation

2.10.1

Sender:

Company

Department

Last name, first name

P.O.Box | Post code | Town, Country

Street address | Post code | Town, Country

Fon | Fax | E-mail

Area of application:

(e.g. Doors/Gates, closing edge of machine, textile machine, public transport ...)

⇩ Do not write in this column! ⇩
For internal use

Environmental conditions:

- ❑ dry ❑ water ❑ oil
- ❑ agressive agents: ❍ coolant, type: _____
  ❍ solvent, type: _____
  ❍ other: _____
- ❑ Room temperature ❑ other: from____ °C to____ °C

Mechanical conditions:

- ❑ Max. braking distance of system ____ mm
- ❑ sensitive ends ❑ non-sensitive ends (max. 35 mm) OK
- ❑ Cable exit version no. ____
- ❑ No. of monitoring circuits: ____ ❑ SG- _____

Nipping and shearing points to be made safe:
(Sketch should include mounting possiblity and cable run)

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