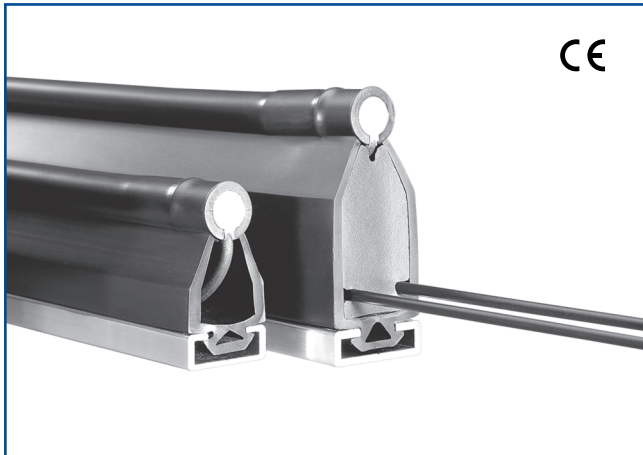


SELECTION GUIDE

SCHMERSAL's Series SE Safety Edges/Bumpers are available as sub-assembly components or as custom assemblies produced to user specifications. The following pages provide details regarding operation, construction and ordering details. Among the user options are safety edge profile, mounting frame profile and length. Please contact us if you have any questions, special needs or require assistance with properly specifying the safety edge which meets your requirements.



Description

The series SE Safety edge consists of a rugged high tear resistant rubber profile, an aluminum mounting rail, a plug-in optoelectronic transmitter and receiver pair and a compatible safety controller. The design features a high reflective internal rubber surface and a self-adjusting gain optical pair whose performance is uncompromised by slight bending ... and predictable over the specified operating range.

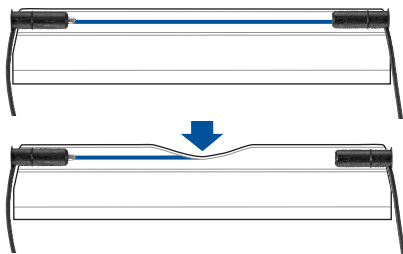
Units can be quickly and easily assembled (without special skills or use of adhesives) for lengths of 400 mm to 10 m.

The self adjusting optical pair assure the same sensitivity and performance independent of chosen length.

The mechanical design assures encapsulation of the transmitter and receiver ensuring reliable operation unaffected by environmental soiling.

Operation

In operation the transmitted IR beam is detected, by the receiver resulting in enabling of the safety controllers safety output(s). Deformation of the rubber profile interrupts/weakens the signal between the transmitter and receiver. This is sensed by the safety controller disabling the outputs allowing the hazardous movement to be stopped. Depending upon the choice of safety controller the system meets the requirements of EN ISO 13849-1 (PL_c, PL_d or PL_e) as well as EN 954-1 (Safety control category 1, 3 or 4).

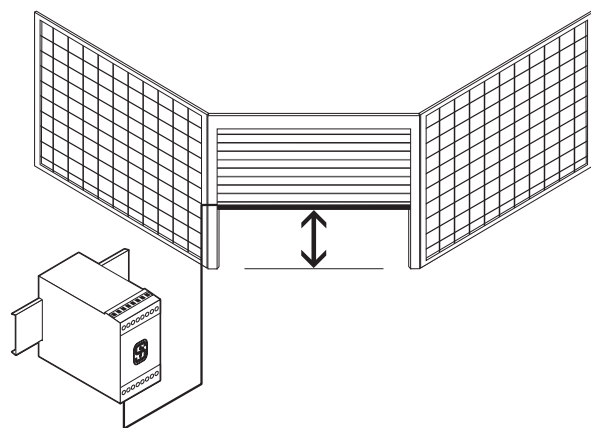


Features & Benefits

- **Can be cut & mounted in the field** ... easy to fit and adjust length when placing the edge on the door
- **Safety controller SE 100 handles up to 2 safety edges** ... reduced cost in multiple door applications
- **Rugged corrosion & abrasion resistance rubber profiles** ... tolerant to most industrial environments
- **Watertight design** ... meets IP 68 environmental requirements.
- **Low operating force** ... assures reliable operation
- **Automatic gain control** ... tolerates slight bending
- **Simple field installation** ... low cost & easy to repair
- **Designed to meet Performance Level requirements per EN ISO 13849-1 and Safety Control Categories of EN 954-1.**

Typical Applications

Ideal wherever crushing or shearing points are to be safeguarded, such as on guard doors, elevating platforms, rising stages, moving stock shelving, operating process tables, loading ramps, hoists or tipping equipment.



SERIES SE ORDERING & ASSEMBLY INFORMATION

AVAILABLE ASSEMBLY* COMPONENTS

40 mm Safety Edge	
SE-P40-1250	Rubber profile, 1.25 meter
SE-P40-2500	Rubber profile, 2.5 meters
SE-AL10-1250	Mounting Rail, 1.25 meter
SE-AL12-1250	Mounting Rail with flange, 1.25 meter
SE-T40	Endcap (2 required)
70 mm Safety Edge	
SE-P70-1250	Rubber profile, 1.25 meter
SE-P70-2500	Rubber profile, 2.5 meters
SE-AL20-1250	Mounting Rail, 1.25 meter
SE-AL22-1250	Mounting Rail with flange, 1.25 meter
SE-T70	Endcap (2 required)
IR Sensor Set	
SE-SET	Emitter & Receiver set
Safety Controllers	
SE-100C	PL _c Safety Control Category 1 (2 bumpers)
SE-304C	PL _d Safety Control Category 3 (4 Bumpers)
SE-400C	PL _e Safety Control Category 4
Accessories	
SE- SC	Rubber profile shears
SE- WA	Wiring aid
SE- J1	Junction Box



* **Note:** Each assembly requires:
 Rubber profile
 Mounting rail(s)
 Endcaps (2)
 Sensor Set
 Safety Controller



Six steps to install the safety edge

1 Cut aluminum rail to desired length and fasten in place

2 Cut the rubber profile to desired length

3 Clip the rubber profile into the aluminum rail

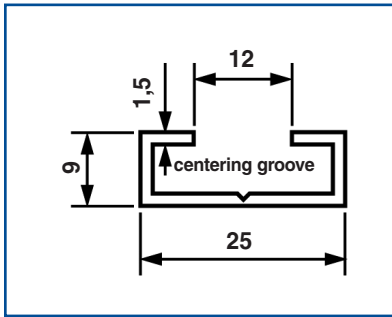
4 Press the transmitter and receiver units into the ends of the rubber profile

5 Thread emitter or receiver cable through profile to desired cable exit end of rubber profile.

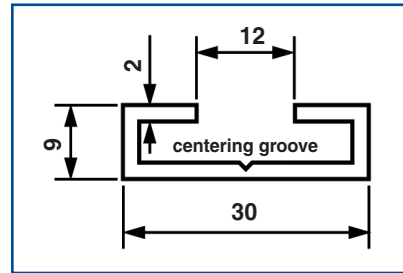
6 Connect to the desired safety controller
It is ready!

SERIES SE TECHNICAL DATA

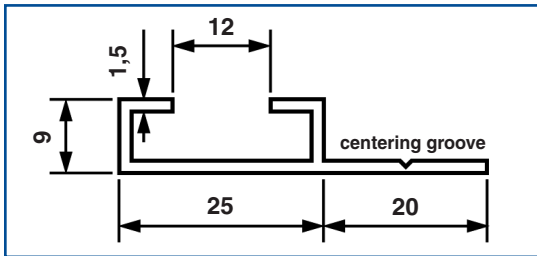
Aluminum Mounting Rail Profiles & Dimensions (mm)



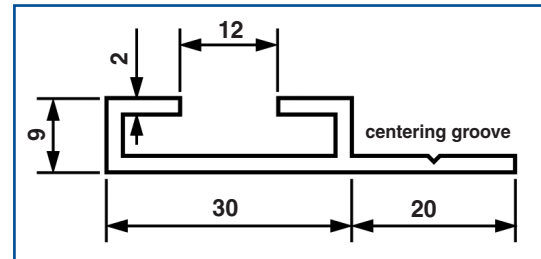
SE AL 10



SE AL 20



SE AL 12



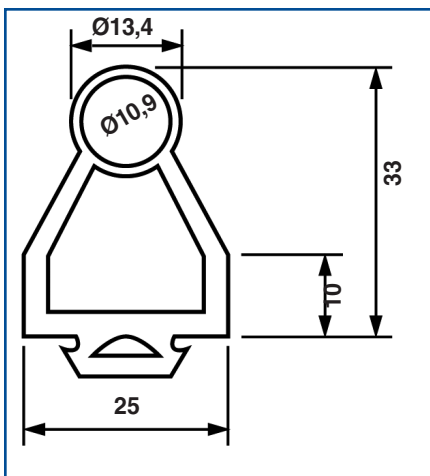
SE AL 22

Rubber Mounting Rail Profiles & Dimensions (mm)

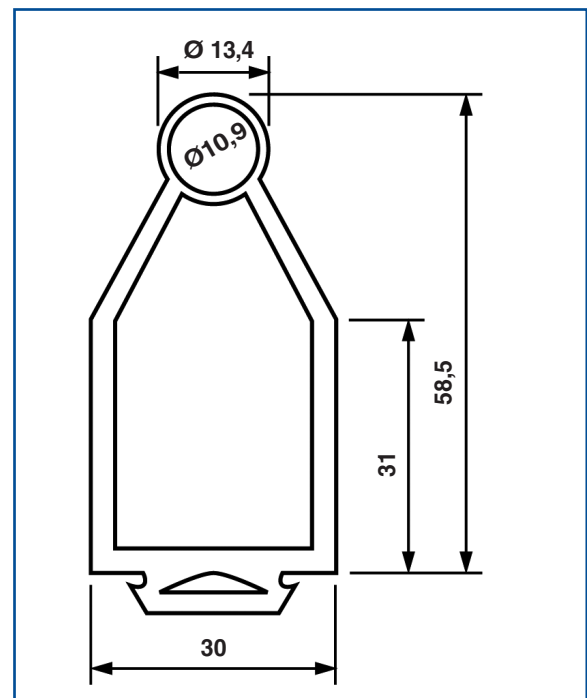
Table of Properties

Rubber Profile	SE - P 40, SE - P 70
Rubber Material	EPDM (ethylene propylene diene Monomer), shore hardness 60
Temperature Range	-40°C to +170°C (short term) -30°C to +170°C (long term)
Resistance	Good against ozone, moderate against oils, acids, solvents, fuels

Note: NBR (Nitrile butadiene rubber) profile also available. Consult factory.

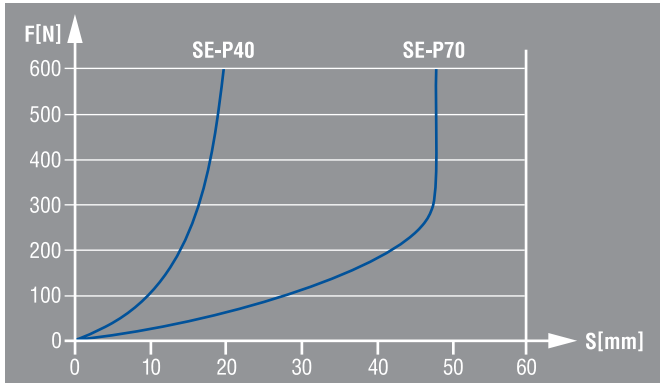


SE P 40

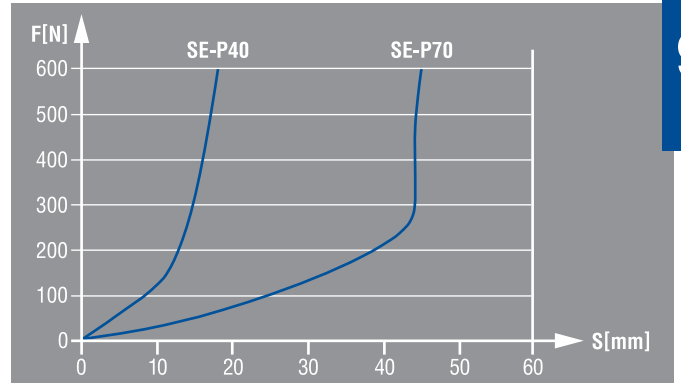


SE P 70

SERIES SE TECHNICAL DATA



Force/Travel diagram for the rubber profiles with SE 100 C controller unit



Force/Travel diagram for the rubber profiles with SE 400 C controller unit

Force/Travel table of rubber profiles with SE-100 C				
Force/Travel	Fa [N]	Sa [mm]	Fn [N]	Sn [mm]
Testing Speed	100 mm/s		10 mm/s	
SE-P40	92	9	250	16
			400	18
			600	20
SE-P70	22	8	250	46
			400	47
			600	48

Force/Travel table of rubber profiles with SE-400 C				
Force/Travel	Fa [N]	Sa [mm]	Fn [N]	Sn [mm]
Testing Speed	100 mm/s		10 mm/s	
SE-P40	140	11	250	14
			400	16
			600	18
SE-P70	23	9	250	43
			400	44
			600	45

- Legend
- Fa Actuating force
 - Sa Actuating travel
 - Fn Overtravel force
 - Sn Overtravel
 - Sg Total deformation travel

$$Sg = Sa + Sn$$

The complete system is suitable for finger recognition in accordance

with the above test data.

The measurements are carried out according to EN 1760-2*

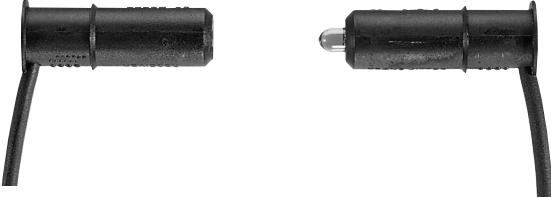
Test conditions

Measurement parameters	
Temperature:	T = 20 °C
Mounting position	B (to EN 1760-2*)
Place of measurement	C 3 (to EN 1760-2*)

* preliminary

SERIES SE TECHNICAL DATA

Transmitter and Receiver Pair



Technical Data for SE-SET

Technical Data	SE-SET
Material	Polyurethane
Protection class	IP 68
Dimensions	11.5 mm dia., 37 mm long
Connecting cable	3 x 0.14 mm ² stranded wire
Cable length	Transmitter 6.6 m Receiver 3 m
Permissible cable length	Max. 200 m
Operating temperature	-25 °C to +75 °C

SERIES SE TECHNICAL DATA

SE Series Safety Controllers



9

Electrical Specification	SE - 100 C	SE - 400 C
Standards	EN 1760-2, EN60947-5-1	EN1760-2, EN60947-5-1
Performance Level/Safety Control Category	“c” to EN ISO 13849-1/cc1 to EN 954-1	“e” to EN ISO 13849-1/cc4 to EN 954-1
Enclosure	PE (black), Crastin (grey)	PE (black), Crastin (grey)
Fixing	DIN rail EN 50 022	DIN rail EN 50 022
Screw terminals	max. 2 x 2.5 mm ² solid wire max. 2 x 1.5 mm ² stranded wire with end thimble	max. 2 x 2.5 mm ² solid wire max. 2 x 1.5 mm ² stranded wire with end thimble
Protection class (terminals)	(IP 20) Enclosure IP 40 IEC/EN 60529/ VDE 0470-1	(IP20) Enclosure IP40 IEC/EN 60529/ VDE 0470-1
Operational voltage	24VDC (+ 20 % / – 10 %)	24VDC (+ 20 % / – 10 %)
Fuse rating (supply)	1A (surge-resistant)	1A (surge-resistant)
Inputs	1 or 2 pairs SE-T/R Transmitter/Receiver	1 pair SE-T/R Transmitter/Receiver
Outputs	Changeover contacts	Normally open contacts
Safety contacts	11/14	13/14, 23/24
Signalling contacts	21/22/24	Semiconductor X1, Connection to internal ground U _{max} . 36 V, I _{max} . 50 mA
Max. switching capacity	max. 1000 VA	max. 1000 VA
Utilization category	AC-15; DC-13	AC-15; DC-13
Rated operational current/voltage I _e / U _e	2 A/230VAC; 2 A/24VDC	2 A/230VAC; 3 A/24VDC
Switching voltage	250V AC/DC	250V AC/DC
Max. switching current	6A (resistive load)	4A (resistive load)
Contact fuse rating	6A surge-resistant	4A surge-resistant
Mechanical life	2 x 10 ⁷ switching cycles	3 x 10 ⁷ switching cycles
Readiness time	Max. 300ms	Approx. 32ms
Switch-on delay	Max. 300ms	Approx. 32ms
Switch-off delay	Typically 15ms	Typically 15ms
Ambient temperature	+5 °C to +55 °C	+5 °C to +55 °C
Shock resistant	< 5g / 33Hz (VDE 0160)	< 5g / 33Hz (VDE 0160)
Interference	According to EMC Directive	According to EMC Directive
Weight Approx.	0.18kg	Approx. 0.2kg
Clearance and creepage distances	Degree of soiling 2 to VDE 0160 Overvoltage category III / 4kV to VDE 0160	Degree of soiling 2 to VDE 0160 Overvoltage category III / 4kV to VDE 0160
Power consumption	< 4 W	< 4 W

Note: Maximum distance to controller: 200m. Use 20AWG to extend bumper leads to safety controller.

SERIES SE TECHNICAL DATA

SE 304C

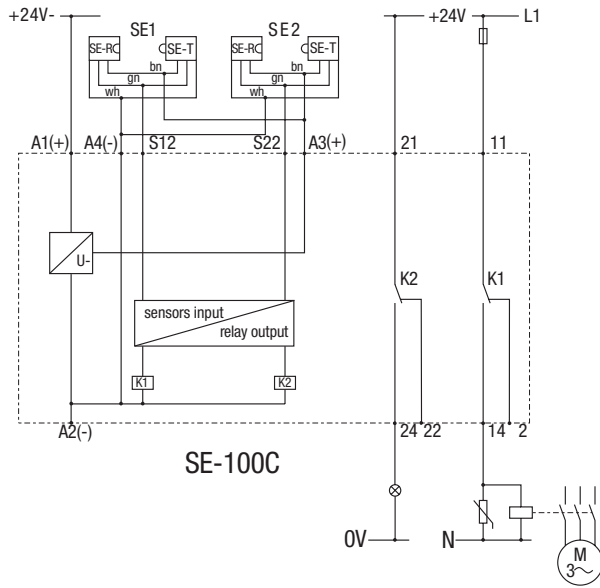


Electrical Specification	SE - 304C
Standards	EN 1760-2
Performance Level/Safety Control Category	“d” to EN ISO 13849-1/cc3 to EN954-1
Enclosure	Thermoplastic
Mounting	DIN rail EN50 022
Screwterminals	Max. 2x2.5mm ² solid wire Max. 2x1.5mm ² stranded with end thimble
Protection class (terminals)	(IP20) Enclosure IP40 IEC/EN 60529/VDE 0470-1
Operating voltage	24VDC (+20%/-10%) 24VAC (+10%/-10%)
Fuse rating (supply)	1A (Slow-blow)
Inputs	1 to 4 pairs SE-T/R Transmitter/Receiver
Outputs	NO contact
Safety contacts	13/14
Signalling contacts	Semi-conductor XI, I _{max} . 50 mA
Max. switching capacity	Max. 1500VA
Utilization category	AC-15, DC-13
Rated operational current/voltage	2A/230VAC, 2A/24VDC
Switching voltage	250VAC/60VDC
Max. switching current	2A
Mechanical life	>10 ⁷ switching cycles
Switch-off delay	Typically 17ms
Ambient temperature	+5°C to +55°C
Shock resistant	<5g/33Hz (VDE 0160)
Interference	According to EMC Directive
Weight	0.185 kg
Power consumption	<4W

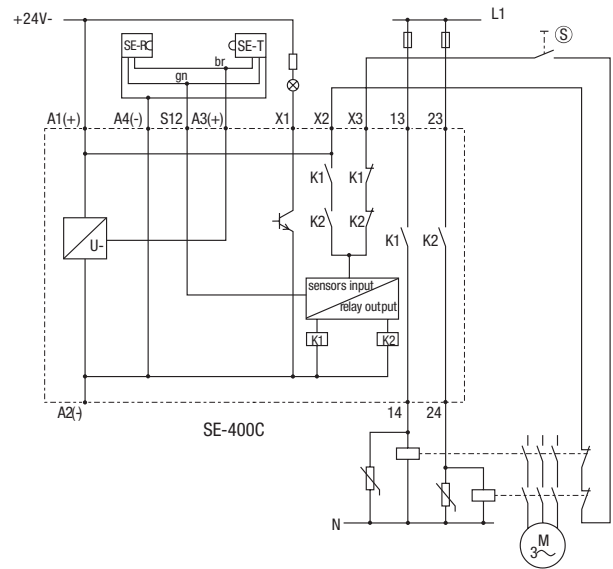
SERIES SE TECHNICAL DATA

Typical Wiring Diagram

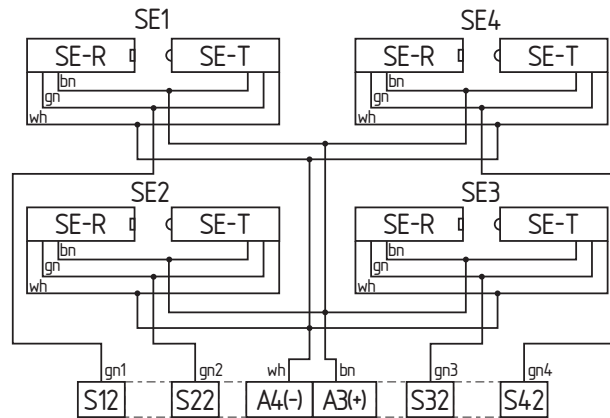
Example with SE - 100 C



Example with SE - 400 C



Example with SE - 304 C





*Safer
by
Design*