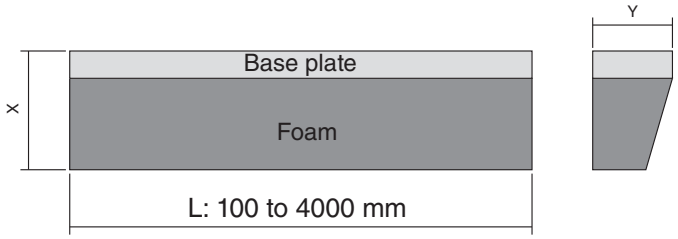
Contents

Mayser GmbH & Co. KG Postfach 13 62 88153 Lindenberg Germany Phone: +49 8381 507-0 Fax +49 8381 507-217

Available forms and lengths

Safety bumper 7.1

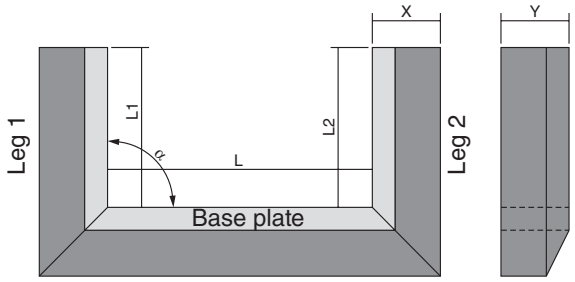
Straight form



Standard straight form:
Length L: 100 to 4,000 mm
Special versions on request.

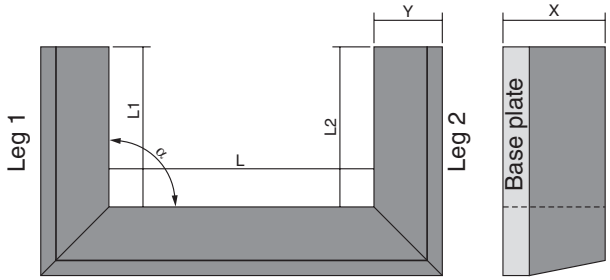
U-form

Horizontal



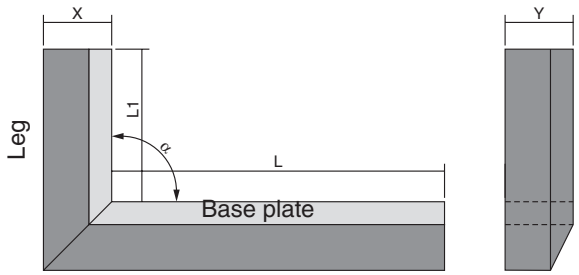
Standard U-form:
Covered area (L1 x L or L2 x L): max. 4 m²
Leg angle α: 90°, 120°, 135°, 150°
Same depth X: for L, L1 and L2
Special versions on request.

Vertical



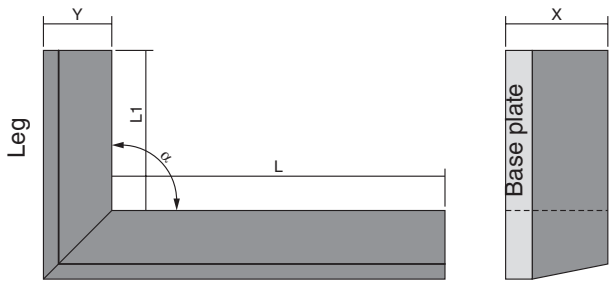
L-form

Horizontal



Standard L-form:
Covered area (L1 x L): max. 4 m²
Leg angle α: 90°, 120°, 135°, 150°
Same depth X: for L and L1
Special versions on request.

Vertical



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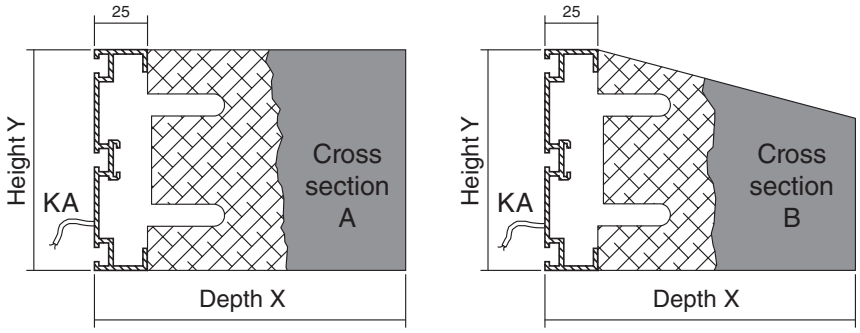
Available cross sections

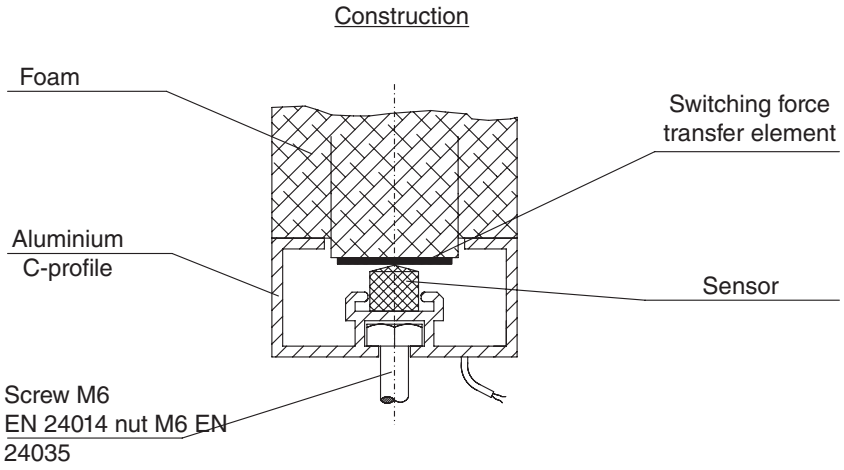
Standard safety bumpers are available in 2 cross sections:

Cross section A rectangular for Y = 40
Cross section B wedge-shaped for Y = 100; 150; 200



Installation / mounting

Universal mounting with M 6 bolts or nuts in continuous C-profile grooves.



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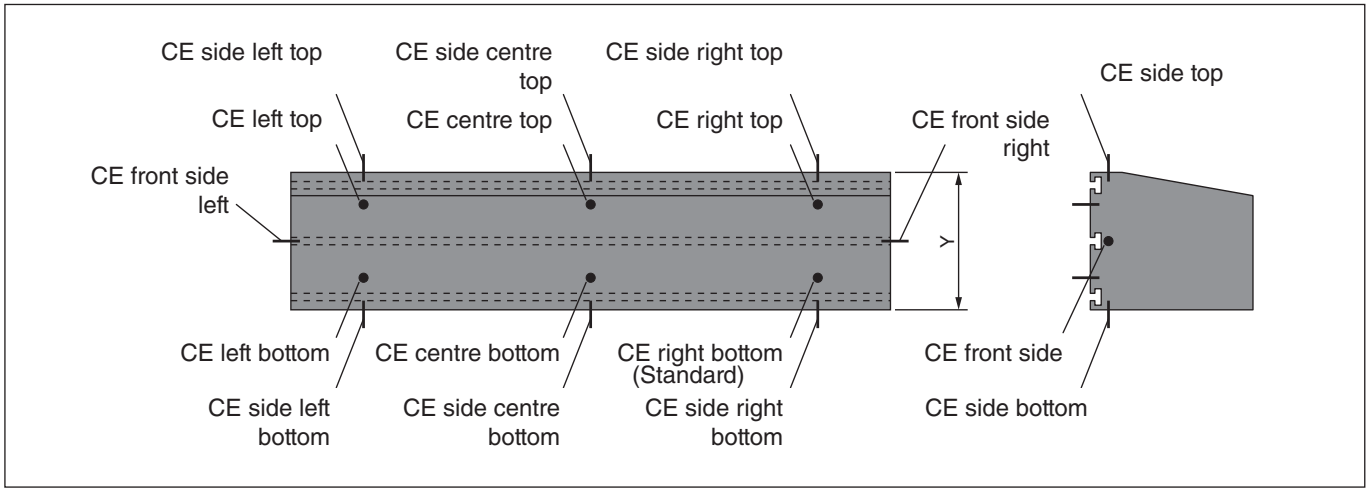
Position of cable exits

The position of the cable exits (CE) can be designed to be variable.

Standard position:
- Horizontal: 50 mm from left/right or centred
- Vertical for height
  - Y = 40 mm: 8 mm from top/bottom
  - Y = 100 / 150 / 200 mm: 20 mm from top/bottom

Special versions on request.

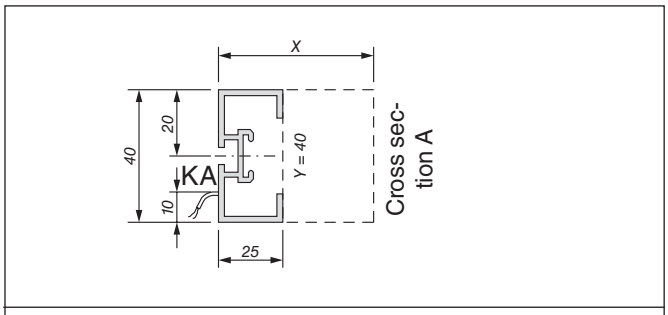


Cable connection

Standard

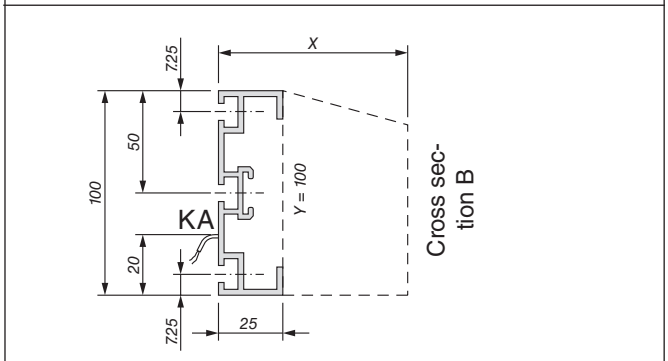
- Cable
  - 2-wire technology: Ø 5 mm; 2x 0.5 mm² or 4x 0.34 mm² Cu
  - 4-wire technology: Ø 5 mm; 2x 0.5 mm² or 4x 0.34 mm² Cu
  - NC technology: Ø 5 mm; 2x 0.5 mm² Cu
- Cable length: 2 m
  - Special lengths possible
- Cable ends without plug or coupling
  - Option: Cable ends with plug or coupling available

Aluminium base plates



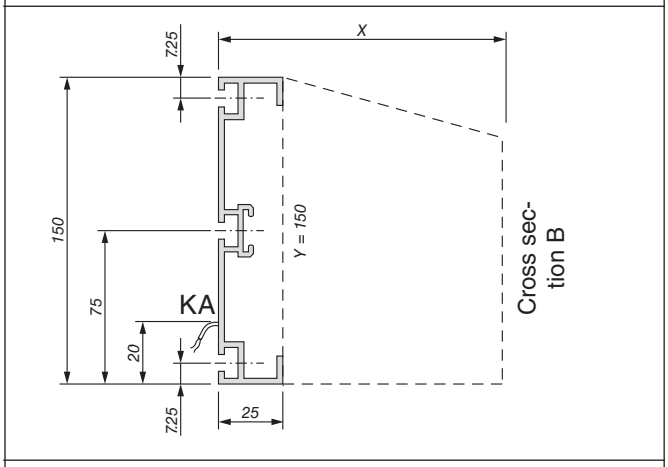
Cross section: **A**
Height: **Y = 40**

Available
Depth: **X = 60 to 150**



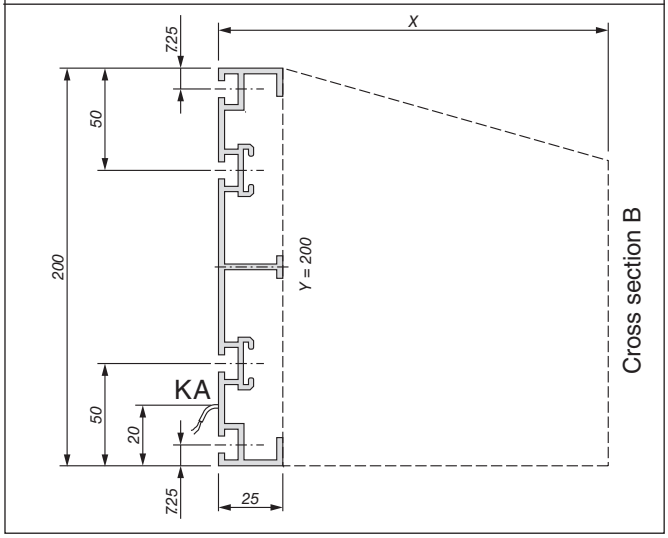
Cross section: **B**
Height: **Y = 100**

Available
Depth: **X = 70 to 250**



Cross section: **B**
Height: **Y = 150**

Available
Depth: **X = 70 to 300**



Cross section: **B**
Height: **Y = 200**

Available
Depth: **X = 70 to 500**

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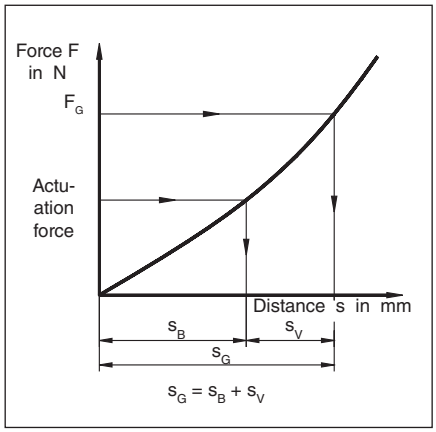
Design of the depth

The depth of a safety bumper is determined based on the stopping distance of the moving object and the actuation distance of the safety bumper. The design is carried out by Mayser Lindenberg. The data for the stopping distance must be provided by the customer.

Calculation of the depth by Mayser Lindenberg.



The basis for calculation of the depth is the force F_G. It represent a limiting force up to which a sensor deforms or can continue moving.

It is assumed that this force does not present a hazard for human beings.

A force F_G = 250 N is recommended as a value for an adult.

Formula for calculating the stopping distance or follow-through s_V:

$$s_V = ½ \times v \times t$$

v = Speed
t = Time

Formula for calculating the total deformation distance s_G:

$$s_G = s_B + s_V$$

s_B = Actuation distance

Example:

The object to be protected is a vehicle with a width of 1.5 m, which travels at a speed of 0.3 m/s. The time from the stop signal until the vehicle stops is 2 s. The calculated stopping distance is:

$$s_V = ½ \times v \times t = ½ \times 0.3 \text{ m/s} \times 2 \text{ s} = 0.3 \text{ m} = 300 \text{ mm}$$

The actuation distance s_B is assumed to be 30 mm. This results in the total deformation distance s_G:

$$s_G = s_B + s_V = 300 \text{ mm} + 30 \text{ mm} = 330 \text{ mm}$$

Mayser uses this data to determine a required depth of the safety bumper of 465 mm. That means that the maximum force F_G acting on the person or object, with a deformation of 330 mm for this safety bumper will be 250 N.

For available depths, see 7.4

The depth X = 465 mm necessitates a safety bumper with a height of Y = 200 mm. The required safety bumper therefore has the following dimensions:

Length in mm: 1500
Height in mm: 200
Depth in mm: 465

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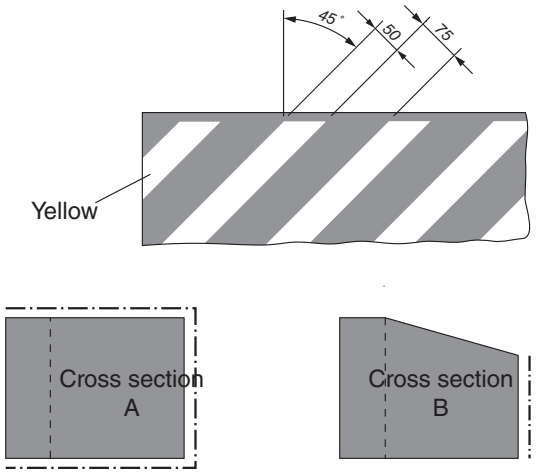
Colour

- Jet black (similar to RAL 9005) or
- Jet black with yellow stripes (similar to RAL 1021)

Other colours and colour combinations are available.



The yellow stripes are applied in the area of the dot-dash line.

Skin

- Eco-friendly PUR skin with good mechanical properties

Chemical resistance

A requirement for the following resistance values (at room temperature 23 °C) is an intact, undamaged bumper skin.

Skin	PUR
Acetone	±
Formic acid	-
Ammonia	+
Petrol	±
Brake fluid	-
Diesel oil	+
Acetate	-
Isopropyl alcohol	+
Methyl alcohol	+
Hydrochloric acid 10 %	+
Sulphuric acid 50 %	±
Spirit (ethyl alcohol)	+
Carbon tetrachloride	±
Rolling oil	+
Water	+
Hydrogen peroxide 10 %	+
Household/sanitary cleaner	+

Explanation of symbols:
+ = resistant
± = resistant to a certain extent
- = not resistant

The information is provided to the best of our knowledge and conscience as the results from tests conducted in our lab. Binding obligations cannot be derived from it. The suitability of our products for special applications must always be examined in the customer's own tests.

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Custom types

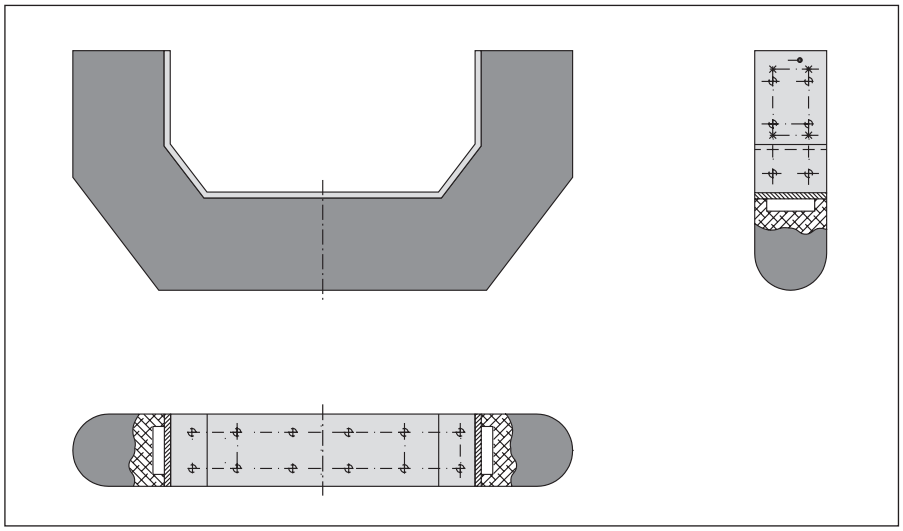
Types

Different types of the safety bumpers are available for special applications.

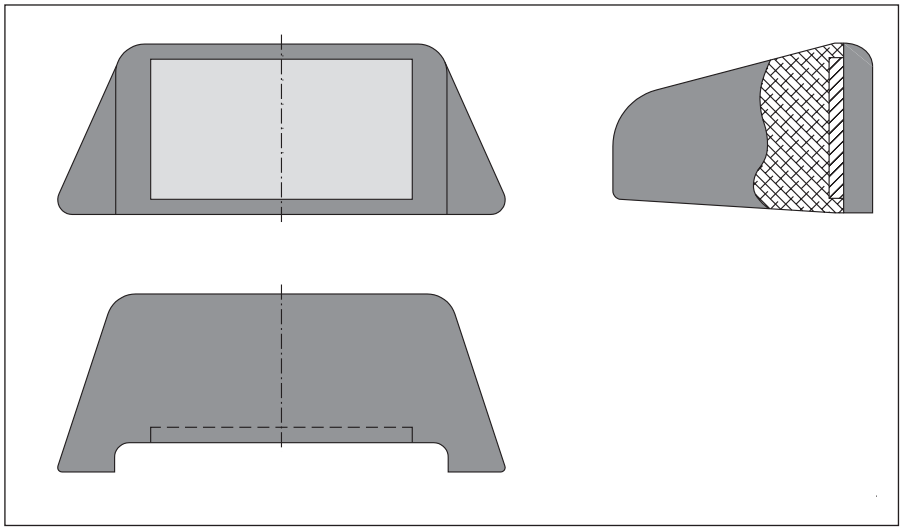
Forms: U-form, L-form, ...
Surface:
- Various skins and colours (single colour, striped, ...)
- Protective sleeves for high mechanical loads
- Heat-resistant coatings

Special solutions for explosion protected areas are possible.
Custom base plates can be provided.

Examples from actual use



U-form



Trapezoidal form

Special types
If special forms or special monitoring facilities are needed, please contact Mayser's project engineers.

Mayser Safety System
We ensure progress!

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Technical data

Safety bumper 7.8

Safety bumper consisting of SB/W and SB/BK sensors
and control unit
Dimensions of sensor: 1000 x 150 x 210 mm *)

1.	Protection type sensor	IP53 *)		IP53 *)
2.	Sensor switching operations	> 10^5 > 10^4*)		> 10^5 > 10^4*)
3.	Switching times with control unit	SB/W and SB/BK SG-EFS 1X4 ZK2/1		SB/W and SB/BK SG-SLE 04-0X1
3.1	Response time Test speed	22 ms 100 mm/s		22 ms 100 mm/s
3.2	Reset of control command	Optionally manual or automatic		automatic
4.	Actuation force, deformation path, switching range of the safety bumper			
	Test specification:	EN 1760-2		DIN V 31006 T2
	Test sample	Ø 80 mm	45 x 400 mm	Ø 80 mm 45 x 400 mm
4.1	Actuation force	< 150 N	< 600 N	< 150 N < 600 N
4.2	Deformation paths sV at 100 mm/s *)	96 mm		96 mm
4.3	Effective switching range WB*)	90°		90°
5.	Behaviour in case of fault*)	Single-fault tolerance EN 954 Category 3		Single-fault tolerance EN 954 Category 3
6.	Operating and environmental conditions			
6.1	Operating temperature Sensor *)	- 20 °C to +55 °C		- 20 °C to +55 °C
7.	Operation/maintenance			
7.1	Maintenance	The sensor is maintenance-free.		
7.2	Monitoring	Co-monitoring by control unit		
7.3	Inspection by expert (1x annually) according to ZH 1/494	• When the sensor is not actuated, both LEDs must light up. • When the sensor is actuated both relays open; the two LEDs go out. • This inspection should be carried out at different locations of the sensor.		
8.	Chemical resistance	The sensor is resistant to normal chemical influences such as diluted acids, alkaline solutions, and alcohol over an exposure period of 24 hours.		
9.	Bumper repair set (Accessories)	Damage to the foam body can result in functional impairment. The damage can be repaired with the bumper repair set.		

All data marked with *) is documented with EC design certificates.

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Technical data

Safety bumper consisting of SB/M sensor.
Dimensions of sensor: 1000 x 40 x 120 mm *)

1.	Sensor degree of protection	IP53
2.	Switching operations and connection data	
2.1	Sensor switching operations	5x 106
2.2	Utilisation category	DC-13, DC 60 V / 0.5 A AC-15, AC 230 V / 1.5 A
	Max. continuous current	8 A
3.	Switching times	
3.1	Response time	180 ms
	Test speed	100 mm/s
3.2	Reset of control command	Automatic
4.	Actuation force, deformation path, switching range of the safety bumper	
	Test specification:	EN 1760-2
	Test sample	Ø 80 mm
4.1	Actuation force	< 150 N
4.2	Overtravel distance at 100 mm/s	49 mm *)
4.3	Effective switching range WB	90° *)
5.	Behaviour in case of fault	Single-fault tolerance *) EN 954 Category 3
	Sequential control must likewise fulfil Category 3 according to EN 954.	
6.	Operating and environmental conditions	
6.1	Operating temperature Sensor	+5 °C to +55 °C*)
7.	Operation/maintenance	
7.1	Maintenance	The sensor is maintenance-free.
7.2	Monitoring	NC chain with forced opening
8.	Chemical resistance	The sensor is resistant to normal chemical influences such as diluted acids, alkaline solutions, and alcohol over an exposure period of 24 hours.
9.	Bumper repair set (Accessories)	Damage to the foam body can result in functional impairment. The damage can be repaired with the bumper repair set.

All data marked with *) is documented with EC design certificates.

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