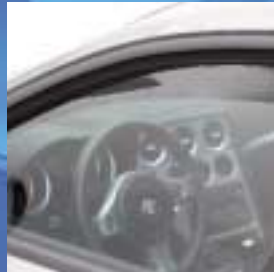


MAYSER®

Automotive Safety Systems

More safety in the motor car. Active anti-pinch protection from Mayser.



- protective function present for entire closing movement
- constant actuating force
- shakeproof and impervious to vibration
- highly sensitive, even at extreme temperatures
- continuous monitoring for function

Active Anti Pinch features

Today, power operated closing features are standard included features in a growing number of vehicles. This technology can, however, be risky because, when improperly used – be it by children playing, or even adults – it can lead to injury. The danger can, using mature safety systems – such as the active anti-pinch sensor APS from Mayser – be averted in a simple manner.

The monitored-for-function anti-pinch sensor APS from Mayser is a high-quality safety system that has been adapted to fulfil the high requirements in a motor car. The material, design and function of the Mayser APS comply with the highest of standards. They are the result of our development work and the extensive experience we have gained down through the years in tactile sensors. To protect car occupants. Made to suit the individual requirements of the vehicle in question. From the point of view of both function and design. Be the Mayser APS used to make power windows and vent windows, roof systems, sliding doors or lift gates safe or as a sensor for pedestrian safety.

Active Anti Pinch Protection. Safe and reliable.

Nipping and trapping points can arise when power operated windows, sliding doors and lift gates and power car seat adjustment functions are put to use. It is the task of the Mayser Anti Pinch Protection system APS to make these danger areas safe. The APS responds quickly and reliably. Even the least amount of pressure is sufficient to avert the danger. The Mayser Anti Pinch Protection system has its origin in sensors that have been tried and proven for many years in safety at work applications and in local public transport. The working principle is conceivably simple. Electrically conductive layers, the contacts, are inside a rubber profile, well protected. When in neutral position the contacts are separated from each other by means of an insulating layer. Even the least amount of pressure applied during the closing operation is sufficient: the conductive layers are pressed onto each other, a

signal is triggered and the closing operation is electronically reversed.

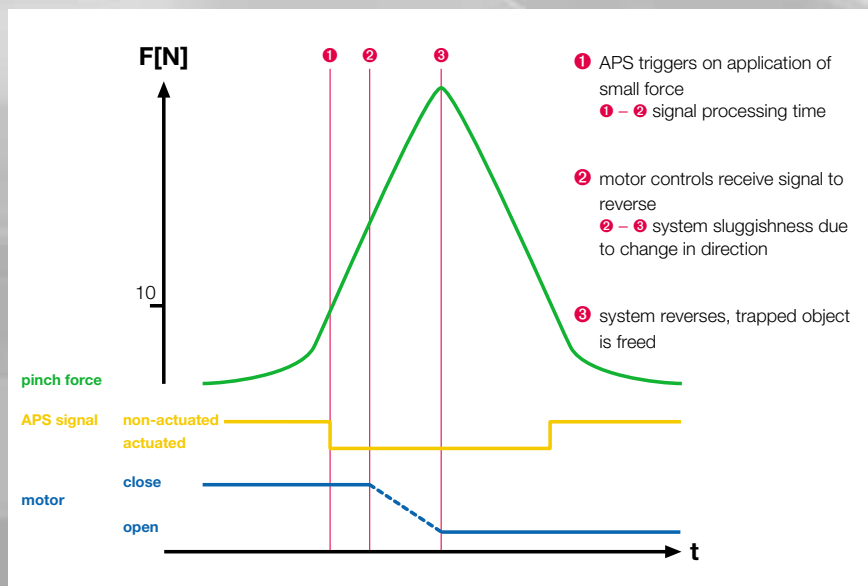
The advantages at a glance:

- decoupled from the drive
- pinch situations are safely recognized and faultlessly evaluated
- protective function present for the entire closing operation
- even small radii can be made actively safe
- very fast response to actuating forces ($F = 7-25\text{ N}$), independent of the closing operation
- all trapping and shearing edges in contour-controlled power windows made safe

- unsusceptible to environmental conditions such as ice and extreme temperatures
- maintenance-free APS system
- continuously monitored for function due to closed circuit current principle
- individual adaptation to application and vehicle in question
- easy OEM installation

The applications:

- windows
- roof systems
- sliding doors
- lift gates
- pedestrian safety
- individual solutions possible



ch Protection for power



Windows



When it comes to power windows, two anti pinch technologies are in use today: one is direct protection using a tactile safety edge which is either mounted to a carrier or integrated in the window seal, the other is indirect protection using complex electronics. In the case of indirect protection the anti pinch function is deactivated for the last few millimetres when the glass enters the seal area because the glass goes right to the stop and the window could wrongly reverse. In comparison, this problem does not arise in the case of a safety edge. Lower pinch forces can generally be reached using a safety edge as the sensor is decoupled from the drive system and is therefore always uniformly sensitive and active to the last, even when the glass goes right to the stop in the seal area. Objects that do not get trapped perpendicularly to the glass movement are also easier to detect.



Roof systems



Evermore complex roof systems – especially extensive panorama roofs that can have one or several panels/segments all moving at the same time – make high demands on Anti Pinch Protection systems. The protection of the main closing edge alone is not sufficient as shearing edges and thus very high forces arise when the panels/segments move downwards to close. Any pinching action that arises can be easily and safely severed using a tactile APS system.



Vent windows



In order to protect passengers sitting in the rear of a vehicle vent windows that operate automatically for air circulation or air conditioning reasons can be equipped with an anti pinch protection system. Injuries can be prevented using the Mayser APS as a precautionary safety measure for, should something get trapped, the mini safety edge on the seal triggers an immediate reversal.



Sliding doors



When making sliding doors safe special attention must be paid to that extremely critical phase where the door enters the latch. During this phase the mechanical frictional force of the drive system is largely increased. This means that a high closing force arises when the sliding door presses onto the seal. A possible pinch situation can only be prevented by an extremely sensitive APS system that is decoupled from the drive system. Critical in sliding doors is the front closing edge as well as the entire interior closing area. In the case of vehicles with two and three rows of seats, it is indeed a good idea to make these critical areas safe.



Lift gates/trunk lids



The ideal solution when it comes to making power lift gates safe is a combination of an indirect system with active anti pinch sensors. The guarantee that the trapping and shearing points that arise in the critical hinge area are made safe for third-row occupants while reaching from the inside to the outside of the vehicle is just as important as for those people reaching from the outside to the inside. The highly sensitive safety edges used to make the upper closing edge of the lift gate safe are either mounted in or on the D-pillar seal and/or are integrated in the lift gate.



Pedestrian safety



Future regulations demand that the aftermaths of an accident be effectively mitigated for a pedestrian in the case of an accident where a vehicle collides with a pedestrian. Should an accident occur the engine hood must, in future, be raised in just milliseconds in order to create a resilient deformable zone for the pedestrian. For a collision to be detected and the safety system to

er operated

be triggered. Mayser safety edges are fixed behind the layer of synthetic material in the foam cushion of the bumper. In the interaction with the evaluation of other relevant signals such as vehicle speed for example, the tactile signal sent out from the Mayser safety edge leads to a "fire" or "no-fire" triggering decision.



Special solutions

The Mayser active Anti Pinch Protection system is also

used in vehicle interiors and makes automatic movements reliably safe. For example: tactile sensors, integrated into the seats. When the power seating adjustment function is put into action a trapping situation that could lead to a person being injured or material being damaged is prevented.

Crash sensory analysis

A further area of application for the Mayser tactile mini safety edges: crash sensory analysis. The Mayser sensors are applied to the crash vehicle for the purpose of recording the collision times and, amongst other things, they control the high-speed camera.

Fixing alternatives: adapted from a technical and visual point of view to suit the various demands in a motor car.

■ Clipping/clamping method

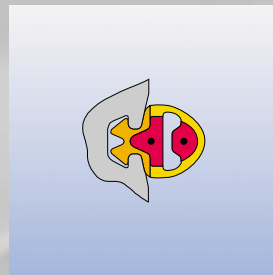
Due to the fact that its shape is so flexible, the APS can be easily mounted to the vehicle either by clipping it with a t-foot or by using a specially designed clamping method.

■ Method using adhesive

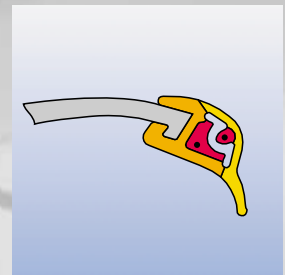
The APS is stuck to a carrier or direct to the closing edge using an acrylic foam adhesive tape to give a lasting position.

■ Insertion method

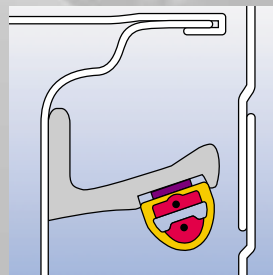
In this fixing process the sensor is inserted directly into a specially designed switching chamber in the vehicle seal.



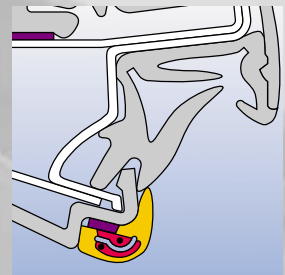
Clipping method



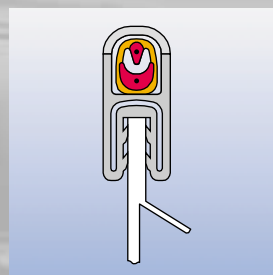
Clamping method



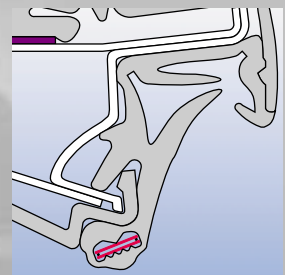
Adhesive tape
(lift gate)



Adhesive tape
(window)



Inserted into a seal



Inserted into a seal

Standards and guidelines specify not only systems operations and operating conditions, they also specify the test pieces, measurement readings and testing assemblies. Valid is: if an object gets trapped during a power closing movement a reversal must take place before the pinch force reaches 100 N. This requirement is verified using a semi-rigid, cylindrical test rod 4 mm to 200 mm in diameter, placed through the opening from the inside of the vehicle.

Standard/Guideline	StVZO §30	74/60/EWG	SMMT	ADR 42/02	CMVSS 118	FMVSS 118
Country	D	EU	GB	AUS	CDN	USA
max. permissible pinch force	≤ 100 N					
Size of opening	200 mm to 4 mm					
Force-deflection rate and test pieces	10 N/mm 4 mm - 200 mm				65 N/mm 4 mm - 25 mm 20 N/mm 26 mm - 200 mm	

Technical Data APS I, APS II

APS I	APS II
<ul style="list-style-type: none"> ■ Anti Pinch Sensor made of steel, inserted into a hollow chamber, specially designed for that purpose, in a window seal, for example. 	<ul style="list-style-type: none"> ■ Anti Pinch Sensor made of TPE, fixed either direct to the vehicle or on a carrier using either adhesive or a t-foot.
<ul style="list-style-type: none"> ■ typical characteristics <ul style="list-style-type: none"> - can be inserted into any kind of profile material and is thus invisible to the eye - small dimensions - simple installation 	<ul style="list-style-type: none"> ■ typical characteristics <ul style="list-style-type: none"> - customized design - various fixing alternatives - free choice of colour - high temperature resistance - environmentally friendly - easy to recycle
<ul style="list-style-type: none"> ■ Operating conditions <ul style="list-style-type: none"> - working temperature: - 40 °C to + 80 °C (short term exposure to temperatures up to +100 °C possible) - protection class: IP67 	<ul style="list-style-type: none"> ■ Operating conditions <ul style="list-style-type: none"> - working temperature : - 40 °C to + 80 °C (short term exposure to temperatures up to +110 °C possible, e.g. when a vehicle has to be repainted) - protection class: IP67
<ul style="list-style-type: none"> ■ Curvature radii <ul style="list-style-type: none"> radial: $R_{min} = 5 \text{ mm}$ axial: - 	<ul style="list-style-type: none"> ■ Biegeradien <ul style="list-style-type: none"> depends on the profile used; e.g. radial: $R_{min} = 70 \text{ mm}$ convex $R_{min} = 60 \text{ mm}$ concave axial: $R_{min} = 20 \text{ mm}$ (perpendicular actuation)
<ul style="list-style-type: none"> ■ Electric operating conditions <ul style="list-style-type: none"> voltage max. 24 V DC current max. 20 mA 	<ul style="list-style-type: none"> ■ Electric operating conditions <ul style="list-style-type: none"> voltage max. 24 V DC current max. 20 mA
<ul style="list-style-type: none"> ■ Functional characteristics: <ul style="list-style-type: none"> response angle: > 60° actuating distance: ≤ 1,0 mm actuating force: < 12 N (test piece: Ø 2,5 mm) 	<ul style="list-style-type: none"> ■ Functional characteristics: <ul style="list-style-type: none"> response angle: 80-140° actuating distance: 1-2 mm actuating force: 10-25 N (test piece: Ø 200 mm) actuating force: 7-15 N (test piece: Ø 4 mm)

The name Mayser stands for safety. Thanks to many years of experience in tactile sensors we now have the largest possible know-how in safety systems at our disposal. The Mayser Anti Pinch Protection system is an in-house development. We regard the opening up of new areas of application as one of our main objectives. So that we can continue to serve you in the future as a competent partner in all matters relating to anti pinch technology for motor vehicles.



Anti Pinch Protection using ultrasonic sensory analysis. For power windows, sliding doors and liftgates.

How does this system work? Where can the ultrasonic system be applied in the vehicle? Ask for our designated brochure. Or talk to our ultrasonic sensory analysis experts. They would be delighted to help you.

MAYSER®

Mayser GmbH & Co. KG
Polymer Electric
Örlinger Str. 1 - 3
89073 Ulm
Germany
Tel. +49 731 2061-0
Fax +49 731 2061-222
<http://www.mayser.de>
E-mail: info.automotive@mayser.com