



Cobot system components

Mayser makes robots safe.

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Production processes are increasingly being automated, resulting in closer contact and cooperation between people and robots.

To create the conditions for an efficient and safe production process, Mayser has developed new safety components for its cobot systems. In this process, we transfer our extensive safety know-how – from automotive applications, for example – to robotics, in order to offer maximum protection for people who work together with robots.

We use the following safety components:

- Soft cover
- Pressure-sensitive collision protection
- Surface sensor
- Ultrasonic safety

Our technologies – used either separately or as a system – create safe conditions for cooperation between man and robot. Another benefit: efficient design of the production process. Our systems can be used to optimise cycle times based on the employee's movement in relation to the robot.



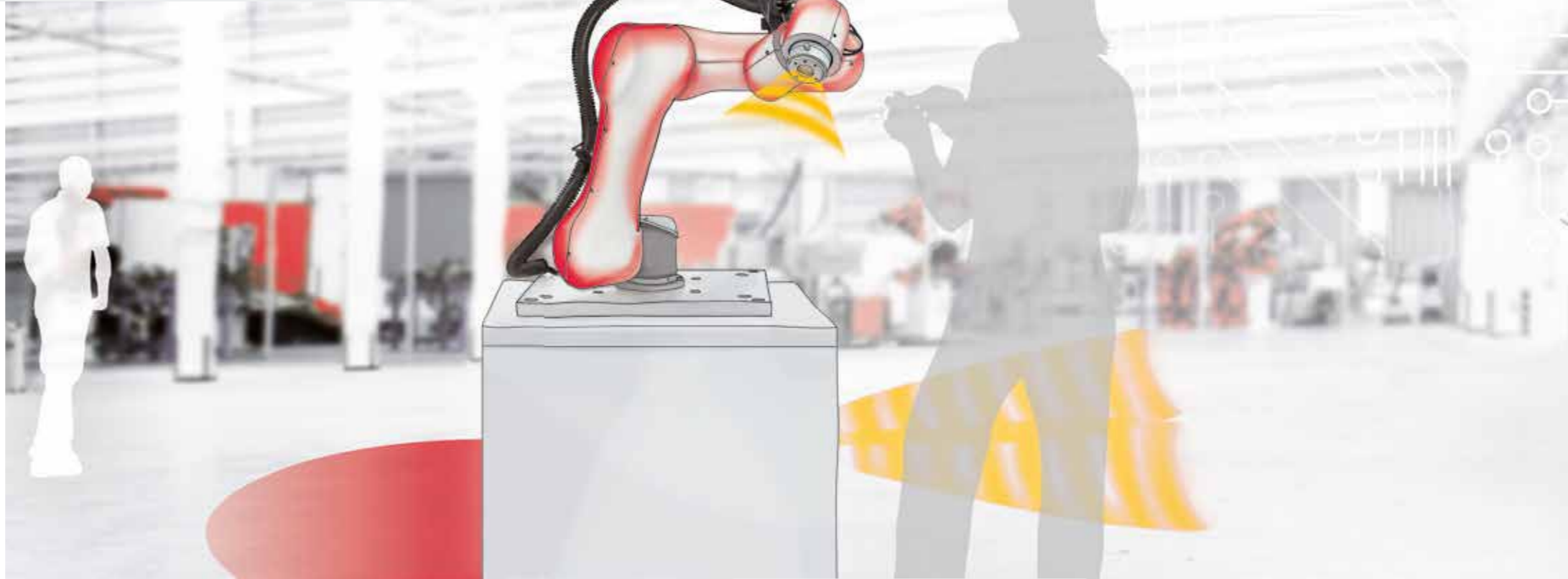
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1. Our cobot solutions

Areas of application

Cobot stands for the collaboration, cooperation and coexistence of humans and robots. Mayser robot components are designed to protect cobot systems of all sizes and weight classes. In addition, standard robots can be retrofitted to increase personal safety in cobot applications.



Pressure-sensitive sensors

Non-touch sensors



Soft cover

In the case of a collision between man and robot, a covering made of damping material evenly distributes the pressure loads. The "soft" look also helps to increase human acceptance of the robot.



Pressure-sensitive & non-touch environment detection

Pressure-sensitive surface sensors detect people in the vicinity of the robot. This solution is especially suitable for dirty environmental conditions.

An ultrasonic field is generated around the robot. As soon as a human enters this field, the movement of the robot is slowed down or stopped.



Pressure-sensitive protection for arms and joints

The robots stops moving as soon as it comes into contact with a human. This prevents injuries.



Non-touch tool and workpiece protection

An ultrasonic field is generated around the tool and workpiece. As soon as a human enters this field, the movement of the robot is slowed down or stopped.



2. Soft cover

The soft cover helps to evenly distribute the pressure loads generated in the event of a collision during cobot operation.

i The soft cover supports passive risk minimisation in accordance with ISO/TS 15066.

Technical data

Areas to be protected	<ul style="list-style-type: none"> • Partial protection • Complete protection • Tool cover
Surface	<ul style="list-style-type: none"> • Paint • Skin
Chemical resistance (depending on the surface)	<ul style="list-style-type: none"> • Diluted acids • Alkaline solutions • Cleaners • Lubricants • Alcohol • Disinfectants • Bodily fluids
Customised modification options	<ul style="list-style-type: none"> • Form • Design • Layout • Damping can be adapted to the target application

Your benefits

- ✓ Can be adapted to virtually any robot geometry
- ✓ Easy installation and removal
- ✓ Rounded corners and edges
- ✓ Smooth surface

- ✓ Flexible surface
- ✓ Damping / padding
- ✓ Deformable

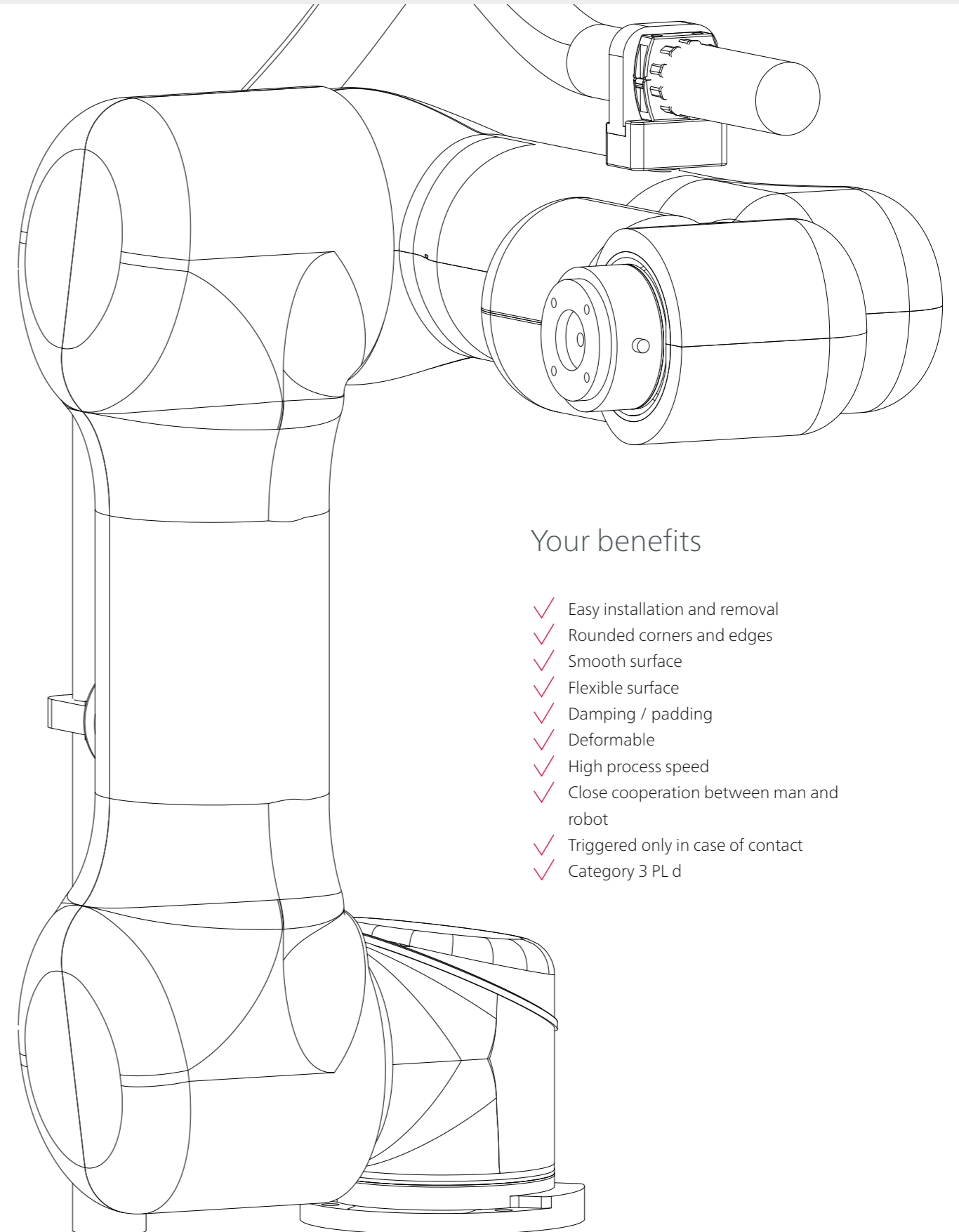
3. Pressure-sensitive collision protection

Collision protection fulfils two purposes: It evenly distributes the forces that occur in the event of a collision, and also shuts down a cobot upon collision.

i Collision protection helps to comply with the requirements for passive and active risk reduction in accordance with ISO/TS 15066.

Technical data

Operating principle	<ul style="list-style-type: none"> • Pressure-sensitive
Areas to be protected	<ul style="list-style-type: none"> • Partial protection • Complete protection • Miniature sensors for protecting tools • Large sensors for protecting heavy-duty robots, for example
Chemical resistance (depending on the surface)	<ul style="list-style-type: none"> • Diluted acids • Alkaline solutions • Cleaners • Lubricants • Alcohol • Disinfectants • Bodily fluids
Protection class	<ul style="list-style-type: none"> • IP54 (up to IP67 possible)
Applied standards	<ul style="list-style-type: none"> • ISO 13856-3 • ISO 13849-1 (suitable for installation of systems up to Category 3 PL d) • ISO 10218-1 (safety requirement)
Customised modification options	<ul style="list-style-type: none"> • Form • Design • Layout • Sensitivity and "softness" of the collision protection, adapted to the target application



Your benefits

- ✓ Easy installation and removal
- ✓ Rounded corners and edges
- ✓ Smooth surface
- ✓ Flexible surface
- ✓ Damping / padding
- ✓ Deformable
- ✓ High process speed
- ✓ Close cooperation between man and robot
- ✓ Triggered only in case of contact
- ✓ Category 3 PL d

4. Surface sensor

Pressure-sensitive surface sensors are used to detect the presence of people in cobot workplaces. This means that a robot operates at a safe speed or stops when a human is present.

i Pressure-sensitive surface sensors initiate a safety-related stop in accordance with ISO/TS 15066 or reduce the speed.

Technical data

	SM 15	SM 11	SM 8	TS
General data				
Height	15	11	8	11
Covering	GM1 GM4 GM5	2-component coating Structured surface	Rubber surface coating with moulded ramp edge	Rubber surface coating (+ moulded logo)
Colours	black, green, yellow	black	black	black
Functional data				
Chemical resistance	+++	++	+	+
Protection class	IP65	IP65	IP65	IP65
Forms	variable	variable	standard sizes, rectangular	standard sizes, rectangular
Maximum size (single mat)	1.5 m ²	1.5 m ²	1.5 m ²	see price list
Structure of ramps	mitre cut according to drawing	standard with corner connections, no drawing	moulded profile	standard with corner connections, no drawing
Safety mat system	max. 10 per control unit	max. 10 per control unit	max. 10 per control unit	max. 10 per control unit
Applied standards	ISO 13856-1 ISO 13849-1	ISO 13856-1 ISO 13849-1	ISO 13856-1 ISO 13849-1	ISO 13856-1 ISO 13849-1
Operating principle	NO	NO	NO	NO
Terminal resistance	•	•	•	•
4-wire connection	•	•	•	•
Slip resistance	R9	R9	R9	R9
Special version	•	•		

Your benefits

- ✓ Maintenance-free
- ✓ Robust system design
- ✓ Resistant to environmental influences and normal chemical influences
- ✓ Reliable functionality in dirty environmental conditions



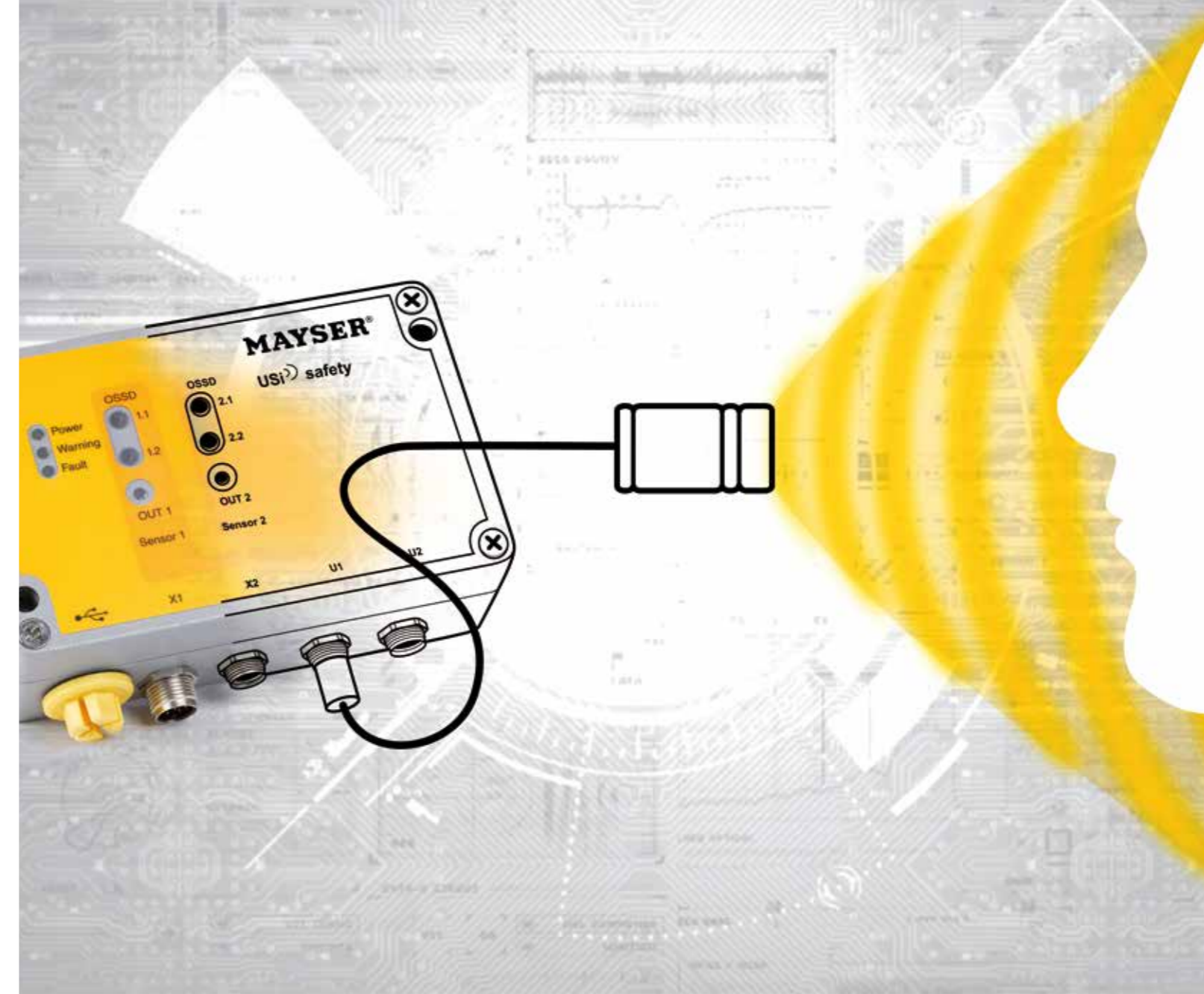
5. Ultrasonic safety

Ultrasonic safety provides a unique solution for protecting tools and workpieces in a cobot environment. Mayser ultrasonic sensors feature two miniature ultrasonic transducers, which are designed for flexible positioning, independent

of the electronic system. The technology is also suitable for non-touch protection and distance measurement. If a human is detected within the ultrasonic protection field or warning field, the robot reduces its speed or stops.

Technical data

General data	
Measuring principle	Ultrasonic pulse echo method
Applied standards	Suitable for installation of systems up to ISO 13849-1:2015 Category 3 PL d
Operating temperature	-10 °C to + 50 °C
IEC 60529: Protection class	
Control unit:	IP65
Sensor:	IP69K
Dimensions (W x H x D)	Control unit: 125 x 91 x 41 mm Sensor: 12.6 x 26.6 x 21 mm
Functional data	
Ultrasonic frequency	Typ. 103 kHz
Sound field geometry	$\pm 17^\circ / \pm 5^\circ$
Measuring frequency	33 Hz
Response time	Typ. 100 ms (for multiple scan 3)
Measuring distance	Typ. 200 cm
Resolution	1 cm
Electrical data	
Connection type	M12 plug-type connector
Supply voltage	DC 24 V -15 % to + 20 %
Input current	150 mA (control unit with 2 ultrasonic transducers, with no output circuit)
Power consumption	max. 3.6 W
OSSD outputs	2 OSSD outputs for each connected ultrasonic transducer, for 2 x 2 safe PNP semiconductor outputs, each with 150 mA, short-circuit proof, cross-circuit monitored
As safe outputs for protection field(s)	
Outputs	1 output for each connected ultrasonic transducer, for 2 x 1 PNP semiconductor outputs, each with 150 mA
As sensor outputs for warning field(s)	
Interface / software	USB 2.0



Your benefits

- ✓ Non-touch monitoring
- ✓ Spatial propagation of the monitored fields
- ✓ Highly elliptical sound field
- ✓ Very small ultrasonic transducer for optimal integration in the application
- ✓ Up to two ultrasonic transducers on one electronic circuit; separate parameter assignment
- ✓ Mobile and stationary applications
- ✓ Two safe OSSD outputs for each connected ultrasonic transducer (sensor) as PNP semiconductor outputs, short-circuit proof and cross-circuit monitored for protection fields, and one message output as PNP semiconductor output for warning fields
- ✓ All parameters can be configured by means of user-friendly software
- ✓ Teach-in environment
- ✓ Category 3 PL d

6. Cobot work environment

Depending on the application, employees can be exposed to additional hazards in the cobot work environment. Safety edges or safety bumpers are used to protect the employees – as well as the robot.

Safety edges

Safety edges are sensors that provide anti-pinch protection at pinching and shearing edges.

Operating principle

- Pressure-sensitive

Variants

- Safety edges
- Sensor profile
- Miniature safety edge

Potential areas of application

- Protection against shearing edges
- Linear protection in vicinity of the robot

Technical data

- Actuation angle: up to $\pm 60^\circ$
- Overall height: from 5.6 mm to 115 mm
- Installation: adhesive, clip and slide-on mounting



Safety bumper

The safety bumper is used as impact protection. It is available in lengths up to 4 m, both in a standard and a special version.

The maximum depth ranges from 500 mm in the standard version to 1200 mm for custom bumpers based on drawings.

Potential areas of application

- Machining centres
- Platform substructures
- AGV systems
- Lifting and painting platforms
- Protective coverings and doors
- Measuring machines
- Transfer carriages

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