

# Technical data sheet

## Safety laser scanner

Part no.: 53800276  
RSL425-M/CU416-25



For illustration purposes only

### Contents

- Technical data
- Dimensioned drawings
- Electrical connection
- Diagrams
- Operation and display
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- Accessories



## Technical data

### Basic data

|             |                                 |
|-------------|---------------------------------|
| Series      | RSL 400                         |
| Application | Mobile danger zone guarding     |
|             | Mobile side guarding            |
|             | Stationary access guarding      |
|             | Stationary danger zone guarding |

### Special version

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| Special version | Measurement data output optimized for vehicle navigation |
|-----------------|----------------------------------------------------------|

### Functions

|           |                                                |
|-----------|------------------------------------------------|
| Functions | Dynamic contactor monitoring (EDM), selectable |
|           | E-stop linkage                                 |
|           | Four-field mode                                |
| Restart   | Start/restart interlock (RES), selectable      |

### Characteristic parameters

|                             |                          |
|-----------------------------|--------------------------|
| Type                        | 3, IEC/EN 61496          |
| SIL                         | 2, IEC 61508             |
| SILCL                       | 2, IEC/EN 62061          |
| Performance Level (PL)      | d, EN ISO 13849-1        |
| PFH <sub>D</sub>            | 9E-08 per hour           |
| Mission time T <sub>M</sub> | 20 years, EN ISO 13849-1 |
| Category                    | 3, EN ISO 13849          |

### Protective field data

|                                             |                       |
|---------------------------------------------|-----------------------|
| Resolution (adjustable)                     | 30/40/50/60/70/150 mm |
| Minimum adjustable range                    | 50 mm                 |
| Number of field pairs, switchable           | 10                    |
| Number of quads, switchable                 | 10                    |
| Number of protective functions              | 1 Piece(s)            |
| Number of independent sensor configurations | 1                     |
| Diffuse reflection, min.                    | 1.8 %                 |
| Operating range                             | 0 ... 4.5 m           |

### Warning field data

|                          |                 |
|--------------------------|-----------------|
| Number of field pairs    | 10              |
| Operating range          | 0 ... 20 m      |
| Object size              | 150 mm x 150 mm |
| Diffuse reflection, min. | 10 %            |

### Optical data

|                          |                        |
|--------------------------|------------------------|
| Light source             | Laser, Infrared        |
| Wavelength               | 905 nm                 |
| Laser class              | 1, IEC/EN 60825-1:2014 |
| Transmitted-signal shape | Pulsed                 |
| Repetition frequency     | 90 kHz                 |
| Angular resolution       | 0.1 °                  |
| Scanning angle           | 270 °                  |

### Measurement data

|                                                                  |                                                                                                                                                                            |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Detection range                                                  | 0 ... 50 m, Diffuse reflection > 90%                                                                                                                                       |
| Diffuse reflection                                               | 90 %                                                                                                                                                                       |
| Distance resolution, radial                                      | 1 mm                                                                                                                                                                       |
| Distance resolution, lateral                                     | 0.1 °                                                                                                                                                                      |
| Systematic measurement error $D_{\text{meas}} - D_{\text{real}}$ | min.: -20 mm<br>typ.: -10 mm<br>max.: 0 mm<br>, (Diffuse reflection: 1.8% ... retro-reflector<br>Measurement range: 0.2 ... 25 m)                                          |
| Measurement value noise                                          | 10 mm 1 $\sigma$<br>(• Diffuse reflection: 1.8% ... 20%<br>Measurement range: 0 ... 9 m<br>• Diffuse reflection: 20% ... retro-reflector<br>Measurement range: 0 ... 25 m) |
| Laser spot (H x W), 10 m                                         | 60 mm x 13 mm                                                                                                                                                              |
| Laser spot (H x W), 20 m                                         | 165 mm x 24 mm                                                                                                                                                             |
| Laser spot (H x W), 30 m                                         | 265 mm x 40 mm                                                                                                                                                             |
| Laser spot (H x W), 40 m                                         | 285 mm x 57 mm                                                                                                                                                             |

### Electrical data

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| Protective circuit                       | Overvoltage protection                   |
| Performance data                         |                                          |
| Supply voltage U <sub>B</sub>            | 24 V, DC, -30 ... 20 %                   |
| Current consumption (without load), max. | 700 mA, (use power supply unit with 3 A) |
| Power consumption, max.                  | 17 W, For 24 V, plus output load         |

### Outputs

|                                                    |            |
|----------------------------------------------------|------------|
| Number of signal outputs, configurable             | 4 Piece(s) |
| Number of safety-related switching outputs (OSSDs) | 2 Piece(s) |

### Safety-related switching outputs

|                              |                                      |
|------------------------------|--------------------------------------|
| Type                         | Safety-related switching output OSSD |
| Switching voltage high, min. | 20.8 V                               |
| Switching voltage low, max.  | 2 V                                  |
| Voltage type                 | DC                                   |
| Switching current, max.      | 300 mA                               |

### Safety-related switching output 1

|                   |                         |
|-------------------|-------------------------|
| Assignment        | Connection 1, gray wire |
| Switching element | Transistor, PNP         |

### Safety-related switching output 2

|                   |                         |
|-------------------|-------------------------|
| Assignment        | Connection 1, pink wire |
| Switching element | Transistor, PNP         |

### Time behavior

|               |               |
|---------------|---------------|
| Response time | 80 ms, $\geq$ |
|---------------|---------------|

### Service interface

|            |                               |
|------------|-------------------------------|
| Type       | Bluetooth, Ethernet, USB      |
| Ethernet   |                               |
| Function   | Configuration/parametization  |
|            | TCP/IP                        |
| Connection | M12 connector, 4-pin, D-coded |

## Technical data

### Bluetooth

|                             |                                 |
|-----------------------------|---------------------------------|
| Function                    | Configuration/parametization    |
| Frequency band              | 2,400 ... 2,483.5 MHz           |
| Radiated transmitting power | Max. 4.5 dBm (2.82 mW), class 2 |

### USB

|                          |                                                                |
|--------------------------|----------------------------------------------------------------|
| Function                 | Configuration/parametization                                   |
| Connection               | USB 2.0 mini-B, socket                                         |
| Transmission speed, max. | 12 Mbit/s                                                      |
| Cable length             | ≤ 5m<br>Longer cable lengths are possible using active cables. |

### Connection

|                       |            |
|-----------------------|------------|
| Number of connections | 2 Piece(s) |
|-----------------------|------------|

#### Connection 1

|                            |                      |
|----------------------------|----------------------|
| Function                   | Machine interface    |
| Type of connection         | Cable                |
| Cable length               | 25,000 mm            |
| Sheathing material         | PVC                  |
| Cable color                | Black                |
| Number of conductors       | 16 -wire             |
| Wire cross section supply  | 1 mm <sup>2</sup>    |
| Wire cross section signals | 0.14 mm <sup>2</sup> |

#### Connection 2

|                    |                |
|--------------------|----------------|
| Function           | Data interface |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Female         |
| Material           | Metal          |
| No. of pins        | 4 -pin         |
| Encoding           | D-coded        |

#### Cable properties

|                        |      |
|------------------------|------|
| Cable resistance, max. | 15 Ω |
|------------------------|------|

### Mechanical data

|                       |                                                                         |
|-----------------------|-------------------------------------------------------------------------|
| Dimension (W x H x L) | 140 mm x 149 mm x 140 mm                                                |
| Housing material      | Metal<br>Plastic                                                        |
| Metal housing         | Diecast zinc                                                            |
| Lens cover material   | Plastic/PC                                                              |
| Net weight            | 3,000 g                                                                 |
| Housing color         | Yellow, RAL 1021                                                        |
| Type of fastening     | Mounting plate<br>Through-hole mounting<br>Via optional mounting device |

### Operation and display

|                       |                                       |
|-----------------------|---------------------------------------|
| Type of display       | Alphanumeric display<br>LED indicator |
| Number of LEDs        | 3 Piece(s)                            |
| Type of configuration | Software Sensor Studio                |
| Operational controls  | Software Sensor Studio                |

### Environmental data

|                                    |               |
|------------------------------------|---------------|
| Ambient temperature, operation     | 0 ... 50 °C   |
| Ambient temperature, storage       | -20 ... 60 °C |
| Relative humidity (non-condensing) | 15 ... 95 %   |

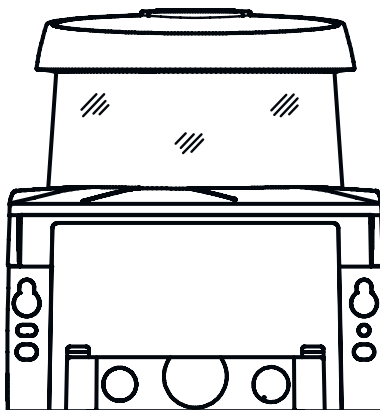
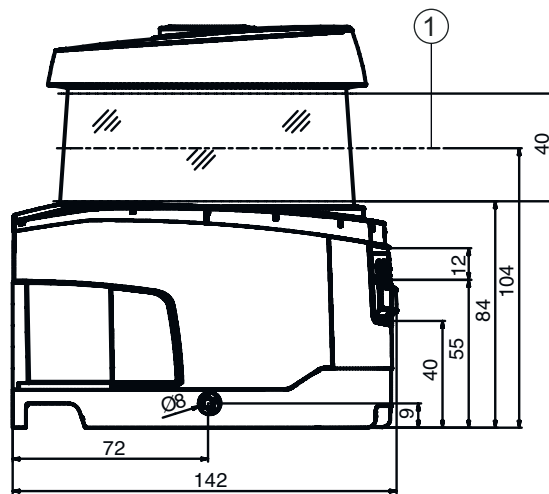
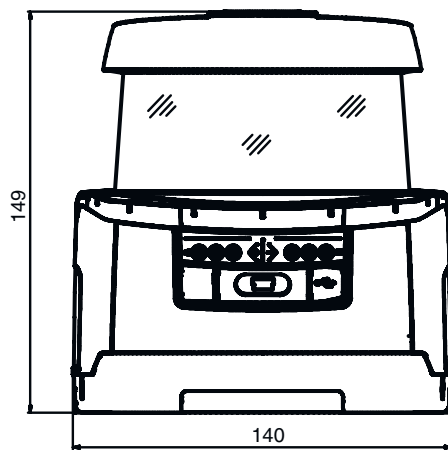
### Certifications

|                                                                 |                                                                      |
|-----------------------------------------------------------------|----------------------------------------------------------------------|
| Degree of protection                                            | IP 65                                                                |
| Protection class                                                | III, EN 61140                                                        |
| Approvals                                                       | TÜV Süd                                                              |
| Test procedure for EMC in accordance with standard              | DIN 40839-1/3<br>EN 61496-1                                          |
| Test procedure for oscillation in accordance with standard      | EN 60068-2-6                                                         |
| Test procedure for continuous shock in accordance with standard | IEC 60068-2-29                                                       |
| US patents                                                      | US 10,304,307B<br>US 7,656,917 B<br>US 7,696,468 B<br>US 8,520,221 B |

### Classification

|                       |          |
|-----------------------|----------|
| Customs tariff number | 85365019 |
| ECLASS 5.1.4          | 27272705 |
| ECLASS 8.0            | 27272705 |
| ECLASS 9.0            | 27272705 |
| ECLASS 10.0           | 27272705 |
| ECLASS 11.0           | 27272705 |
| ECLASS 12.0           | 27272705 |
| ECLASS 13.0           | 27272705 |
| ECLASS 14.0           | 27272705 |
| ECLASS 15.0           | 27272705 |
| ETIM 5.0              | EC002550 |
| ETIM 6.0              | EC002550 |
| ETIM 7.0              | EC002550 |
| ETIM 8.0              | EC002550 |
| ETIM 9.0              | EC002550 |
| ETIM 10.0             | EC002550 |

All dimensions in millimeters



## The Sensor People

info@leuze.com • www.leuze.com  
Phone: +49 7021 573-0 • Fax: +49 7021 573-199

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## Dimensioned drawings

Mounting dimensions safety laser scanner with connection unit



Minimum space requirements for installation and replacement of scanner unit



Dimensioned drawings

Dimensions of scanning range



1 Reference point for distance measurement and protective field radius

Electrical connection

Connection 1

|                            |                   |
|----------------------------|-------------------|
| Function                   | Machine interface |
| Type of connection         | Cable             |
| Cable length               | 25,000 mm         |
| Sheathing material         | PVC               |
| Cable color                | Black             |
| Number of conductors       | 16 -wire          |
| Wire cross section supply  | 1 mm²             |
| Wire cross section signals | 0.14 mm²          |

Conductor color

Conductor assignment

|                |              |
|----------------|--------------|
| White          | RES1         |
| Brown          | +24 V        |
| Green          | EA1          |
| Yellow         | A1           |
| Gray           | OSSDA1       |
| Pink           | OSSDA2       |
| Blue           | GND / Ground |
| Red            | MELD         |
| Black          | F1           |
| Violet         | F2           |
| Gray / Pink    | F3           |
| Blue / Red     | F4           |
| Green / White  | F5           |
| Brown / Green  | SE1          |
| White / Yellow | SE2          |
| Brown / Yellow | A2           |

Electrical connection

Connection 2

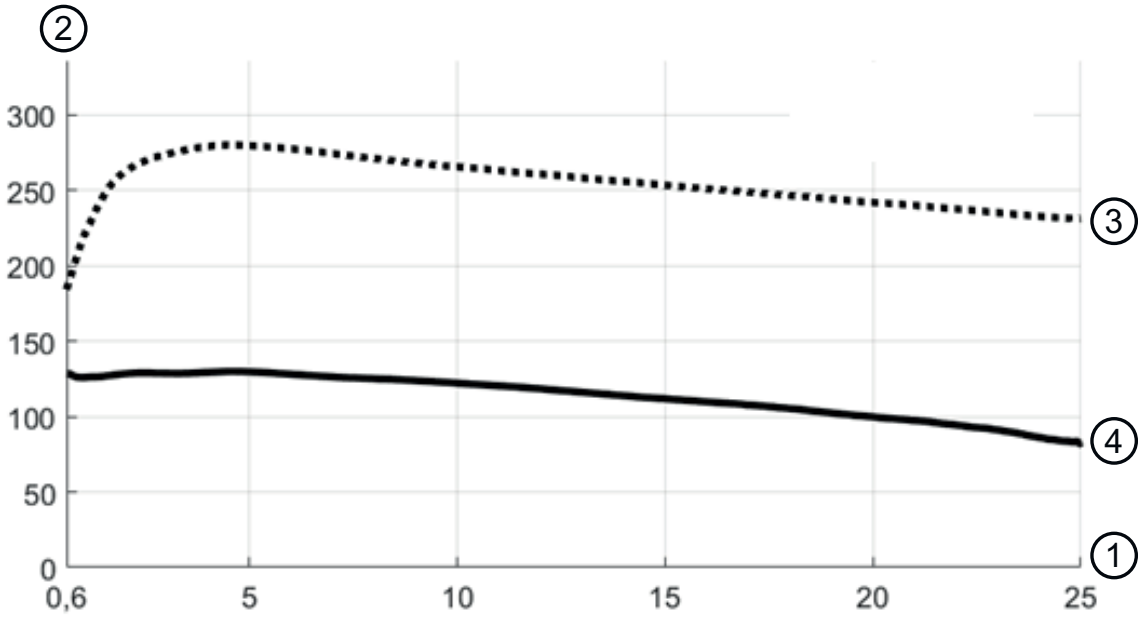
|                    |                |
|--------------------|----------------|
| Function           | Data interface |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Female         |
| Material           | Metal          |
| No. of pins        | 4 -pin         |
| Encoding           | D-coded        |
| Connector housing  | FE/SHIELD      |

| Pin | Pin assignment | Conductor color |
|-----|----------------|-----------------|
| 1   | TD+            | Yellow          |
| 2   | RD+            | White           |
| 3   | TD-            | Orange          |
| 4   | RD-            | Blue            |
| 5   |                |                 |



Diagrams

Signal strength curves depending on the distance



- 1 Object distance [m]
- 2 Signal strength
- 3 Retro-reflector film
- 4 White surface

The figure shows a typical curve of the signal strength transmitted by the safety sensor as a function of the measured object distance and object diffuse reflection for the following boundary conditions:

- Angle of incidence of the laser beam: 0°
- Share of area of the light spot on the object: 100%

## Operation and display

| LED | Display                  | Meaning                                                                                                               |
|-----|--------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1   | Off                      | Device switched off                                                                                                   |
|     | Red, continuous light    | OSSD off                                                                                                              |
|     | Red, flashing            | Error                                                                                                                 |
|     | Green, continuous light  | OSSD on                                                                                                               |
| 2   | Off                      | RES deactivated or RES activated and released                                                                         |
|     | Yellow, flashing         | Protective field occupied                                                                                             |
|     | Yellow, continuous light | RES activated and blocked but ready to be unlocked - protective field free and linked sensor is enabled if applicable |
| 3   | Off                      | Free warning field                                                                                                    |
|     | Blue, continuous light   | Warning field interrupted                                                                                             |
| 4   | Off                      | Four field mode: warning field 3 free                                                                                 |
|     | Blue, continuous light   | Four field mode: warning field 3 interrupted                                                                          |
| 5   | Yellow, flashing         | Four field mode: warning field 2 interrupted                                                                          |

## Notes


**Observe intended use!**



- The product may only be put into operation by competent persons.
- Only use the product in accordance with its intended use.


**ATTENTION! INVISIBLE LASER RADIATION – CLASS 1 LASER PRODUCT**



The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of **laser class 1** and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

- Observe the applicable statutory and local laser protection regulations.
- The device must not be tampered with and must not be changed in any way.  
There are no user-serviceable parts inside the device.  
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

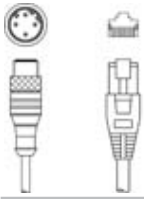
## Accessories

### Connection technology - Interconnection cables

|                                                                                                                                                                        | Part no. | Designation                 | Article               | Description                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 50135081 | KSS ET-M12-4A-RJ45-A-P7-050 | Interconnection cable | Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: RJ45<br>Shielded: Yes<br>Cable length: 5,000 mm<br>Sheathing material: PUR  |
|                                                                                                                                                                        | 50135082 | KSS ET-M12-4A-RJ45-A-P7-100 | Interconnection cable | Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: RJ45<br>Shielded: Yes<br>Cable length: 10,000 mm<br>Sheathing material: PUR |



## Accessories

|                                                                                  | Part no. | Designation                 | Article               | Description                                                                                                                                                                                 |
|----------------------------------------------------------------------------------|----------|-----------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50135083 | KSS ET-M12-4A-RJ45-A-P7-150 | Interconnection cable | Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: RJ45<br>Shielded: Yes<br>Cable length: 15,000 mm<br>Sheathing material: PUR |

## Mounting technology - Mounting brackets

|                                                                                   | Part no. | Designation | Article          | Description                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|----------|-------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 53800134 | BT840M      | Mounting bracket | Application: Mounting on chamfered 90° corner<br>Dimensions: 84.9 mm x 72 mm x 205.2 mm<br>Color: Yellow, RAL 1021<br>Type of fastening, at system: Through-hole mounting<br>Type of fastening, at device: Screw type<br>Material: Metal                               |
|   | 53800132 | BTF815M     | Mounting bracket | Application: Mounting bracket for floor mounting<br>Dimensions: 186 mm x 120 mm x 288 mm<br>Scan level height: 150 mm<br>Color: Yellow, RAL 1021<br>Type of fastening, at system: Through-hole mounting<br>Type of fastening, at device: Screw type<br>Material: Metal |
|  | 53800133 | BTF830M     | Mounting bracket | Application: Mounting bracket for floor mounting<br>Dimensions: 186 mm x 275 mm x 288 mm<br>Scan level height: 300 mm<br>Color: Yellow, RAL 1021<br>Type of fastening, at system: Through-hole mounting<br>Type of fastening, at device: Screw type<br>Material: Metal |

## Mounting

|                                                                                    | Part no. | Designation | Article    | Description                                                    |
|------------------------------------------------------------------------------------|----------|-------------|------------|----------------------------------------------------------------|
|  | 53800131 | BTP800M     | Loop guard | Dimensions: 160 mm x 169 mm<br>Color: Black<br>Material: Metal |

## General

|                                                                                    | Part no. | Designation    | Article      | Description                                                                 |
|------------------------------------------------------------------------------------|----------|----------------|--------------|-----------------------------------------------------------------------------|
|  | 430400   | RS4-clean-Set1 | Cleaning set | Number of cleaning cloths: 40 Piece(s)<br>Content of cleaning fluid: 150 ml |

Accessories

Services

|                                                                                  | Part no. | Designation | Article           | Description                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------|----------|-------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | S981051  | CS40-I-141  | Safety inspection | Details: Checking of a safety laser scanner application in accordance with current standards and guidelines. Inclusion of the device and machine data in a database, production of a test log per application.<br>Conditions: It must be possible to stop the machine, support provided by customer's employees and access to the machine for Leuze employees must be ensured. |
|  | S981047  | CS40-S-141  | Start-up support  | Details: For safety devices including stopping time measurement and initial inspection.<br>Conditions: Devices and connection cables are already mounted, price not including travel costs and, if applicable, accommodation expenses.                                                                                                                                         |

| Note                                                                             |                                                                                                                                  |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|  | <p>A list with all available accessories can be found on the Leuze website in the Download tab of the article detailed page.</p> |