

## Technical data sheet

## Safety laser scanner

Part no.: 53800295

RSL445-S/CU429-300-WPU

### Contents

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



Figure can vary



## Technical data

### Basic data

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

### Special version

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

### Functions

|           |   |
|-----------|---|
| Functions | Data output, configurable<br>Dynamic contactor monitoring (EDM), selectable<br>E-stop linkage<br>Four-field mode<br>Resolution, selectable<br>Safe time delay, internal |
|-----------|---|

### 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

|   |            |
|---|------------|
| Scanning angle                              | 270 °      |
| Minimum adjustable range                    | 50 mm      |
| Number of field pairs, reversible           | Up to 100  |
| Number of quads, reversible                 | 50         |
| Number of protective functions              | 2 Piece(s) |
| Number of independent sensor configurations | Up to 10   |
| Diffuse reflection, min.                    | 1.8 %      |
| Operating range                             | 0 ... 3 m  |

### Warning field data

|                          |                 |
|--------------------------|-----------------|
| Number of field pairs    | Up to 100       |
| Operating range          | 0 ... 20 m      |
| Object size              | 150 mm x 150 mm |
| Diffuse reflection, min. | 10 %            |

### Optical data

|                          |                        |
|--------------------------|------------------------|
| Light source             | Laser, Infrared        |
| Laser light wavelength   | 905 nm                 |
| Laser class              | 1, IEC/EN 60825-1:2007 |
| Transmitted-signal shape | Pulsed                 |
| Repetition frequency     | 90 kHz                 |

### Measurement data

|  |  |
|--|--|
| Detection range  | 0 ... 50 m, Diffuse reflection > 90%   |
| Diffuse reflection   | 20 %   |
| Angular resolution   | 0.1 °  |
| Distance resolution, radial  | 1 mm   |
| Distance resolution, lateral                                       | 0.1 °  |
| Systematic measurement error D <sub>meas</sub> - D <sub>real</sub> | 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 σ<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 safety-related switching outputs (OSSDs) | 4 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                                   |

#### Safety-related switching output 1

|                   |                     |
|-------------------|---------------------|
| Assignment        | Connection 1, pin 4 |
| Switching element | Transistor, PNP     |

#### Safety-related switching output 2

|                   |                     |
|-------------------|---------------------|
| Assignment        | Connection 1, pin 5 |
| Switching element | Transistor, PNP     |

#### Safety-related switching output 3

|                   |                      |
|-------------------|----------------------|
| Assignment        | Connection 1, pin 26 |
| Switching element | Transistor, PNP      |

#### Safety-related switching output 4

|                   |                      |
|-------------------|----------------------|
| Assignment        | Connection 1, pin 27 |
| Switching element | Transistor, PNP      |

### Service interface

|      |                |
|------|----------------|
| Type | Bluetooth, USB |
|------|----------------|

#### Bluetooth

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

## Technical data

### USB

|                          |  |
|--------------------------|--|
| Function                 | Configuration/parametering                                     |
| 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 with connector |
| Cable length               | 300 mm               |
| Sheathing material         | PVC                  |
| Cable color                | Black                |
| Wire cross section supply  | 1 mm <sup>2</sup>    |
| Wire cross section signals | 0.14 mm <sup>2</sup> |
| Thread size                | M30                  |
| Type                       | Male                 |
| Material                   | Plastic              |
| No. of pins                | 30 -pin              |

#### 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       | Alphanumerical display<br>LED indicator |
| Number of LEDs        | 6 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  |
| Certifications  | 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 |
| eCl@ss 5.1.4          | 27272705 |
| eCl@ss 8.0            | 27272705 |
| eCl@ss 9.0            | 27272705 |
| eCl@ss 10.0           | 27272705 |
| eCl@ss 11.0           | 27272705 |
| ETIM 5.0              | EC002550 |
| ETIM 6.0              | EC002550 |
| ETIM 7.0              | EC002550 |

## Dimensioned drawings

All dimensions in millimeters

Dimensions safety laser scanner with connection unit



1 Scan level

## Dimensioned drawings

Mounting dimensions safety laser scanner with connection unit

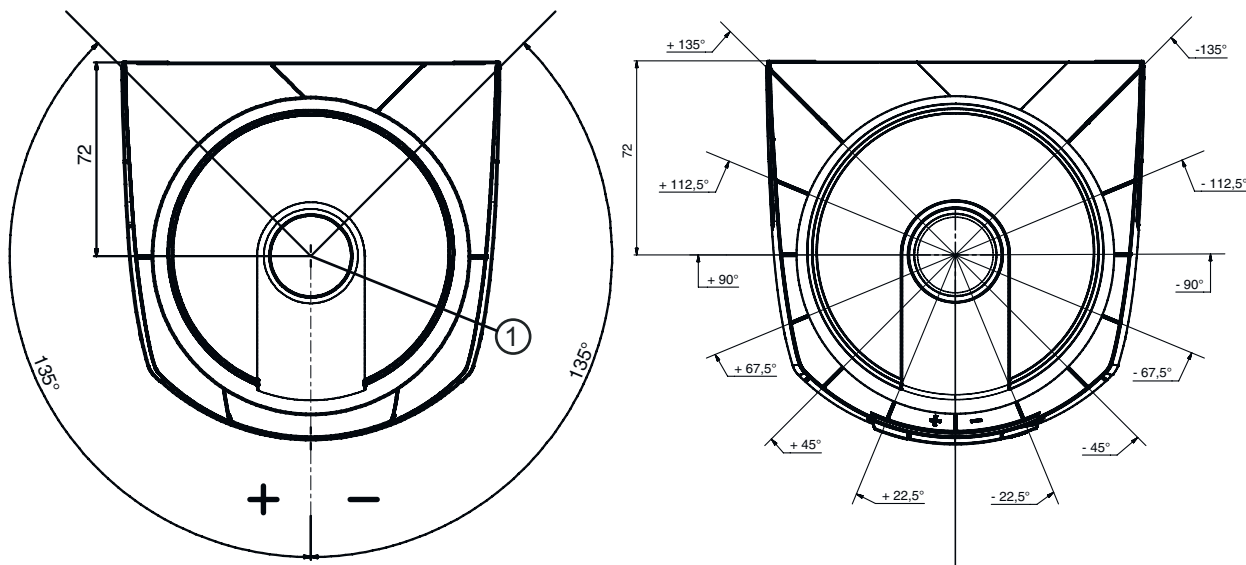


Minimum space requirements for installation and replacement of scanner unit



# Dimensioned drawings

Minimum space requirements for installation and replacement of scanner unit



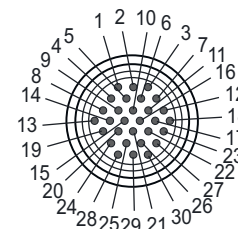
1 Reference point for distance measurement and protective field radius

## Electrical connection

### Connection 1

|                            |                      |
|----------------------------|----------------------|
| Function                   | Machine interface    |
| Type of connection         | Cable with connector |
| Cable length               | 300 mm               |
| Sheathing material         | PVC                  |
| Cable color                | Black                |
| Wire cross section supply  | 1 mm <sup>2</sup>    |
| Wire cross section signals | 0.14 mm <sup>2</sup> |
| Thread size                | M30                  |
| Type                       | Male                 |
| Material                   | Plastic              |
| No. of pins                | 30 -pin              |
| Connector housing          | FE/SHIELD            |

| Pin | Pin assignment | Conductor color |
|-----|----------------|-----------------|
| 1   | RES1           | White           |
| 2   | +24V           | Brown           |
| 3   | EA1            | Green           |
| 4   | OSSDA1         | Gray            |
| 5   | OSSDA2         | Pink            |
| 6   | MELD           | Red             |
| 7   | A1             | Yellow          |
| 8   | F1             | Black           |
| 9   | F2             | Violet          |
| 10  | F3             | Gray            |
|     |                | Pink            |
| 11  | F4             | Blue            |
|     |                | Red             |
| 12  | F5             | Green           |
|     |                | White           |



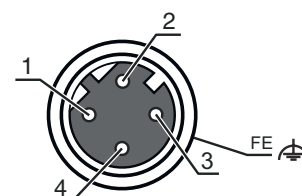
## Electrical connection

| Pin | Pin assignment | Conductor color |
|-----|----------------|-----------------|
| 13  | SE1            | Brown           |
|     |                | Green           |
| 14  | SE2            | White           |
|     |                | Yellow          |
| 15  | A2             | Brown           |
|     |                | Yellow          |
| 16  | A3             | Gray            |
|     |                | White           |
| 17  | A4             | Brown           |
|     |                | Gray            |
| 18  | EA2            | Pink            |
|     |                | White           |
| 19  | EA3            | Brown           |
|     |                | Pink            |
| 20  | EA4            | Blue            |
|     |                | White           |
| 21  | F6             | Blue            |
|     |                | Brown           |
| 22  | F7             | Red             |
|     |                | White           |
| 23  | F8             | Brown           |
|     |                | Red             |
| 24  | F9             | Black           |
|     |                | White           |
| 25  | F10            | Black           |
|     |                | Brown           |
| 26  | OSSDB1         | Gray            |
|     |                | Yellow          |
| 27  | OSSDB2         | Green           |
|     |                | Pink            |
| 28  | n.c.           | -               |
| 29  | GND / Ground   | Blue            |
| 30  | RES2           | Gray            |
|     |                | Green           |

### Connection 2

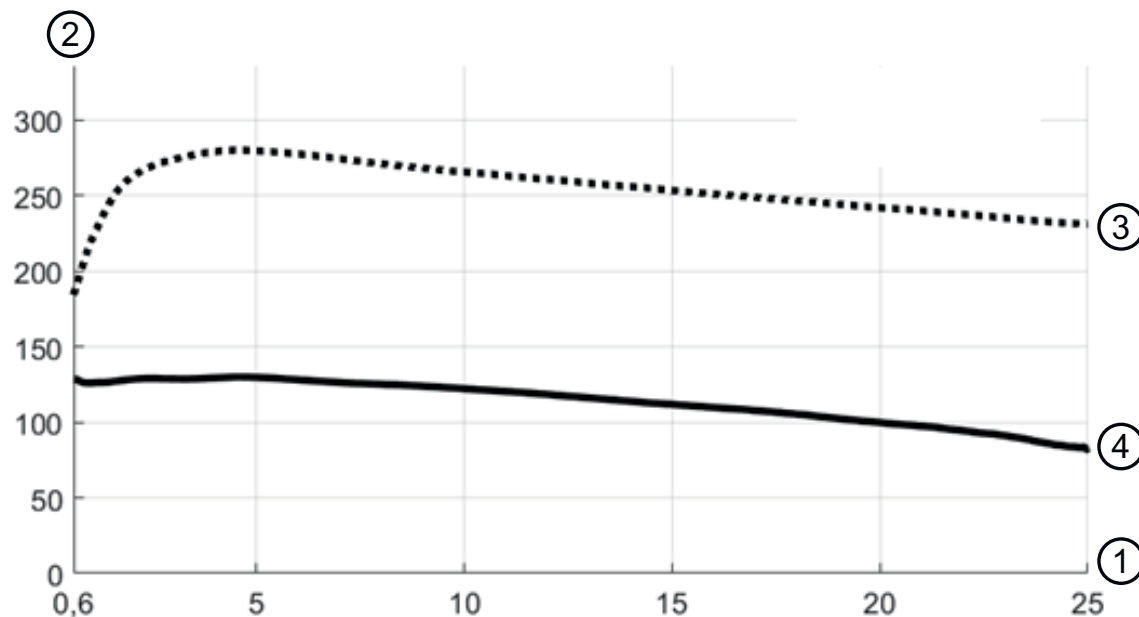
|                    |                |
|--------------------|----------------|
| Function           | Data interface |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Female         |
| Material           | Metal          |
| No. of pins        | 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

## 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                      | Free warning field  |
|     | Blue, continuous light   | Warning field interrupted   |
| 5   | 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 |
| 6   | Off                      | Device switched off   |
|     | Red, continuous light    | OSSD off  |
|     | Red, flashing            | Error   |
|     | Green, continuous light  | OSSD on   |



## 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.

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

The device satisfies the requirements of IEC 60825-1:2014 (EN 60825-1:2014) safety regulations for a product of **laser class 1 as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to "Laser Notice No. 56" from 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 - Connection cables




|  | Part no. | Designation         | Article          | Description  |
|--|----------|---------------------|------------------|--|
|  | 50137269 | KD S-M30-30A-V1-050 | Connection cable | Connection 1: Connector, M30, Axial, Female, 30 -pin<br>Connection 2: Open end<br>Shielded: Yes<br>Cable length: 5,000 mm<br>Sheathing material: PVC |

### 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 |
|  | 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 |

## Accessories


### 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 |

### Services

|  | Part no. | Designation | Article   | Description  |
|--|----------|-------------|---|--|
|  | S981051  | CS40-I-141  | Safety inspection<br>"Safety laser<br>scanners" | 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.<br>Restrictions: Travel costs and accommodation expenses charged separately and according to expenditure. |

## Accessories

|  | Part no. | Designation | Article          | Description   |
|--|----------|-------------|------------------|---|
|  | S981047  | CS40-S-141  | Start-up support | <p>Details: For safety devices including stopping time measurement and initial inspection.</p> <p>Conditions: Devices and connection cables are already mounted, price not including travel costs and, if applicable, accommodation expenses.</p> <p>Restrictions: Max. 3 h., no mechanical (mounting) and electrical (wiring) work performed, no changes (attachments, wiring, programming) to third-party components in the nearby environment.</p> |

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