

## Technical data sheet

## Safety laser scanner

Part no.: 53800295

RSL445-S/CU429-300-WPU



For illustration purposes only

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- Technical data
- Dimensioned drawings
- Electrical connection
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## 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 | Data output, configurable                      |
|           | Dynamic contactor monitoring (EDM), selectable |
|           | E-stop linkage                                 |
|           | Four-field mode                                |
|           | Safe time delay, internal                      |
| 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           | Up to 100             |
| Number of quads, switchable                 | 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        |
| 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 <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                   |
| <b>Performance data</b>                  |                                          |
| 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             | 9 Piece(s) |
| 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                                   |
| Switching current, max.      | 300 mA                               |

### 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      |

### Time behavior

|               |          |
|---------------|----------|
| Response time | 80 ms, ≥ |
|---------------|----------|

## Technical data

### Service interface

|                             |                                                                |
|-----------------------------|----------------------------------------------------------------|
| Type                        | Bluetooth, Ethernet, USB                                       |
| <b>Ethernet</b>             |                                                                |
| Function                    | Configuration/parametization                                   |
|                             | TCP/IP                                                         |
| Connection                  | M12 connector, 4-pin, D-coded                                  |
| <b>Bluetooth</b>            |                                                                |
| Function                    | Configuration/parametization                                   |
| Frequency band              | 2,400 ... 2,483.5 MHz                                          |
| Radiated transmitting power | Max. 4.5 dBm (2.82 mW), class 2                                |
| <b>USB</b>                  |                                                                |
| 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)           |
| <b>Connection 1</b>        |                      |
| 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              |
| <b>Connection 2</b>        |                      |
| Function                   | Data interface       |
| Type of connection         | Connector            |
| Thread size                | M12                  |
| Type                       | Female               |
| Material                   | Metal                |
| No. of pins                | 4 -pin               |
| Encoding                   | D-coded              |
| <b>Cable properties</b>    |                      |
| Cable resistance, max.     | 15 Ω                 |

### Mechanical data

|                       |                              |
|-----------------------|------------------------------|
| Dimension (W x H x L) | 140 mm x 149 mm x 140 mm     |
| Housing material      | Metal                        |
|                       | 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               |
|                       | Through-hole mounting        |
|                       | Via optional mounting device |

### Operation and display

|                       |                        |
|-----------------------|------------------------|
| Type of display       | Alphanumeric display   |
|                       | 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                                                        |
| 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 |

## 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

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 with connector |
| Cable length               | 300 mm               |
| Sheathing material         | PVC                  |
| Cable color                | Black                |
| Wire cross section supply  | 1 mm²                |
| Wire cross section signals | 0.14 mm²             |
| 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   | +24 V          | 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   |
| 13  | SE1            | Brown / Green   |
| 14  | SE2            | White / Yellow  |
| 15  | A2             | Brown / Yellow  |
| 16  | A3             | Gray / White    |



Electrical connection

| Pin | Pin assignment | Conductor color |
|-----|----------------|-----------------|
| 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

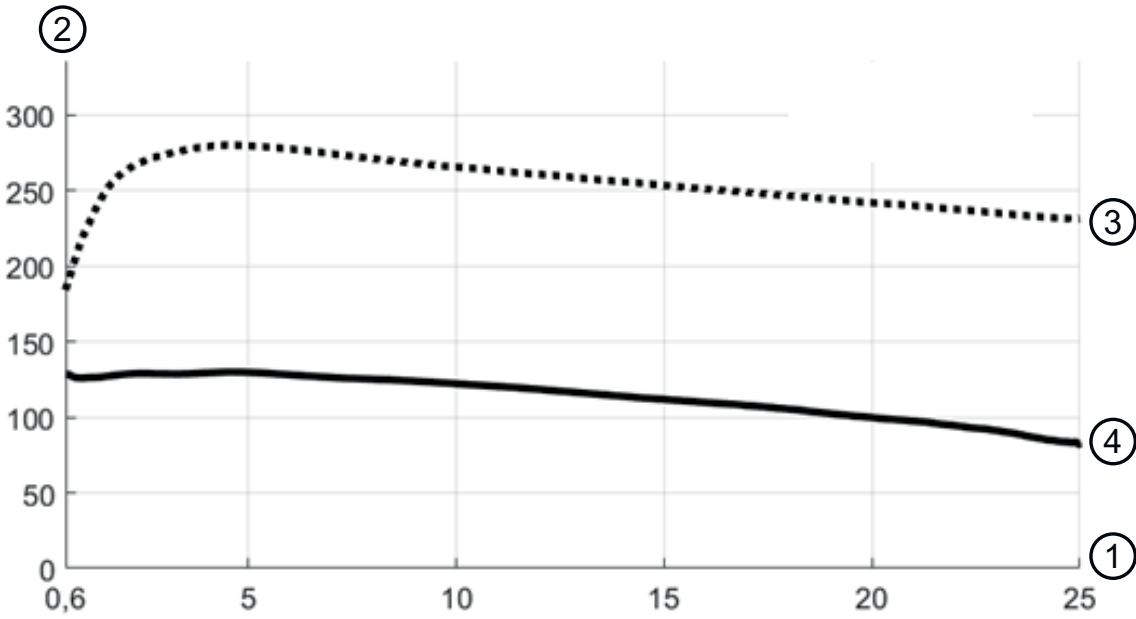
|                    |                |
|--------------------|----------------|
| Function           | Data interface |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Female         |
| Material           | Metal          |
| No. of pins       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



### 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.

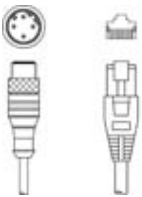
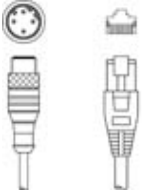
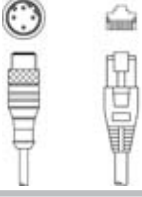
- ⚡ Observe the applicable statutory and local laser protection regulations.
- ⚡ The device must not be tampered with and must not be changed in any way. There are no user-serviceable parts inside the device. Repairs must only be performed by Leuze electronic GmbH + Co. KG.

## Accessories

### Connection technology - 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>Connector, LED: No<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 | 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. |

Accessories

|                                                                                  | Part no. | Designation | Article          | Description                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------|----------|-------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 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                                                                             |                                                                                                                           |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|  | A list with all available accessories can be found on the Leuze website in the Download tab of the article detailed page. |