



LS2, LS2_K, LS2_H series

Light Curtains

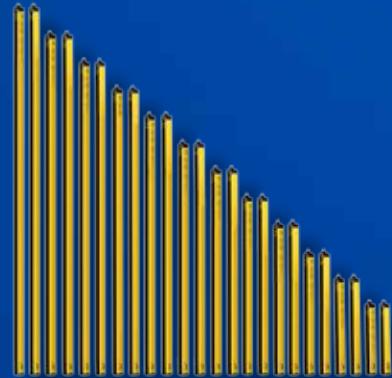
Type 2 according to IEC 61496-1 and 2



Light Curtains
Type 2

features

- Compact housing (28 x 30 mm) and no dead zone on cap side
- Resolution 30, 40, 50, 90 mm for hand protection and presence control and 2, 3, 4 beams for body protection/access control
- Controlled distance up to: 3, 4, 10, 12 m
- Base, Standard versions and Master, Slave version to connect up to 3 sets in cascade configuration
- Selectable Automatic/Manual Restart and EDM integrated functions (Standard models)
- Selectable controlled distance
- IP69K protection models (LS2_K) and models with integrated heating system to reach -25°C operating temperature (LS2_H)
- Standard M12 da 5 and 8 poles connectors



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- Application notes
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- Catalogue / Manuals



code description

LS2 ER / 30 - 015

| | | |
|------------|-----------|---|
| series | LS2 | Type 2 Safety light Curtains 28 x 30 mm compact housing |
| E/R | ER | Emitter / Receiver couple |
| beams | 30 | Light grid, 30 mm resolution, hand protection |
| | 40 | Light grid, 40 mm resolution, hand protection |
| | 50 | Light grid, 50 mm resolution, presence control |
| | 90 | Light grid, 90 mm resolution, presence control |
| | 0A | 2 beams; body protection, 500 mm resolution |
| | 0B | 3 beams; body protection, 400 mm resolution |
| | 0C | 4 beams; body protection, 300 mm resolution |
| area | 015 - 180 | Protected height from 150 to 1,800 mm (light grids) |
| | 050 - 090 | Protected height 500, 800, 900 mm (multiple light beams) |
| model | | Standard model with selectable MANUAL/AUTOMATIC Restart and EDM functions |
| | B | Base model with integrated AUTOMATIC Restart |
| | M | Master Model with selectable functions |
| | F | Final Slave model |
| protection | | IP65 and IP67 protection, 10° ... 55 °C operating temperature |
| | K | Models in transparent cylindrical housing, IP69K, suitable for applications in the food industry. Resistance to washing with water at 100 bar, 80 °C Housing in PMMA, caps in POM C with silicone seals. Brackets in stainless steel AISI 316L. Operating temperature -10 ... 55 °C. |
| | H | Models in transparent cylindrical casing, IP69K protection, thermostated, suitable for applications in the food industry. Resistance to washing with water at 100 bar, 80 °C. Housing in PMMA, POM C caps and silicone seals. Brackets in stainless steel AISI 316L. Operating temperature -25 ... 55 °C. |

LS2; LS2_K;
LS2_H

available models

30 mm resolution; 0...4 / 0...12 m controlled distance

Light Curtains
Type 2

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 160 | 8 | 4.5 | LS2ER/30-015B |
| | | | LS2ER/30-015 |
| | | | LS2ER/30-015F |
| 310 | 16 | 6 | LS2ER/30-030B |
| | | | LS2ER/30-030 |
| | | | LS2ER/30-030M |
| | | | LS2ER/30-030F |
| | | | LS2ER/30-030S |
| | | | LS2ER/30-045B |
| 460 | 23 | 8 | LS2ER/30-045 |
| | | | LS2ER/30-045M |
| | | | LS2ER/30-045F |
| | | | LS2ER/30-045S |
| | | | LS2ER/30-060B |
| 610 | 31 | 10 | LS2ER/30-060 |
| | | | LS2ER/30-060M |
| | | | LS2ER/30-060F |
| | | | LS2ER/30-060S |
| | | | LS2ER/30-075B |
| 760 | 38 | 11 | LS2ER/30-075 |
| | | | LS2ER/30-075M |
| | | | LS2ER/30-075F |
| | | | LS2ER/30-075S |
| | | | LS2ER/30-090B |
| | | | LS2ER/30-090 |
| 910 | 46 | 13 | LS4ER/30-090M |
| | | | LS2ER/30-090F |
| | | | LS2ER/30-090S |
| | | | LS2ER/30-105B |
| | | | LS2ER/30-105 |
| 1,060 | 53 | 14.5 | LS2ER/30-105M |
| | | | LS2ER/30-105F |
| | | | LS2ER/30-105S |
| | | | LS2ER/30-120B |
| | | | LS2ER/30-120 |
| 1,210 | 61 | 16 | LS2ER/30-120M |
| | | | LS2ER/30-120F |
| | | | LS2ER/30-120S |

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 1,360 | 68 | 17.5 | LS2ER/30-135B |
| | | | LS2ER/30-135 |
| | | | LS2ER/30-135M |
| | | | LS2ER/30-135F |
| | | | LS2ER/30-135S |
| 1,510 | 76 | 19.5 | LS2ER/30-150B |
| | | | LS2ER/30-150 |
| | | | LS2ER/30-150M |
| | | | LS2ER/30-150F |
| | | | LS2ER/30-150S |
| 1,660 | 83 | 21 | LS2ER/30-165 |
| 1,810 | 91 | 22.5 | LS2ER/30-180 |

available models

40 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 160 | 6 | 4 | LS2ER/40-015B |
| | | | LS2ER/40-015 |
| | | | LS2ER/40-015F |
| 310 | 11 | 5 | LS2ER/40-030B |
| | | | LS2ER/40-030 |
| | | | LS2ER/40-030M |
| | | | LS2ER/40-030F |
| | | | LS2ER/40-030S |
| | | | LS2ER/40-045B |
| 460 | 11 | 6 | LS2ER/40-045 |
| | | | LS2ER/40-045M |
| | | | LS2ER/40-045F |
| | | | LS2ER/40-045S |
| | | | LS2ER/40-060B |
| 610 | 21 | 7.5 | LS2ER/40-060 |
| | | | LS2ER/40-060M |
| | | | LS2ER/40-060F |
| | | | LS2ER/40-060S |
| | | | LS2ER/40-075B |
| 760 | 26 | 8.5 | LS2ER/40-075 |
| | | | LS2ER/40-075M |
| | | | LS2ER/40-075F |

available models

40 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 760 | 26 | 8.5 | LS2ER/40-075S |
| | | | LS2ER/40-090B |
| 910 | 31 | 9.5 | LS2ER/40-090 |
| | | | LS2ER/40-090M |
| | | | LS2ER/40-090F |
| | | | LS2ER/40-090S |
| | | | LS2ER/40-105B |
| 1,060 | 36 | 10.5 | LS2ER/40-105 |
| | | | LS2ER/40-105M |
| | | | LS2ER/40-105F |
| | | | LS2ER/40-105S |
| | | | LS2ER/40-120B |
| 1,210 | 41 | 11.5 | LS2ER/40-120 |
| | | | LS2ER/40-120M |
| | | | LS2ER/40-120F |
| | | | LS2ER/40-120S |
| | | | LS2ER/40-135B |
| 1,360 | 46 | 13 | LS2ER/40-135 |
| | | | LS2ER/40-135M |
| | | | LS2ER/40-135F |
| | | | LS2ER/40-135S |
| | | | LS2ER/40-150B |
| 1,519 | 51 | 14 | LS2ER/40-150 |
| | | | LS2ER/40-150M |
| | | | LS2ER/40-150F |
| | | | LS2ER/40-150S |

available models

50 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 160 | 4 | 3.5 | LS2ER/50-015B |
| | | | LS2ER/50-015 |
| | | | LS2ER/50-015F |
| 310 | 8 | 4.5 | LS2ER/50-030B |
| | | | LS2ER/50-030 |
| | | | LS2ER/50-030M |
| | | | LS2ER/50-030F |
| | | | LS2ER/50-030S |

available models

50 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 460 | 12 | 5.5 | LS2ER/50-045B |
| | | | LS2ER/50-045 |
| | | | LS2ER/50-045M |
| | | | LS2ER/50-045F |
| | | | LS2ER/50-045S |
| 610 | 16 | 6 | LS2ER/50-060B |
| | | | LS2ER/50-060 |
| | | | LS2ER/50-060M |
| | | | LS2ER/50-060F |
| | | | LS2ER/50-060S |
| 760 | 20 | 7 | LS2ER/50-075B |
| | | | LS2ER/50-075 |
| | | | LS2ER/50-075M |
| | | | LS2ER/50-075F |
| | | | LS2ER/50-075S |
| 910 | 24 | 8 | LS2ER/50-090B |
| | | | LS2ER/50-090 |
| | | | LS4ER/50-090M |
| | | | LS2ER/50-090F |
| | | | LS2ER/50-090S |
| 1,060 | 28 | 9 | LS2ER/50-105B |
| | | | LS2ER/50-105 |
| | | | LS2ER/50-105M |
| | | | LS2ER/50-105F |
| | | | LS2ER/50-105S |
| 1,210 | 32 | 10 | LS2ER/50-120B |
| | | | LS2ER/50-120 |
| | | | LS2ER/50-120M |
| | | | LS2ER/50-120F |
| | | | LS2ER/50-120S |
| 1,360 | 36 | 10.5 | LS2ER/50-015B |
| | | | LS2ER/50-015 |
| | | | LS2ER/50-015F |
| | | | LS2ER/50-030B |
| | | | LS2ER/50-030 |
| 1,510 | 40 | 11.5 | LS2ER/50-030M |
| | | | LS2ER/50-030F |
| | | | LS2ER/50-030S |
| | | | LS2ER/50-045B |
| | | | LS2ER/50-045 |

available models

90 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 310 | 4 | 3.5 | LS2ER/90-030B |
| | | | LS2ER/90-030 |
| | | | LS2ER/90-030M |
| | | | LS2ER/90-030F |
| | | | LS2ER/90-030S |
| 460 | 6 | 4 | LS2ER/90-045B |
| | | | LS2ER/90-045 |
| | | | LS2ER/90-045M |
| | | | LS2ER/90-045F |
| | | | LS2ER/90-045S |
| 610 | 8 | 4.5 | LS2ER/90-060B |
| | | | LS2ER/90-060 |
| | | | LS2ER/90-060M |
| | | | LS2ER/90-060F |
| | | | LS2ER/90-060S |
| 760 | 10 | 5 | LS2ER/90-075B |
| | | | LS2ER/90-075 |
| | | | LS2ER/90-075M |
| | | | LS2ER/90-075F |
| | | | LS2ER/90-075S |
| 910 | 12 | 5.5 | LS2ER/90-090B |
| | | | LS2ER/90-090 |
| | | | LS2ER/90-090M |
| | | | LS2ER/90-090F |
| | | | LS2ER/90-090S |
| 1,060 | 14 | 6 | LS2ER/90-105B |
| | | | LS2ER/90-105 |
| | | | LS2ER/90-105M |
| | | | LS2ER/90-105F |
| | | | LS2ER/90-105S |
| 1,210 | 16 | 6 | LS2ER/90-120B |
| | | | LS2ER/90-120 |
| | | | LS2ER/90-120M |
| | | | LS2ER/90-120F |
| | | | LS2ER/90-120S |
| 1,360 | 18 | 6.5 | LS2ER/90-135B |
| | | | LS2ER/90-135 |
| | | | LS2ER/90-135M |
| | | | LS2ER/90-135F |
| | | | LS2ER/90-135S |
| 1,510 | 20 | 7 | LS2ER/90-150B |
| | | | LS2ER/90-150 |

available models

500 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 510 | 2 | 3 | LS2ER/0A-050B |
| | | | LS2ER/0A-050 |
| | | | LS2ER/0A-050M |
| | | | LS2ER/0A-050F |
| | | | LS2ER/0A-050S |

available models

400 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 310 | 3 | 3.5 | LS2ER/0B-080B |
| | | | LS2ER/0B-080 |
| | | | LS2ER/0B-080M |
| | | | LS2ER/0B-080F |
| | | | LS2ER/0B-080S |

available models

300 mm resolution; 0...4 / 0...12 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 910 | 4 | 3.5 | LS2ER/0C-090B |
| | | | LS2ER/0C-090 |
| | | | LS2ER/0C-090M |

available models

30 mm resolution; 0...3 / 0...10 m controlled distance

| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 160 | 8 | 4.5 | LS2ER/30-015K |
| 310 | 16 | 6 | LS2ER/30-030K |
| 460 | 23 | 8 | LS2ER/30-045K |
| 610 | 31 | 10 | LS2ER/30-060K |
| 760 | 38 | 11 | LS2ER/30-075K |
| 910 | 46 | 13 | LS2ER/30-090K |
| 1,060 | 53 | 14.5 | LS2ER/30-105K |
| 1,210 | 61 | 16 | LS2ER/30-120K |
| 1,360 | 68 | 17.5 | LS2ER/30-135K |
| 1,510 | 76 | 19.5 | LS2ER/30-150K |

available models

30 mm resolution; 0...3 / 0...10 m controlled distance




| protected height (mm) | n° of beams | response time (ms) | series |
|-----------------------|-------------|--------------------|---------------|
| 160 | 8 | 4.5 | LS2ER/30-015H |
| 310 | 16 | 6 | LS2ER/30-030H |
| 460 | 23 | 8 | LS2ER/30-045H |
| 610 | 31 | 10 | LS2ER/30-060H |
| 769 | 38 | 11 | LS2ER/30-075H |
| 910 | 46 | 13 | LS2ER/30-090H |
| 1,060 | 53 | 14.5 | LS2ER/30-105H |
| 1,210 | 61 | 16 | LS2ER/30-120H |
| 1,360 | 68 | 17.5 | LS2ER/30-135H |
| 1,510 | 76 | 19.5 | LS2ER/30-150H |

available models

0...3 / 0...10 m controlled distance

| n° of beams | protected height (mm) | controlled area (mm) | response time (ms) | series |
|-------------|-----------------------|----------------------|--------------------|---------------|
| 2 | 500 | 510 | 4.5 | LS2ER/0A-050K |
| 3 | 400 | 810 | 6 | LS2ER/0B-080K |
| 4 | 300 | 910 | 8 | LS2ER/0C-090K |

| n° of beams | protected height (mm) | controlled area (mm) | response time (ms) | series |
|-------------|-----------------------|----------------------|--------------------|---------------|
| 2 | 500 | 510 | 4.5 | LS2ER/0A-050H |
| 3 | 400 | 810 | 6 | LS2ER/0B-080H |
| 4 | 300 | 910 | 8 | LS2ER/0C-090H |

| | LS2ER/**-*** | |
|--|---|---|
| |    | |
| operating voltage | 19.2...28.8 Vdc | PELV power supplier according to EN 60204-1 Cap.6.4 |
| power consumption, Receiver | 2 W | no load |
| power consumption, Emitter | 1 W | |
| power consumption, heater | 2...10 W | H models, IP69K with heater |
| output type | 2 x PNP | OSSD safety outputs |
| output current | 400 mA | higher values are considered overload |
| equivalent resistive load | 60 Ω | lower values are considered short circuit |
| capacitive load | 0.82 μF | lower values may be considered short circuit |
| recovery time | 2 s | |
| response time | 2.5...20 ms | |
| effective aperture angle | ± 5° | IEC 61496-1 |
| artificial light rejection | according to IEC 61496-2 | } according to the reported standards |
| ambient light rejection | according to IEC 61496-2 | |
| IP mechanical protection (standard models) | IP65 and IP67 | without any additional precaution the device can't be used for outdoor applications |
| IP mechanical protection (special models) | IP65, IP67 and IP69K | external transparent tube resistant against 100 bar water jets |
| operating temperature | -10...+55°C | no condensation |
| operating temperature, K models | -10...+55°C | no condensation, models without internal heater |
| operating temperature, H models | -25...+55°C | models with internal heater |
| storage temperature | -25...+70°C | to be respected also during transportation |
| humidity | 95% | no condensation |
| vibrations | according to IEC 61496-1 | } according to the reported standards |
| shocks | according to IEC 61496-1 | |
| cable length (power supply/outputs) | 100 m | } cable section 0.34 mm ² (to respect max length) |
| max cable length for Master Slave interconnections | 50 m | |
| dimension (IP67 models) | 28 (front) x 30 mm | } painted aluminium RAL 1012 |
| tube (IP69K models) | ∅ 56 mm | |
| connectors models LS2ER/**-***B | Emitter 1 x M12, 5p, male Receiver 1 x M12, 5p male | |
| connectors models LS2ER/**-*** | Emitter 1 x M12, 5p, male Receiver 1 x M12, 8p male | |
| connectors models LS2ER/**-***M | Emitter 2 x M12, 5p, male Receiver 1 x M12, 8p male + 1 x M12, 5p male | |
| connectors models LS2ER/**-***S | Emitter 2 x M12, 5p, male Receiver 2 x M12, 5p male | |
| connectors models LS2ER/**-***F | Emitter 1 x M12, 5p, male Receiver 1 x M12, 5p male | |
| connectors models LS2ER/**-***K | Emitter cable 5 wires Receiver cable 8 wires | |
| connectors models LS2ER/**-***H | Emitter cable 8 wires Receiver cable 10 wires | |

safety parameters

| LS2ER/30-***_ | 015 | 030 | 045 | 060 | 075 | 090 | 105 | 120 | 135 | 150 | 165 | 180 |
|-------------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| height (mm) | 160 | 310 | 460 | 610 | 760 | 910 | 1,060 | 1,210 | 1,360 | 1,510 | 1,660 | 1,810 |
| number of beams | 8 | 16 | 23 | 31 | 38 | 46 | 53 | 61 | 68 | 76 | 83 | 91 |
| response time (ms) | 4.5 | 6 | 8 | 10 | 11 | 13 | 14.5 | 16 | 17.5 | 19.5 | 21 | 22.5 |
| response time Master + Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Master) + 1.1044] * 2 (Master + 1 Slave) | | | | | | | | | | | |
| response time Master + 2 Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Slave2 + Nr Master) + 1.3228] * 2 (Master + 2 Slave) | | | | | | | | | | | |
| Type ⁽¹⁾ | 2 | | | | | | | | | | | |
| SIL ⁽²⁾ | 1 | | | | | | | | | | | |
| SILCL ⁽³⁾ | 1 | | | | | | | | | | | |
| PL ⁽⁴⁾ | c | | | | | | | | | | | |
| PFHd | 2.04E-08 | 2.66E-08 | 3.30E-08 | 3.92E-08 | 4.57E-08 | 5.19E-08 | 5.83E-08 | 6.45E-08 | 7.09E-08 | 7.71E-08 | 8.35E-08 | 8.98E-08 |
| DCavg | 91.30% | 91.00% | 90.90% | 90.70% | 90.60% | 90.60% | 90.50% | 90.50% | 90.40% | 90.40% | 90.40% | 90.30% |
| MTTFd (years) | 100 | | | | | | | | | | | |
| CFF | 80% | | | | | | | | | | | |

| LS2ER/40-***_ | 015 | 030 | 045 | 060 | 075 | 090 | 105 | 120 | 135 | 150 |
|-------------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| height (mm) | 160 | 310 | 460 | 610 | 760 | 910 | 1,060 | 1,210 | 1,360 | 1,510 |
| number of beams | 6 | 11 | 16 | 21 | 26 | 31 | 36 | 41 | 46 | 51 |
| response time (ms) | 4 | 5 | 6 | 7.5 | 8.5 | 9.5 | 10.5 | 11.5 | 13 | 14 |
| response time Master + Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Master) + 1.1044] * 2 (Master + 1 Slave) | | | | | | | | | |
| response time Master + 2 Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Slave2 + Nr Master) + 1.3228] * 2 (Master + 2 Slave) | | | | | | | | | |
| Type ⁽¹⁾ | 2 | | | | | | | | | |
| SIL ⁽²⁾ | 1 | | | | | | | | | |
| SILCL ⁽³⁾ | 1 | | | | | | | | | |
| PL ⁽⁴⁾ | c | | | | | | | | | |
| PFHd | 1.83E-08 | 2.29E-08 | 2.73E-08 | 3.18E-08 | 3.63E-08 | 4.08E-08 | 4.53E-08 | 4.98E-08 | 5.43E-08 | 5.88E-08 |
| DCavg | 94.60% | 93.80% | 93.20% | 92.80% | 92.40% | 92.20% | 92.00% | 91.80% | 91.70% | 91.50% |
| MTTFd (years) | 100 | | | | | | | | | |
| CFF | 80% | | | | | | | | | |

| LS2ER/50-***_ | 015 | 030 | 045 | 060 | 075 | 090 | 105 | 120 | 135 | 150 |
|-------------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| height (mm) | 160 | 310 | 460 | 610 | 760 | 910 | 1,060 | 1,210 | 1,360 | 1,510 |
| number of beams | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| response time (ms) | 3.5 | 4.5 | 5.5 | 6 | 7 | 8 | 9 | 10 | 10.5 | 11.5 |
| response time Master + Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Master) + 1.1044] * 2 (Master + 1 Slave) | | | | | | | | | |
| response time Master + 2 Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Slave2 + Nr Master) + 1.3228] * 2 (Master + 2 Slave) | | | | | | | | | |
| Type ⁽¹⁾ | 2 | | | | | | | | | |
| SIL ⁽²⁾ | 1 | | | | | | | | | |
| SILCL ⁽³⁾ | 1 | | | | | | | | | |
| PL ⁽⁴⁾ | c | | | | | | | | | |
| PFHd | 1.75E-08 | 2.13E-08 | 2.47E-08 | 2.85E-08 | 3.19E-08 | 3.57E-08 | 3.91E-08 | 4.29E-08 | 4.63E-08 | 5.01E-08 |
| DCavg | 94.80% | 94.00% | 93.50% | 93.10% | 92.80% | 92.50% | 92.30% | 92.10% | 91.90% | 91.80% |
| MTTFd (years) | 100 | | | | | | | | | |
| CFF | 80% | | | | | | | | | |

⁽¹⁾ ref. CEI EN 61496-1; CEI EN 61496-2 ⁽²⁾ ref. CEI EN 61508:2002 ⁽³⁾ ref. CEI EN 62061 + CEI EN 62061/EC2 ⁽⁴⁾ ref. UNI EN ISO 13849-1

safety parameters

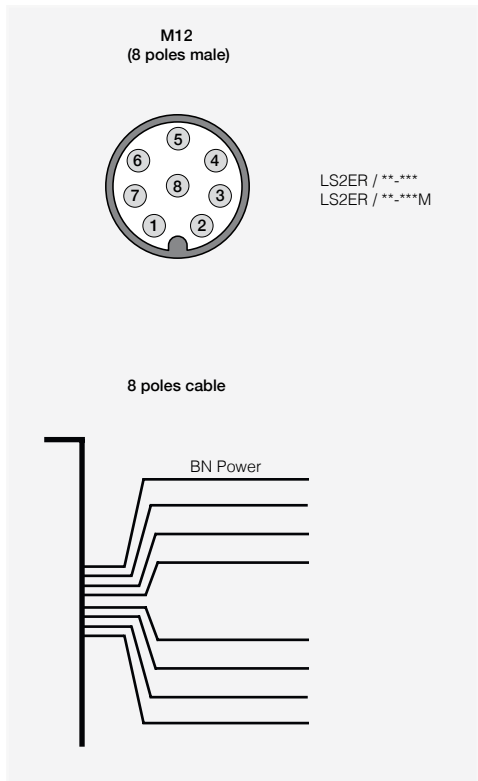
Light Curtains
Type 2

| LS2ER/90-***_ | 030 | 045 | 060 | 075 | 090 | 105 | 120 | 135 | 150 |
|-------------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|
| height (mm) | 310 | 460 | 610 | 760 | 910 | 1.060 | 1.210 | 1.360 | 1.510 |
| number of beams | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| response time (ms) | 3.5 | 4 | 4.5 | 5 | 5.5 | 6 | 6 | 6.5 | 7 |
| response time Master + Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Master) + 1.1044] * 2 (Master + 1 Slave) | | | | | | | | |
| response time Master + 2 Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Slave2 + Nr Master) + 1.3228] * 2 (Master + 2 Slave) | | | | | | | | |
| Type ⁽¹⁾ | 2 | | | | | | | | |
| SIL ⁽²⁾ | 1 | | | | | | | | |
| SILCL ⁽³⁾ | 1 | | | | | | | | |
| PL ⁽⁴⁾ | c | | | | | | | | |
| PFHd | 1.82E-08 | 2.05E-08 | 2.27E-08 | 2.50E-08 | 2.72E-08 | 2.95E-08 | 3.18E-08 | 3.41E-08 | 3.63E-08 |
| DCavg | 94.70% | 94.20% | 93.80% | 93.50% | 93.20% | 93.00% | 92.80% | 92.60% | 92.40% |
| MTTFd (years) | 100 | | | | | | | | |
| CFF | 80% | | | | | | | | |

| LS2ER/**-***_ | 0A-050 | 0B-080 | 0C-090 |
|-------------------------------------|---|----------|----------|
| height (mm) | 500 | 800 | 900 |
| number of beams | 2 | 3 | 4 |
| response time (ms) | 3 | 3.5 | 3.5 |
| response time Master + Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Master) + 1.1044] * 2 (Master + 1 Slave) | | |
| response time Master + 2 Slave (ms) | Ttot = [0.1104 * (Nr Slave1 + Nr Slave2 + Nr Master) + 1.3228] * 2 (Master + 2 Slave) | | |
| Type ⁽¹⁾ | 2 | | |
| SIL ⁽²⁾ | 1 | | |
| SILCL ⁽³⁾ | 1 | | |
| PL ⁽⁴⁾ | c | | |
| PFHd | 1.71E-08 | 1.87E-08 | 2.02E-08 |
| DCavg | 94.90% | 94.60% | 94.20% |
| MTTFd (years) | 100 | | |
| CFF | 80% | | |

⁽¹⁾ref. CEI EN 61496-1; CEI EN 61496-2 ⁽²⁾ref. CEI EN 61508 ⁽³⁾ref. CEI EN 62061 + CEI EN 62061/EC2 ⁽⁴⁾ref. UNI EN ISO 13849-1

LS2 series receiver unit

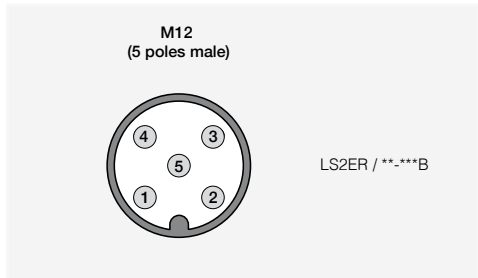


| pin | color | signal | type | description |
|-----|-------|-------------------|-------|--|
| 1 | WH | OSSD1 | OUT | first safety static output (PNP) |
| 2 | BN | 24V _{DC} | POWER | power supply input |
| 3 | GN | OSSD2 | OUT | second safety static output (PNP) |
| 4 | YE | EDM | IN | connection to Restart and/or external control contacts (EDM) |
| 5 | GY | Mode_A | IN | selection of the Start/Restart/EDM mode |
| 6 | PK | Mode_B | IN | selection of the Start/Restart/EDM mode |
| 7 | BU | 0V | POWER | supply voltage reference |
| 8 | RD | FE | GND | functional earth |

| possible combinations | | | |
|---------------------------------------|-------------------|-------------------|--------------|
| pin4 (YE) | pin5 (GY) | pin6 (RK) | function |
| 24V _{DC} | 24V _{DC} | 0V | AUTO |
| K1 + K2 + 24V _{DC} | 24V _{DC} | 0V | AUTO + EDM |
| restart + 24V _{DC} | 0V | 24V _{DC} | MANUAL |
| K1 + K2 + restart + 24V _{DC} | 0V | 24V _{DC} | MANUAL + EDM |

- BK** black **OG** orange
- BN** brown **GN** green
- RD** red **BU** blue
- YE** yellow **GY** grey
- WH** white **VT** violet
- PK** pink

NOTE: On these Standard and Master models it is possible to choose the operating modes by changing the wiring. By using the EDM function it is possible to extend the safety control to the contactors controlled downstream, that must be the type with guided contacts and approved for safety applications. With this model of curtain you can use the relay module SB300, but the EDM input must be connected.



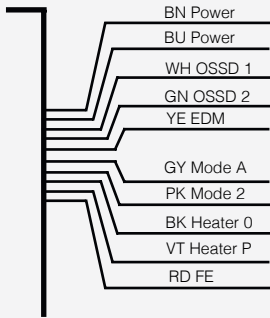
| pin | color | signal | type | description |
|-----|-------|-------------------|-------|-------------------------------|
| 1 | BN | 24V _{DC} | POWER | power supply input |
| 2 | WH | OSSD1 | OUT | range or Test selection input |
| 3 | BU | 0V | POWER | supply voltage reference |
| 4 | BK | OSSD2 | OUT | range or Test selection input |
| 5 | GY | FE | GND | functional earth |

NOTE: These Base models with automatic restart do not have the EDM function, the device downstream must therefore be able to control its own safety integrity independently. With this model of curtain you can not use the relay module SB300, because the EDM input is not available.

electrical diagrams of the connections

Light Curtains
Type 2

10 poles cable
(IP69K with heater receiver unit)



LS2ER / **-***H

| color | signal | type | description |
|-------|-------------------|-------|--|
| BN | 24V _{DC} | POWER | power supply input |
| BU | 0V | POWER | supply voltage reference |
| WH | OSSD1 | OUT | first safety static output (PNP) |
| GN | OSSD2 | OUT | second safety static output (PNP) |
| YE | EDM | IN | connection to Restart and/or external control contacts (EDM) |
| GY | Mode_A | IN | selection of the Start/Restart/EDM mode |
| PK | Mode_B | IN | selection of the Start/Restart/EDM mode |
| BK | Heater 0 | POWER | heater supply common |
| PK | Heater p | POWER | heater supply 24V DC or AC |
| BK | FE | GND | functional earth |

possible combinations

| YE | GY | PK | function |
|---------------------------------------|-------------------|-------------------|--------------|
| 24V _{DC} | | 0V | AUTO |
| K1 + K2 + 24V _{DC} | 24V _{DC} | 0V | AUTO + EDM |
| restart + 24V _{DC} | 0V | 24V _{DC} | MANUAL |
| K1 + K2 + restart + 24V _{DC} | 0V | 24V _{DC} | MANUAL + EDM |
| x | | 0V | NOT ADMITTED |
| x | | 24V _{DC} | NOT ADMITTED |

NOTE: On these Standard models it is possible to choose the operating modes by changing the wiring. By using the EDM function it is possible to extend the safety control to the contactors controlled downstream, that must be the type with guided contacts and approved for safety applications. The supply voltage of the thermostated heater can be indifferently 24VDC or 24VAC. With this model of curtain you can use the relay module SB300, but the EDM input must be connected.

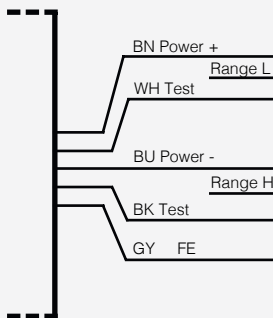
LS2 series emitter unit

M12
(5 poles male connector)



LS2ER / **-***
LS2ER / **-***M

5 poles cable



LS2ER / **-***K

| pin | color | signal | type | description |
|-----|-------|--------|-------|-------------------------------|
| 1 | BN | POWER | OUT | power supply input |
| 2 | WH | IN | POWER | range or test selection input |
| 3 | BU | POWER | OUT | supply voltage reference |
| 4 | BK | IN | | range or test selection input |
| 5 | GY | GND | IN | functional earth |

possible combinations

| pin2 (WH) | pin6 (BK) | function |
|-----------|-----------|--------------|
| LO | | test |
| LO | HI | high range |
| HI | LO | low range |
| HI | | not admitted |

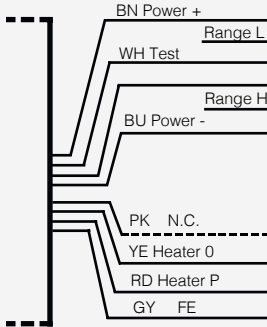
Levels: LO = < 5 V or open; HI = 11 to 30 V

NOTE: The Test contact is necessary only if the safety chain of the receiver downstream must be periodically checked. If the Test is not necessary (the safety light curtain has already been tested independently) replace the contact with direct wiring at +24 V_{DC}.

LS2: LS2_K:
LS2_H

LS2 series emitter IP68K with heater receiver unit

8 poles cable
(IP69K with heater receiver unit)



LS2ER / **-****H

| color | signal | type | description |
|-------|-------------------|-------|-------------------------------|
| BN | 24V _{DC} | POWER | power supply input |
| WH | Range L/Test | IN | range or test selection input |
| BU | 0V | POWER | supply voltage reference |
| GN | Range H/Test | IN | range or test selection input |
| PK | not connected | N.C. | not connected |
| YE | heater 0 | POWER | heater supply common |
| RD | heater P | POWER | heater supply 24V DC or AC |
| GY | FE | GND | functional earth |

possible combinations

| WH | GN | function |
|----|----|--------------|
| LO | | test |
| LO | HI | high range |
| HI | LO | low range |
| HI | | not admitted |

Levels: LO = <5V or open; HI = 11 to 30V

NOTE: The Test contact is necessary only if the safety chain of the receiver downstream must be periodically checked. If the Test is not necessary (the safety light curtain has already been tested independently) replace the contact with direct wiring at + 24 V_{DC}. The supply voltage of the thermostated heater can be indifferently 24 V_{DC} or 24 V_{AC}. The PK cable is not connected internally.

LS2 series emitter and receiver unit : master slave secondary connectors

M12
(5 poles male)



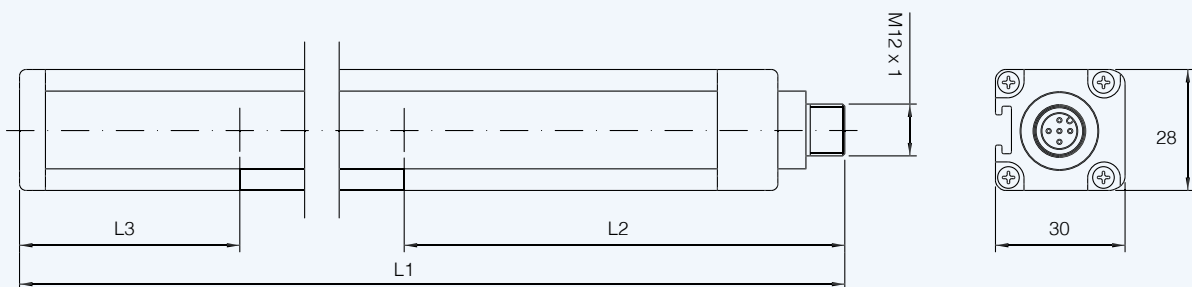
LS2ER / **-****M
LS2ER / **-****S
LS2ER / **-****F

| pin | color | signal | type | description |
|-----|-------|-------------------|--------|---|
| 1 | BN | 24V _{DC} | POWER | power supply (supply line for the upstream device) |
| 2 | WH | Line 1 | IN/OUT | communication line 1 |
| 3 | BU | 0V | POWER | power supply reference (supply line for the upstream device) |
| 4 | BK | Line 2 | IN/OUT | communication line 2 |
| 5 | GY | FE | GND | functional earth |

NOTE: Preferably use Female/Female pre-wired extension cables (it is not permitted to access the connection lines).

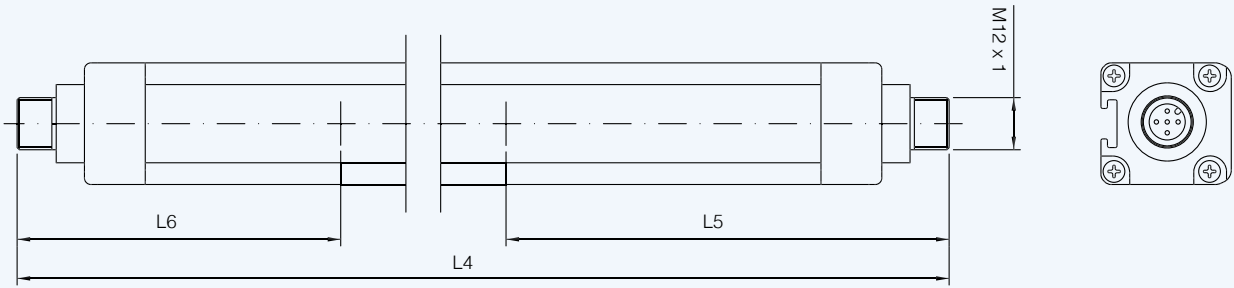
dimensions (mm)

Dimensions of Standard, Base, Final models; view of the base and head with relevant connectors; see Tab.:1 and 3



dimensions (mm)

Dimensions of Master and Slave models; view of the base and head with relevant connectors; see Tab.: 2 and 3 (mm)



TAB.1

| LS2 series | | size models with rays terraced | | | | | | | | | | |
|--|--------------------------|--------------------------------|-------|-------|-------|-------|-------|---------|---------|---------|---------|-----------------------|
| paired models | | *** | | | | | | | | | | dimensions (mm) |
| | | 015 | 030 | 045 | 060 | 075 | 090 | 105 | 120 | 135 | 150 | |
| LS2ER/**-*** LS2ER/**-***B LS2ER/**-***F | standard, base, final | 213 | 363 | 513 | 663 | 813 | 963 | 1,113 | 1,263 | 1,413 | 1,563 | L1 |
| | | 61.5 | | | | | | | | | | L2 (bottom-most beam) |
| | | 11 | | | | | | | | | | L3 (top-most beam) |
| LS2ER/**-***M LS2ER/**-***S | master and slave | 236.5 | 386.5 | 536.5 | 686.5 | 836.5 | 986.5 | 1,136.5 | 1,286.5 | 1,436.5 | 1,586.5 | L4 |
| | | 61.5 | | | | | | | | | | L5 (bottom-most beam) |
| | | 34.5 | | | | | | | | | | L6 (top-most beam) |

TAB.2


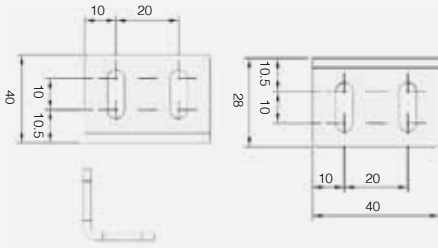

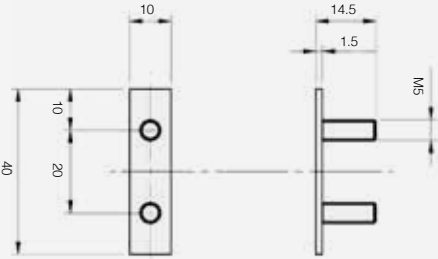
| LS2 series | | size models with multiple beams | | | |
|--|--------------------------|---------------------------------|--------|--------|-----------------------|
| paired models | | *** | | | dimensions (mm) |
| | | 0A-050 | 0B-080 | 0C-090 | |
| LS2ER/**-*** LS2ER/**-***B LS2ER/**-***F | standard, base, final | 653 | 953 | 1,053 | L1 |
| | | 102 | | | L2 (bottom-most beam) |
| | | 51 | | | L3 (top-most beam) |
| LS2ER/**-***M LS2ER/**-***S | master and slave | 677 | 977 | 1,077 | L4 |
| | | 102 | | | L5 (bottom-most beam) |
| | | 75 | | | L6 (top-most beam) |

TAB.3

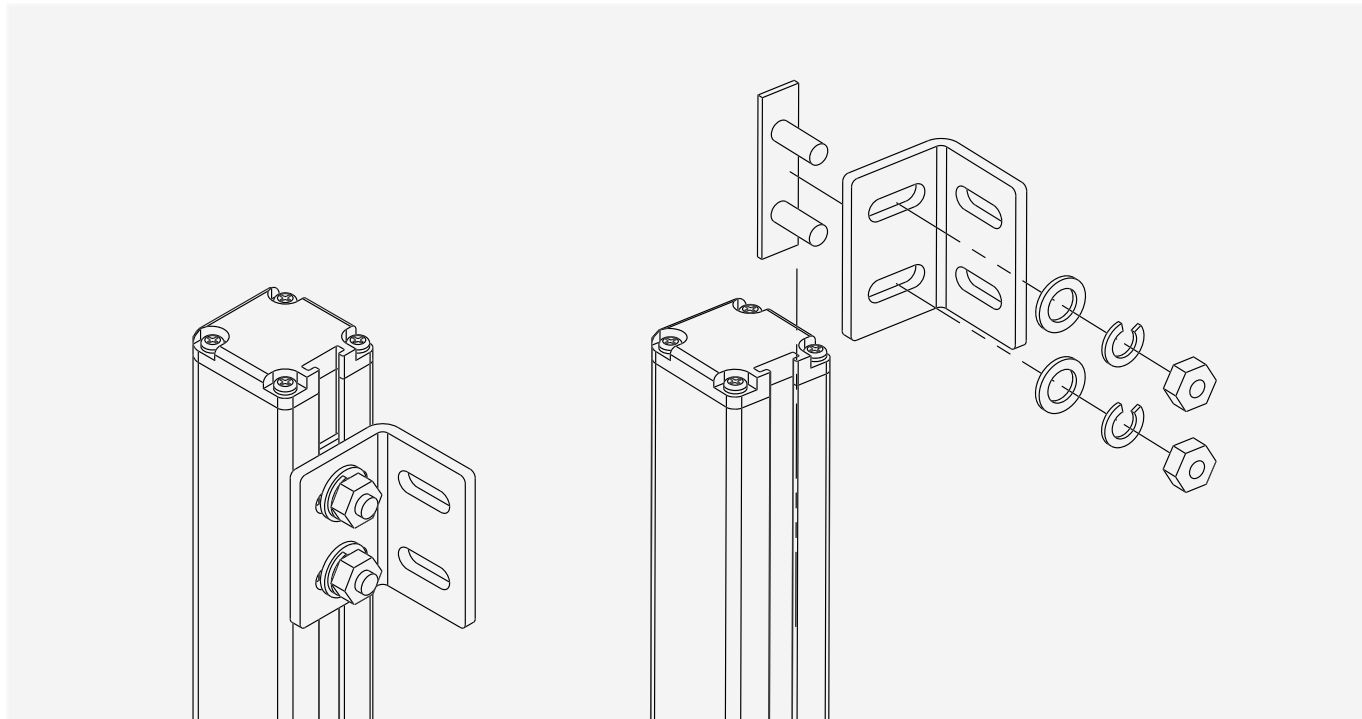
| LS2 series | | termination types and connectors | | | | | | | |
|---------------|----------|----------------------------------|------------|------------------|------------|------------------|------------|------------------|------------|
| models | | LS2R (receiver) | | | | LS2R (emitter) | | | |
| | | base view | connector | base view | connector | base view | connector | vista base | connector |
| LS2ER/**-*** | standard | C | M12, 8p, M | A | - | B | M12, 5p, M | A | - |
| LS2ER/**-***B | base | B | M12, 5p, M | A | - | B | M12, 5p, M | A | - |
| LS2ER/**-***F | final | B ⁽¹⁾ | M12, 5p, M | A | - | B ⁽¹⁾ | M12, 5p, M | A | - |
| LS2ER/**-***M | master | F | M12, 8p, M | D ⁽¹⁾ | M12, 5p, M | E | M12, 5p, M | D ⁽¹⁾ | M12, 5p, M |
| LS2ER/**-***S | slave | E ⁽¹⁾ | M12, 5p, M | D ⁽¹⁾ | M12, 5p, M | E ⁽¹⁾ | M12, 5p, M | D ⁽¹⁾ | M12, 5p, M |

NOTE: These connectors are dedicated to a communication BUS of the Master/ Slave chain, it is not permissible to access the lines, always use cord sets.

ST204* / outfit mounting accessories

| product | to used with | dimensions (mm) | description / installation |
|---|-------------------|--|---|
|  | <p>LS2 series</p> |  | <p>L Bracket Supplied as standard, 4 pieces to couple to the length from 300 to 1,050, 6 pieces for the length from 1,200 to 1,500.</p> |
|  | <p>LS2 series</p> |  | <p>Insert with threaded bolts and nuts Supplied as standard, in a number corresponding to the brackets.</p> |

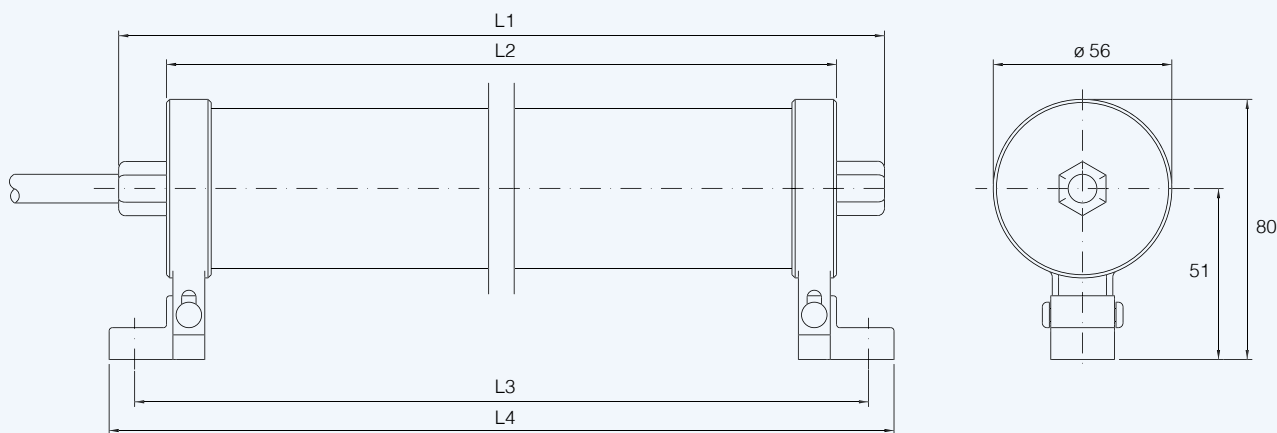
outfit brackets mounting



dimensions (mm)

Light Curtains
Type 2

IP69K models



The light Curtain is supplied already fitted inside the transparent housing.
The power cord has a standard length of 10 meters and a maximum diameter of 6 mm. The brackets are included.

| models | 150 | 300 | 450 | 600 | 750 | 900 | 1,050 | 1,200 | 1,350 | 1,500 | 2B | 3B | 4B |
|--------------------------------|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-----|-------|-------|
| L1 dimensions (mm) | 320 | 470 | 620 | 770 | 920 | 1,070 | 1,220 | 1,370 | 1,520 | 1,670 | 760 | 1,060 | 1,160 |
| L2 dimensions (mm) | 290 | 440 | 620 | 740 | 890 | 1,040 | 1,190 | 1,340 | 1,490 | 1,640 | 730 | 1,030 | 1,130 |
| L3 (± 3) dimensions (mm) | 315 | 465 | 590 | 765 | 915 | 1,065 | 1,215 | 1,365 | 1,515 | 1,665 | 755 | 1,055 | 1,155 |
| L4 dimensions (mm) | 337 | 487 | 637 | 787 | 937 | 1,087 | 1,237 | 1,387 | 1,537 | 1,687 | 777 | 1,077 | 1,177 |