



## High performance contrast sensor for colored registration mark detection

- Fast and accurate low jitter model (TL46-WJ)
- Wide-spectrum RGB or white LED emission
- 4 different models: basic, standard, enhanced, low jitter
- Automatic, manual and dynamic settings
- 15, 20, 30 or 50 kHz switching frequencies
- Very low jitter down to 7µs (TL46-WJ...)
- NPN/PNP and analog outputs
- Standard mounting, M12 connector rotates to 5 positions



### APPLICATIONS

- Packaging and labeling machinery
- Beverage/Food/Cosmetic/Pharmaceutical industries
- Printing machinery
- Flexographic printing machinery



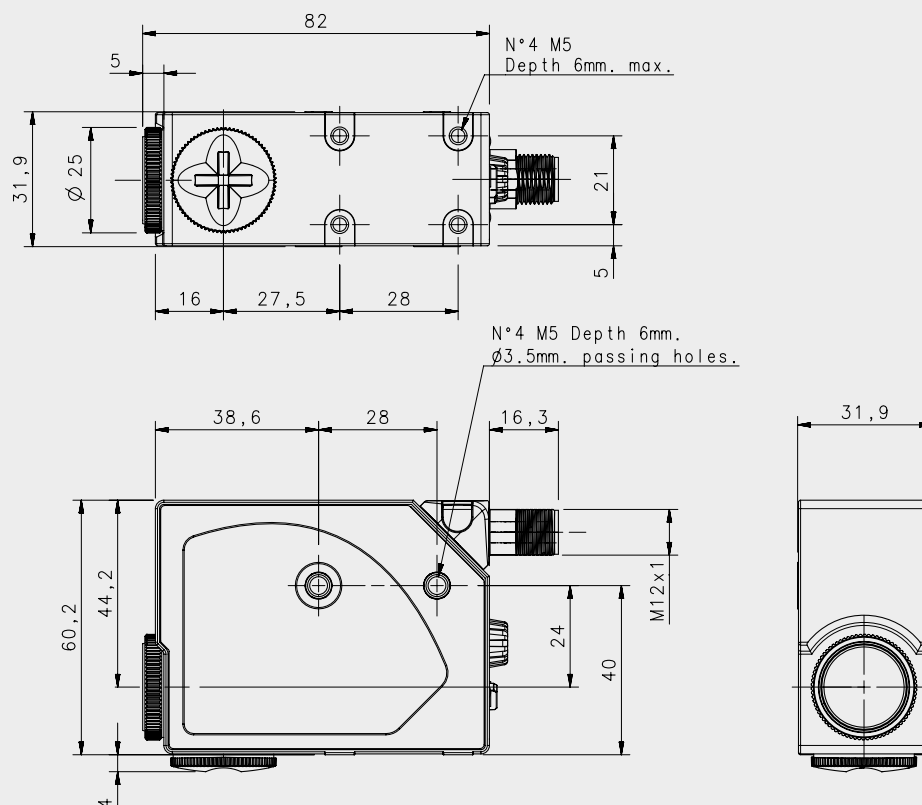
(\*) ATEX II 3DG

| TL46                        |           |                              |
|-----------------------------|-----------|------------------------------|
| Contrast sensor             |           | 9 ±3 mm                      |
|                             |           | 18 mm (Lens No.18 glass)     |
|                             |           | 22 mm (Lens No.22 glass)     |
|                             |           | 28 mm (Lens No.28 glass)     |
|                             |           | 40 mm (Lens No.40 glass)     |
| Switching frequency         |           | 15 kHz                       |
|                             |           | 20 kHz                       |
|                             |           | 30 kHz                       |
|                             |           | 50 kHz                       |
|                             |           |                              |
| Jitter                      |           | < 7µs (TL46-WJ)              |
|                             |           | 16µs (TL46-WLF)              |
|                             |           | > 25µs (TL46-W/WL)           |
|                             |           |                              |
| Light emission              |           | RGB LED                      |
|                             |           | white LED                    |
|                             |           | Red LED                      |
| Setting                     |           | push buttons                 |
|                             |           | trimmer                      |
| Power supply                | Vdc       | 10...30 V                    |
|                             | Vac       |                              |
|                             | Vac/dc    |                              |
|                             |           |                              |
| Output                      | PNP       | ▪                            |
|                             | NPN       | ▪                            |
|                             | NPN/PNP   | ▪                            |
|                             | relay     | ▪ (see Technical Data Table) |
|                             | other     | 0...5 V Analog Output        |
| Connection                  | cable     | ▪ (see Technical Data Table) |
|                             | connector | ▪                            |
|                             | pig-tail  |                              |
| Approximate dimensions (mm) |           | 31x81x58                     |
| Housing material            |           | Aluminium                    |
| Mechanical protection       |           | IP67                         |

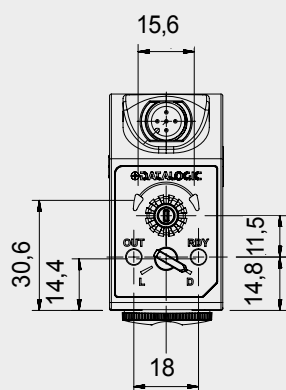
## TECHNICAL DATA

|                                       |                                                                                                                                                                                                                                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply                          | 10 ... 30 Vdc (limit values)                                                                                                                                                                                                                                                         |
| Ripple                                | 2 Vpp max.                                                                                                                                                                                                                                                                           |
| Consumption (output current excluded) | 40 mA max. at 24 Vdc (mod. TL46-A)<br>50 mA max. at 24 Vdc (mod. TL46-W/WJ)<br>85 mA max. at 24 Vdc 24 Vdc with bargraph ON in threshold adjustment mode,<br>55 mA max at 24 Vdc with bargraph OFF in normal functioning mode (mod. TL46-WL)<br>35 mA max. at 24 Vdc (mod. TL46-WLF) |
| Light emission                        | white LED 400-700 nm (mod. TL46-A-4xx)<br>red LED 630 nm (mod. TL46-A-6xx)<br>blu LED 465nm/green LED 520 nm/red LED 630 nm (mod. TL46-W/WL/WLF/WJ)                                                                                                                                  |
| Detection Distance                    | 9 ±3 mm<br>18 mm (Lens No.18 glass)<br>22 mm (Lens No.22 glass)<br>28 mm (Lens No.28 glass)<br>40 mm (Lens No.40 glass)                                                                                                                                                              |
| Minimum spot dimension                | 1,5 x 5 mm<br>0,8x4mm (TL46-WJ)                                                                                                                                                                                                                                                      |
| Depth of field                        | ± 3 mm                                                                                                                                                                                                                                                                               |
| Response time                         | 33 µs (mod. TL46-W)<br>25 µs (mod. TL46-A/WL)<br>16 µs (mod. TL46-WLF)<br>10 µs (mod. TL46-WJ)                                                                                                                                                                                       |
| Switching frequency                   | 15 kHz (mod. TL46-W)<br>20 kHz (mod. TL46-A/WL)<br>30 kHz (mod. TL46-WLF)<br>50 kHz (mod. TL46-WJ)                                                                                                                                                                                   |
| Jitter                                | 7 µs (mod. TL46-WJ)                                                                                                                                                                                                                                                                  |
| Setting                               | SET push-buttons (mod. TL46-W/WL/WLF)<br>sensivity trimmer (mod. TL46-A)                                                                                                                                                                                                             |
| Operating mode                        | DARK/LIGHT selection by switch (mod. TL46-A)<br>automatic DARK/LIGHT selection (mod. TL46-W/WL/WJ)<br>automatic DARK/LIGHT selection in the target/background detection, selectable via wire in the dynamic detection (mod. TL46-WLF)                                                |
| Indicators                            | yellow OUTPUT LED<br>green READY LED, orange DELAY LED and KEYLOCK (Mod TL46-W/WJ)<br>green READY LED, 4-digit display/DELAY LED/KEYLOCK LED (mod. TL46-WLF)<br>orange ARROWS (mod. TL46-A), DELAY LED and KEYLOCK LED 5-segment bargraph (mod. TL46-WL)                             |
| Dark/light selection                  | Switch<br>Automatic<br>Automatic/manual; remote/dynamic                                                                                                                                                                                                                              |
| Delay                                 | 0...20ms selectable via delay input<br>0...100ms programmed                                                                                                                                                                                                                          |
| Auxiliary function                    | Keylock<br>Fine Hysteresis regulation                                                                                                                                                                                                                                                |
| Indicators                            |                                                                                                                                                                                                                                                                                      |
| Output                                | PNP (mod. TL46-WJ); PNP or NPN; PNP/NPN (mod. TL46-W/WL/WLF); analog output (mod. TL46-A/W/WL)                                                                                                                                                                                       |
| Output current                        | 100mA                                                                                                                                                                                                                                                                                |
| Saturaton Voltage                     | ≈<2V                                                                                                                                                                                                                                                                                 |
| Analogue Out                          | 0,5...5,5V ±10%; 2V on white target 90%<br>1...3V ±10%(white 90%) ; 5,5V max                                                                                                                                                                                                         |
| Analogue out impedance                | 2,2 kΩ (short circuit protection)                                                                                                                                                                                                                                                    |
| Connection                            | M12 5-pole connector                                                                                                                                                                                                                                                                 |
| Dielectric strength                   | 500 Vac, 1 min between electronics and housing                                                                                                                                                                                                                                       |
| Insulating resistance                 | >20 MΩ, 500 Vdc between electronics and housing                                                                                                                                                                                                                                      |
| Electrical protection                 | class 2, double insulation                                                                                                                                                                                                                                                           |
| Protection device                     | Reverse polarity protection, overload and short circuit protection                                                                                                                                                                                                                   |
| Mechanical protection                 | IP67                                                                                                                                                                                                                                                                                 |
| Ambient light rejection               | according to EN 60947-5-2                                                                                                                                                                                                                                                            |
| Vibrations                            | 0,5 mm amplitude, 10 ... 55 Hz frequency, for every axis (EN60068-2-6)                                                                                                                                                                                                               |
| Shock resistance                      | 11 ms (30 G) 6 shock for every axis (EN60068-2-27)                                                                                                                                                                                                                                   |
| Housing material                      | aluminium                                                                                                                                                                                                                                                                            |
| Lens material                         | mirror (mod. TL46-A), glass (mod. TL46-W/WL/WLF/WJ)                                                                                                                                                                                                                                  |
| Operating temperature                 | -10 ... 55 °C                                                                                                                                                                                                                                                                        |
| Storage temperature                   | -20 ... 70 °C                                                                                                                                                                                                                                                                        |
| Weight                                | 170 g max.                                                                                                                                                                                                                                                                           |

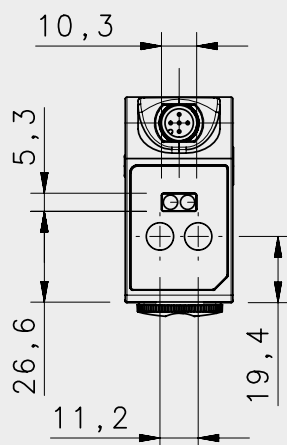
## DIMENSIONS



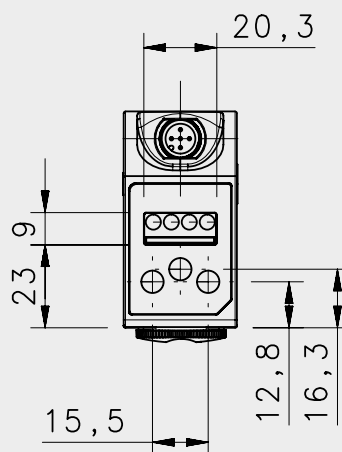
TL46-A



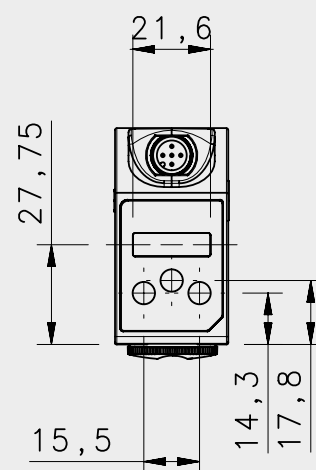
TL46-W/TL46-WJ



TL46-WL



TL46-WLF



## DETECTION DIAGRAM

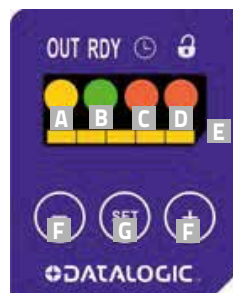


**TL46-A  
TRIMMER**

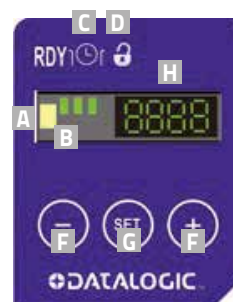


**TL46-W  
BASE**

**TL46-WJ  
LOW JITTER**



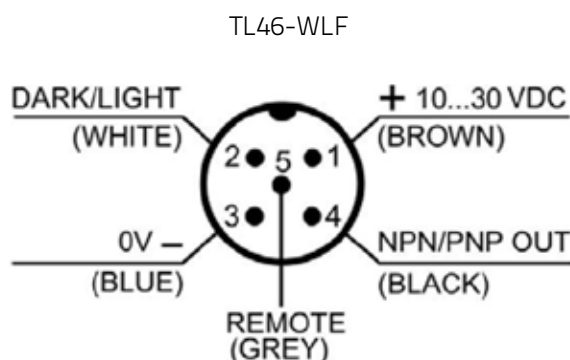
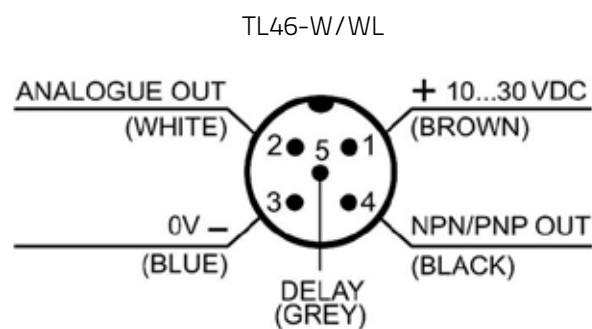
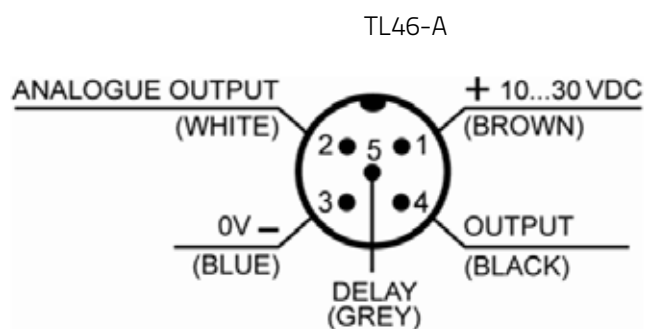
**TL46-WL  
STANDARD**



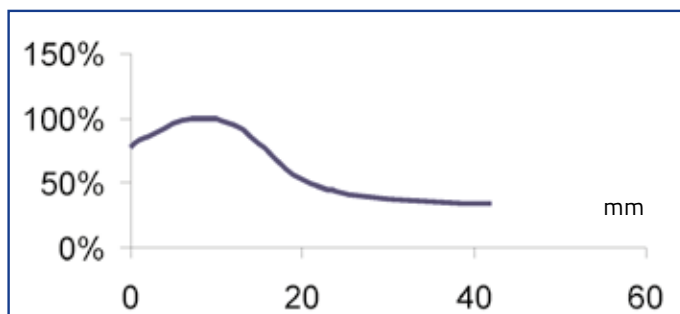
**TL46-WLF  
ENHANCED**

- |                             |                           |                                      |
|-----------------------------|---------------------------|--------------------------------------|
| <b>A</b> yellow OUTPUT LED  | <b>F</b> +/- push-buttons | <b>L</b> BKGD push-button            |
| <b>B</b> green READY LED    | <b>G</b> SET push-button  | <b>M</b> Light/Dark Switch           |
| <b>C</b> orange DELAY LED   | <b>H</b> Display          | <b>N</b> Orange Indicators Arrows    |
| <b>E</b> orange KEYLOCK LED | <b>I</b> MARK push-button | <b>O</b> Sensitivity Adjustment Knob |
| <b>D</b> Bargraph           |                           |                                      |

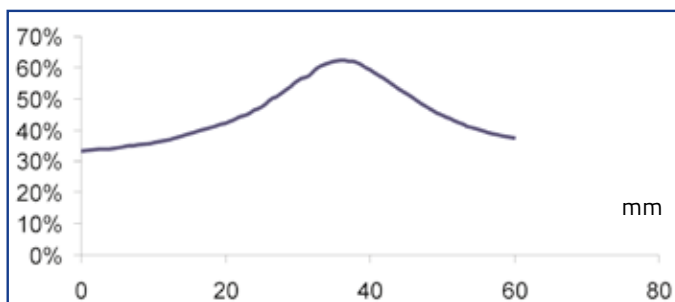
## CONNECTION



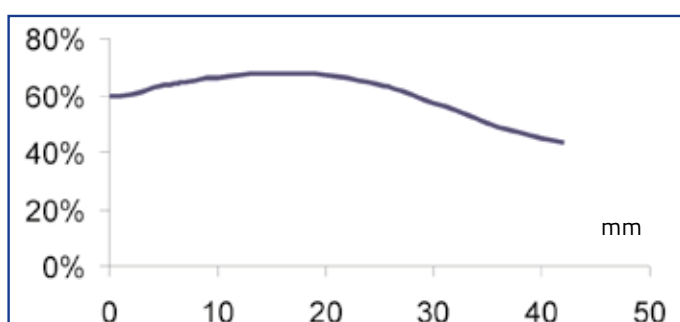
## DETECTION DIAGRAMS



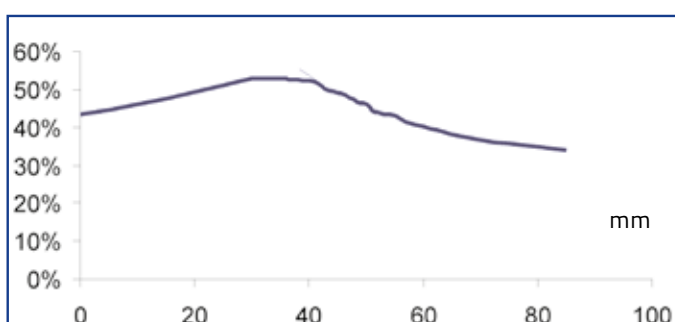
Standard 9 mm lens  
(1.5 x 5 mm spot on focal point)



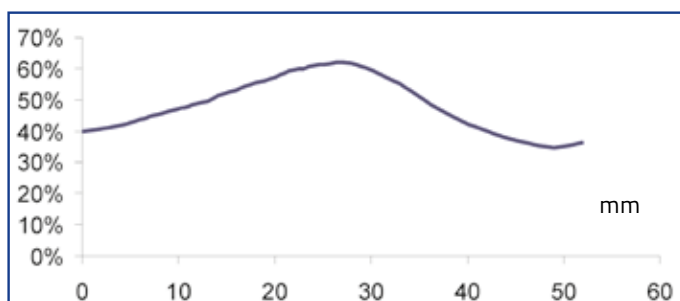
Accessory 28 mm lens  
(2 x 9 mm spot on focal point)



Accessory 18 mm lens  
(2 x 7 mm spot on focal point)



Accessory 40 mm lens  
(2.5 x 11 mm spot on focal point)



Accessory 22 mm lens  
(2 x 8 mm spot on focal point)

### VERTICAL SPOT



### HORIZONTAL SPOT



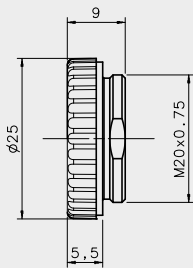
Horizontal spot is present in the TL46 models with final '-L' suffix

## MODEL SELECTION AND ORDER INFORMATION

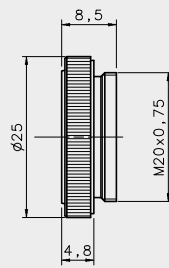
| OPTIC FUNCTION  | SETTING & INDICATORS            | EMISSION               | OUTPUT  | MODEL         | ORDER No. |
|-----------------|---------------------------------|------------------------|---------|---------------|-----------|
| Contrast sensor | Trimmer<br>2 LEDs               | WHITE vertical spot    | PNP     | TL46-A-415    | 954601070 |
|                 |                                 |                        | NPN     | TL46-A-425    | 954601080 |
|                 |                                 | RED vertical spot      | PNP     | TL46-A-615    | 954601090 |
|                 |                                 |                        | NPN     | TL46-A-625    | 954601100 |
|                 | Push-buttons<br>2 LEDs          | R.G.B. vertical spot   | PNP/NPN | TL46-W-815    | 954601000 |
|                 |                                 | R.G.B. horizontal spot |         | TL46-W-815L   | 954601010 |
|                 | Push buttons<br>4 LEDs bargraph | R.G.B. vertical spot   |         | TL46-WL-815   | 954601020 |
|                 |                                 | R.G.B. horizontal spot |         | TL46-WL-815L  | 954601030 |
|                 | Push buttons<br>4 LEDs display  | R.G.B. vertical spot   |         | TL46-WLF-815  | 954601040 |
|                 |                                 | R.G.B. horizontal spot |         | TL46-WLF-815L | 954601050 |
|                 |                                 | R.G.B. vertical spot   | PNP     | TL46-WJ-815   | 954601110 |
|                 |                                 | R.G.B. horizontal spot |         | TL46-WJ-815L  | 954601120 |

## ACCESSORIES

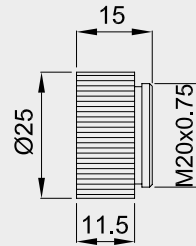
9 mm PMMA



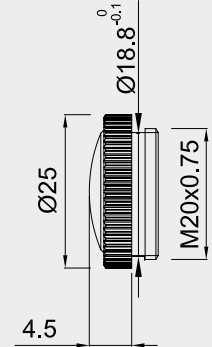
9 mm



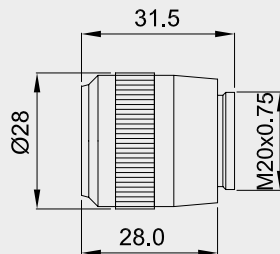
HI-RES LENS



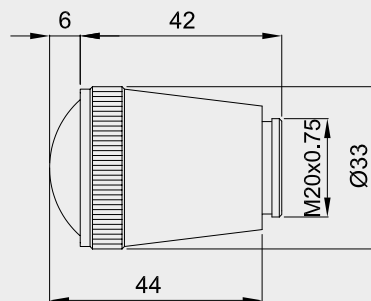
18 mm LENS



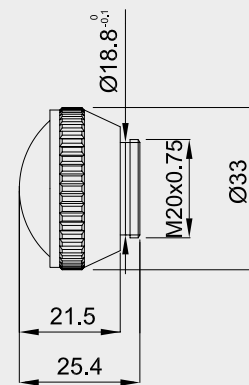
22 mm LENS



28 mm LENS



40 mm LENS



| MODEL          | DESCRIPTION                                         | ORDER No. |
|----------------|-----------------------------------------------------|-----------|
| Lens No.9      | glass lens with 9 mm focus                          | 95ACC2670 |
| Lens No.9 PMMA | plastic lens with 9 mm focus                        | 95ACC2540 |
| Lens Hi-Res    | additional focussing glass lens with 9 mm focus (*) | 95ACC1050 |
| Lens No.18     | glass lens with 18 mm focus                         | 95ACC2680 |
| Lens No.22     | glass lens with 22 mm focus                         | 95ACC1100 |
| Lens No.28     | glass lens with 28 mm focus                         | 890000194 |
| Lens No.40     | glass lens with 40 mm focus                         | 95ACC2740 |

\* focussing lens to screw between the sensor and the normal 9 mm lens

## CABLES

| TYPE                | DESCRIPTION                | LENGTH | MODEL         | ORDER No. |
|---------------------|----------------------------|--------|---------------|-----------|
| Axial M12 Connector | 5-pole, grey, P.V.C.       | 3 m    | CS-A1-03-G-03 | 95ACC2110 |
|                     |                            | 5 m    | CS-A1-03-G-05 | 95ACC2120 |
|                     |                            | 10 m   | CS-A1-03-G-10 | 95ACC2140 |
|                     | 5-pole, U.L., black, P.V.C | 3 m    | CS-A1-03-U-03 | 95ASE1170 |
|                     |                            | 5 m    | CS-A1-03-U-05 | 95ASE1180 |
|                     |                            | 10 m   | CS-A1-03-U-10 | 95ASE1190 |
|                     |                            | 15 m   | CS-A1-03-U-15 | 95ASE1200 |
|                     |                            | 25 m   | CS-A1-03-U-25 | 95ASE1210 |
|                     |                            | 50 m   | CS-A1-03-U-50 | 95A252700 |