# PHOTOELECTRIC

**◇DATALOGIC**

**SENSORS**

## TL46 SERIES

**TL46** line offers the best performance and most complete selection of contrast sensors for print registration mark detection.

**TL46-A** version has a new patented multi-turn digital trimmer for an easy and quick adjustment of the switching threshold.

Models with Red or White LED emission are available, both with 20 KHz switching frequency to solve the most of contrast detection applications.

**TL46-W** basic models allow a teach-in setting by means of two pushbuttons, clearly defined as MARK and BACKGROUND.

**TL46-WL** has three pushbuttons and a 5-LED bar-graph for a fine automatic or manual adjustment of the switching threshold.

**TL46-WLF** offers the most complete interface with three pushbuttons and a 4-digit display, allowing also the dynamic setting.

These models offers the automatic selection of RGB LED emission and have respectively 15, 20, or 30 KHz switching frequency.

The operating distance is from 6 to 12 mm with a good depth of field, and many accessory lens are available for longer ranges.

The IP67 metal case with standard "TL" dimensions and fixing holes offers the best protection and installation in all applications.
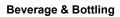
## HIGHLIGHTS

- Red, White, or RGB LED emission
- Automatic, manual and dynamic setting
- Trimmer or Teach-in with 4 digit display
- 15, 20 or 30 kHz switching frequency
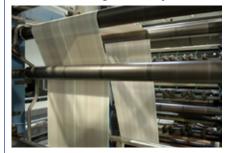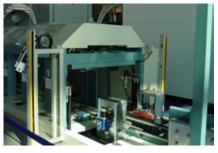- NPN/PNP selection and analogue output

## APPLICATIONS

**Packaging lines**

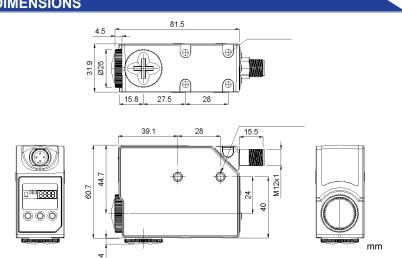**Beverage & Bottling**

**Printing Machinery**

**Ceramics**

## SETTING

**TL46-A**: a multi-turn digital trimmer is present for an easy and quick adjustment of the switching threshold.
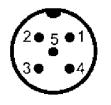
**TL46W**: the MARK pushbutton is used for the target acquisition and the BKGD pushbutton for the background acquisition, the threshold is then automatically set.

**TL46-WL/WLF**: the switching threshold is set pressing twice the SET push-button; the first for the mark the second for the background. The threshold level can be set manually pressing the '+' and '-' push-buttons which increase or reduce the threshold as visualized on the bar-graph or display. The dynamic setting, present in the TL46-WLF version, detects the moving mark by simply keeping the SET push-button pressed, or activating the Remote/Dynamic input.

## DIMENSIONS

mm
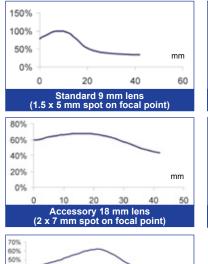
## INDICATORS AND PUSH-BUTTONS

| | TL46-A TRIMMER | TL46-W BASE | TL46-WL STANDARD | TL46-WLF ENHANCED |

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

## CONNECTIONS

**M12 CONNECTOR**

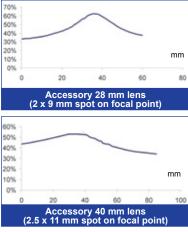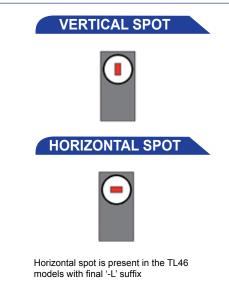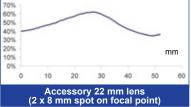| Version | pin 1 | pin 2 | pin 3 | pin 4 | pin 5  * |
|---|---|---|---|---|---|
| | (brown) | (white) | (blue) | (black) | (gray) |
| TL46-A Trimmer | +10...30Vdc | 0,5...5,5Vdc output | 0Vdc | PNP or NPN output | Delay |
| TL46-W Base | +10...30Vdc | 1...5,5Vdc output | 0Vdc | NPN/PNP output | Delay |
| TL46-WL Std. | +10...30Vdc | 1...5,5Vdc output | 0Vdc | NPN/PNP output | Remote |
| TL46-WLF Enh. | +10...30Vdc | Dark/Light Dyn. | 0Vdc | NPN/PNP output | Remote/Dyn. |
| * A M12 4-pole connector can be used if the PIN5 function is not necessary. | | | | | |

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## TECHNICAL DATA

| | TL46-A | TL46-W | TL46-WL | TL46-WLF |
|---|---|---|---|---|
| Power supply | 10+30 Vdc (limit values) | | | |
| Ripple | 2 Vpp max | | | |
| Current Consumption (output current excluded) | 40mA max @ 24 Vdc | 50mA max @ 24 Vdc | 85mA max @ 24Vdc (bargraph ON) 55mA max @ 24Vdc (bargraph OFF) | 35mA max @ 24 Vdc |
| Output | PNP or NPN | 1 PNP/NPN selectable output (default PNP configuration) | | |
| Output current | 100mA max | | | |
| Output saturation voltage | ≤ 2V | | | |
| Response time | 25 µs | 33 µs | 25 µs | 16 µs |
| Switching frequency | 20 kHz | 15 kHz | 20 kHz | 30 kHz |
| Analogue output | 0,5…5,5V ±10% 2V on white target 90% | 1…3V ±10%(white 90%); 5,5V max | 1…3V ±10%(white 90%); 5,5V max | n/a |
| Analogue output impedence | 2,2 kΩ (short circuit protection) | | | n/a |
| Delay | 0…20ms selectable via delay input | | | 0…100ms programmed |
| Dark/light selection | Switch | Automatic | | Automatic/manual remote/dynamic |
| Auxiliary function | n/a | n/a | Keylock | |
| | | | n/a | Fine Hysteresis regulation |
| Indicators | OUT LED (yellow) READY LED (green) INDICATORS ARROWS (orange) | OUT LED (yellow) READY LED (green) | OUT LED (yellow) READY LED (green) DELAY and KEYLOCK LED (orange) 5-segment BARGRAPH | OUT LED (yellow) READY LED (green) DELAY and KEYLOCK LED (green) 4-digit DISPLAY (green) |
| Operating temperature | -10…55°C | | | |
| Storage temperature | -20…70°C | | | |
| Electric shock protection | double insulation | | | |
| Operating distance | 9mm | | | |
| Depth of field | ±3mm | | | |
| Spot Orientation | Vertical | Horizontal or Vertical | | |
| Minimun spot dimension | 1,5x5mm | | | |
| Emission type[1] | White(400-700nm) Red(630nm) | Red(630nm) Green(520nm) Blue(465nm) | | |
| Ambient light rejection | According to EN 60947-5-2 | | | |
| Vibrations | 0,5mm amplitude, 10…55Hz frequency, for each axis (EN60068-2-6) | | | |
| Shock resistance | 11ms (30G) 6 shock for each axis (EN 60068-2-27) | | | |
| Housing material | Aluminium | | | |
| Lens material | Glass | PMMA | Glass | |
| Mechanical protection | IP67 | | | |
| Protection device | Reverse polarity protection, overload and short circuit protection | | | |
| Connections | M12 5-pole connector rotable on 5 position | | | |
| Weight | 170g max | | | |

[1]Average life of 100.000 h with TA= +25°C

## READING DIAGRAM



**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

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## MODEL SELECTION AND ORDER INFORMATION

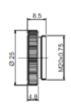| SETTINGS | INDICATORS | LIGHT EMISSION | OUTPUT | MODEL | ORDER NO. |
|----------|-----------|----------------|--------|-------|-----------|
| **Trimmer** | 2 LEDs | WHITE vertical spot | PNP | TL46-A-415 | 954601070 |
| | | | NPN | TL46-A-425 | 954601080 |
| | | RED vertical spot | PNP | TL46-A-615 | 954601090 |
| | | | NPN | TL46-A-625 | 954601100 |
| **Teach-in** | 2 LEDs | R.G.B. vertical spot | selectable PNP/NPN | TL46-W-815 | 954601000 |
| | | R.G.B. horizontal spot | selectable PNP/NPN | TL46-W-815L | 954601010 |
| | 4 LEDs bargraph | R.G.B. vertical spot | selectable PNP/NPN | TL46-WL-815 | 954601020 |
| | | R.G.B. horizontal spot | selectable PNP/NPN | TL46-WL-815L | 954601030 |
| | 4 LEDs display | R.G.B. vertical spot | selectable PNP/NPN | TL46-WLF-815 | 954601040 |
| | | R.G.B. horizontal spot | selectable PNP/NPN | TL46-WLF-815L | 954601050 |

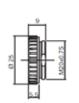## ACCESSORY SELECTION AND ORDER INFORMATION

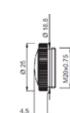| DESCRIPTION | MODEL | ORDER NO. |
|-------------|-------|-----------|
| axial M12 NO-NC 5-poles 3 m | CS-A1-03-G-03 | 95ACC2110 |
| axial M12 NO-NC 5-poles 5 m | CS-A1-03-G-05 | 95ACC2120 |
| axial M12 NO-NC 5-poles 10 m | CS-A1-03-G-10 | 95ACC2140 |
| glass lens with 9 mm focus | Lens No.9 glass | 95ACC2670 |
| plastic lens with 9 mm focus | Lens No.9 PMMA | 95ACC2540 |
| additional focussing glass lens (*) | Lens Hi-Res glass | 95ACC1050 |
| glass lens with 18 mm focus | Lens No.18 glass | 95ACC2680 |
| glass lens with  22 mm focus | Lens No.22 glass | 95ACC1100 |
| glass lens with 28 mm focus | Lens No.28 glass | 890000194 |
| glass lens with 40 mm focus | Lens No.40 glass | 95ACC2740 |

\* focussing lens to screw between the sensor and normal 9 mm lens to reduce the light spot dimension and increase resolution.
**Please refer also to Sensor Accessories**
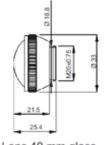
## ACCESSORY LENS DIMENSIONS
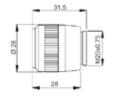


Lens No.9 glass
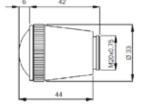
Lens No.9 PMMA

Lens HI-RES glass

Lens 18 mm glass

Lens 22 mm glass

Lens 28 mm glass

Lens 40 mm glass

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