◆DATALOGIC
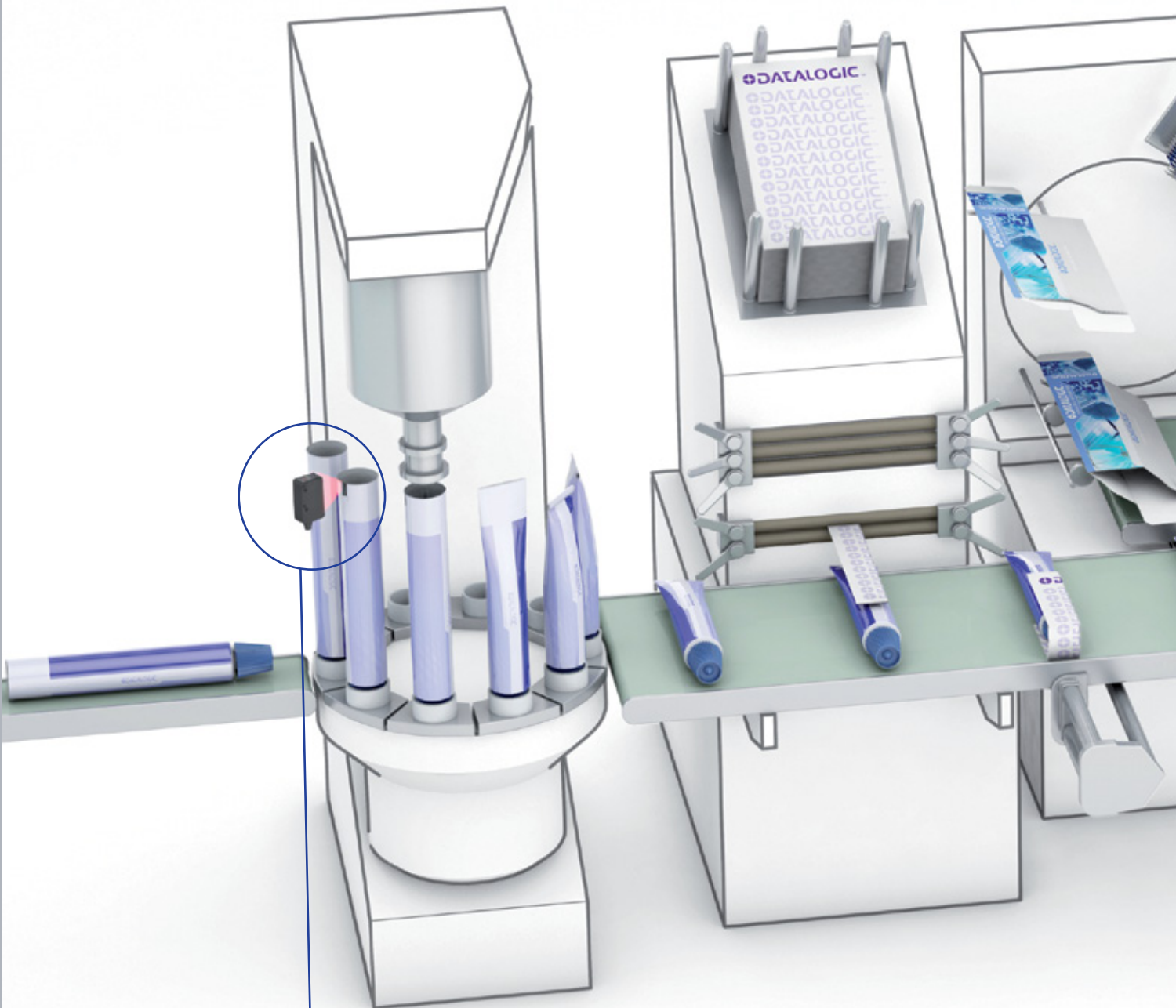

WHITE PAPER

Sensors for Packaging & Filling Machines

Filling Machines

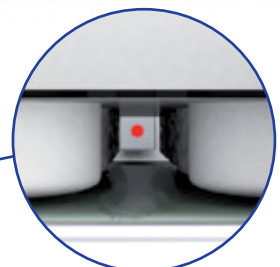- **Presence control**
- **Filling phase**
- **Machine phase control**
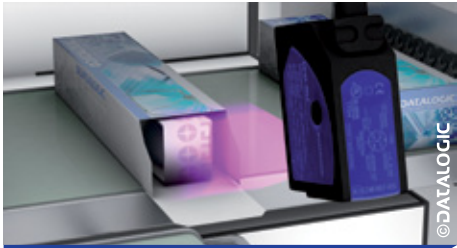- **Instruction sheet presence control**

Tubes orientation

Blisters synchronization

Instruction sheet presence control

Wrapping control
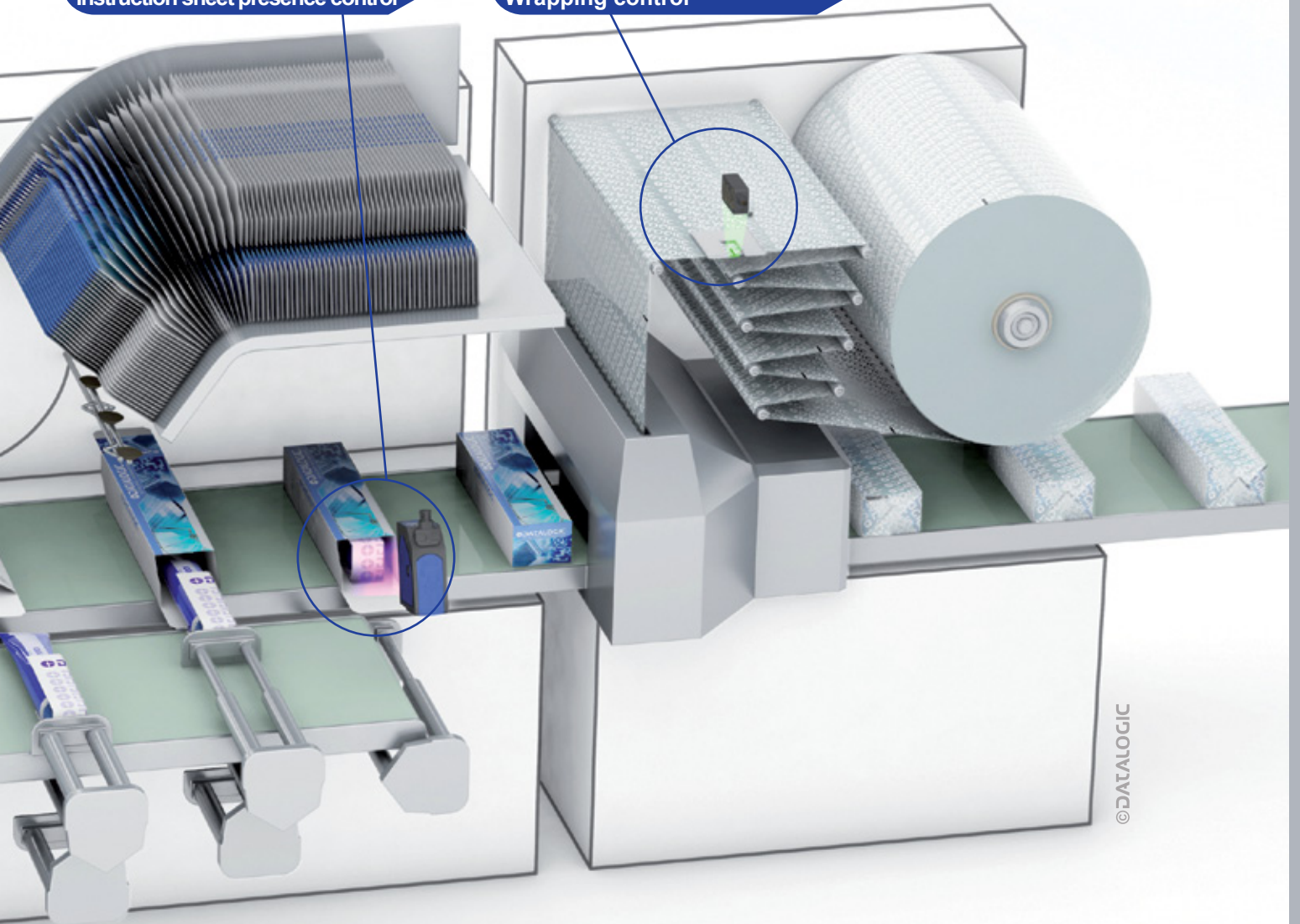

APPLICATIONS		PRODUCTS
Presence control	SM, S3Z, S7	
Filling Phase	US18, DATAVS1/2	
Machine phase control	IS, S8, TL46	
Instruction sheet presence control	S60-U, LD46	

In presence control applications, sensors are installed to detect the presence of objects moving on conveyors.
Detection requirements and issues are usually related to:
• Different **product formats** and **shapes** (bottles, cans, blisters, bags, tubes)
• Different **materials** of the workpiece (glass, plastic, metals)
• Different **surfaces** (opaque, highly reflective, transparent/clear)
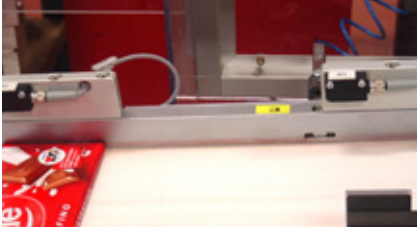
Detection of shiny objects - plastic/paper

Detection of transparent objects - glass

Detection of semi-reflective objects - metal

A very wide range of sensors are available on the market for this application. Together with **performance and pricing, dimensions of the sensor and easy installation** represent key customers' selection criteria.

S3Z SERIES

The **high operating distance** and its **excellent price/performance ratio** make the **S3Z series** widely used for detection applications in the packaging industry. The family offers a **wide range of models**: polarized, coaxial polarized for clear objet detection, diffused (narrow-beam or long distance), background suppression and through-beam. **Protection against interferences** allows **side by side installation** (through-beam models are the only exception).

ADVANTAGES & BENEFITS
• **Perfect match with machine manufacturers' requirements**
High compatibility with competitors' products is a major industry requirement. Most machine manufacturers have standardized the housing for these sensors. Non-compliance may limit the introduction to new potential customers.
• **Designed for harsh industrial environments** Extremely compact and robust casing with IP67 protection grade.
• **Multi-turn clutch system to avoid trimmer breakdown on the background suppression model.** Lifecycle is consequently improved, while machine downtime and operators' maintenance are dramatically reduced.
• **No 'blind zone' and reliable precision for clear objects detection (plastic films, glass bottles, PET plastic, etc.) in the polarized models,** thanks to coaxial optics, where emitter and receiver beams are aligned on the same sensor axis.
• **Coaxial polarized models offer perfect match with different machine mechanical layouts, designs and requirements** Despite horizontal or vertical installation, coaxial optics configuration guarantees high detection performance.

SMALL SERIES

The **Small Series** provides a complete family of **subminiature amplified photoelectric sensors ideal for** mounting in **reduced spaces** or in presence of particular mechanical obstacles. They guarantee **advanced performance** and **detection precision** regardless of the object color and surface.

ADVANTAGES & BENEFITS
• **Precise and reliable detection, unaffected by the workpiece material, surface or color (white, black, reflective, clear, opaque)**
Visible red emission with bright pin shaped spot and very precise cut-off at the focusing distance.
• **No field-setting required**
Factory settings guarantee fast installation and prevents customers' changes in the calibration, thus dramatically reducing uncontrolled machine failures wastes or downtime.
• **Designed for harsh industrial environments**
Extremely compact and robust casing with IP67 protection grade.
• **Extremely robust and easy to install**
Over-moulded plastic casing and M3 metal holes to guarantee extreme robustness to provide excellent mechanical fixing during installation and to minimize operators' maintenance.

S7 SERIES

The **S7 fibre optics sensors** represent the ideal solution for all the applications requiring **high accuracy sensing** combined with **very compact dimensions** which allow **installation in very limited spaces**. In addition, the S7 series offers **transparent/clear object detection** (both plastic and glass) by direct proximity, which is not possible for traditional fibre sensors.
The good performance of the amplifier positions the S7 series among the medium-high end fibre optic sensors, which represent almost 80% of all market applications.

ADVANTAGES & BENEFITS
• **Complete range of fibre optics sensors** including standard or advanced models for special applications.
• **Easy setting and configuration**
Intuitive, user friendly control panel makes configuration, calibration and further parameters extremely easy**.** Setting is made even easier by the 4 digit display visualizing key information. The time needed for adjusting the machine to different product formats or processes parameters is thus minimized.
• **Simple and precise calibration,** thanks to multi-turn trimmer. Sensor calibration is possible even in the presence of moving objects, easing and speeding up installation.
• **Perfect solution for contrast detection applications in reduced spaces**
The white light emission model can be installed in reduced spaces where traditional contrast sensors cannot be mounted.
• **Excellent background suppression** is offered by the high resolution up to 12 bits (4096 steps).

In this phase, the correct filling of the products is verified, either still-standing or moving on conveyors.
Also in this case, main requirements and detection issues are usually related to:
• Different **product formats** and **shapes** (bottles, cans, blisters, bags, tubes)
• Different **materials** of the work-piece (glass, plastic, metals)
• Different **surfaces** (opaque, highly reflective, transparent/clear)

Focus application for Datalogic Automation products is the detection of the correct fill level with clear/transparent objects.

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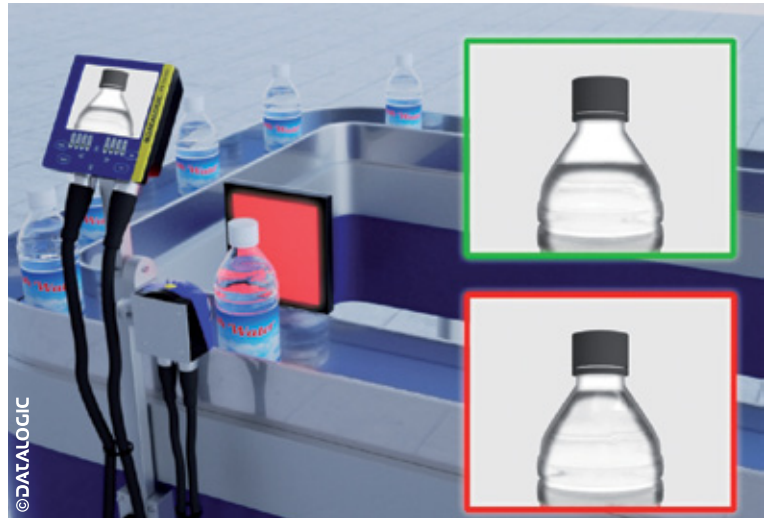
Liquid level check using vision sensor

US18 SERIES

Another possible solution for the filling phase is the use of ultrasonic sensors which represent a **cost-effective alternative** to the use of the cameras in specific applications. The **US18** series efficiently integrates a wide range of detection and inspections sensors. These sensors are **particularly suited for applications where liquid must be detected**. Extremely **easy to configure**, they also offer **unequalled response speed and detection precision.**

ADVANTAGES & BENEFITS
• **Outstanding detection performance**
  The US series guarantees a small blind zone and an excellent foreground and background suppression. They also provide a wide operating range: 30 - 300mm range.
• **Unequalled response speed and detection precision**
  Reading resolution up to 0.5mm and very fast response time of 2.5ms place the US18 series as the "best in class" ultrasonic sensor in the M18 tubular shape.
• **A wide range of models** The series includes both digital and analogue models from 0÷10Vdc or 4÷20m
• **Precise detection not depending on the object's color or surface**
  The time of flight (TOF) technology associated to the ultrasonic wavelength detects all objects independently from their materials and surfaces**.**
• **Excellent detection of transparent materials**
  Thanks to the direct proximity optic function, ultrasound sensors can detect transparent objects. This application is impossible when using traditional proximity photoelectric sensors.
• **Suited for complex ambient and environments**
  Detection precision is not affected by external agents such as dust, dirt or external light interferences.

However, ultrasonic technology shows some limits:
• They are more sensitive to specific external agents such as: vibrations, mechanical moving parts or ventilated environments.
• To perform appropriate detection, sensors position has to be orthogonal or at a >8° angle.
• Typically slower than a photoelectric sensor.
• It is a more expensive technology.

DATAVS1/2 SERIES

DataVS Vision Sensor represents the most suitable solution for these filling control applications which, thanks to its **2D technology**, guarantees **unmatched precision** even with **extremely different items and shapes**.
The wide range of controls offered by DataVS makes these solutions extremely efficient and effective.

ADVANTAGES & BENEFITS
• **Easy configuration**
  Thanks to Ethernet communication option, the DataVS Series can be easily integrated and flexible set-up can be made via PC.
  The GUI (graphic user interface) is user-friendly and immediate even for unskilled users. Programming is guided through 3 sequential steps. Access to next steps is prevented unless the user has appropriately completed the previous one.
• **Secure set-up**
  Password protection can be applied to prevent the access to the configuration parameters to unauthorized personnel.
• **Compact size**
  Suitable for mounting also in reduced spaces
• **A wide range of controls are available on the same object**
  Multiple controls are available including, but not limiting to: Pattern match, Contour Match, Position, Width, Edge count, Brightness, Contrast, Barcode read, OCV.
• **No loss of productivity thanks to fast update**
  The system flexibility allows the memorization of up to 20 different projects (each including single or multiple controls). DataVS can thus be immediately updated and upgraded from one inspection process to the following one by selected the appropriate project among the stored data.
• **High level performance and flexible configuration**
  DataVS series provides high frame rate (60 fps) and resolution of up to 0.1mm (VGA 640x480 CMOS).
  A complete range selectable lenses - 6mm, 8mm, 12mm, 16mm – allows different configuration to match application requirements.

Mark detection on plastic films

In packaging and filling applications, the **synchronization of all the machine phases** is extremely important. All part movements have to be coordinated. Among the typical applications are the correct **detection** of registration **colored marks** (contrast detection) and **presence control of mechanical parts.**
High resolution (RGB + electronics), **Depth Of Field** (DOF) and **speed** represent key features for sensors in in contrast detection applications.

The following variables can affect the appropriate detection of the colored marks detection:
• Different product **formats and shapes** (bottles, cans, blisters, bags, tubes)
• Different **materials** of the workpiece (glass, plastic, metals)
• Different **surfaces** (opaque, highly reflective, transparent/clear)

IS SERIES

The **IS series** of **inductive sensors** represents an **extremely competitive** solution in terms of **performances and reliability,** offering-a **wide range of models**, **either** with 1X or 2X operating distance. The IS series provides the most appropriate answer to application control of the machine mechanical part thanks to its **price** positioning and to the **wide range of models**.

ADVANTAGES & BENEFITS
• **Wide range of models to match manufacturers' requirements**
  The wide range of models available offers a good solution for most process applications, offering an industry standard components to machine manufacturers.
• **Stainless steel models - AISI 316L**
  Thanks to this feature, very high standard and environment can be approached**,** such as Food and Pharma where strict regulations are mandatory.
• **Excellent price/performance ratio**
  The IS series represents a very competitive solution in terms of performances and price.

S8 SERIES

The **S8 series** of photoelectric sensors offers high performance and reliability range. Its concept responds to the **ONE for ALL** philosophy: a **wide range of models** for a **wide range of applications** with a **unique standard case and same fixing layout**. Machine manufacturers can thus choose the best possible solution among the many models available: polarized, coaxial polarized for clear objet detection, diffused (narrow-beam or long distance), mechanical background suppression, contrast, Led or LASER, Stainless steel models for Food and Pharma industry.

ADVANTAGES & BENEFITS
• **Excellent reading repeatability of the Laser versions guarantee reliability and productivity**
  Very focused spot and high switching frequency on the Laser models for constant detection precision. Coaxial polarized models are the appropriate solution where the standard Laser sensors cannot work, e.g. detection through narrow holes.
• **The most compact contrast sensor for installation in reduced spaces**
  The S8 contrast sensor is the most compact on the market offering coaxial optics with RGB emission and high performances. Setting push-button, which can be remoted, offers easy calibration.
• **Reading precision and excellent resolution in the detection of clear objects,** thanks to coaxial optics and high resolution amplifier.
• **Auto-adaptive function reduces maintenance and the machine down time**
  This function maintains stable detection even in presence of changes in environmental and working conditions (e.g. dust, disalignment): the sensors continuously updates the position of the internal switching threshold with the intensity of the light received from the prismatic reflector.

TL46 SERIES

The ideal solution for colored mark detection. The extremely high performances of the **TL46 series**, associated to the different advanced functions available, make the TL46 sensor the best contrast sensor available on the market. Features include static or dynamic setting options, remote setting function, LEDs, bar-graph or display 4 digits indication, M12 5 poles connector with 5 positions orientation possibility.

ADVANTAGES & BENEFITS
• **Unparalleled price/performance ratio**
  The TL46 offers the best performances in terms of resolution, Depth of Field (DOF), speed and switching frequency from 15KHz to 30KHz at the lowest price for products in its range. RGB emission completes the high standard features of this product. Many market reference customers considers this sensor better than that of the competitor products.
• **Easy setting**
  Thanks to easy configuration and calibration of the TL46 series, installation is fast. End users can also quickly re-set the parameters in a fast way, minimizing the time needed for adjusting to different processes or product formats. Machine maintenance time is also reduced.
• **Automatic keyboard lock function**
  This function reduces the risk of changes in the sensor's parameters or calibration on behalf of non-authorized personnel and so guarantees process efficiency and reliability.
• **PNP/NPN outputs selectable by keyboard**
  Change of PNP to NPN output with a single touch of the push-buttons for managing two different models with one single code.

At this stage, the **correct insertion of the instruction sheet** in the product package has to be verified. Among main issues in this detection application:
- The product package can be partially closed, thus reducing the **available detection area**
- Both **product** and **instruction** can be of **the same color.**

A luminescence sensor is typically used in this application in order to **avoid color issues or reflection problems.**
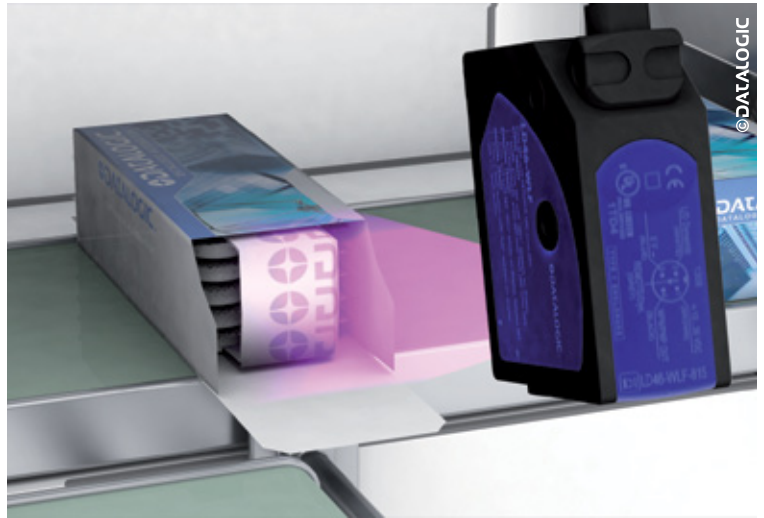
Detection of instruction sheet using a luminescence sensor

S60 SERIES

The luminescence sensor of the **S60 series** is the ideal solution for applications in **reduced spaces,** offering almost all the **advanced optic functions.**
The luminescence sensor of the S60 series represents **an extremely competitive solution** in terms of price.

ADVANTAGES & BENEFITS
- **Simple and fast installation in reduced spaces** thanks to a very compact case.
- **High level performance** UV emission capability, excellent reading resolution, extremely fast switching frequency 2KHz, teach-in setting and M12 four poles rotatable connector.
- **Excellent price/performance ratio**
  The luminescence sensors of the S60 series offer, in a compact housing, coaxial optics and performances usually associated to more expensive products.
- **Fast & Easy set-up and calibration**
  Sensor calibration is extremely simple thanks to a detection push-button that can be remoted via cable. Easy configuration and calibration speed up installation allow the user to easily and quickly change parameters, thus minimizing switching time between different processes and workpiece format.

LD46 SERIES

The **'best in class'** ideal for fluorescent mark detection.
The excellent performance of the **LD46 series** makes this sensor a **market reference**.
This luminescence sensors emit UV light and receive visible light reflected by the luminescent surfaces. This technology allows very high resolution detection of fluorescent marks.
Features include: glass lens, 4 signalling LEDs and 5-segment bar-graph indicator and 20ms delay selectable by keyboard.

ADVANTAGES & BENEFITS
- **Top performance contrast detection**
  The series offer 6 LEDs UV 375nm emission – unique on the market.
  The 2KHz switching frequency.
  Guarantees excellent performance also in high speed applications.
- **Excellent price/performances ratio**
  The LD46 series offers the best performances in terms of resolution, depth of field DOF and speed at practically the lowest price for products in its range.
- **Designed for harsh industrial environments**
  Extremely compact and robust casing with IP67 protection grade.
- **Fast & Easy set-up and calibration**
  Easy configuration and calibration speed up installation and allow the user to easily and quickly change parameters, thus minimizing switching time between different processes and workpiece format. Machine maintenance time is also reduced.
- **Secured process parameters**
  The automatic keyboard lock function reduces the risk of changes in the sensor's parameters or calibration on behalf of non-authorized personnel.
- **PNP/NPN bipolar digital outputs**
  The possibility of having both PNP and NPN outputs offers the possibility of managing two different models with one single code.

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The Datalogic Automation range has been developed and manufactured according to the requirements of the Factory Automation particularly in the following industries: Packaging Machinery & Machinery, Automotive, Electronics & Solar, Transportation & Logistics.

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