Smart-VS Overview

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Smart-VS General Characteristics

- **Dimensions (as per Matrix 220):**
  - 78 x47 x 38 mm (0° connector)
  - 58 x 47 x 58 mm (90° connector)

- **Inspection distance:**
  - 50mm – 150mm (from camera front window)

- **FoV (related to inspection distance):**
  - HFoV: 22mm – 55mm
  - VFoV: 16mm – 41mm

- **Image Resolution:**
  - 320 x 240 pixels

- **Illuminator:**
  - 4 white LED with Polarizer Filter

- **Mechanical features:**
  - IP65 and IP67
  - -10°C to 55°C
- **One model:**
  - Smart-VS-MR-5-150-WH-O SVS WP 150mm OUT 959971320

Smart-VS Inspection Area
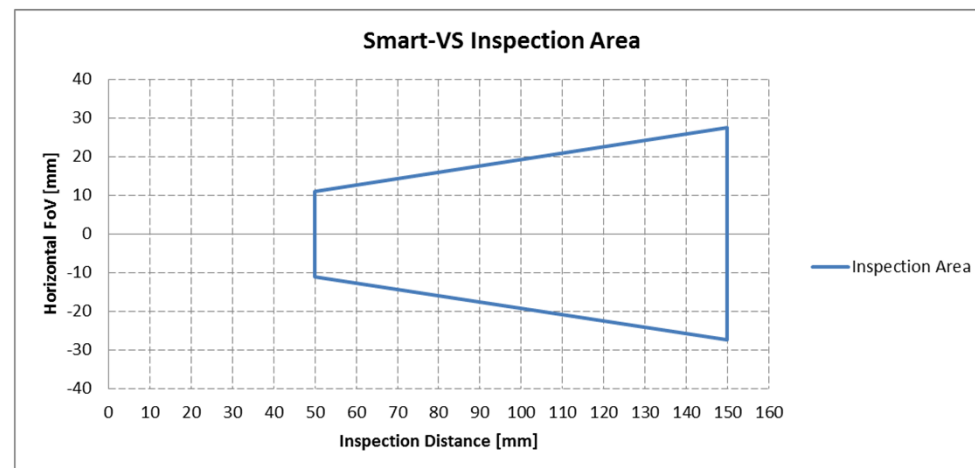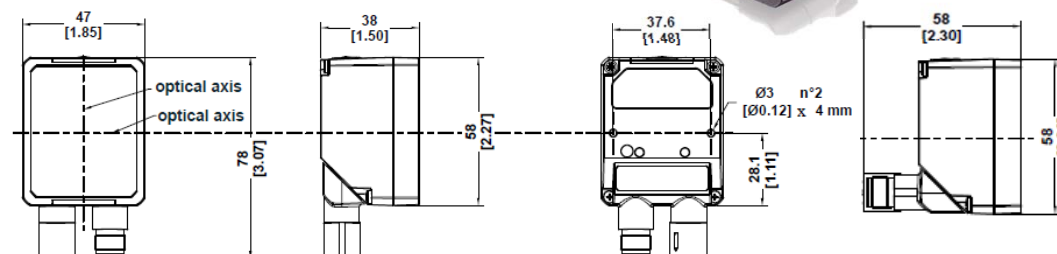
Focus on **Smart-VS**

Innovation in Detection

Bright Polarized
White Illuminator

Bright Double
Red LED Pointer
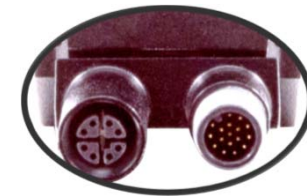
7mm optics with
autofocus

Red and Green
spot feature

TEACH Button
& UI LEDs

Sturdy IP67
Metal Body

ETH & Power I/O
M12 Connectors

Focus on **Smart-VS**
Innovation in Detection

Leading Technology

- Ai enabled technology
- Machine Learning customized algorithm
- System on Chip for multicore processing
- High resolution image sensor

Outstanding Flexibility

- Double RED bright pointer system
- High power white polarized illuminator
- RED Spot and Green Spot
- Automatic focus and exposition

Compact and Easy Installation

- Compact enclosure dimensions
- Rotating connector block
- LEDs for Active Ethernet and power supply
- Fast and easy mounting custom bracket

Outstanding Ease of Use

- Intuitive SET-UP method likewise sensors
- Quick & Easy SET-UP one Button procedure
- Intuitive User interface with TECH-IN button
- Guided procedure through bright LEDs
- Easy & effective WEB Server Graphic Interface

Industrial Strength

- IP65 & IP67 IP protection for any application
- Operating temp -10°C to 50°C
- Rugged Metal enclosure

Standard Connectivity

- Remote TEACH-IN input
- Trigger input
- 3 configurable output for detection result
- Ethernet 10/100M point to point

Focus on **Smart-VS**
Innovation in Detection

| ITEM N.	DESCRIPTION
1	Illuminator with 4 powerful White LEDs with polaroid filter
2	7mm lens with automatic focus system
3	Aiming system with 2 powerful Red LEDs
4	Red Spot illuminator LED for NO GOOD detection object
5	Green Spot illuminator for GOOG detection object
6	2 holes for direct mounting or bracket
7	Blue Power Supply LED
8	Yellow Ethernet connection LED
9	M12 Ethernet X-coded female connector
10	Rotating connector block
11	M12-17 Pin Power Supply and I/O male connector
12	5 bright LED for User Interface signalization
13	Yellow TEACH-IN button for sensor set-up

Focus on **Smart-VS**

HMI LEDs CONFIGURATION

HMI CONFIGURATION

🔴 ✕	**NO GOOD object** • blinking: NO GOOD object teaching • in Run phase: NO GOOD object detected
🟡	**For future use**
🟡	**Trigger** • Trigger received
🟢 ✓	**GOOD object** • blinking: GOOD object teaching • in Run phase: GOOD object detected
🟢 ▷	**Run** • Device is in Run phase

Smart-VS Connectors and Pin-out
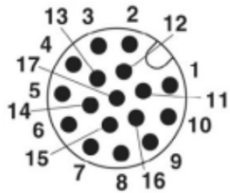
M12 17-pin Power, COM, and I/O Connector Pinout

Pin	Nome	Colore	Funzione
1	Vdc	Marrone	Power supply input voltage +
2	GND	Blu	Power supply input voltage -
Connector case	Chassis		Connector case provides electrical connection to the chassis
6	I1A	Yellow	I1A Trigger Input A (Polarity Insensitive)
5	I1B	Pink	I1B Trigger Input B (Polarity Insensitive)
13	I2A	White/Green	I2A Remote Teach A (Polarity Insensitive)
3	I2B	White	I2B Remote Teach A (Polarity Insensitive)
9	O1*	Red	Data Valid PP
8	O2*	Grey	GOOD Output PP
16	O3*	Yellow/Brown	NO-GOOD Output PP

M12 8-pin Standard Ethernet Network Connector Pinout

Pin	Name	Function
1	TX+	Transmit data (positive pin)
2	TX-	Transmit data (negative pin)
3	RX+	Receive data (positive pin)
4	RX-	Receive data (negative pin)
5	nc	Not Connected
6	nc	Not Connected
7	nc	Not Connected
8	nc	Not Connected

Smart-VS Applications Smart-VS
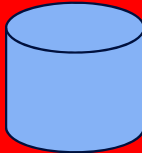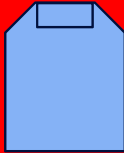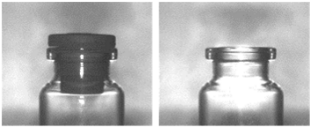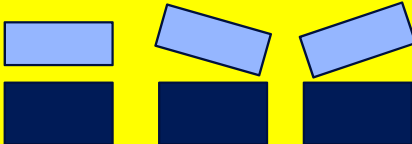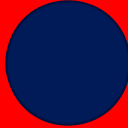
> **REQUIREMENT:**
> - Multiplicity of use case scenarios, mostly derived from Machine Vision applications
> - Fast and easy setup, teach-in similar to a photocell, without means of a GUI

APPLICATION NAME		DESCRIPTION
CHECK LABEL PRESENCE		Check whether a label is present or not.
CAP ORIENTATION		Detect the opening side of a cap on bottles
CAP POSITIONING VIALS		Detect whether a cap is present on vials Detect whether the cap is correctly closed
CAP POSITIONING BOTTLES		Detect whether a cap is present on bottles Detect whether the cap is correctly closed
CHECK PRINTING ON LABEL		Check the presence of the label with printed or not printed information

Smart-VS Binary Classification Applications

- **The Binary Classification algorithm allows to recognize between 2 precise types of objects previously learned.**
- **Little variation are tolerated, large variation must be verified case by case.**

APPLICATION NAME	SOLVED CASES (OK / NOT-OK)		TO BE VERIFIED CASE
CHECK LABEL PRESENCE			
CAP ORIENTATION			
CAP PRESENCE			
CHECK PRINTING ON LABEL	print		print / pri / print

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Focus on **Smart-VS**

Easiest Setting than ever directly by user no special tools are needed

1

GOOD

2

NO GOOD

GO!

RUN!

Focus on **Smart-VS**

WEB Server Smart-GUI for any monitoring or special additional settings

Initialization

1

**STEP 1 - GOOD**

2

STEP 2 – NO GOOD

- No vision tools to set and understand
- No image parametrization to set
- 2 step setting for any application condition
- Job setting
- Easy sensor parametrization
- Chrome suggested

Training

**GO !**

Smart-VS Digital I/O Diagram

- Image acquisition starts on the Leading edge of the input Trigger signal (default, can be changed to Trailing edge via WebApp). It is possible to set a Debounce time (via WebApp) to reject noisy trigger signals.

- The result of the inspection, that is a GOOD object or a NO-GOOD object detected, is always available after 50msec (response time) from Trigger. If a debounce time greater than zero has been chosen, the device response time is 50msec plus trigger debounce time.

- To each trigger event corresponds a Data Valid signal indicating that the Output signals can be sampled.
  Even if not strictly required, the Data Valid is useful for diagnostic and troubleshooting since OVERRUN conditions can be detected (see troubleshooting section).
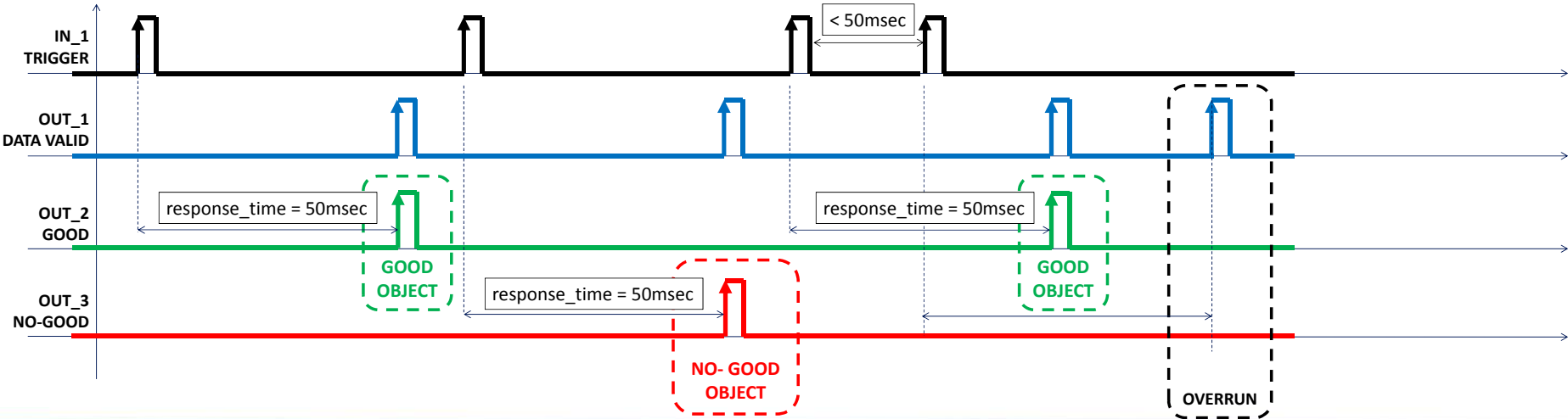
Smart-VS Digital I/O – Data Valid details

Data Valid signal timings:

Data Valid signal is raised 1msec after the GOOD or NO-GOOD signal has been raised and is lowered 1msec before the GOOD or NO-GOOD signal has been lowered.
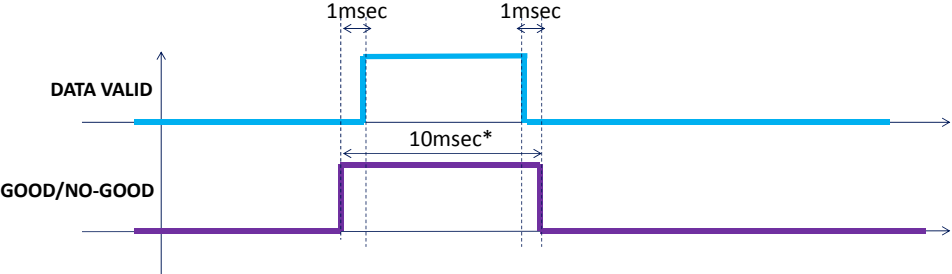
* default, adjustable via Smart-VS WebApp

Smart-VS Response Time

- Processing starts when the image is available in memory

- response_time = (trigger_response_time + sensor_data-out_time + processing_time)

- Smart-VS responds in 50ms time with 6 images setup (GOOD+NO GOOD)

50 ms DETERMINISTIC

trigger_response = ~1msec

TRIGGER

12.5 msec

SENSOR DATA

10msec

RESULT

processing_time

response_time

IN ANY DETECTION CONDITION
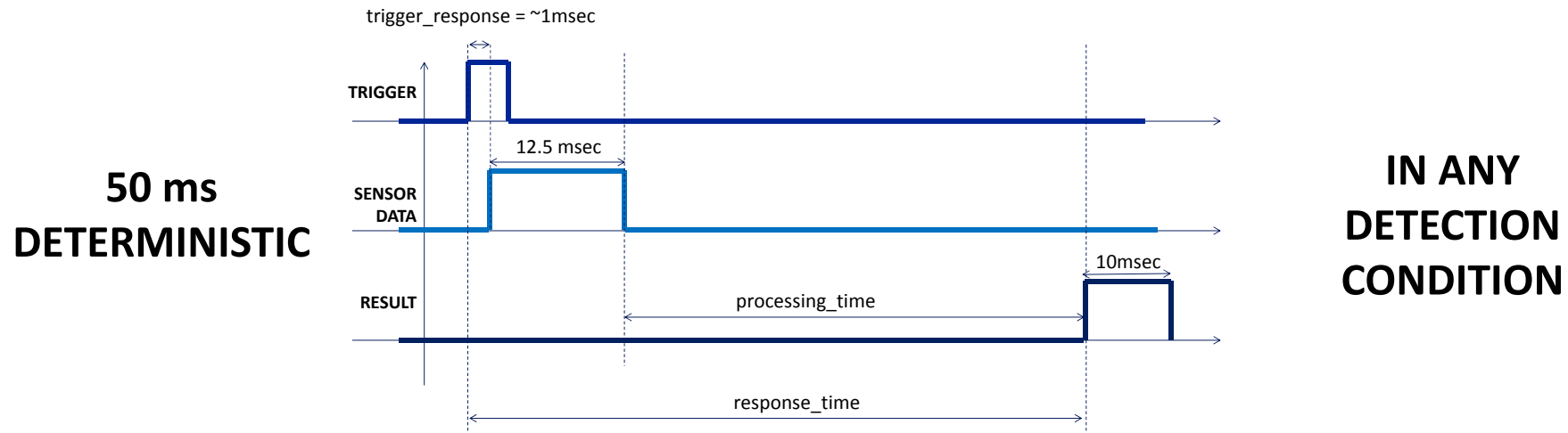
Smart-VS Aiming System, Green-Spot and Red-Spot

❑ Green-Spot and Red-Spot have the same state and meaning as Good and No-Good HMI LEDs

❑ The Aiming System is ALWAYS ON, both in teaching and running scenario

Smart-VS Typical Layout /1

Sensor-like setup

The Smart-VS is connected directly to the machine control system.
An optional push-button is recommended if frequent teachings for product batch changes are required or if the device is not easily accessible.
A presence sensor or the machine electrical phase is necessary to trigger the image acquisition.
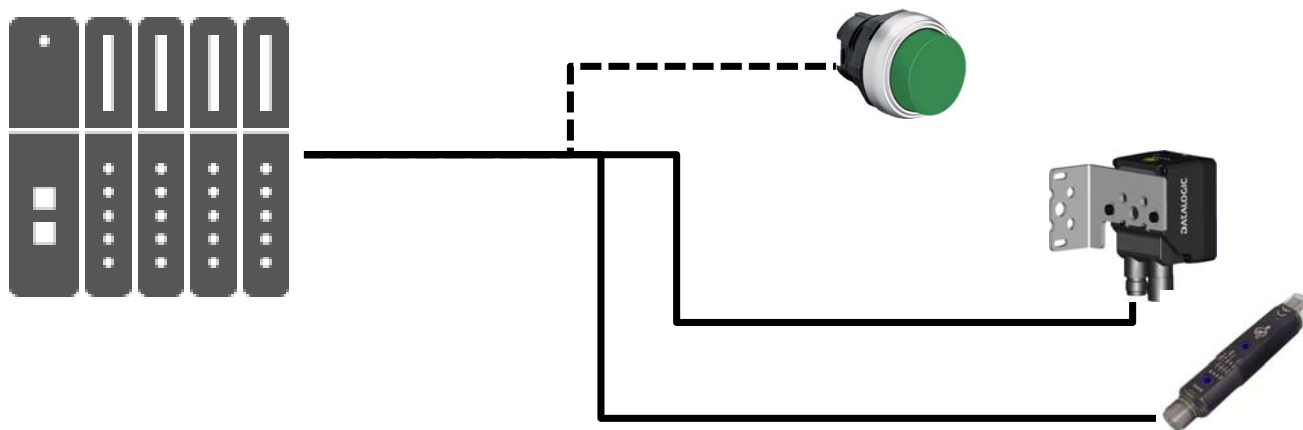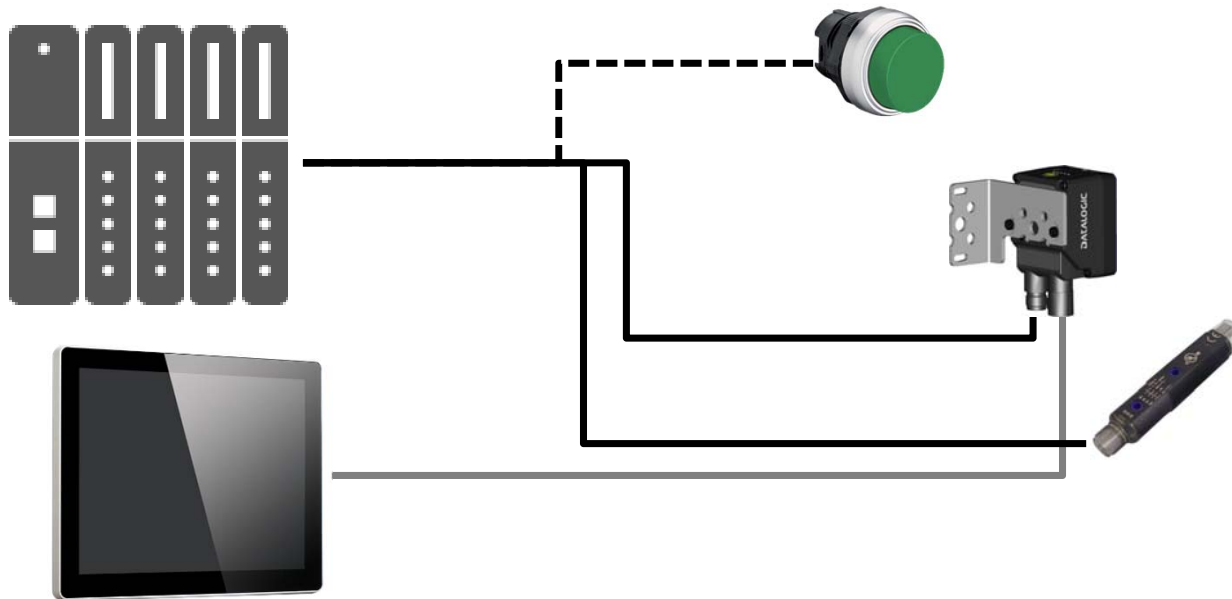
Smart-VS Typical Layout /2

WebApp for initial configuration and occasional monitoring

In addition to the previous setup, a PC can be connected via Ethernet for initial configuration and occasional monitoring.
A point-to-point Ethernet connection is recommended.
A presence sensor or the machine electrical phase is necessary to trigger the image acquisition.

Smart-VS Typical Layout /3

Setup with Telnet communication for Job switching

If more than one Job are necessary, Job switching can be done via Telnet communication.
An Ethernet switch can be used to ease the connection but it is reccomended to do a small dedicated LAN, since the Smart-VS is configured with a fix IP address.
A presence sensor or the machine electrical phase is necessary to trigger the image acquisition.
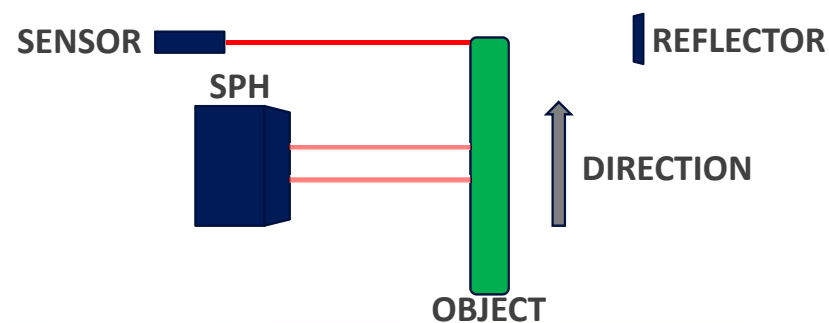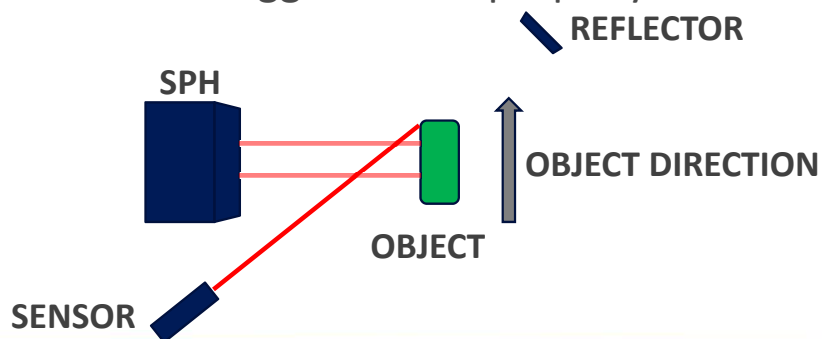

ETHERNET SWITCH
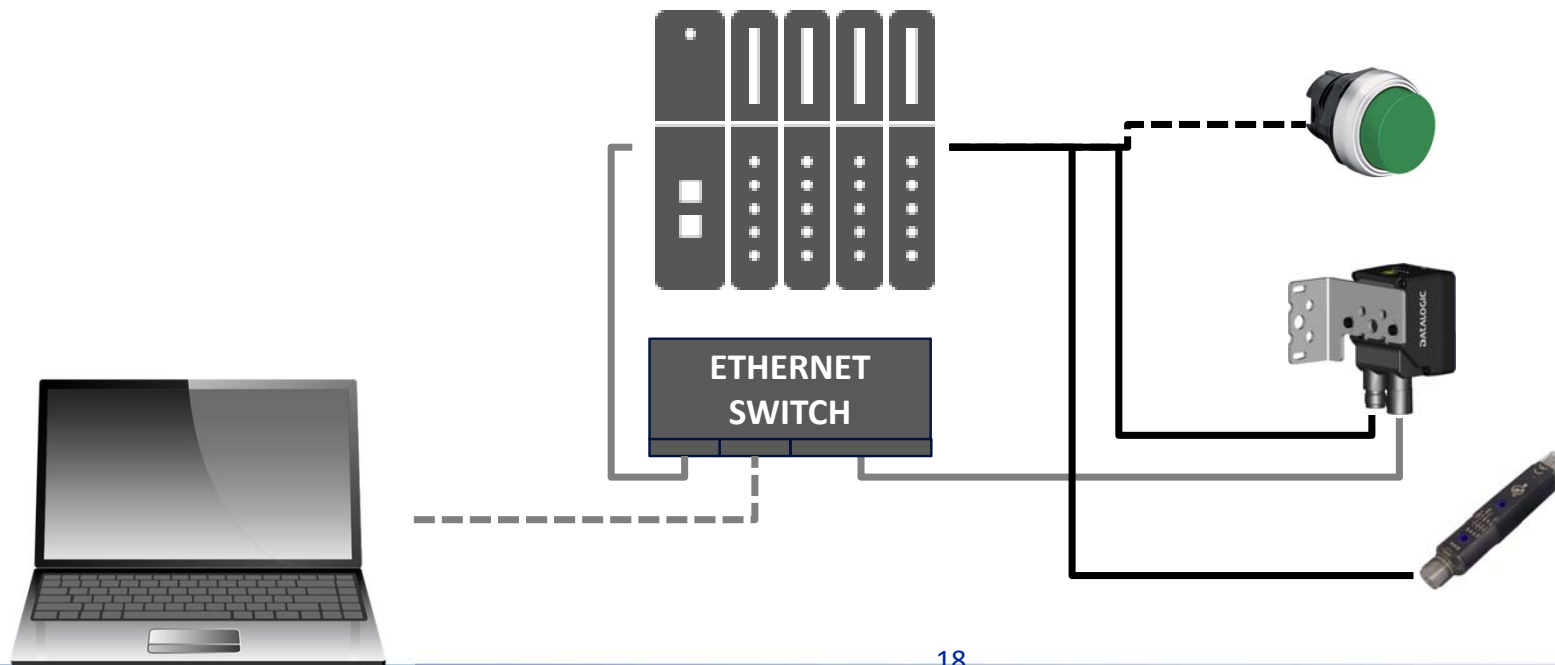
Smart-VS Trigger installation /1

1. Put the device in Teach Mode

2. Place the object in order that the feature to detect is between the Aiming System spots
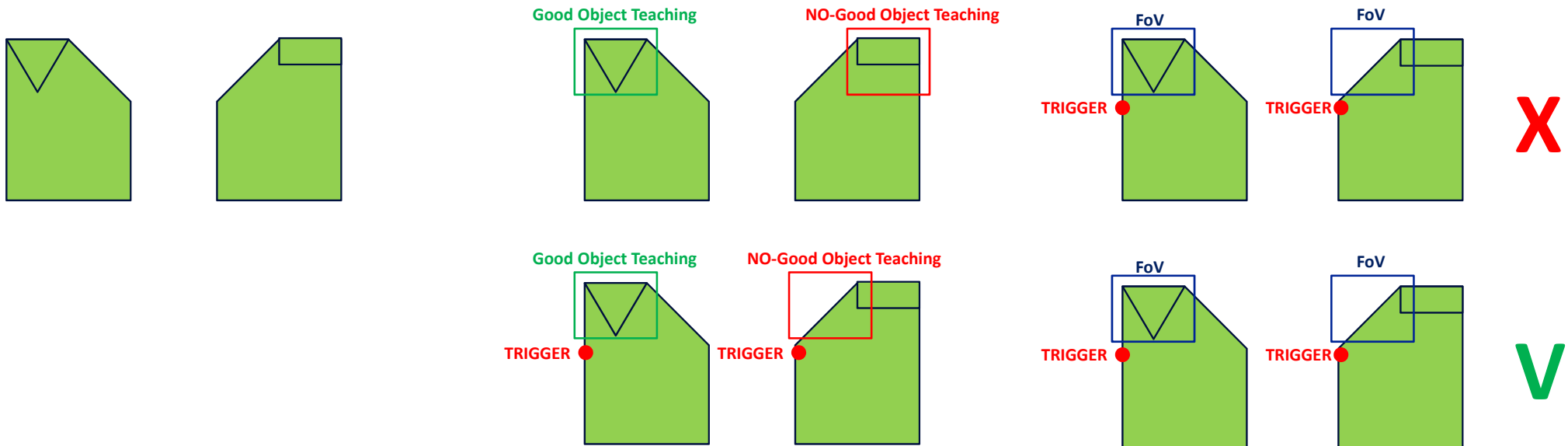
3. Place the trigger sensor properly before starting the teaching procedure. Examples:
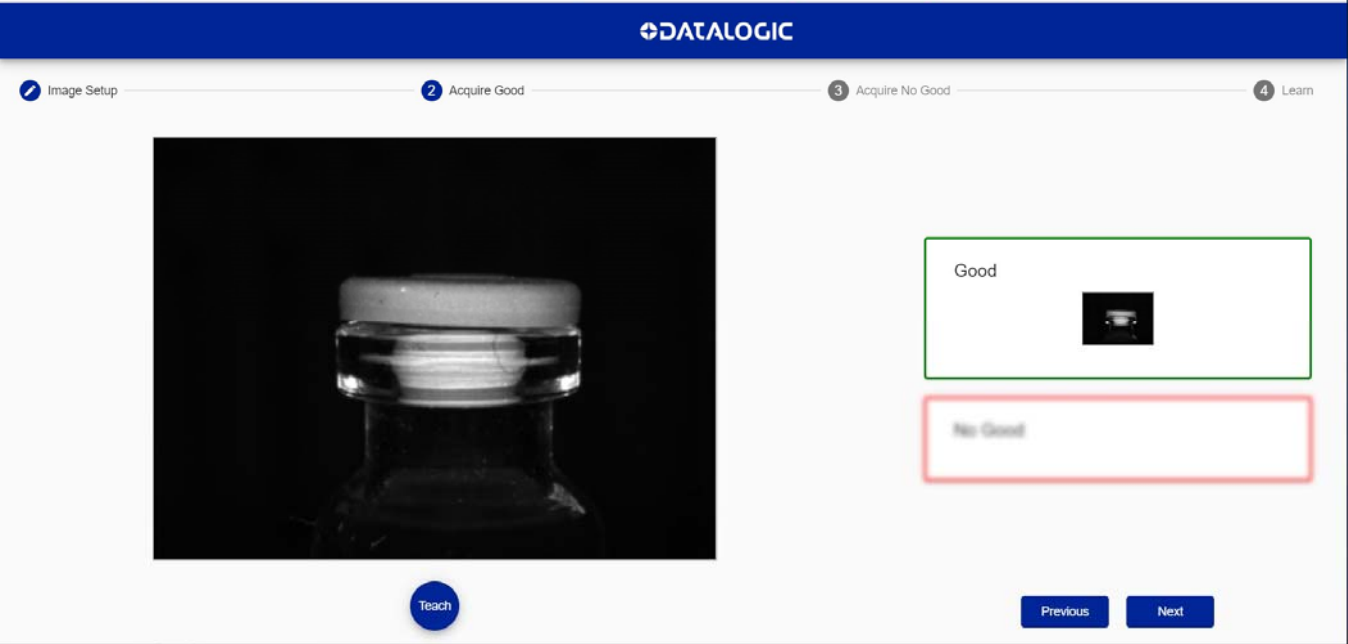
Smart-VS Trigger installation /2

TAKE CARE OF TRIGGER INSTALLATION when TEACHING!

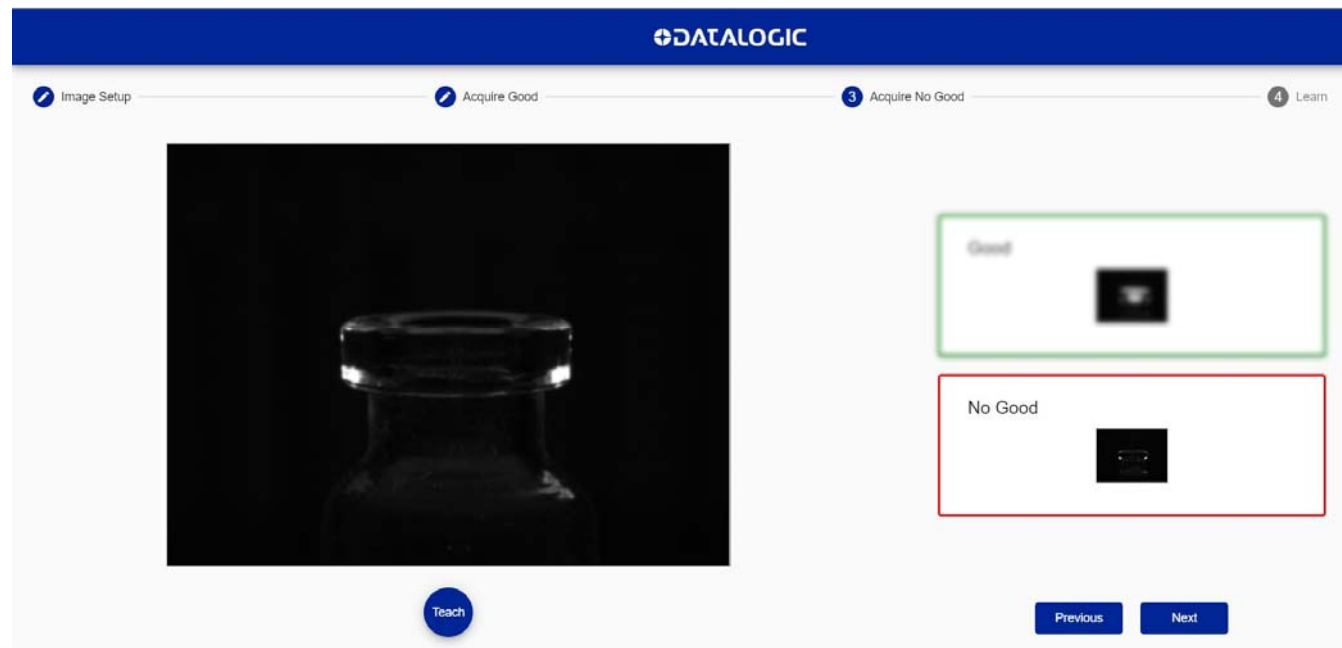- EXAMPLE: OBJECT ORIENTATION with asymmetric shapes:

Smart-VS WEB Interface

First TEACH step for GOOD condition in CAP PRESENCE application with WEB interface

Smart-VS WEB Interface

Second TEACH step for NO GOOD condition in CAP PRESENCE application with WEB interface

Smart-VS WEB Interface

LEARNING phase the sensor is elaborating and then it will automatically go in RUN status
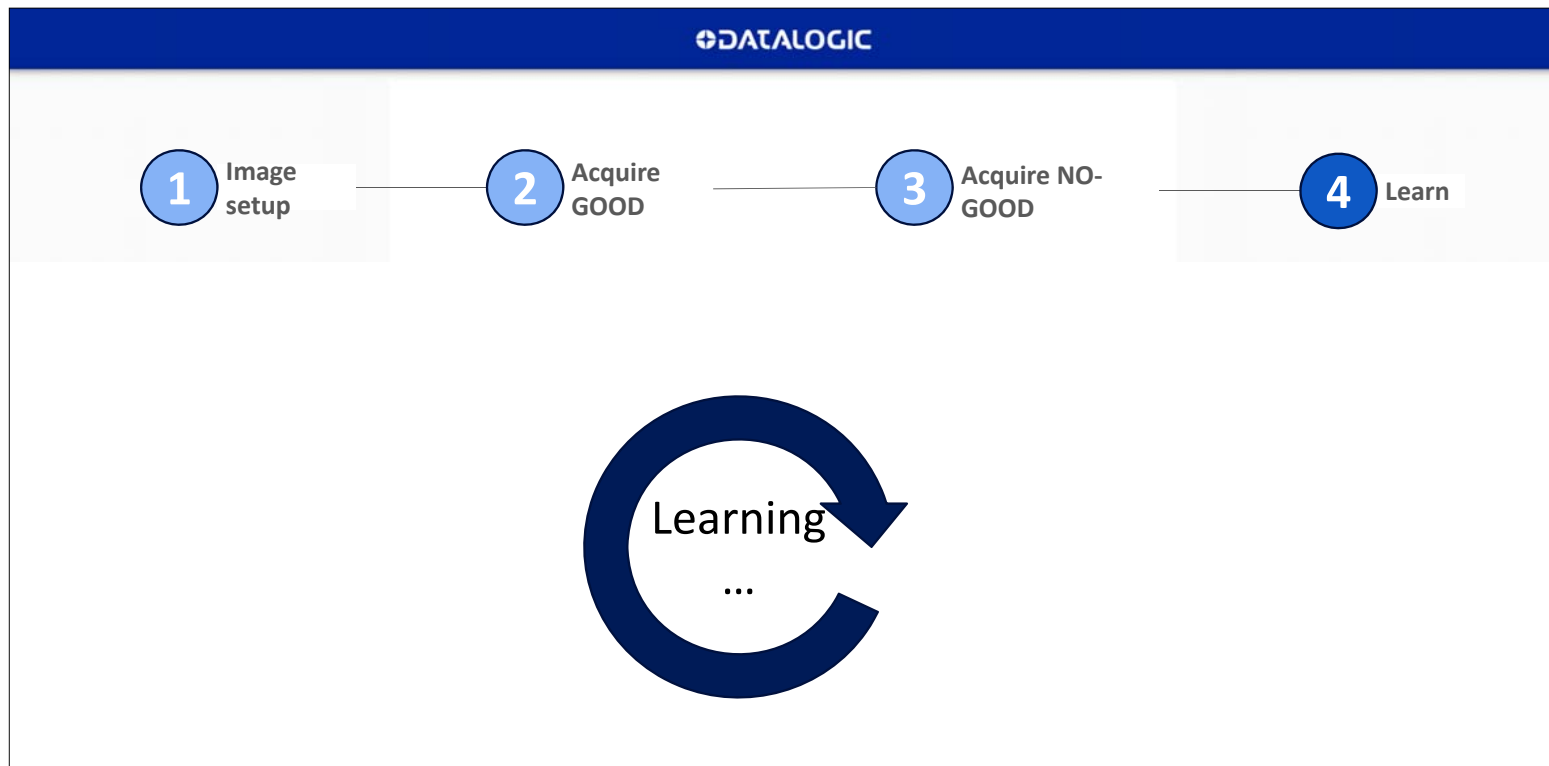
WEB Interface

Panel for running condition from this panel ia also possible to add more images to GOOD and NO GOOD boxex from the image stripe in the bottom

Smart-VS WEB Interface

Panel for setting the hardware parameters of general use and interface of the sensor

Smart-VS Accessories

93A050076 CAB-GD03 M12-17P F/L 3M Free wires
93A050077 CAB-GD03 M12-17P F/L 3M Free wires

93A050122 M12-IP67 GIGA Ethernet Cable X-Coded (1M)
93A050123 M12-IP67 GIGA Ethernet Cable X-Coded (3M)
93A050124 M12-IP67 GIGA Ethernet Cable X-Coded (5M)

PART NUMBER	DESCRIPTION	AVAILABILITY
93A050076	CAB-GD03 M12-17P F/L 3M Free wires	Available
93A050077	CAB-GD05 M12-17P F/L 5M Free wires	Available
93A050122	M12-IP67 GIGA Ethernet Cable X-Coded (1M)	Available
93A050123	M12-IP67 GIGA Ethernet Cable X-Coded (3M)	Available
93A050124	M12-IP67 GIGA Ethernet Cable X-Coded (5M)	Available
93A050128	Adapter Cable GIGA Ethernet X-Coded M12 to RJ45	Available
93A050129	Adapter Cable GIGA Ethernet X-Coded to Ethernet D-Coded	Available
93ACC0230	BK-22-000 Fixing Bracket M220 Body	Available

93A050129 Adapter cable GIGA Ethernet X-Coded to Ethernet D-Coded

93A050128 Adapter cable GIGA Ethernet X-Coded M12 to RJ45

93ACC0230 BK-22-000 Fixing Bracket M220 Body

Smart-VS Food and Beverage Applications

The manufacturing sector has several types of machinery to fill different types of bottles, flasks, jars with many kinds of liquid using several formats of label, recipients, materials and colors.

The use of sensors is not very flexible, they need to be adjusted for different formats and the detection stability is not very good consuming time for production.

The use of camera is sometimes too expensive as components and needs skilled people increasing the cost of ownership.The Smart-VS is the right solution

Smart-VS Food and Beverage Applications

Main applications

- ❑ Label presence check
- ❑ Cap presence checking
- ❑ Cap orientation
- ❑ Bottle orientation
- ❑ Check printing

Key success factor

- ❑ Good distance detection area
- ❑ Automatic focus
- ❑ Pointer to aim the detection area
- ❑ Polarized white illuminator
- ❑ Setting by Push Button

Selling arguments

- ❑ Quick and easy installation
- ❑ Quick and easy setup
- ❑ Handle different formats with quick and easy TECH-IN
- ❑ Handle different receipts with quick and easy WEB Server GUI
- ❑ Stable in operation with different materials and color independent
- ❑ Deterministic response time

Application Cosmetic and Pharma

The manufacturing sector has several types of machinery to fill different types of vials, dispensers and jars with many kinds of liquid, pastes, enamels using several formats of label, recipients, materials and colors.

The use of sensors is not very flexible, they need to be adjusted for different formats and the detection stability is not very good consuming time for production.

The use of camera is sometimes too expensive as components and needs skilled people increasing the cost of ownership.

The application does not require antiseptic specification since it should be placed at the end of the closing station or at the end of the labelling station which are transition block without antiseptic areas. The Smart-VS is the right solution

Unscrambler

Filling, Stoppering & Pre-Closing Machine

Closing Machine

Smart-VS Application Cosmetic and Pharma

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Smart-VS Other Applications

The packaging industry has also other very interesting applications where expensive application sensors with special task detecting glare object or true color detection or luminescent detection are failing despite their higher cost than Smart-VS and camera are too expensive for such kind of application.

These applications are related to presence detection of transparent or holographic antitampering closing sealing labels.

Thanks to its working principle the Smart-VS is very adaptable to any type of seal format independently by color and surface type of the sealing label and its background.
This application is also recurrent also in pharma and cosmetic market sector
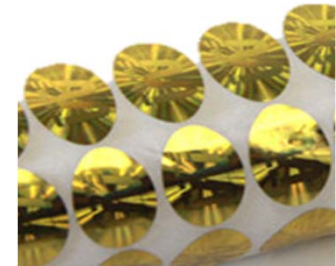
Smart-VS Other Applications

Main applications
- ❑ Check Label presence

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- ❑ Good distance detection area
- ❑ Automatic focus
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Thank You

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