

AS30

Application and Tricks



1 Introduction

The AS30 Application Service package was developed to aid in identification of applications that could be solved using the AS30 Array sensor. In this document we will elaborate on the applications as well as giving a step by step configuration for these applications. Keep in mind that this is not an instruction manual on how to do an initial setup of the device. This information is available in the Device operating instructions. This document is application based setup, optimization and trouble shooting.

As products become more versatile, they also become more complex. This document aids in bridging this gap. Information not in this document is available on the SICK Internal Intranet and includes AS30 product training, application and setup videos, troubleshooting guide, firmware information and PLC integrations training Videos.

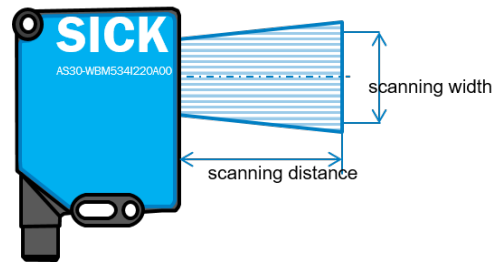
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2 Getting started

First steps

1. Type selection
2. Power connection
3. Connection analog output



1	2	-	3	4	5	6	7	8	9	10	11	12	13	14
AS	30	-	W	B	M	5	3	4	I	2	2	0	A	00

Keyposition	Performance	Scanning width	Scanning Distance	Control Panel	Core / Prime classification
3	E = Edge W = Width P = Position				
6		3 = 30 mm 4 = 45 mm 5 = 50 mm			
7			1 = 25 mm 3 = 100 mm		
10				1 = LEDs & Buttons 2 = TFT Graphics	
11					1 = Core 2 = Prime 3 = Pro

Type selection

Selecting between Core and Prime:

Table 1: Control Panel



Figure 1: TFT Graphic



Figure 2: LEDs & Buttons

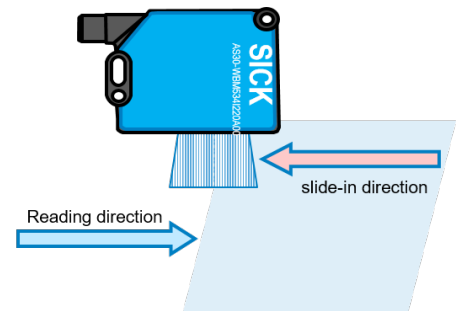
	AS30 Core	AS30 Prime	Applications hints
Configuration via Control panel	push buttons & LED	TFT display	more comfortable

	AS30 Core	AS30 Prime	Applications hints
Repeatability	0.2 mm	30/50 µm	Higher precision
Edge guiding	yes	yes	Choosing E type
Width measurement	no	yes	Choosing W type
Position teach	yes	yes	Single point & window mode
Enhanced functions	fix smoothing	adjustable smoothing	for smoothing rugged edges time based
	analog scale fix	scalable analog range	adjustment of measurement field

Reading direction

Connector to head

Both Core and Prime:
Default Analog scale
Default direction



NOTE PLEASE TAKE CARE:

Reading direction is inverse to slide-in direction!
mA values can be adjusted in Prime version

for SD = 25:

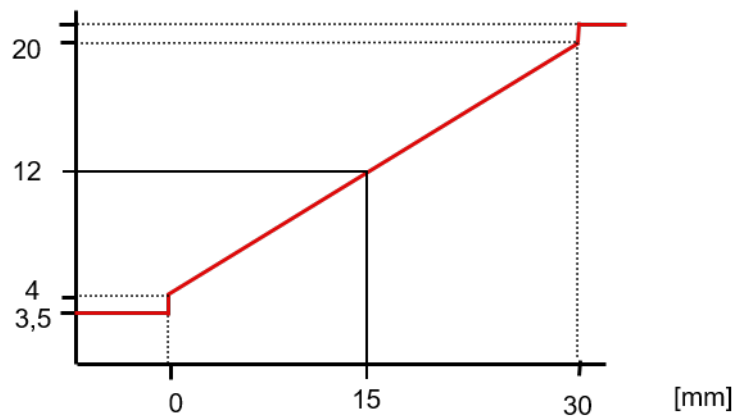
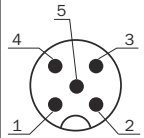
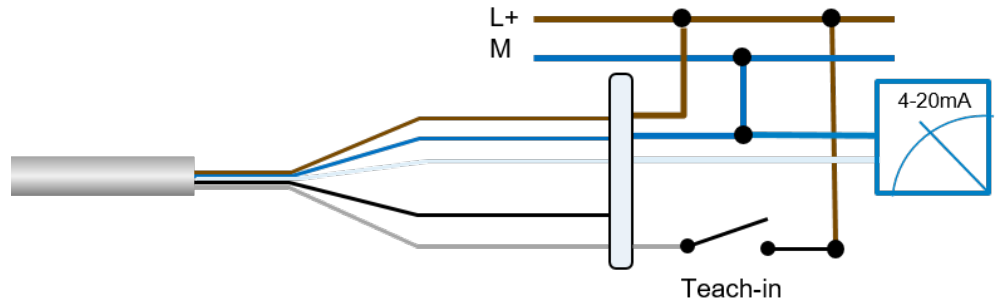


Table 2: Connection

Pin	Color	Code	Description
1	BN = brown	+ (L+)	Supply plus
2	WH =white	Qa	Analog output 4 ... 20 mA
3	BU = blue	M	Supply minus
4	BK = black	Q (C)	Switching output or IO-Link communication
5	GY = gray	MF	Multifunction control input

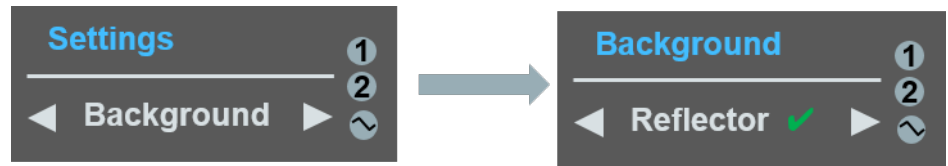
Pin	Color	Code	Description
			



Settings via display

The most comprehensive way to configure is via SOPAS as not all settings are available via the display.

Example for changing to reflector mode:



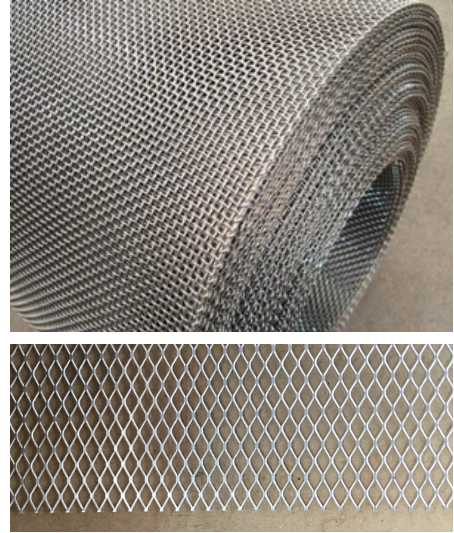
If a reflector calibration is needed, Sopas will be needed:

Background	Auto
Reading direction	Connector to head
Pin 2 configuration	Qa Width / Center position
Pin 5 configuration	Reflector teach-in
Sender configuration	Sender active
Find me	Deactivated
General notification handling	All enabled
Edge loss events	Ignore edge loss events
Reflector teach	Teach-in

3 Edge detection of a grid

Task:

During the manufacturing of metal grids, the customer wants to maintain the alignment of the product on the conveyor. As the target product is not a solid target, a suitable product in an acceptable price category has not been found. The customer has considered analog inductive sensors, photoelectric arrays and camera systems with minimal success.

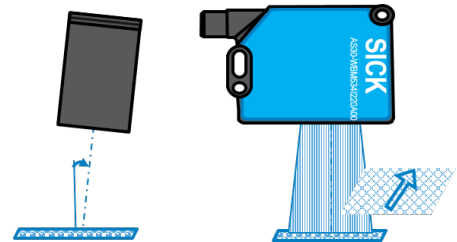


How to ... (Setup and configuration)

The AS30 can be configured as normal to Edge guiding.

Within the Sopas settings, a smoothing adjustment will resolve the issue of the object not being solid.

- Use the device in Reflector Mode
- Consider a Tilt angle
- Adjust the Smoothing in Sopas
- Use the sensor as normal

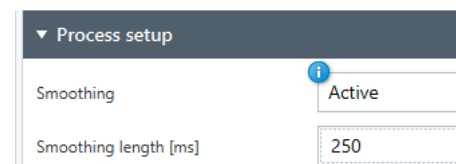


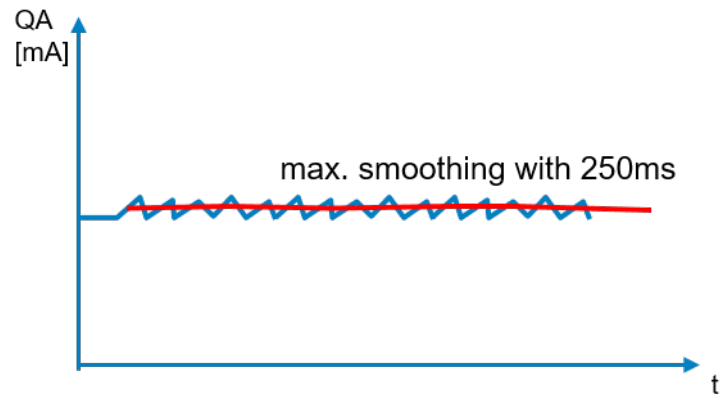
Sopas

Smoothing for moving targets.

Setting in Sopas:

Adjust the Smoothing length in accordance to the speed of the movement and the size of the openings

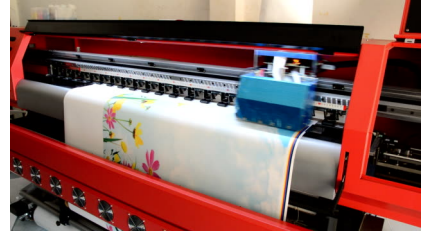




4 Guide line detection in print industry

Task:

In large printing houses, the alignment of the paper is extremely important. On many occasions, a printing alignment line is also used. With this line, the paper edge and the printing edge are both measured to ensure alignment of printer head and paper. Camera systems have been used to manage this task, but due to lighting and different print line colors, repeated setup is often needed. The customer requires an accuracy of 0.1 mm with the distance from Line to edge calibrated to 13 mm.

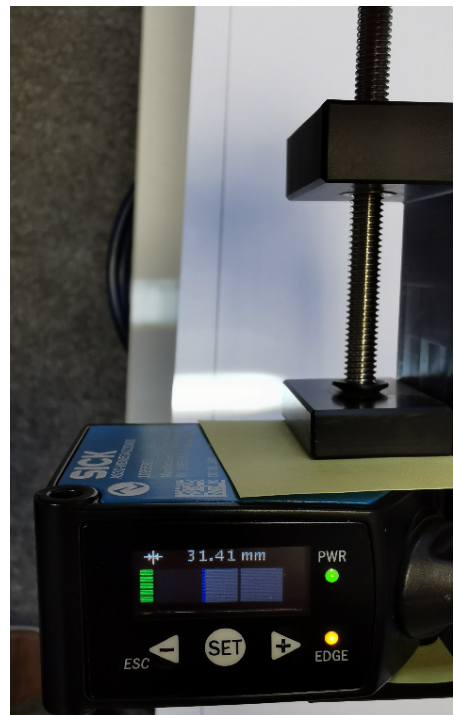
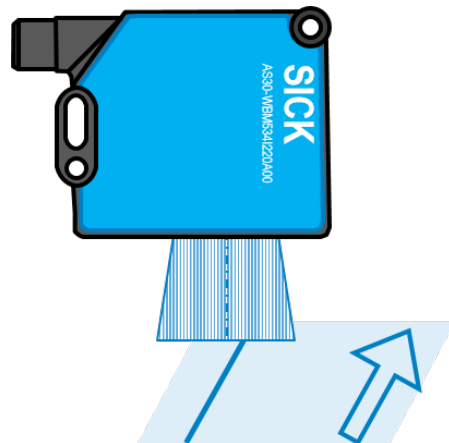


How to ... (Setup and configuration)

Using Sopas, the AS30 can be configured to width measurement. Also ensure that the sensitivity is set to **Fine**.

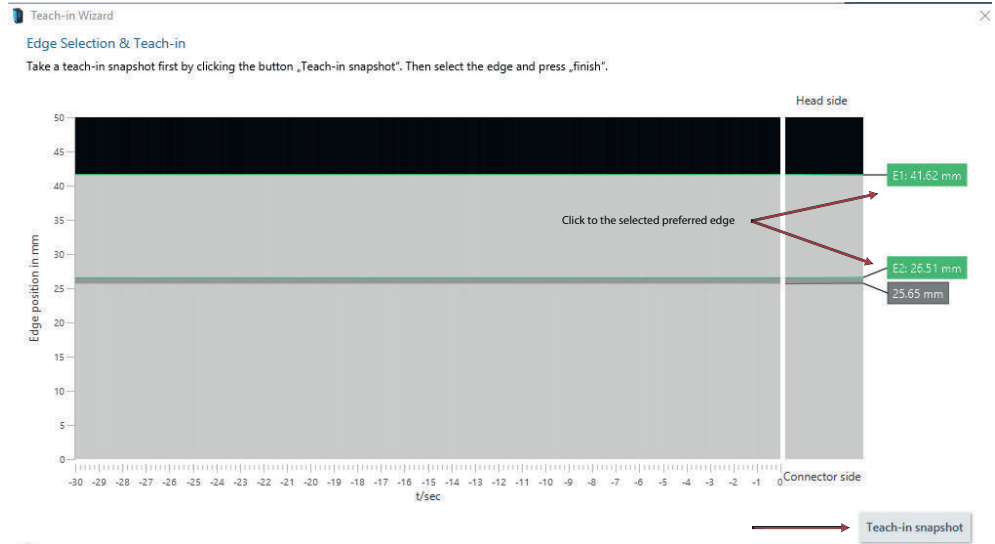
On the target, select an **Easy Teach-in** to detect the first two edges in edge search direction.

Select **Advanced Teach-in** to select the preferred edges.



Sopas

In the **Teach-in Wizard**, select the **Teach-in snapshot** and then select the preferred edge.



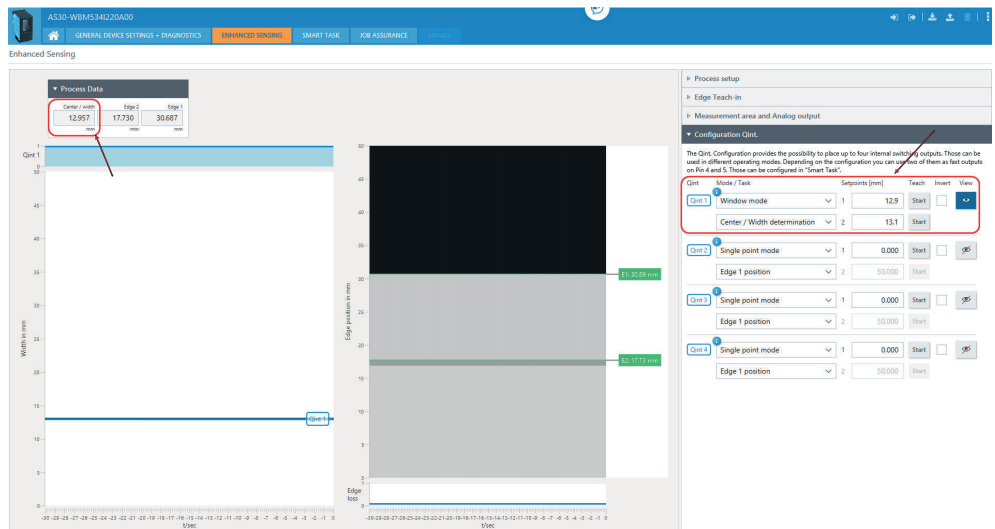
In Process data, select **Width Measurement** and **Sensitivity Fine**.

Process setup

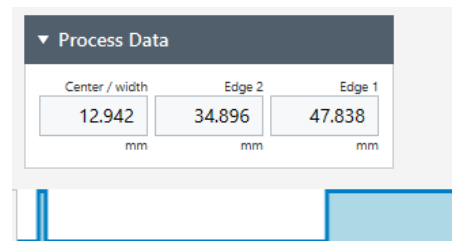
Please use the following setup configurations before teach-in.

- Process data: **Width measurement**
- Smoothing: **Active**
- Smoothing length [ms]: **33**
- Sensitivity: **Fine**
- Edge 1 search direction: **Top to bottom**
- Edge 2 search direction: **Top to bottom**
- Application reset: **Reset**

Selecting a window mode and set-points, you can set the tolerance window.



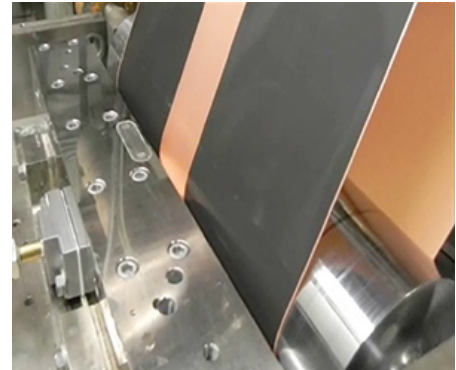
Within the Process data the width measurement is visible in reference to the two selected edges. This value can be measured with an analogue value as well as a standard switching output.



5 Foil control in battery manufacturing

Task:

During the manufacturing of Lithium-Ion batteries, layers of different materials including copper and aluminum foil are used. During the application, it is required to monitor that the Cathode electrode film is accurately applied to the copper film. The customer currently uses cameras, but due to lighting and reflection, regular re-programming is needed. The camera also needs to be re-programmed to every different layering process, which requires programmers and downtime.

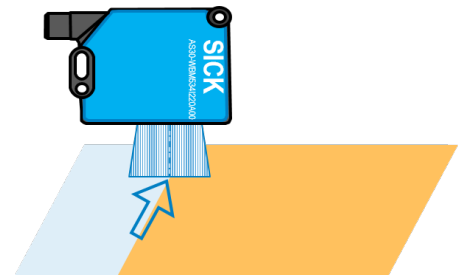


How to ... (Setup and configuration)

Using the AS30, we can easily configure the required detection edge. Doing so, we can configure the AS30 to detect that the layers are evenly aligned.

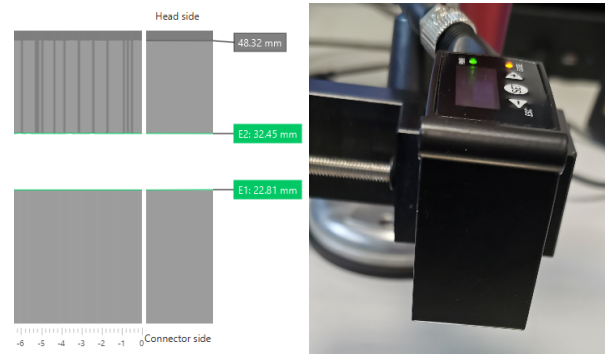
An IO-Link, analog out or a simple switching output can be used to align using the rollers or give an output as soon as a predetermined tolerance level has been breached.

- Mount the unit at a slight angle to avoid reflections
- Select edge guidance
- Use Sopas if the reflection influences the measurement

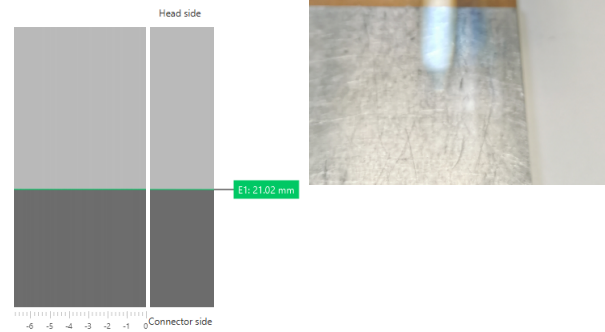


Sopas

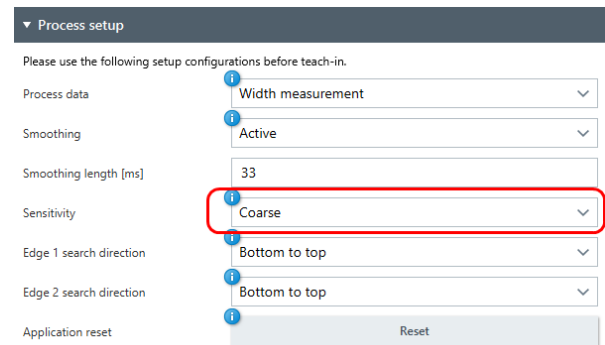
Using Advanced Teach-in for the edge detection, you could pick up additional reflections as per image 1. Tilting the sensor by a few degrees (Image 2) can clean up the detection as per image 3.



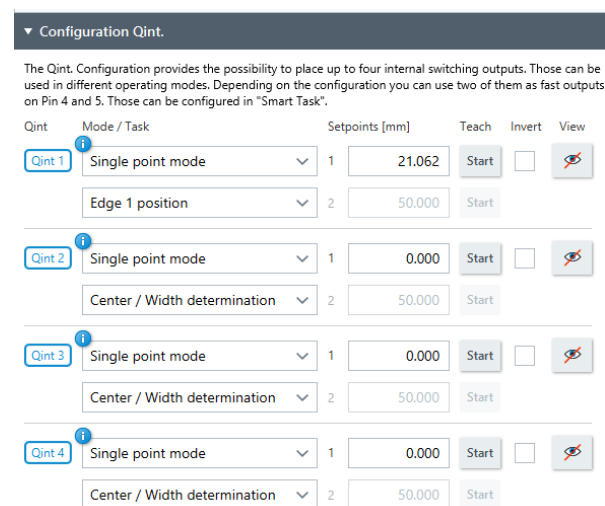
Choose needed edge



Ensure that the sensitivity is set to Coarse due to material reflections.



Select your preferred output configuration



6 Glue line tracking in furniture manufacturing

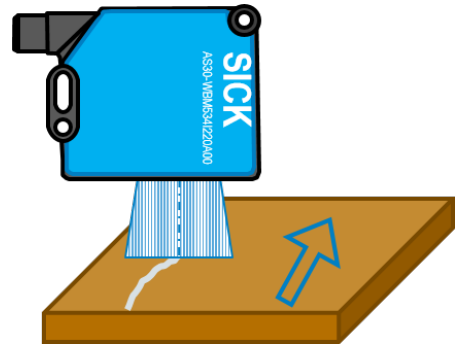
Task:

In a furniture manufacturing plant, the customer has an automated gluing station. There is no inspection for the glue and the customer wishes to add one. As the gluing takes place in a straight line, the inspection will also be in a straight line. However, if a blockage occurs, the glue jet can be partially clogged, causing less glue to run or the glue to run out at an angle that would lead to quality failure.



How to ... (Setup and configuration)

Using the AS30, we can easily configure the required detection area. You can set an area that would trigger a switching output when the glue is applied in the correct area. From the analog value you can determine the continuous thickness of the applied glue.



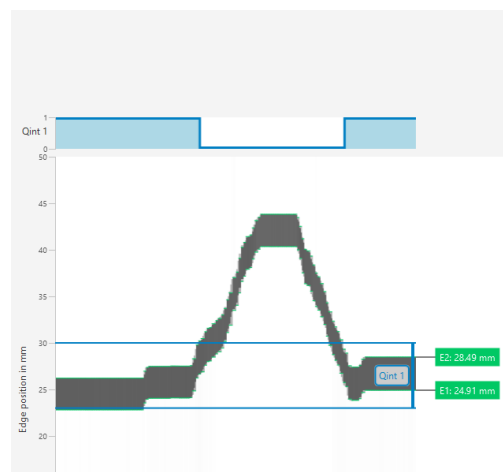
- Using Sopas, do an easy Teach-in
- In the Configuration Quint, set your two set points in window mode
- In the Process setup, you can select Process data as width measurement.



NOTE

You can also monitor the diameter and position using IO-Link

Sopas



Process setup

Edge Teach-in

Measurement area and Analog output

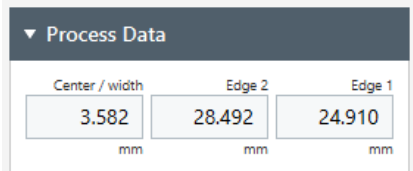
Configuration Quint.

The Quint Configuration provides the possibility to place up to four internal switching outputs. Those can be used in different operating modes. Depending on the configuration you can use two of them as fast outputs on Pin 4 and 5. Those can be configured in "Smart Task".

Qint	Mode / Task	Setpoints [mm]	Teach	Invert	View
Qint 1	Window mode	1: 23	Start	<input type="checkbox"/>	
	Edge 2 position	2: 30	Start		
Qint 2	Window mode	1:	Start	<input type="checkbox"/>	
	Edge 1 position	2:	Start		
Qint 3	Window mode	1:	Start	<input type="checkbox"/>	
	Edge 2 position	2:	Start		
Qint 4	Window mode	1:	Start	<input type="checkbox"/>	
	Edge 2 position	2:	Start		

The Width is displayed in Sopas and the output based on 4-20 mA is sent via Pin 2.

The width and positioning is available within IO-Link as an integer value.



Center / width	Edge 2	Edge 1
3.582	28.492	24.910
mm	mm	mm

7 Bottle inspection - roundness

Task:

During the manufacturing of glass bottles, quality inspections are done. Depending on the need of the company and their customers, the inspection could consist of several cameras for overall inspection, or a roundness inspection. The roundness inspection is important for the bottle to be suitable for labelling and branding. Here we can offer a solution to replace a camera or camera set with our AS30.

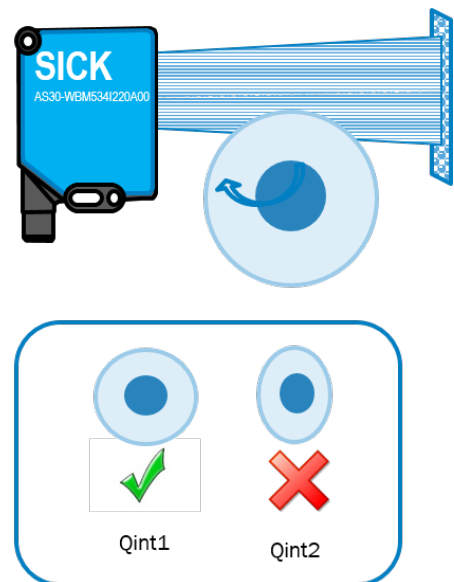


How to ... (Setup and configuration)

Using the AS30, we can set two fields. One field would be the required accuracy tolerance and the second, a confirmation that a bottle is detected. These two signals combined will set a switching output on pin 4.

The measurement value can also be monitored using the analogue output or IO-Link.

- Set up the sensor with REF-AX-002 reflector
- Do a reflector teach in Sopas
- Run an advanced teach and based on the transparency of your bottle, select your sensitivity. For a clear transparent bottle, consider Course.
- In the Configuration Qint, set your tolerance values in window mode
- For Qint 2, set your broader detection window

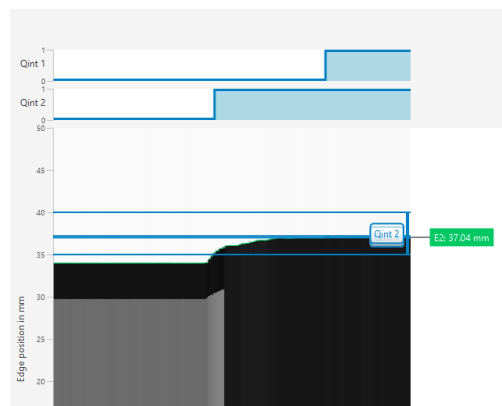
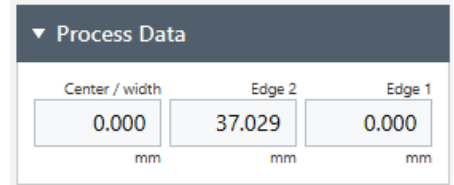
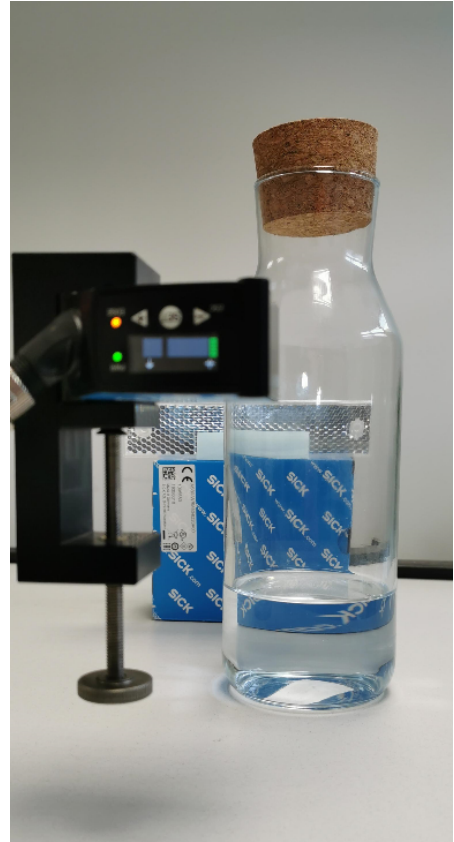


Sopas

During the inspection, the bottle is centered on a rotation plate.

The following states of the internal markers will determine the signal output QL1.

	Round	Not Round	Present
Qint.1	●	●	●
Qint.2	●	●	●
QL1	●	●	●
QL2		●	●

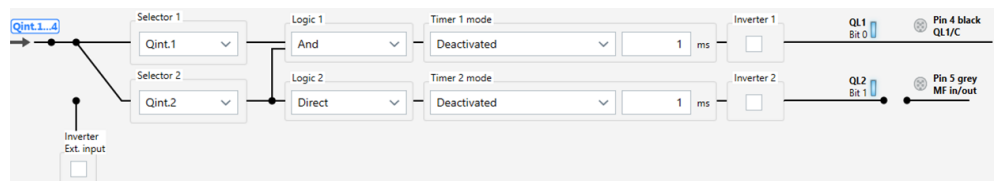


Configuration Qint.

The Qint. Configuration provides the possibility to place up to four internal switching outputs. Those can be used in different operating modes. Depending on the configuration you can use two of them as fast outputs on Pin 4 and 5. Those can be configured in "Smart Task".

Qint	Mode / Task	Setpoints (mm)	Teach	Invert	View
Qint 1	Window mode	1 37.0	Start	<input type="checkbox"/>	
	Edge 2 position	2 37.200	Start		
Qint 2	Window mode	1 35	Start	<input type="checkbox"/>	
	Edge 2 position	2 40	Start		
Qint 3	Single point mode	1	Start	<input type="checkbox"/>	
	Edge 1 position	2 50.000	Start		
Qint 4	Single point mode	1	Start	<input type="checkbox"/>	
	Edge 1 position	2 50.000	Start		

Under the tab Smart tasks, set the "AND" function between Qint.1 and Qint.2. Under this tab you can also add time delays functions if needed.



8 Object diameter measurement

Task:

In a Bearing manufacturing plant it happens that balls of incorrect sizing fall into the mix. The customer wants to differentiate between one to two sizes as some bearings use two different sizes. The application is very fast and an accuracy of 0.5mm needs to be detected.

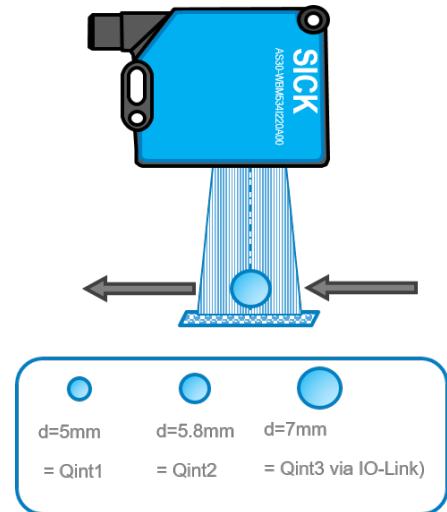


How to ... (Setup and configuration)

Using the AS30, we can set two fields. One field would be the correct ball and the second for the second size. If only one is needed, only configure one.

The measurement value can also be monitored using the analogue output or IO-Link for more variables. With IO-Link, you can have four pre-configured sizes.

- Run an easy teach to evaluate the first result
- Run an advanced teach and based on the reflectivity of the ball, select your sensitivity. In our case "Fine" was suitable
- In the Configuration Qint, set your tolerance values in window mode and output to QL1
- For Qint 2, set your broader detection window if a second size is needed and set the output to QL2

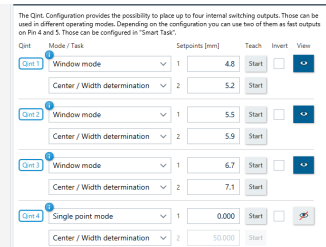
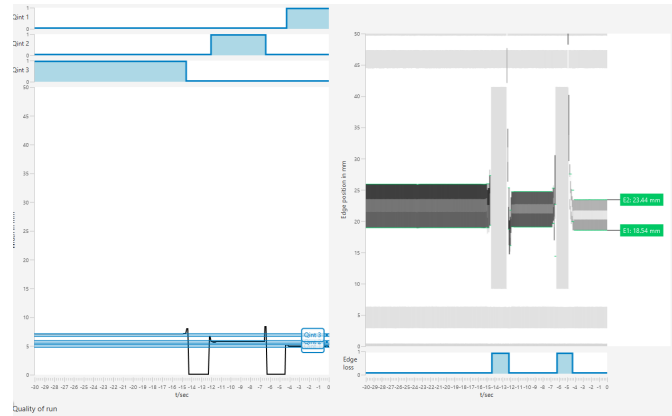
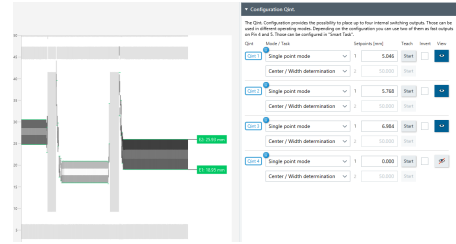


Sopas

First steps

1. Using a set background (conveyor or slide), do a standard setup of the device. Use a single teach (Image 1) for each of your sizes to establish the sizing based on the mounted distance.
2. Set your window to an acceptable tolerance (Image 2).
3. Re-evaluate your sensitivity and teach-in tolerance to the most robust detection.

8 OBJECT DIAMETER MEASUREMENT



9 Control of spray jets

Task:

The customer has primer coating spray jets that get clogged from time to time. This clog can cause a reduction in quantity of primer or an unequal amount over certain areas being applied. The customer has been trying photoelectric sensors, but with limited success. The customer needs a simple pass or fail solution.

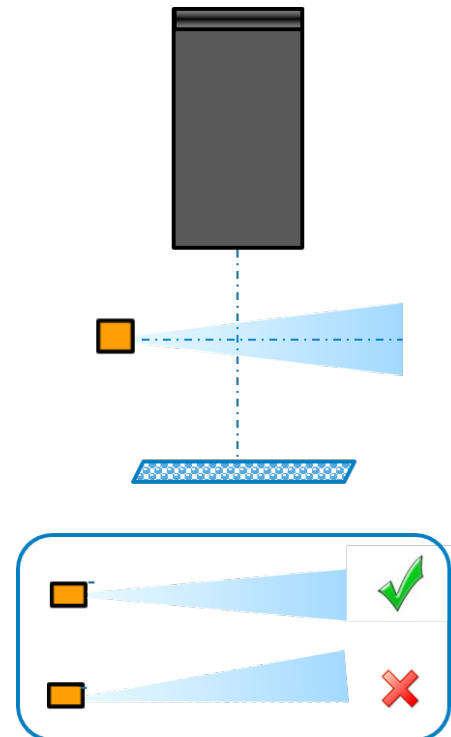


How to ... (Setup and configuration)

Set up the AS30 for Centre Determination in the Process setup using the device with Reflector in reflector mode.

The measurement value can also be monitored using the analogue output or IO-Link for more variables. With IO-Link, you can have four pre-configured tolerances.

- Run a reflector teach, followed by an easy teach to evaluate the first result
- Run an advanced teach and based on the reflectivity and transparency of the spray, select your sensitivity. In our case "Middle" was suitable
- In the Configuration Qint, set your tolerance values in window mode and output to QL1



Sopas

Scanning the center position of a spray jet,

Qint1 = 1>good

Qint1 = 0>bad

Spray jet can be transparent

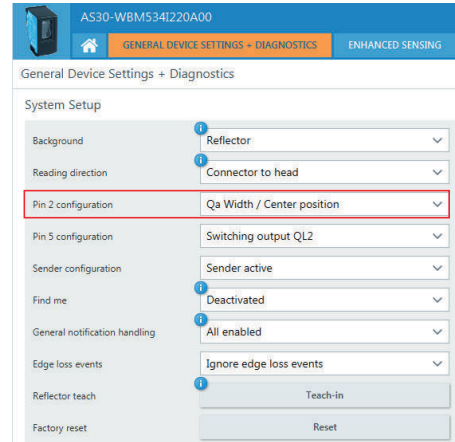
Only the center of the spray jet is considered, not the diameter

Please consider the Minimum

Detectable Object value:

100 mm version MDO = 0.5 mm

25 mm version MDO = 0.2 mm



The screenshot displays the 'Enhanced Sensing' configuration screen. At the top, there are navigation tabs: GENERAL DEVICE SETTINGS + DIAGNOSTICS, ENHANCED SENSING (active), SMART TASK, JOB ASSURANCE, and SERVICE. Below the tabs, the 'Process Data' section shows a table with the following values:

Center / width	Edge 2	Edge 1
17.332 mm	20.576 mm	14.088 mm

The main graph plots 'Edge position in mm' (y-axis, 0 to 50) against 't/Sec' (x-axis, -30 to 0). It shows a profile of a part with a 'Head side' and a 'Connector side'. A green checkmark is visible on the left side of the profile, and a red 'X' is on the right. A 'Qint 1' label is placed on the profile. To the right, the 'Process setup' section contains the following settings:

- Process data: Center determination
- Smoothing: Active
- Smoothing length [ms]: 33
- Sensitivity: Middle
- Edge 1 search direction: Bottom to top
- Edge 2 search direction: Bottom to top
- Application reset: Reset

Below the graph, there are three expandable sections: 'Edge Teach-in', 'Measurement area and Analog output', and 'Configuration Qint.'.

The Qint. Configuration provides the possibility to place up to four internal switching outputs. Those can be used in different operating modes. Depending on the configuration you can use two of them as fast outputs on Pin 4 and 5. Those can be configured in "Smart Task".

Qint	Mode / Task	Setpoints [mm]	Teach	Invert	View
Qint 1	Window mode	1 23	Start	<input type="checkbox"/>	
	Center / Width determination	2 27	Start		
Qint 2	Deactivated	1 15	Start	<input type="checkbox"/>	
	Center / Width determination	2 9.000	Start		
Qint 3	Deactivated	1 15	Start	<input type="checkbox"/>	
	Center / Width determination	2 11.000	Start		
Qint 4	Deactivated	1 35	Start	<input type="checkbox"/>	
	Center / Width determination	2 50.000	Start		

10 Detection of spring

Task:

The customer has a station where the presence of a spring on a component needs to be verified. In many cases, a Photoelectric sensor for transparent detection can be used, but due to the small target size, it was not successful. A camera system was considered, but was too sensitive.

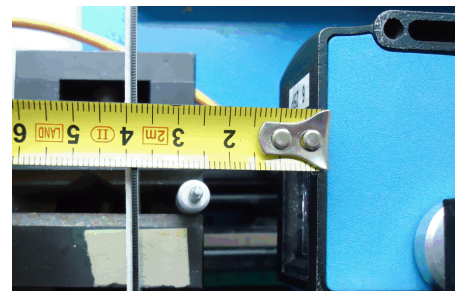


How to ... (Setup and configuration)

For this application, the 25mm version with a finer resolution is needed. Set up the unit in Reflector mode.

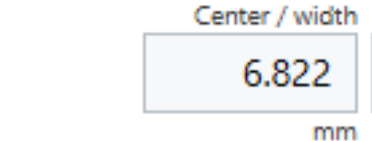
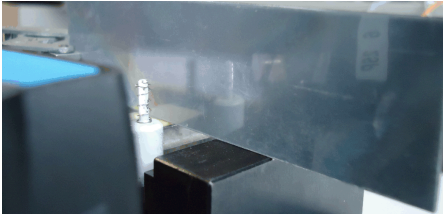
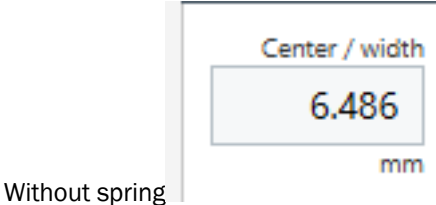
The measurement value can also be monitored using the analogue output or IO-Link for more variables.

- Run a reflector teach, followed by an easy teach to evaluate the first result
- Run an advanced teach and based on the reflectivity and transparency of the spray, select your sensitivity. In our case "Course" was suitable
- Set the unit to Width measurement
- In the Configuration Qint, set your tolerance values in window mode and output to QL1



Sopas

In this case it is necessary that only the thinner part of the bolt is in the light beam Do a configuration with and without the spring present.



Monitor the values and adjust if fine tuning is necessary.

The screenshot shows the SICK software interface. On the left, the 'Process Data' table displays the following values:

Center / width	Edge 2	Edge 1
6.478	28.620	22.142
mm	mm	mm

Below the table are two graphs: 'Edge position in mm' and 'Edge loss'. The 'Edge position in mm' graph shows two horizontal bars with values E1: 22.14 mm and E2: 28.62 mm. The 'Edge loss' graph shows a single horizontal bar.

On the right, the 'Configuration' window is open, showing the 'Oint' configuration table:

Oint	Mode / Task	Setpoints [mm]	Touch	Insert	View
Oint 1	Window mode	6.600	Start	<input type="checkbox"/>	<input type="checkbox"/>
	Center / Width determination	6.852	Start	<input type="checkbox"/>	<input type="checkbox"/>
Oint 2	Single point mode	0.000	Start	<input type="checkbox"/>	<input type="checkbox"/>
	Center / Width determination	50.000	Start	<input type="checkbox"/>	<input type="checkbox"/>
Oint 3	Single point mode	0.000	Start	<input type="checkbox"/>	<input type="checkbox"/>
	Center / Width determination	50.000	Start	<input type="checkbox"/>	<input type="checkbox"/>
Oint 4	Single point mode	0.000	Start	<input type="checkbox"/>	<input type="checkbox"/>
	Center / Width determination	50.000	Start	<input type="checkbox"/>	<input type="checkbox"/>

Arrows point from the 'Without spring' and 'With spring' labels to the 'Oint 1' and 'Oint 2' rows respectively in the configuration table.

11 Tool positioning

Task:

In a tool changer there is a control loop that the tools are adjusted in the right way that they fit into each other. Therefore it is necessary to position the clutch and the tool that they fit to each other. Cameras have been the go to solution, but several are needed and at a costly setup.



How to ... (Setup and configuration)

For this application, set up the unit in Reflector mode.

For this purpose there is a hole the changer to position the wheel and reflector on the backside. If the hole has the biggest diameter the tool is in the correct position.

- Run a reflector teach, followed by a basic teach to evaluate the first result
- Run an advanced teach and based on the reflectivity and transparency of the spray, select your sensitivity.
- Set the unit to Width measurement
- In the Configuration Qint, set your tolerance values in window mode and output to QL1 or
- In this case the hole goes through the whole wheel and there is a reflector REF-AX-
- In this way the customer will have a switching signal if the wheel is correctly aligned

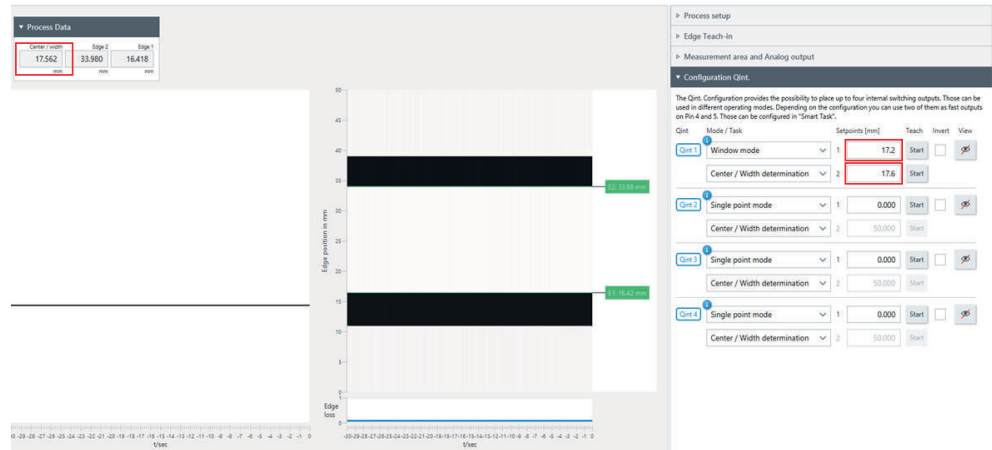


Sopas

Do an easy teach in and then an advanced teach in if the edges are not correctly defined. Select the two most inner edges.



Choose Qint1 and Window mode and do make a Window which makes sense.



12 Troubleshooting

SOPAS Service tool - only available in Service level

Login to service level

AS30-EBM314I220A00 ...

ONLINE

LOGIN

Device-ID: 8389126
 Serial Number: 19310006
 IO-Link: COM3

Offline
 Online

Login ✕

Login to device

Device: AS30-EBM314I220A00 (*****)

Userlevel: Service

Password: *****

LOGIN

CANCEL

For some critical applications it can be helpful to watch the signal sequence which is received at the 255 pixel array.

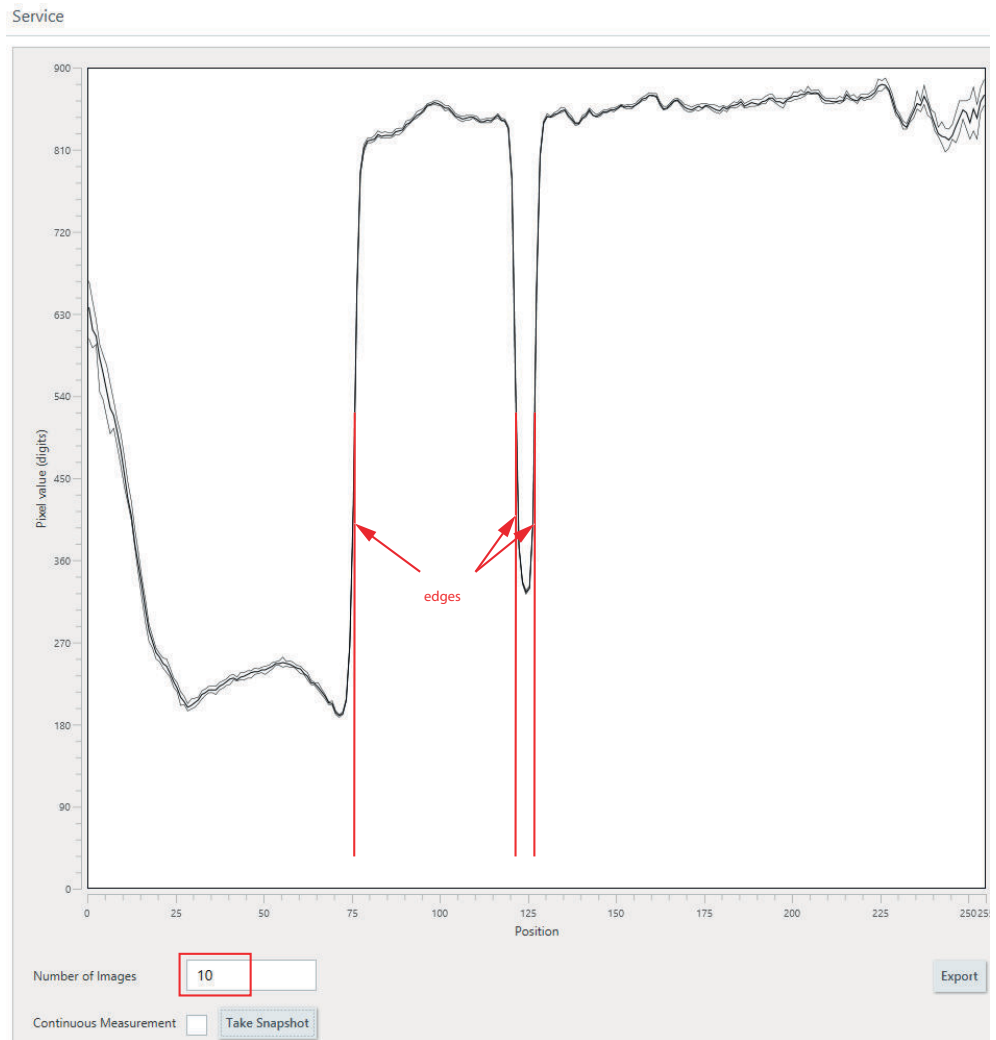
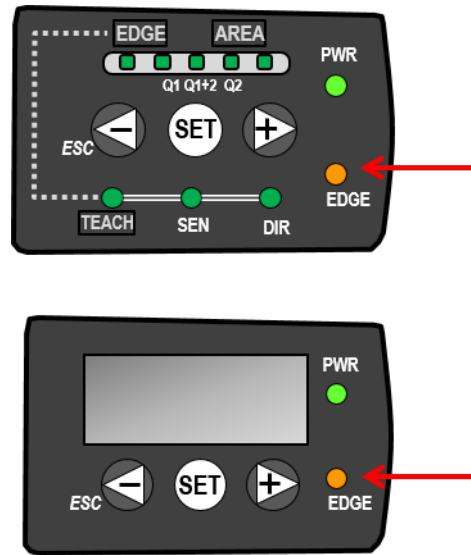


Table 3: Troubleshooting

No.	Fail behavior	Cause	Action
1	SOPAS doesn't function correctly	Possibly an old SOPAS version	Install newest SOPAS version - must be at least 2018.2

No.	Fail behavior	Cause	Action
2	Red error LED at Si-Link Box	Low current power supply with Si-Link Box	Aux. power supply
3	Unstable Edge LED = unstable edge detection	Contrast is too low Wrong sensing distance	Change sensitivity Check sensing distance
4	QoR Low	Low contrast	Check target Change sensitivity Use reflector mode
5	No edge found	Wrong scanning distance Reflector mode with missing reflector	Correct distance Change mode
6	Edge detected but no target	Scratched reflector dirt on front screen	Clean the target Perform reflector teach-in
7	Accuracy in reflector mode not consistent	Incorrect reflector used Reflector dirty Reflector not aligned	Use REF-AX-002 reflector Clean reflector Align reflector
8	Hardware Error	Sensor defective	Recycle power and try again Exchange defective device



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