

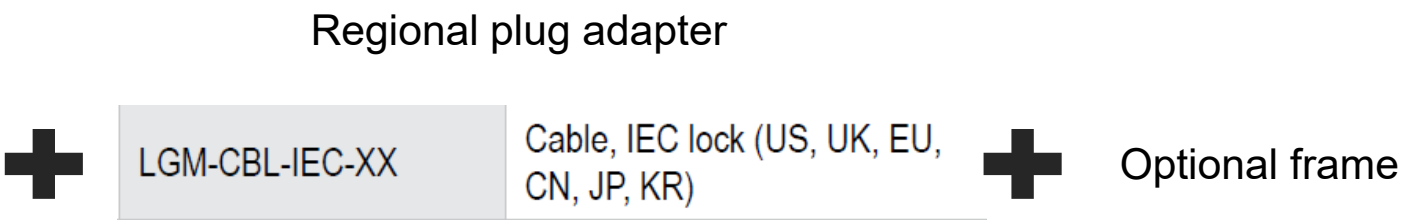


Cognex Multi-Head Dimensioning System

Installation guide

Kitted solution

Kits for 3D-A1000 Multi-Head Dimensioning System	
Product ID	Description
LST-MHDS-DIM	Acquisition heads and cables. Includes: 2 3D-A1000 acquisition heads, universal mounting brackets, power cables, Ethernet cables.
LGM-MHDS-PANEL-X	IO panel including vision controller. Includes: Vision controller, Power Distribution Board, Emparro Power Supply 8A, Master Breakout Board, Hybrid Switch, Emparro input 7/8" to C14, Emparro output 7/8" to L-coded, External/light cable, L-coded power chain.
LST-MHDS-ACCS	Encoder and photoeye kits. Includes: Encoder kit with M12 connector cable, photoeye kit with M12 connector cable.

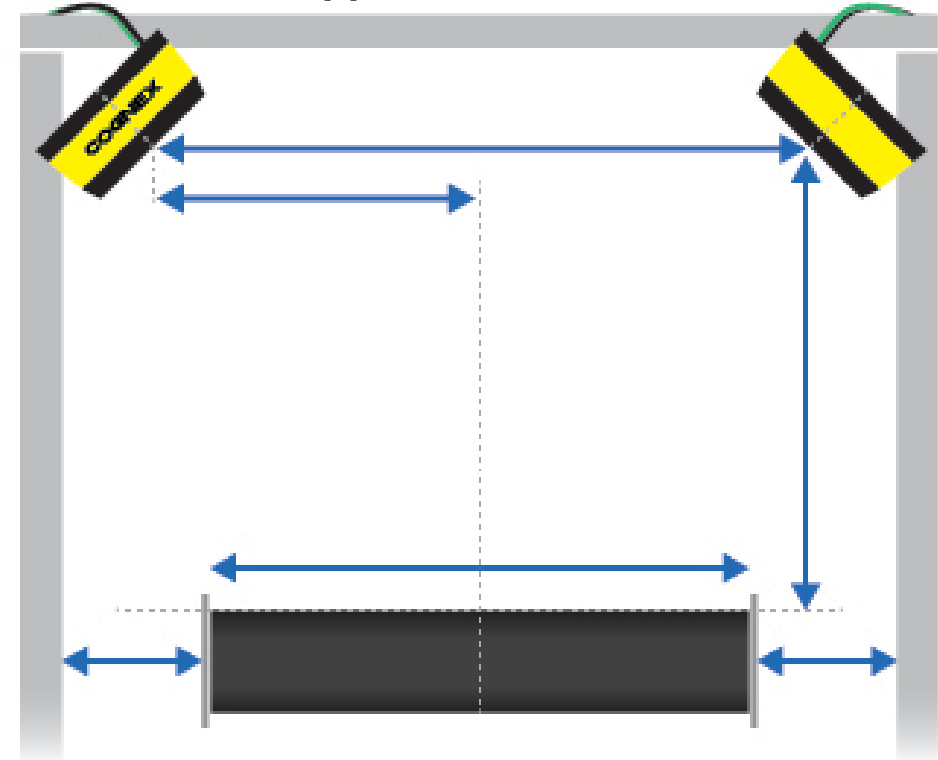


Mounting the cameras



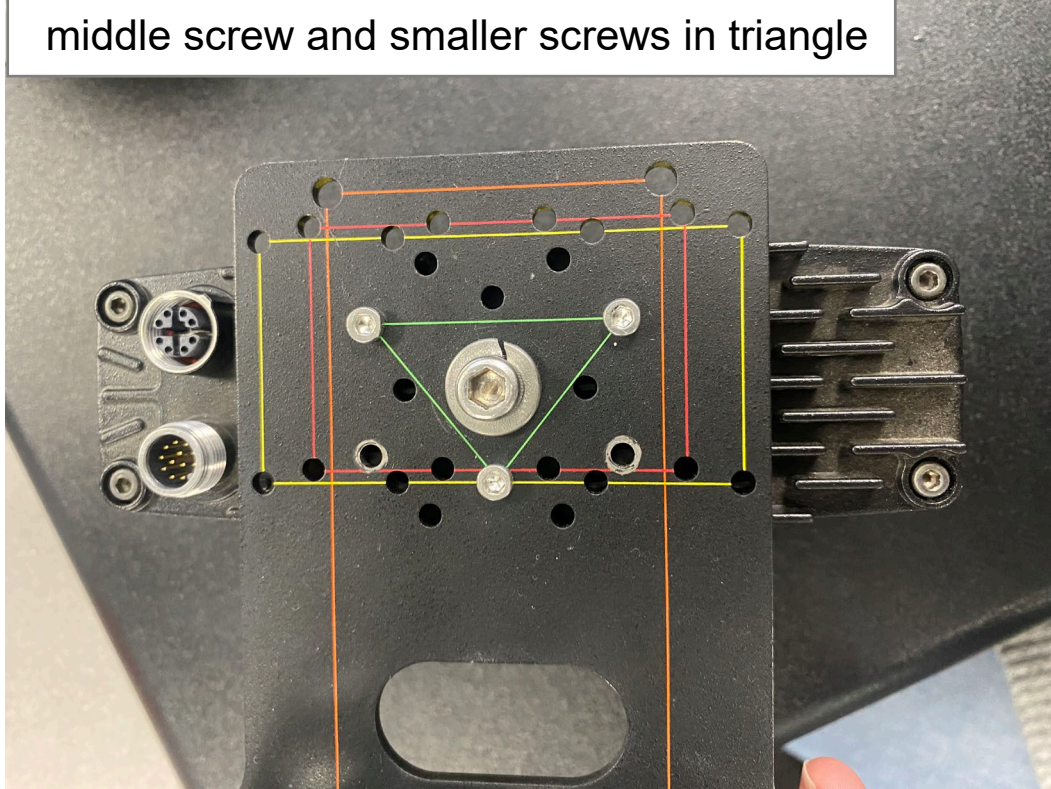
**Mount blue lens down
(closest to the belt)**

**Wires should be on the upper part of
the camera and Cognex logos should
face in opposite directions**



Mechanical - Brackets

Mount bracket to A1000 using larger middle screw and smaller screws in triangle



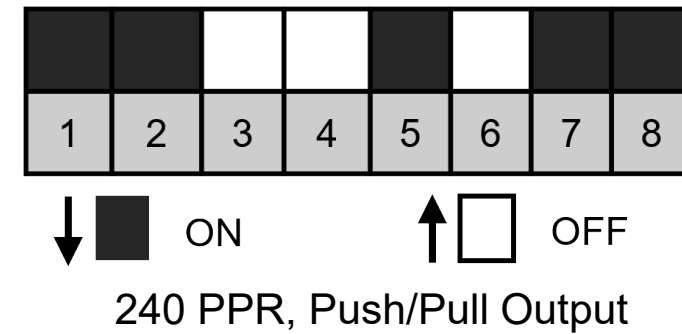
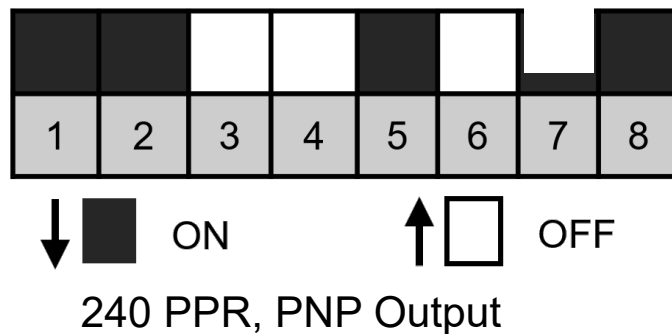
Cut out with notches for standard mounting angles (25 and 45 degrees)



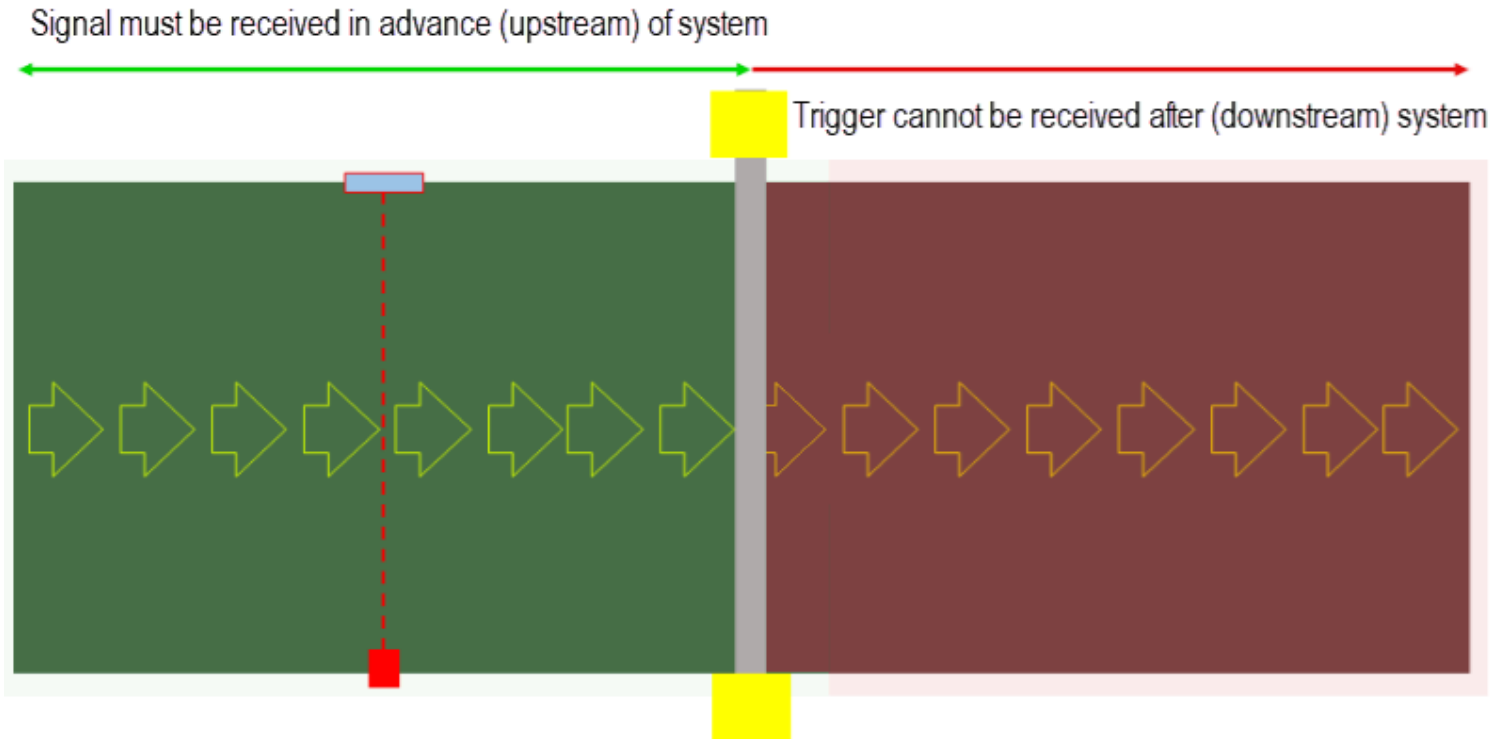
This camera should be flipped on the bracket!

Mounting the encoder

- Best practice – mount encoder on the same section of belt that the system is over
 - Avoid mounting encoder on a section of belt that may be going a different speed than the section the system is mounted on
- Verify resolution of encoder. **Recommended is 240 PPR, PNP.**
 - Both PNP and Push/Pull output settings are acceptable, though other Cognex standards use PNP
 - On standard Cognex encoder this corresponds to the following switches which are set by default:



Mounting the photoeye

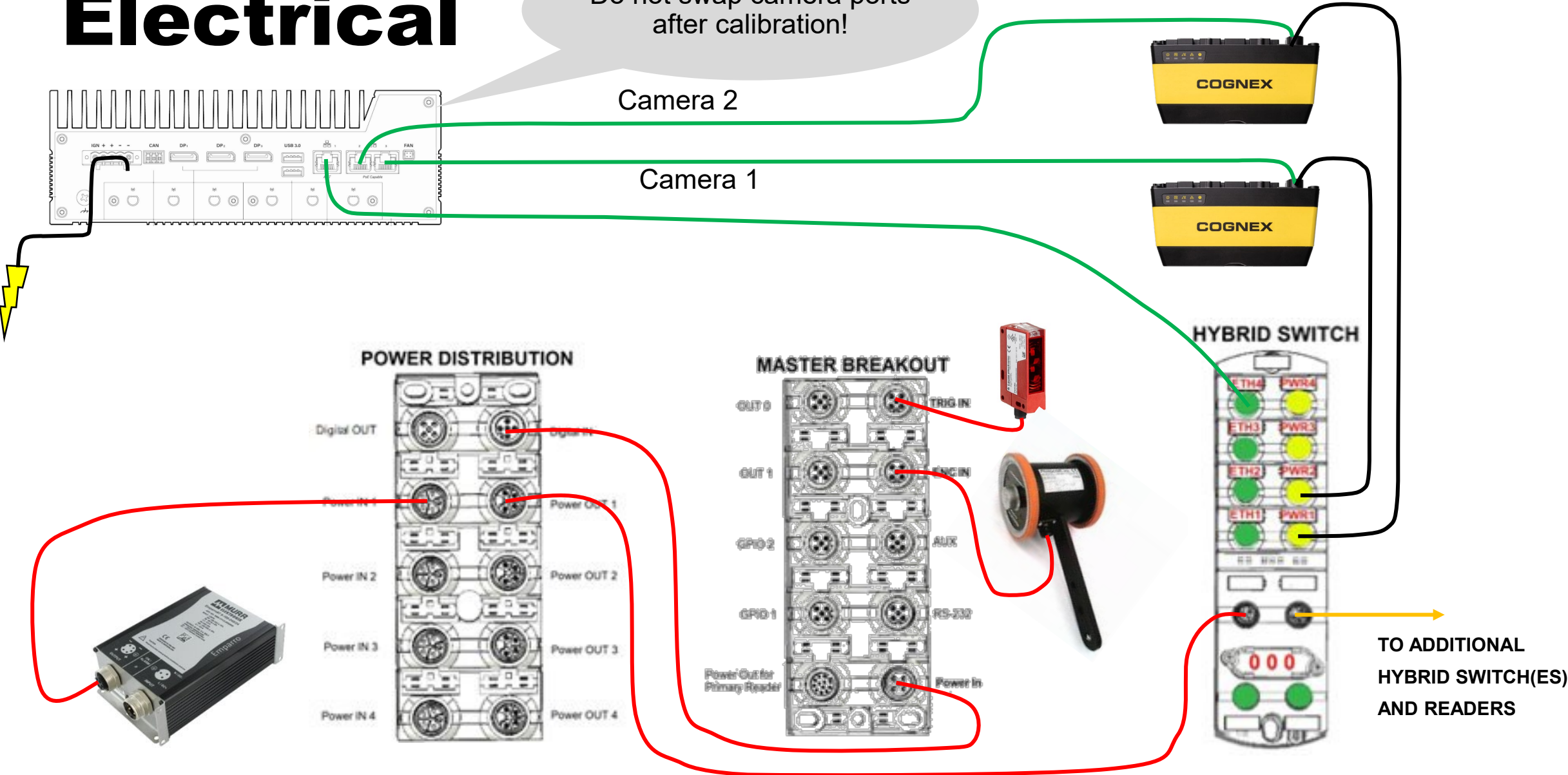


Photoeye placement:

- Ideal location is at the center of the system
- Acceptable to place PE upstream and add delay
- Buffer zone of ~100mm (4") downstream of center of the system also acceptable

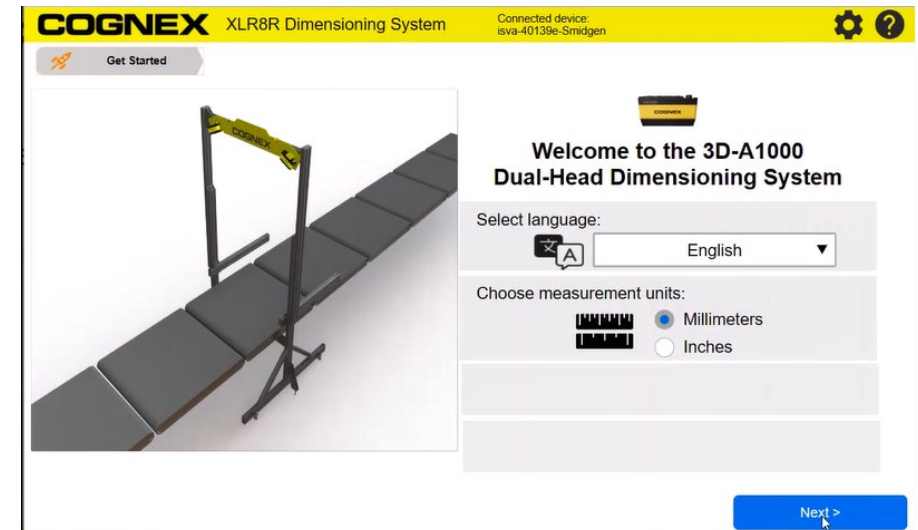
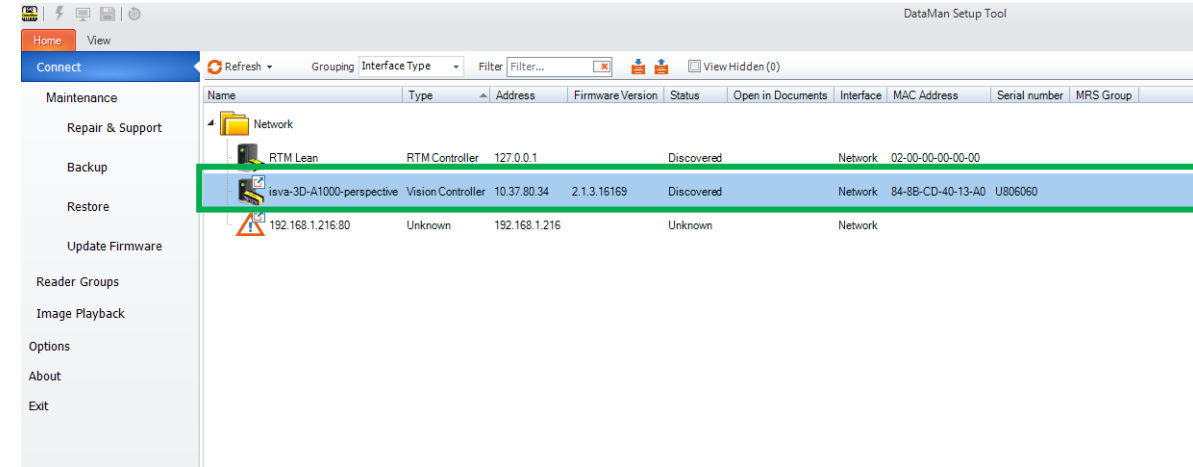
Electrical

Do not swap camera ports after calibration!



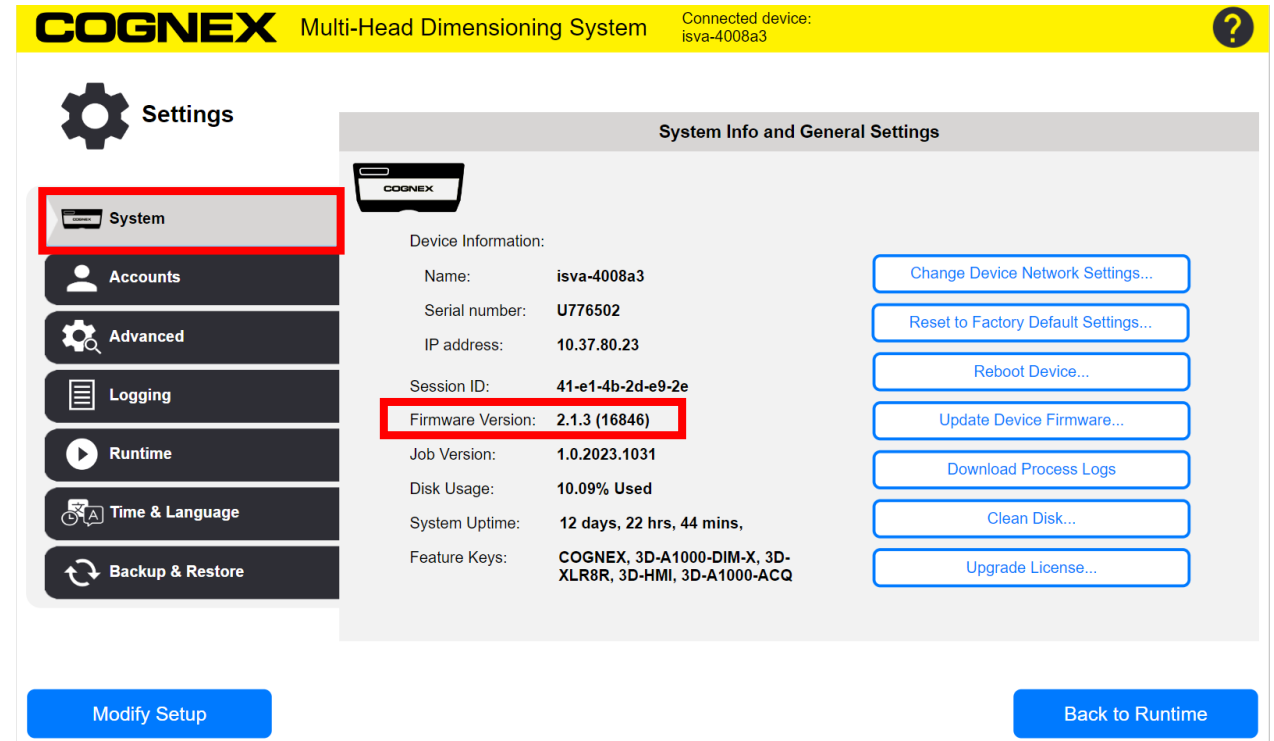
Connecting to the system

- Default IP is 192.168.1.218
- Discoverable in Setup Tool
 - Network settings
- Connect to system via Web HMI



Current Software version

- Release FW is version 2.1.3 – this is what should ship when ordered
- If you do not have this FW version:
 - Download FW from 1 Vision page
 - FW versions 2.1.3 (15796) and newer can be updated through UI, all older versions require support



Troubleshooting Tip

Symptom

- System fails to boot (to Welcome or Runtime page)

Likely causes

- Heads with incorrect firmware are attached
- MHDS not set to start up in correct mode

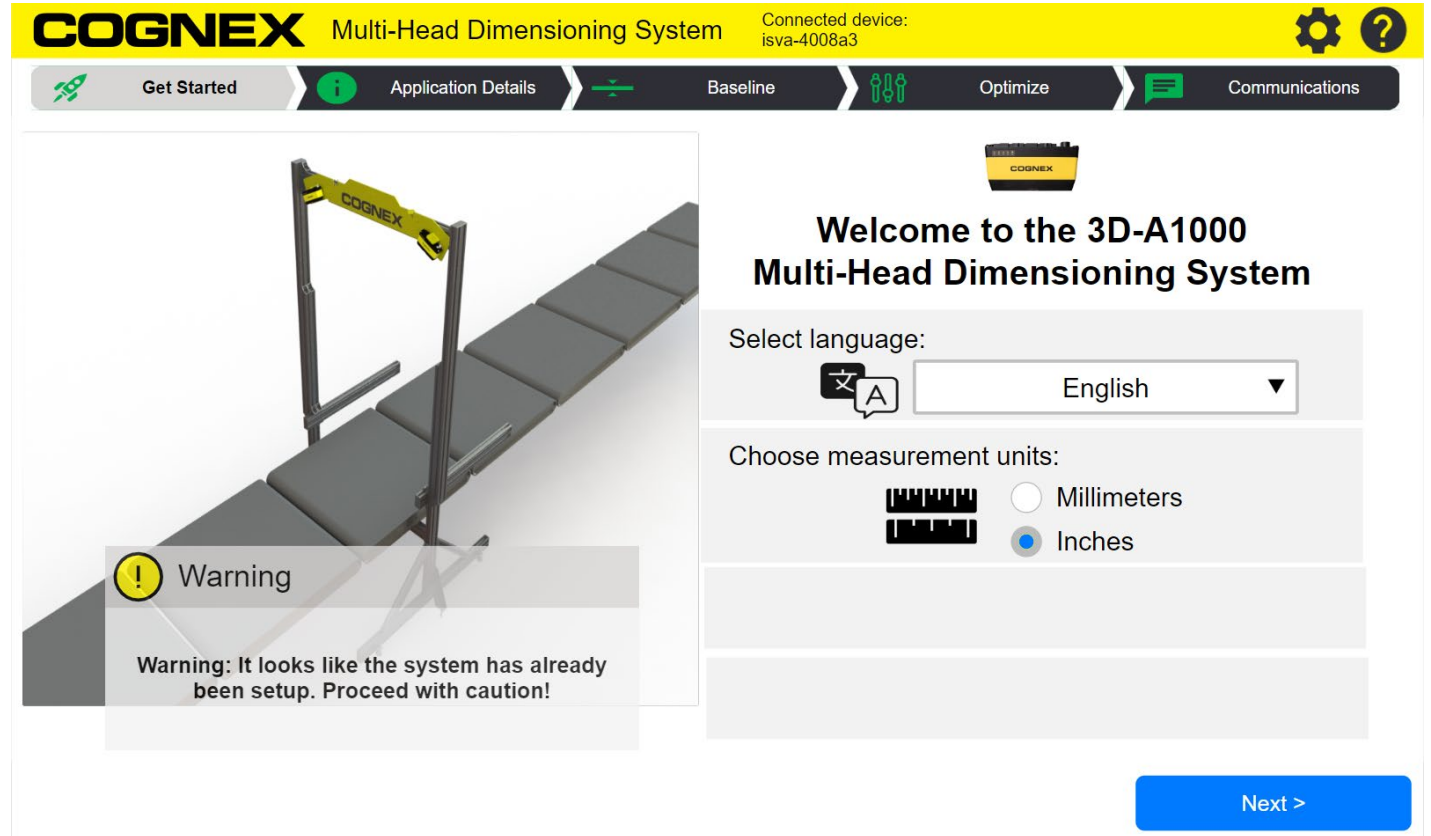
Resolution

- Attach correct MHDS heads (part number 3D-A1000-ACQ)



Get Started

1. Select units of measure
2. Click 'Next'



COGNEX Multi-Head Dimensioning System Connected device: isva-4008a3

Get Started Application Details Baseline Optimize Communications

Welcome to the 3D-A1000 Multi-Head Dimensioning System

Select language: English

Choose measurement units: ☐ Millimeters ☒ Inches

Warning

Warning: It looks like the system has already been setup. Proceed with caution!

Next >

Application Details

1. Enter details for your specific application

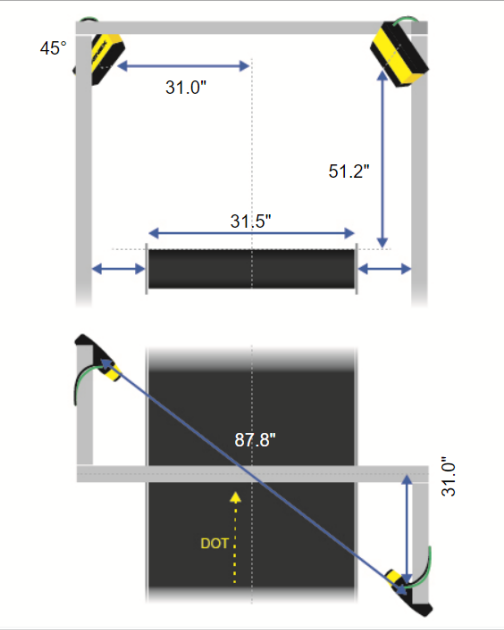
- Conveyor Information
- Object Information (Input as provided by customer)

1. Verify suggested mounting details match your drawings

2. Check that no warnings pop up

COGNEX Multi-Head Dimensioning System Connected device: isva-4008a3

Get Started Application Details Baseline Optimize Communications



45° 31.0" 51.2" 31.5" 87.8" 31.0" DOT

Conveyor Information		Object Information	
Trigger Type	Hardware	Production Type	Simple - Matte
Configuration	Isometric	Justification	None
Belt Width	31.496 in	Max Length	31.496 in
Max Line Speed	450 ft/min	Max Width	26.575 in
Device Angle	45 deg	Max Height	25.591 in
Working Distance	51.181 in	Min Length	3.789 in
Device Separation	87.795 in	Min Width	3.789 in
Min Gap	19.685 in	Min Height	1 in

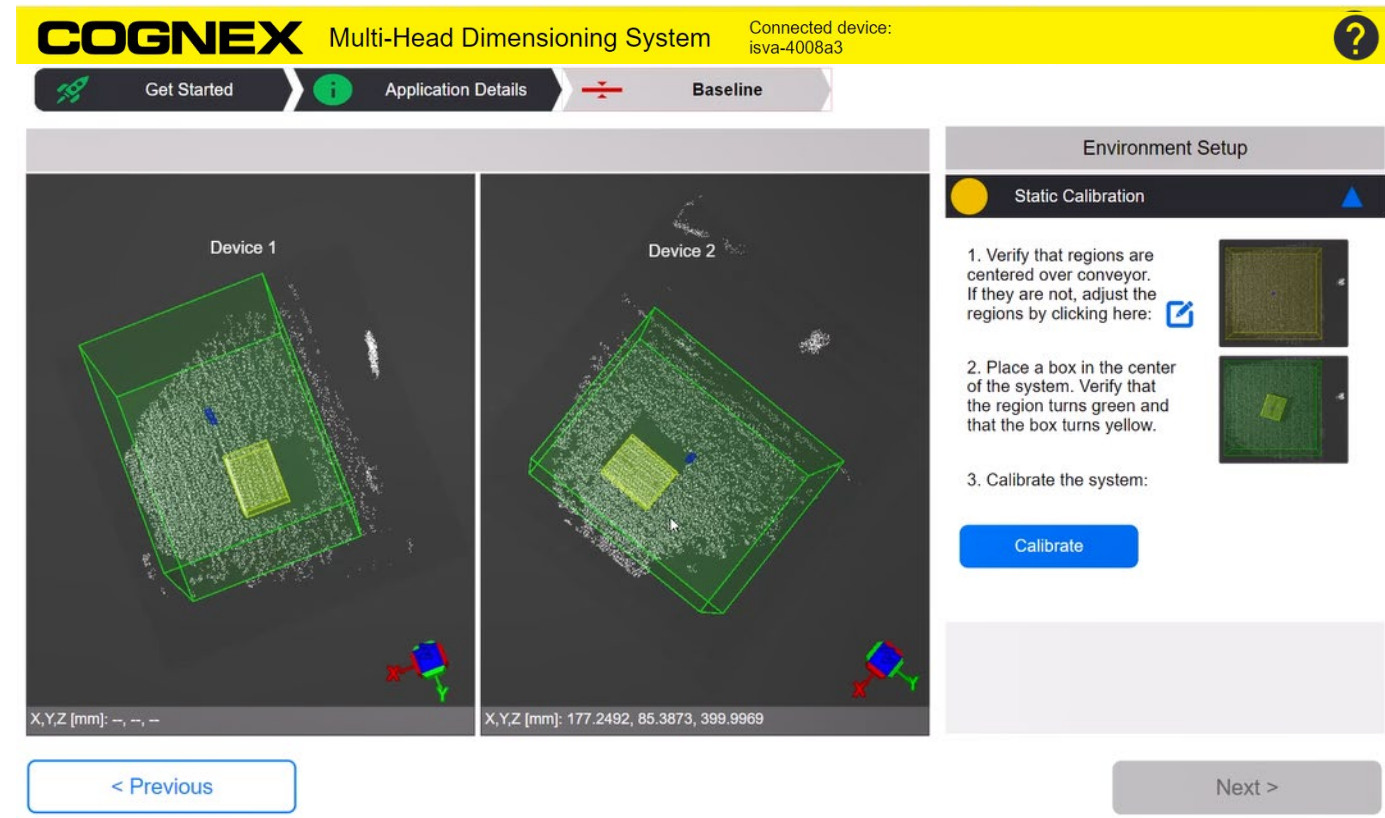
< Previous

Warnings show up here

Next >

Baseline – Static Calibration

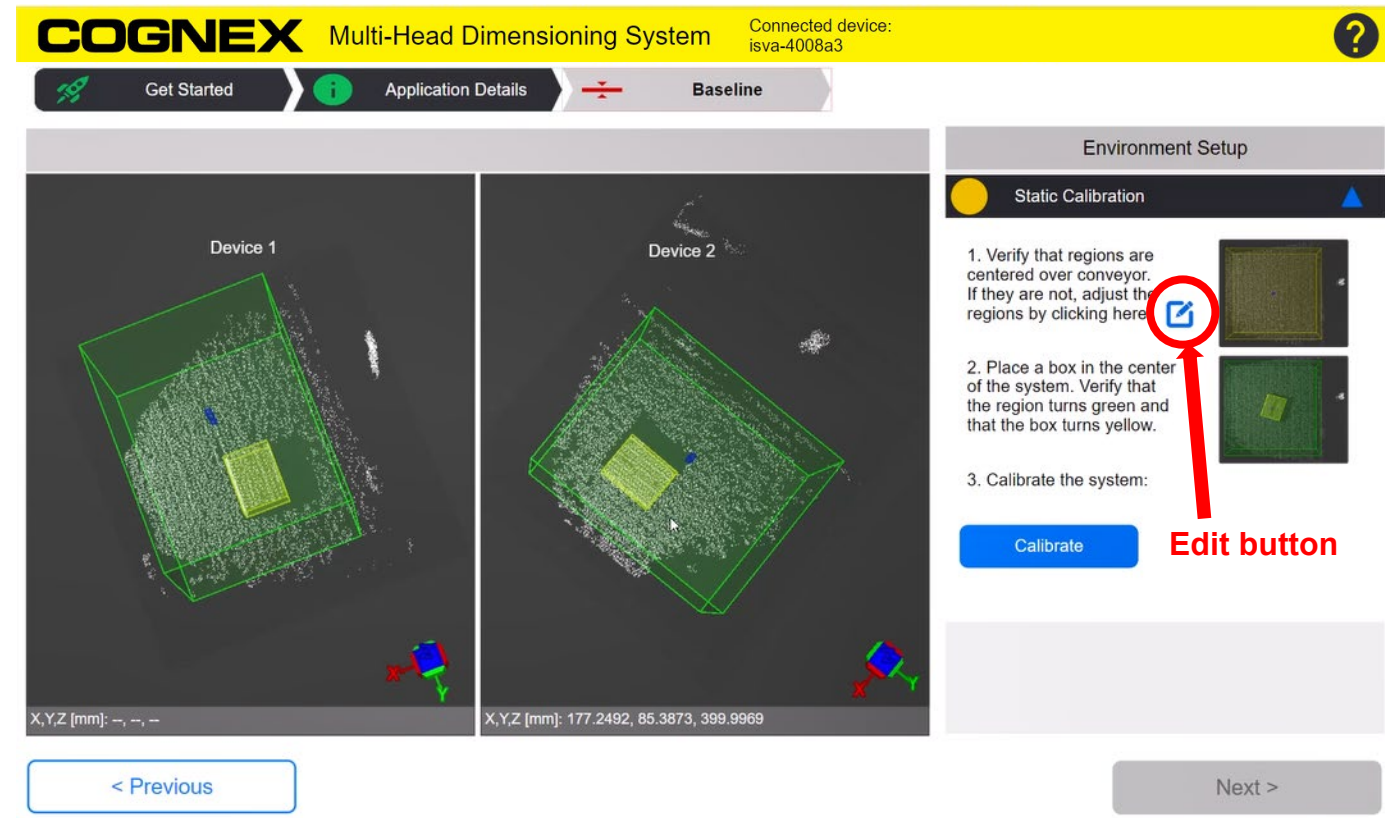
- Purpose
 - Obtain 3D spatial relationship between A1000 heads
- Requirements
 - An easy-to-image cuboidal object that will fit in FOV of both cameras
 - Stationary conveyor
- Procedure
 - Place object on stationary conveyor
 - Run static calibration (follow onscreen instructions)
 - **Look for a low RMS result (RMS <5), and verify stitched image quality**



Baseline – Static Calibration

Make sure conveyor is stopped and follow on screen instructions

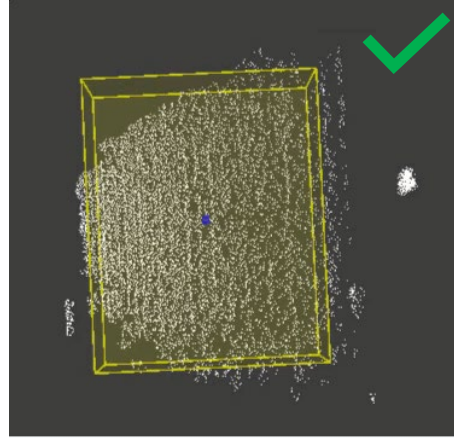
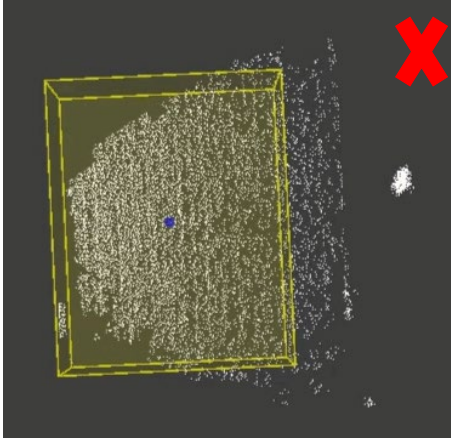
- Before you can perform the static calibration, you need to be sure the regions are in the proper locations
- Accurate values in device details should place the regions in the proper locations, but if they are not, you can manually modify them via the edit button in step 1



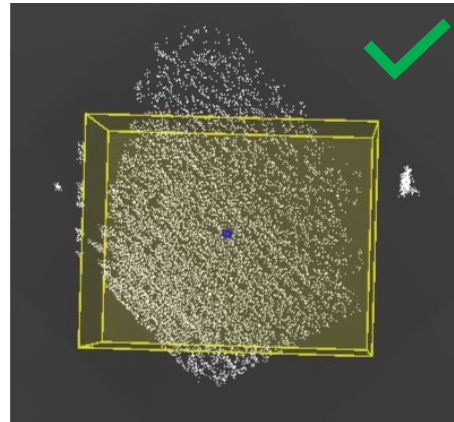
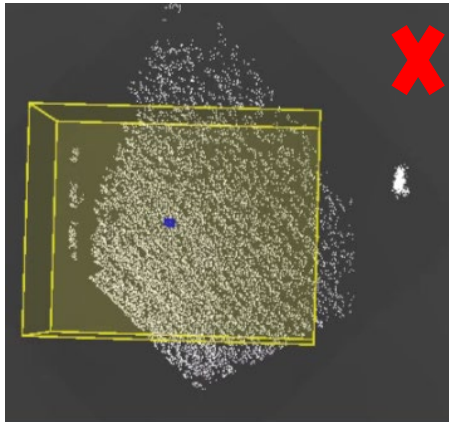
Troubleshooting static calibration - regions

Verify regions are centered over conveyor

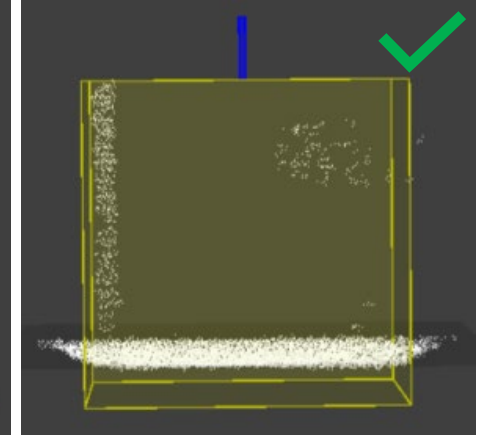
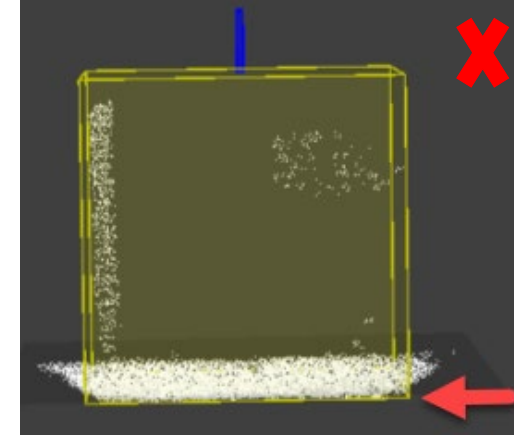
Top down or
perspective system



Isometric system

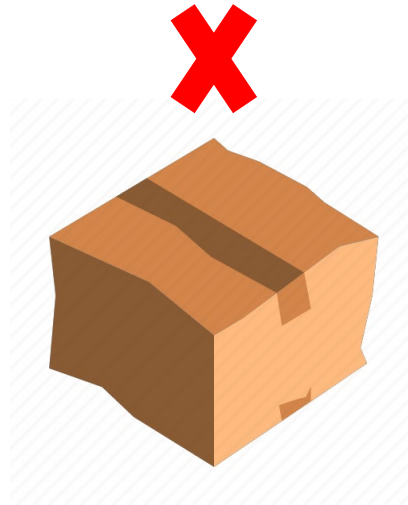


Verify there is space in the
region below the conveyor



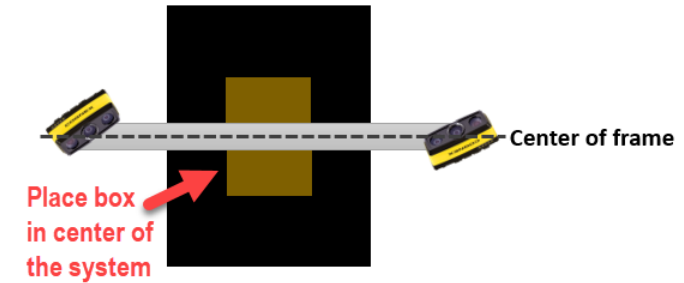
Troubleshooting static calibration – box placement

Verify box used for calibration meets the following criteria:

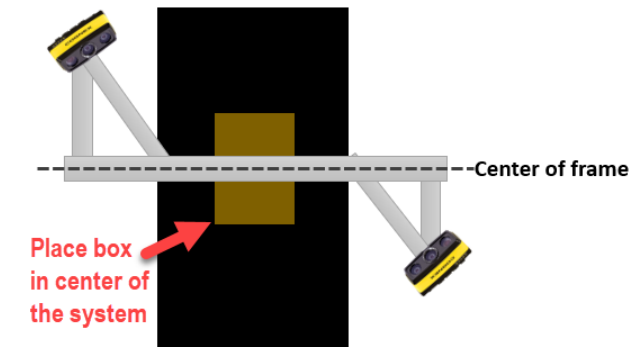


Top down or
perspective system

Verify box placement:



Isometric system



Pro tip: Use box that A1000 ships in as your calibration box

Troubleshooting Tip

Symptom

- Static calibration button can't be pressed even though both boxes are turning yellow, or calibration is consistently failing

Likely cause

- Error with A1000 head – warped point cloud or incorrect internal calibration

Resolution

- Replace faulty A1000 head(s) through RMA process

Baseline – Dynamic Calibration (1/3)

Photoeye must be in line with the center of the system or upstream from the system before proceeding

- Images on the left will provide guidance on what to do during this step
- If Photoeye is upstream measure the distance to the center of the system and input it in step 1 (this can be a rough measurement)

COGNEX Multi-Head Dimensioning System Connected device: isva-4008a3

Get Started

Application Details

Baseline

Optimize

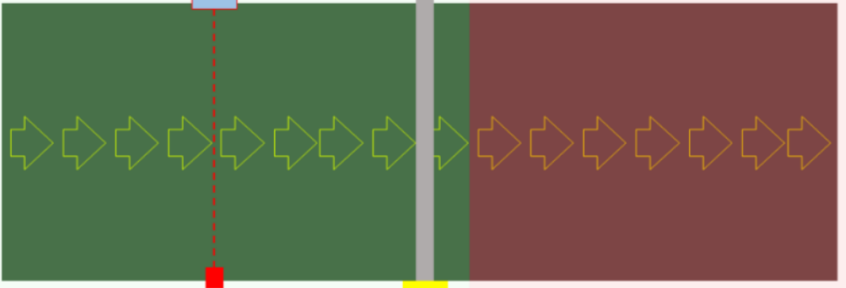
Communications

Dynamic Calibration

Optimal trigger location

Signal must be received in advance (upstream) of system

Trigger cannot be received after (downstream) system



Measure distance between trigger / signal transmit and system center, then enter

< Previous

Environment Setup

Static Calibration

Dynamic Calibration

1. Measure & enter trigger distance per diagram:

900 mm

Accept

2. Perform dynamic calibration:

Calibrate

3. Accept trigger setup or manually adjust if needed:

Train Trigger

☐ Override

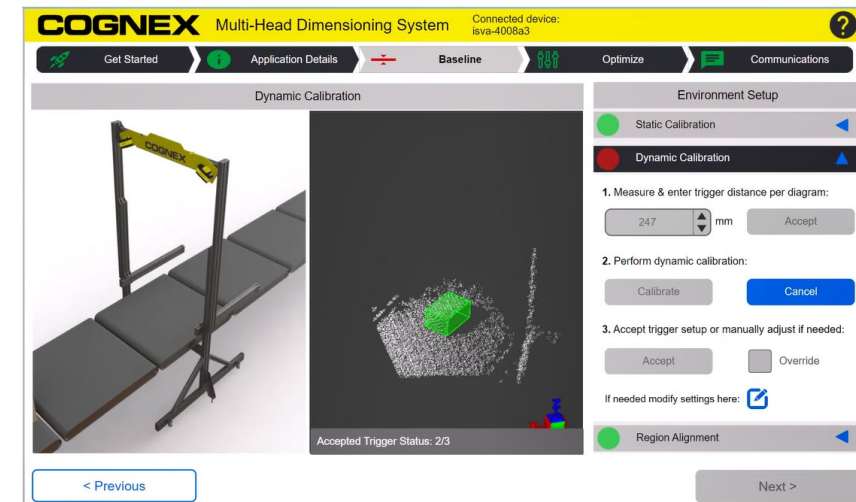
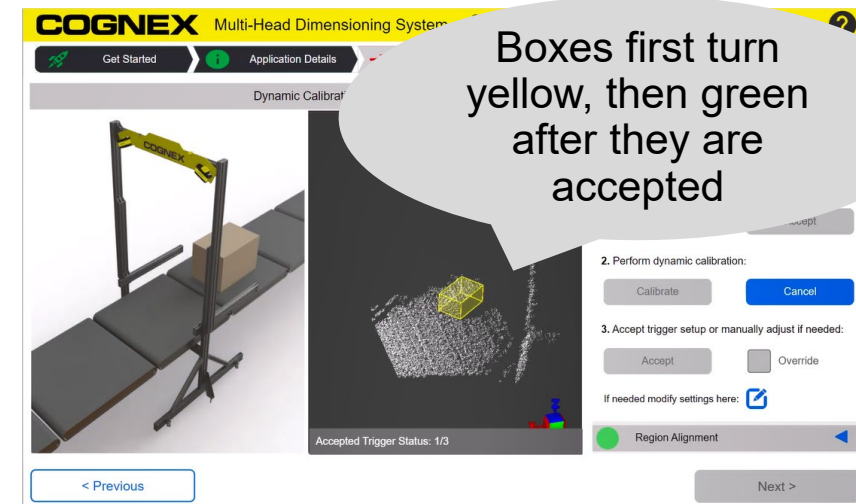
If needed modify settings here:

Region Alignment

Next >

Baseline – Dynamic Calibration (2/3)

- Collect boxes that fit within the parameters specified by the calibration pop up
- Place the boxes on the belt and turn it on
- At least 3 acceptable boxes must go through to compete this step



Troubleshooting Tip

Symptom

- Package does not get two distinct movements in dynamic calibration

Likely cause

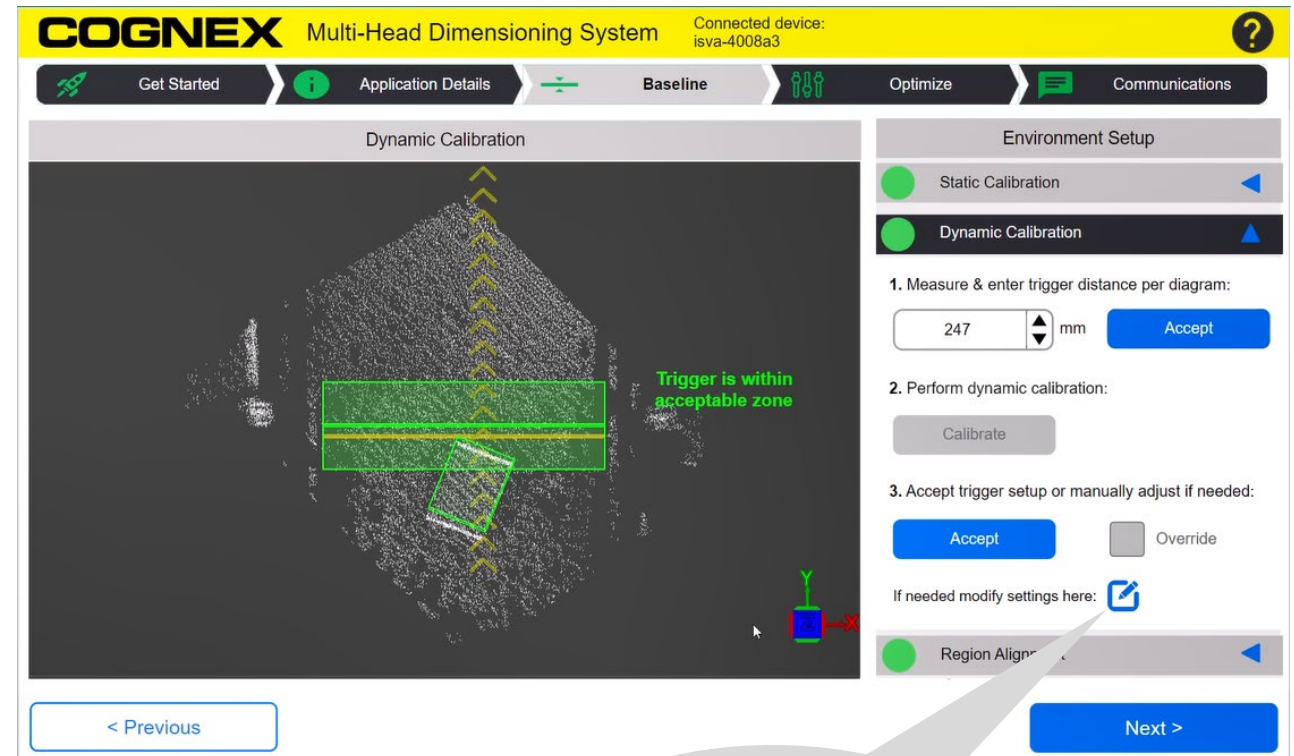
- Encoder settings are incorrect or photoeye polarity is incorrect or photoeye is noisy

Resolution

- Verify encoder settings are correct and match what is entered in HMI, and that the encoder is mounted on the section of belt that the system is mounted over. Verify photoeye polarity matches dark = on

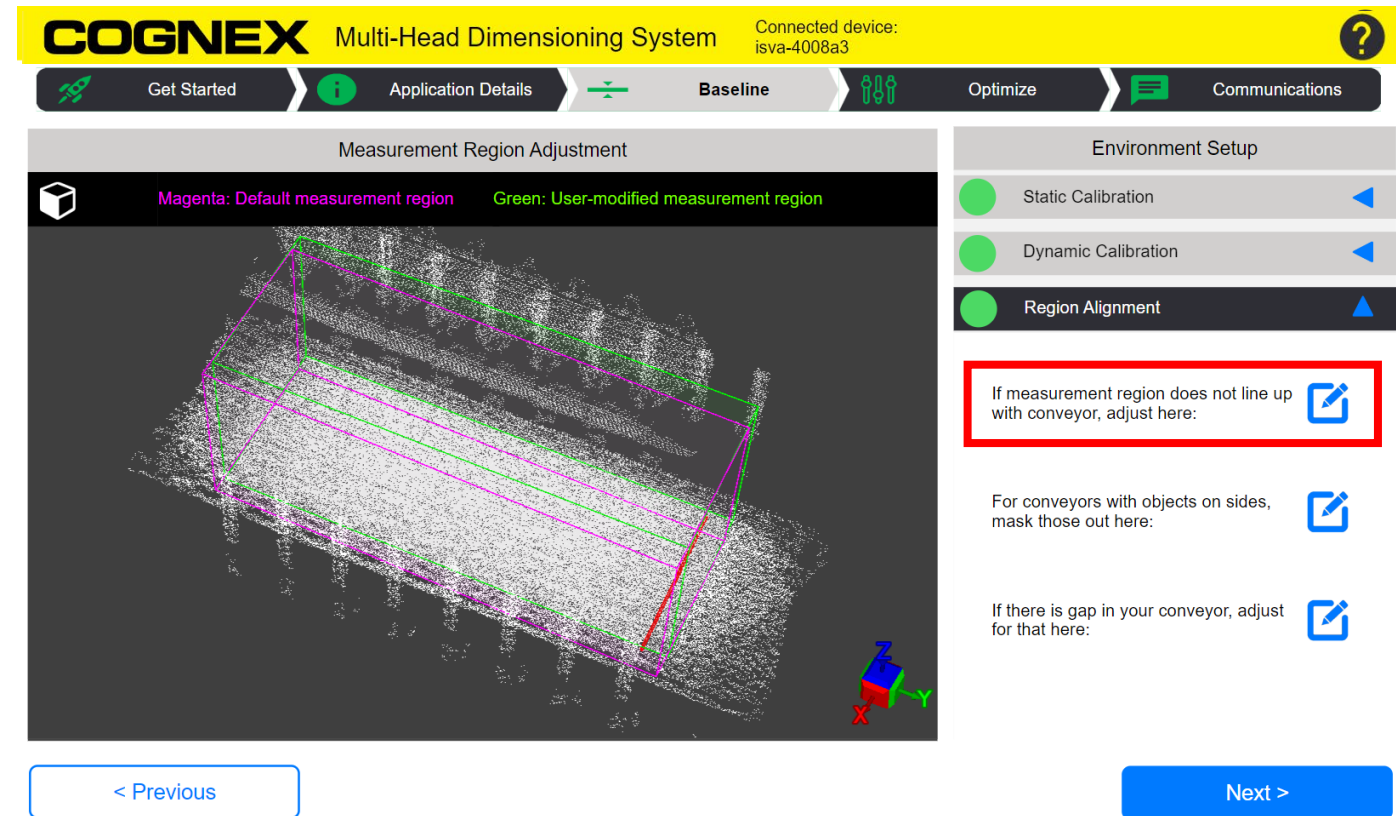
Baseline – Dynamic Calibration (3/3)

- Last step of calibration helps to ensure the photoeye is in the optimal position
- Run boxes on the belt and adjust trigger position until it is within the acceptable zone
 - If trigger is too far upstream system will automatically add delay upon clicking accept
 - If trigger is too far downstream user will be prompted to adjust physical position



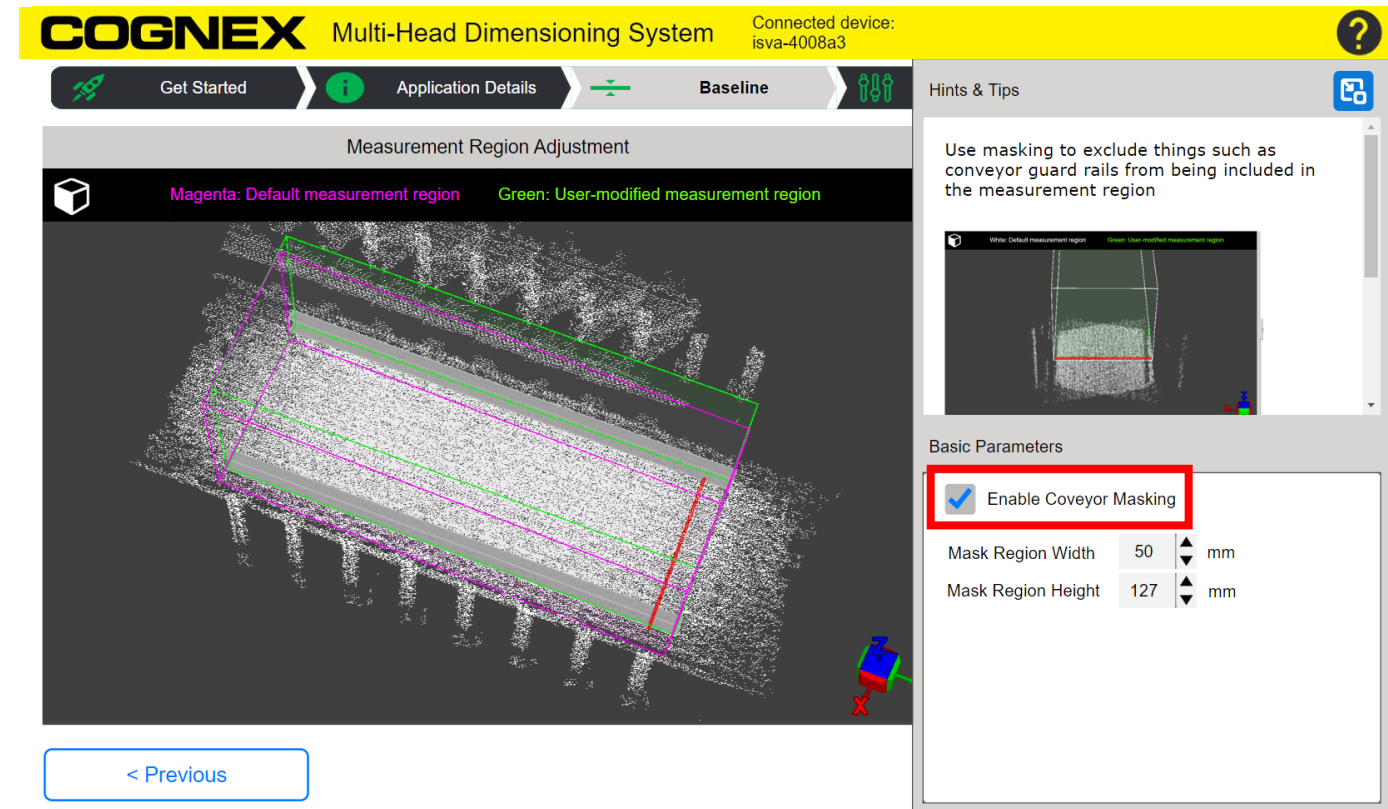
Baseline – Region Alignment

- Use the input parameters to align your measurement region with the belt
- Objects outside of the measurement region will not be dimensioned properly



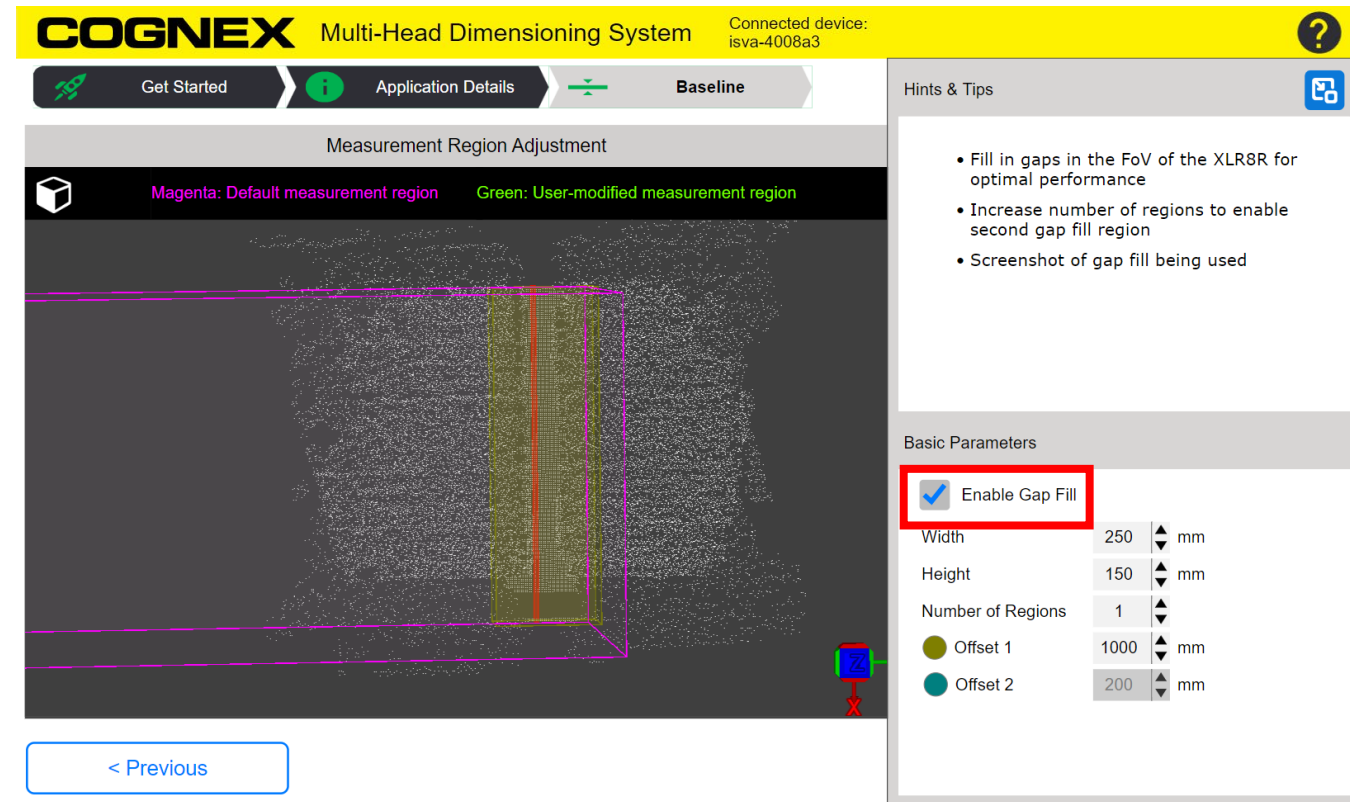
Baseline – Conveyor Masking

- Enable conveyor masking to avoid things such as guard rails and framing from being included in dimensioning results



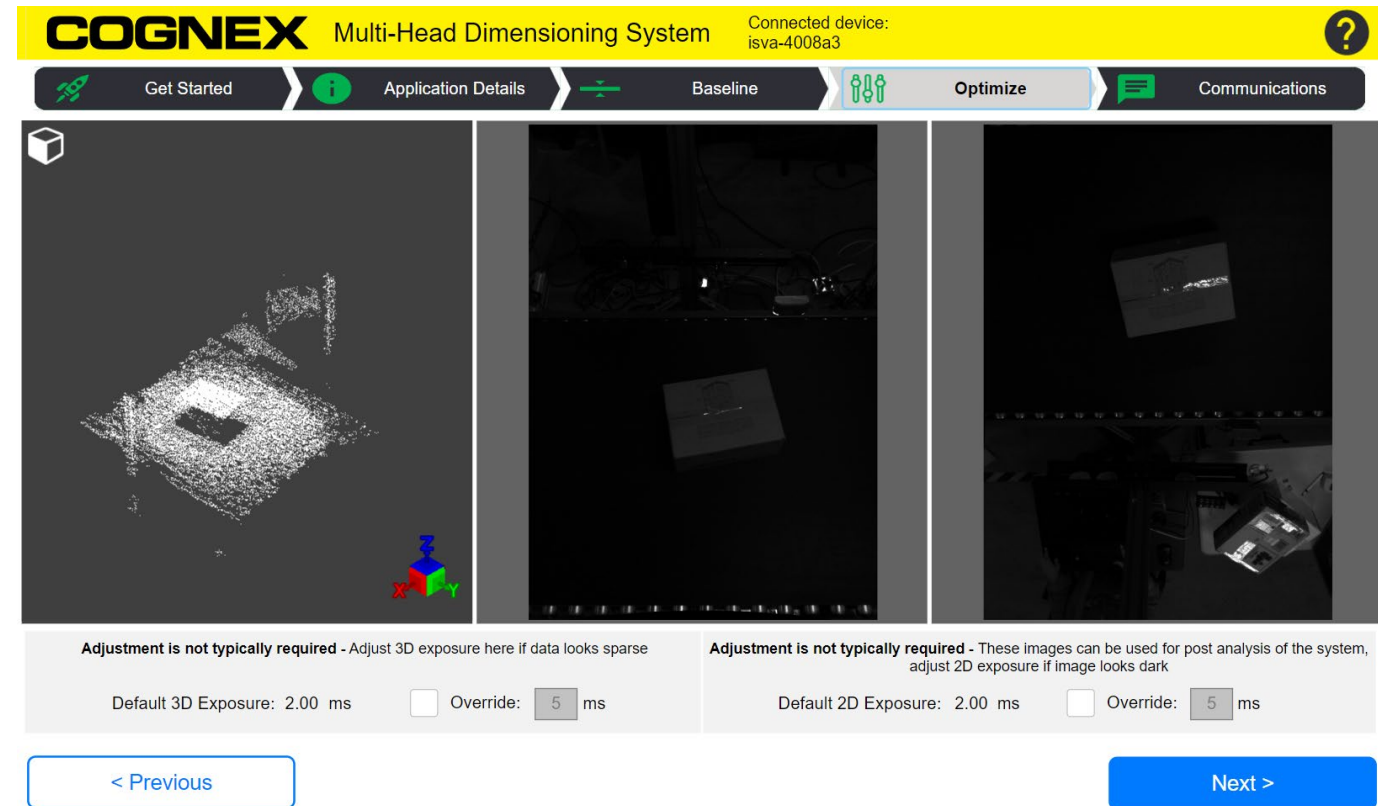
Baseline – Gap Fill

- If the system is mounted above a gap, 3D data from the system will be lost in the gap
- Enable gap fill to help compensate for the loss of 3D data and get more accurate results
- Click 'Enable Gap Fill' and place region over gap in conveyor to fill it in with synthetic points



Optimize

- This step is skipped as a part of initial setup – **you shouldn't need to adjust anything here**
- Adjustment to 2D and 3D exposure values available
- If customer wants image collection, you may have to adjust 2D exposure if you are getting very dark images



Communications – Page 1

- Enable/disable data and tools for the system
- Parameters that have the blue edit button have additional settings in the side panel
- Use the Formatting Options to modify the output string format

The screenshot displays the 'Communications' configuration page for the COGNEX Multi-Head Dimensioning System. The interface is divided into several sections:

- Header:** COGNEX Multi-Head Dimensioning System. Connected device: isva-4008a3. A navigation bar includes 'Get Started', 'Application Details', 'Baseline', 'Optimize', and 'Communications' (the active tab).
- Step 1 of 2:** Communications Fields.
- Fields:** A list of parameters with checkboxes and edit buttons (blue squares with a pencil icon).
 - Trigger ID (checked)
 - Length (checked, has edit button)
 - Width (checked)
 - Height (checked)
 - Angle (checked)
 - Volume (checked)
 - Volume (Liquid) (checked, has edit button)
 - Item Spacing (unchecked)
 - Item Position (unchecked, has edit button)
 - Item Count (unchecked)
 - Side by Side (unchecked, has edit button)
 - Dimensional Limits (unchecked, has edit button)
 - Script (unchecked, has edit button)
- Formatting Options:**
 - Field Separator: Comma (dropdown)
 - Decimal Places: 0 (spinner)
 - Fixed Width: 4 (spinner)
 - Leading zeroes: (checkbox)
 - String Prefix: None (dropdown)
 - String Suffix: CRLF (dropdown)
- Order of data in output string:** A text box showing 'Trigger ID, Length, Width, Height, Angle, Volume, Liquid Volume'.
- Sample output string:** A text box showing '7933,29,270,721,220,5707593,1549<CR><LF>'. A checkbox for 'JSON formatted data' is present.
- Navigation:** '< Previous' and 'Next >' buttons.

Advanced Scripts

- Scripts can be uploaded during setup by checking the script option and clicking 'Upload' in the pop-up panel
 - Description of what the script does and inputs/outputs will show in top portion of panel
 - Any parameters the user can interact with are shown in bottom panel
- Scripts can only be written by Logistics Engineering team
- Reach with script requests through [request form](#)

The screenshot displays the COGNEX Multi-Head Dimensioning System interface. At the top, a yellow header bar contains the COGNEX logo, the text 'Multi-Head Dimensioning System', and a 'Connected device: isva-4008a3' status. Below the header, a navigation bar shows 'Get Started', 'Application Details', and 'Baseline' tabs. The main content area is titled 'Step 1 of 2' and 'Communications Fields'. It contains two columns of checkboxes. The left column includes 'Trigger ID', 'Length', 'Width', 'Height', 'Angle', 'Volume', and 'Volume (Liquid)'. The right column includes 'Item Spacing', 'Item Position', 'Item Count', 'Side by Side', 'Dimensional Limits', 'Crop', and 'Script'. The 'Script' checkbox is checked and highlighted with a red rectangle. Below the checkboxes, there is a section for 'Order of data in output string:' with a placeholder '[Not available for JSON output]'. A 'Sample output string (JSON):' section shows a complex JSON string. At the bottom left, there is a '< Previous' button. On the right side, a 'Hints & Tips' panel is visible, showing a tip about 'Conveyor Aligned Length'. Below the hints, a 'Basic Parameters' section shows 'None'. At the bottom right, there are three buttons: 'Clear', 'Revert', and 'Upload'. The 'Upload' button is highlighted with a red rectangle.

Communications – Page 2

- **TCP Server –**
- **3D-A1000 IP Address** – This is the address the client will use to connect to
 - **Clients Connect to Port** - This is the port the client will use to connect to
 - **Active Connections** – Number of clients currently connected to this device. The indicator will be red if no connections are active, and green if any connections are active
- **Output Delay**
 - **None** – Do not delay the output results
 - **Time-Based** – Wait the specified period of time before reporting the results. The start time for the delay starts when the trigger signal goes high
 - **Distance-Based** – Wait until the specified distance before reporting the results. The reference point for the distance is when the trigger signal goes high

The screenshot shows the 'Communications' tab of the COGNEX Multi-Head Dimensioning System interface. The top navigation bar includes 'Get Started', 'Application Details', 'Baseline', 'Optimize', and 'Communications'. The 'Connected device' is 'isva-4008a3'. The main configuration area is divided into two sections: 'TCP Server' and 'Output Delay'. In the 'TCP Server' section, the 'TCP Server' checkbox is checked, and the 'TCP Client' checkbox is unchecked. The '3D-A1000 IP Address' is '192.168.1.217', 'Clients Connect to Port' is '23', and 'Active Connections' is '3' with a green indicator. A link for 'Need help setting up communications?' is present. The 'Output Delay' section has three options: 'None' (selected), 'Time-Based' (1000 ms), and 'Distance-Based' (1051 mm). A note states: 'Output delay applies only to hardware triggers and FFP results (Profinet and EIP). The delay is in relation to the time or location where the trigger occurs.' At the bottom, there is a 'Sample output string' field showing '7933,29,270,721,220,5707593,1549<CR><LF>' and a 'Test Outputs' button. Navigation buttons '< Previous' and 'Finish' are also visible.

COGNEX Multi-Head Dimensioning System Connected device: isva-4008a3

Get Started Application Details Baseline Optimize Communications

TCP Server

☒ TCP Server ☐ TCP Client

3D-A1000 IP Address: 192.168.1.217

Clients Connect to Port: 23

Active Connections: 3

[Need help setting up communications?](#)

Output Delay

☒ None ☐ Time-Based 1000 ms ☐ Distance-Based 1051 mm

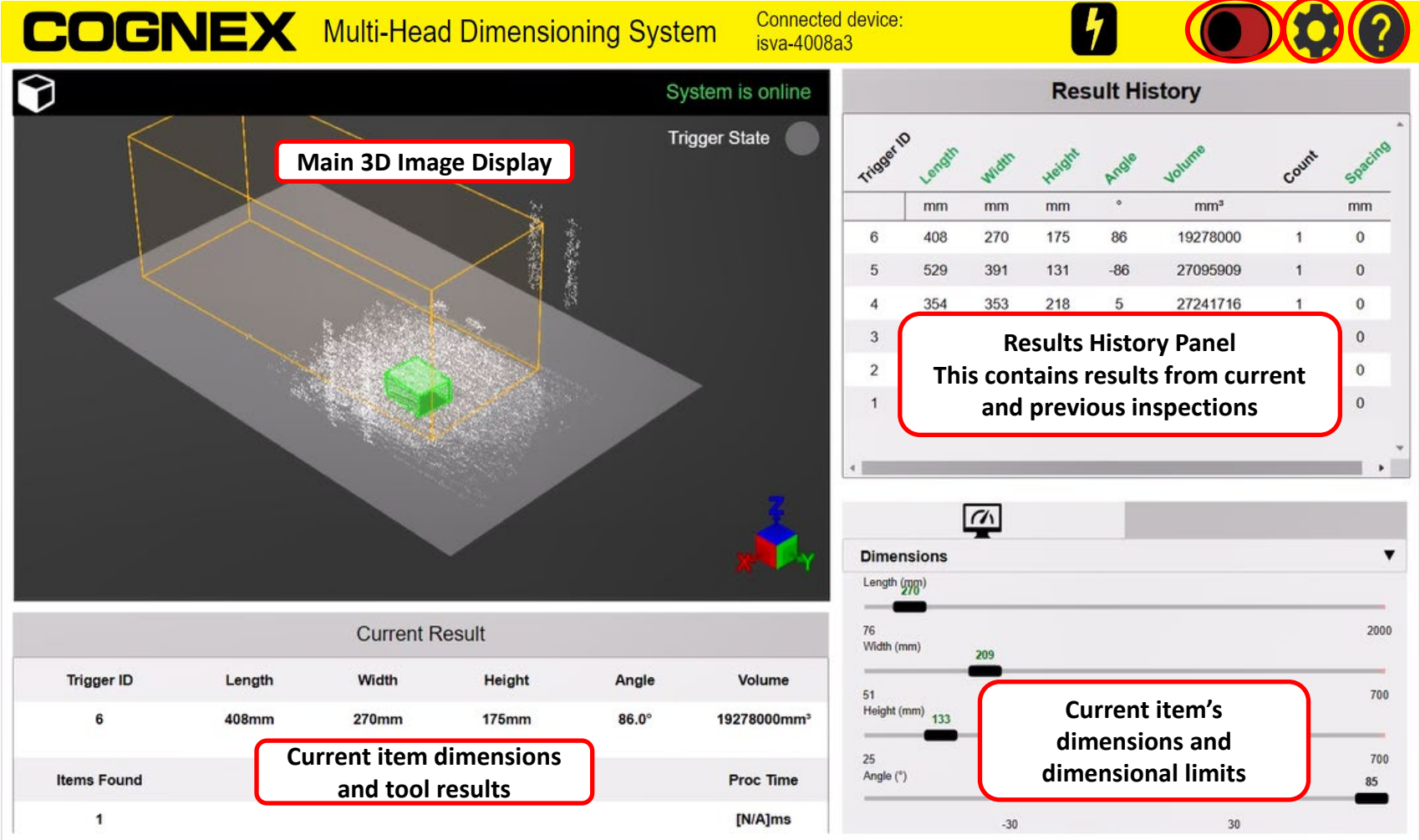
Output delay applies only to hardware triggers and FFP results (Profinet and EIP).
The delay is in relation to the time or location where the trigger occurs.

Sample output string: 7933,29,270,721,220,5707593,1549<CR><LF>

[Test Outputs](#)

[< Previous](#) [Finish](#)

Runtime UI



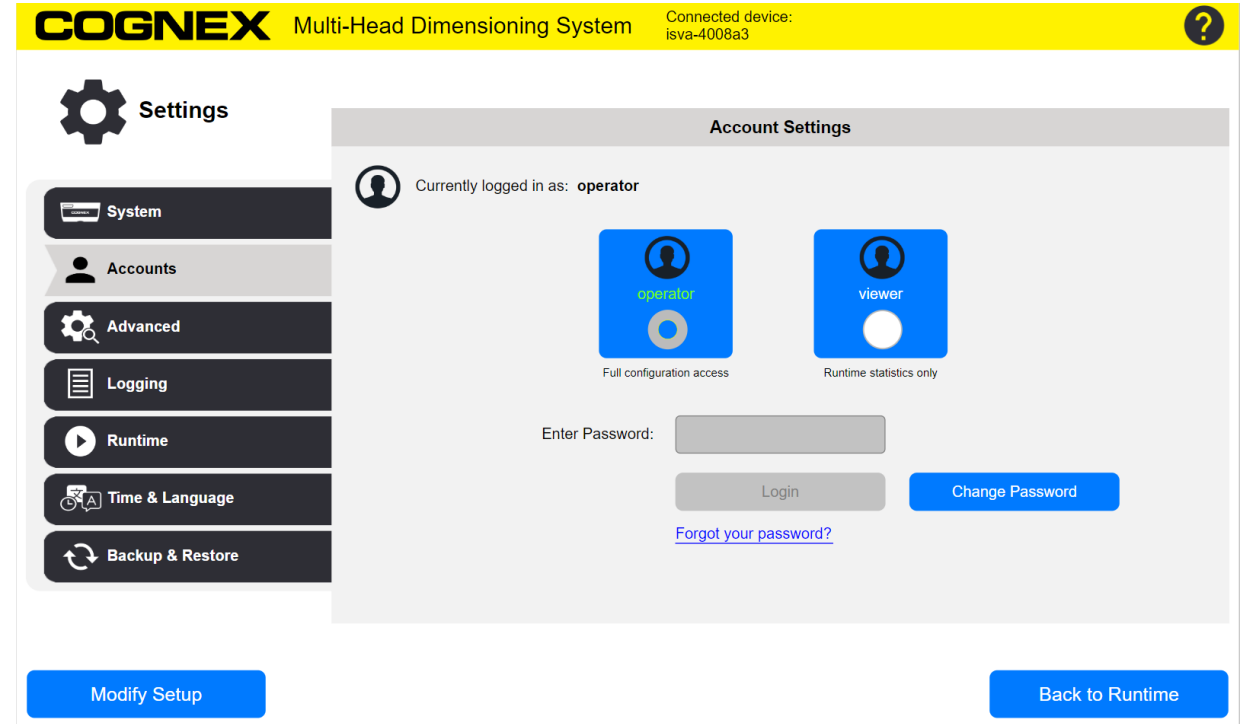
Default User Profiles

There are two user options available:

- Operator – full configuration access
- Viewer – runtime access only

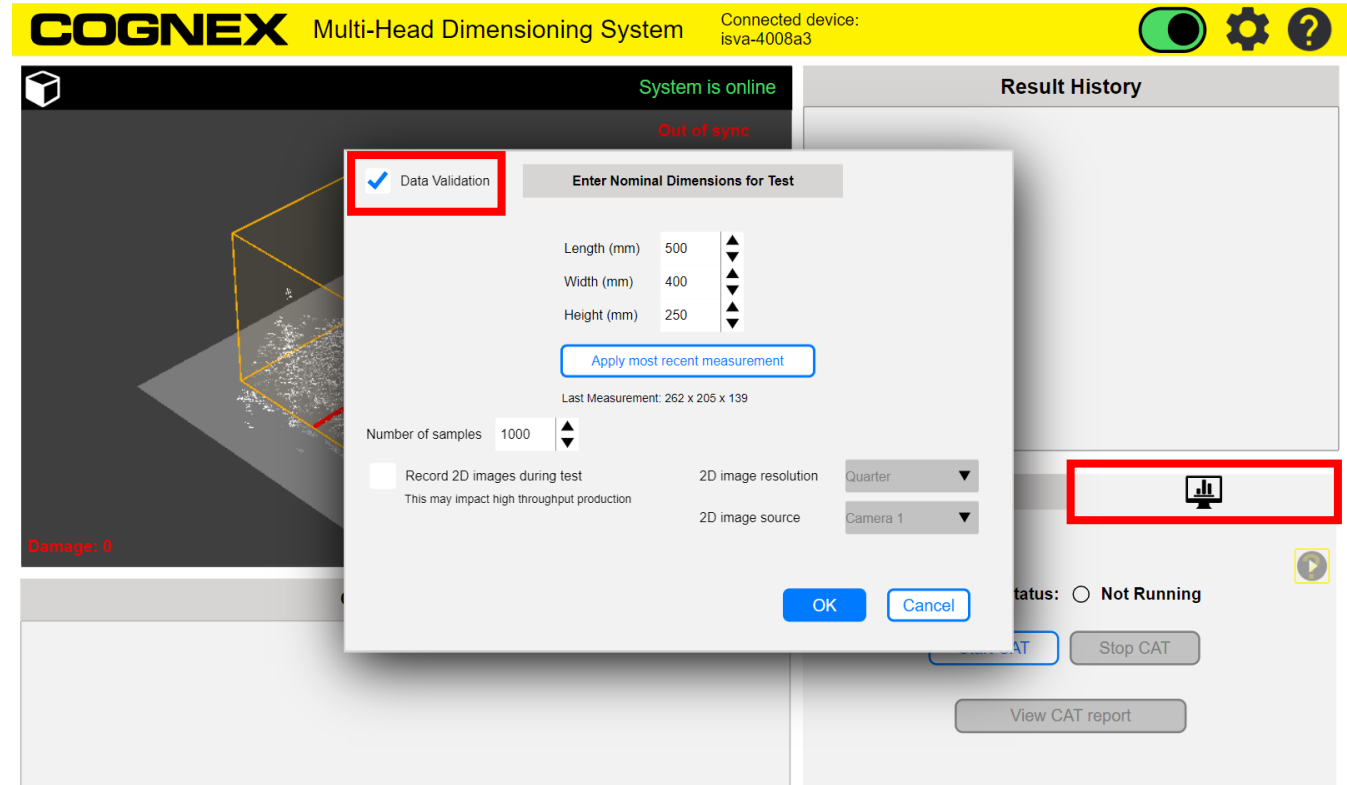
Default Operator password is blank

- If the password is not blank, then somebody has set it – **there are no other default passwords on MHDS**



Getting customer acceptance

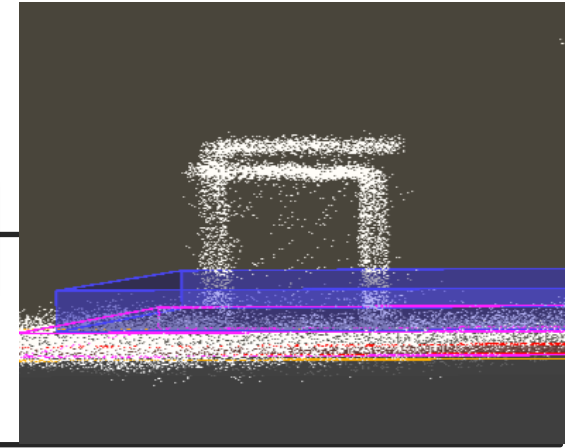
- Use CAT report to collect results for customer acceptance
- Option to use 'Data Validation' to compare measured dimensions against ground truth dimensions
- Use solid items with known dimensions for acceptance – items like polybags with ambiguous measurements are difficult to compare to



Troubleshooting Tip

Symptom

- Poorly stitched point cloud in runtime page



Likely cause

- System has been physically shifted or bumped, heads are not screwed to brackets/frame tightly and are vibration

Resolution

- Verify A1000s are mounted properly and recalibrate the system

Troubleshooting Tip

Symptom

- Package length is incorrect while height and width are good

Likely cause

- Encoder is mounted incorrectly

Resolution

- Verify encoder settings are correct and match what is entered in HMI, and that the encoder is mounted on the section of belt that the system is mounted over

Troubleshooting Tip

Symptom

- Multiple packages are bundled into a single acquisition, or packages are skipped

Likely cause

- The debounce duration is too long. Debounce affects not only the rising edge of the trigger, but also the falling edge. If the time for the gap to pass is shorter than the debounce time, then the gap will be ignored.

Resolution

- Increase package gapping or reduce debounce

Troubleshooting Tip

Symptom

- Multiple triggers for one package, or poor package placement relative to trigger location in 3D display

Likely cause

- Noise on the photo-eye, or extraneous material (e.g., flagged tape) is causing multiple triggers to occur

Resolution

- Increase debounce or adjust photo-eye sensitivity/position

Troubleshooting Tip

Symptom

- Inspection works, but unable to run at expected encoder speed

Likely causes

- Bad network connection to one or more heads

Resolution

- Try first to replace network cable(s)
- Replace head(s) if necessary

Configuring A1000 systems for communicating results through primary using MIB

Step 1 of 2

Communications Fields

- ☒ Trigger ID
- ☒ Length
- ☒ Width
- ☒ Height
- ☒ Angle
- ☐ Volume
- ☐ Volume (Liquid)
- ☐ Item Spacing
- ☐ Item Position
- ☐ Item Count
- ☐ Side by Side
- ☐ Dimensional Limits
- ☐ Crop
- ☐ Script

Formatting Options

Field Separator: Comma

Decimal Places: 1

Fixed Width: 4

Leading zeroes

String Prefix: STX

String Suffix: ETX

Order of data in output string:

[Not available for JSON output]

Sample output string (JSON):

☒ JSON formatted data A1000 1.3FW

[angleDegrees: 77.4, "deviceSerialNumber": "1A1000XX000000", "errors": "", "app_hash": "", "sourceDeviceName": "XLR8R-000000", "height": 20.1, "width": 19.3, "deviceMacAddress": "00-d0-24-00-00-00", "length": 31.6, "firmware_info": "1.0.5 1711 | 123", "device_hash": "", "triggerID": 57572, "angleRadians": 0.0] <CR> <LF>

< Previous

Next >

Configuring the Data



Connected device: XLR8R

TCP Client

☒ TCP Server

☒ TCP Client

☐ Industrial Protocols

Server IP to Connect to: 10.37.80.186

Server Port: 8910

Connection Status: ●

☒ Use Incoming Trigger ID for Results Output

Incoming Trigger ID format: <TID>:1234

[Need help setting up communications?](#)

Sample output string (JSON):

[angleDegrees: 66.1, "deviceSerialNumber": "1A1000XX000000", "errors": "", "app_hash": "", "sourceDeviceName": "XLR8R-000000", "height": 17.5, "width": 25.1, "deviceMacAddress": "00-d0-24-00-00-00", "length": 31.6, "firmware_info": "1.0.5 1711 | 123", "device_hash": "", "triggerID": 57572, "angleRadians": 0.0] <CR> <LF>

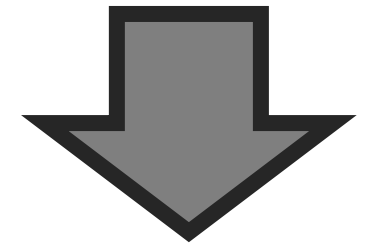
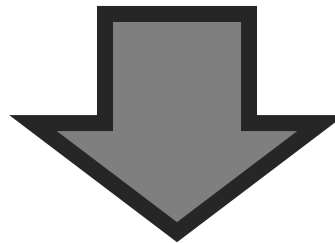
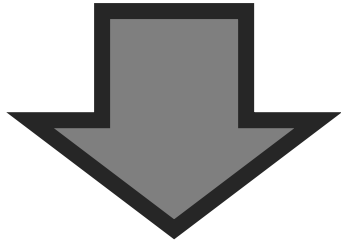
< Previous

Configuring the Communications

MIB with MHDS

```
1 // DM580 MVT Primary - Baseline Communications
2
3 // Set the dimensioner variable to the type of dimensioner in use on this tunnel.
4 // Options include: Dimensioner.None, Dimensioner.CS900, Dimensioner.A1000
5 var dimensioner = Dimensioner.None;
6 dimensioner.registerOnTriggerHandler();
```

One simple change to go from regular communications script to A1000 and MHDS communications



```
1 // DM580 MVT Primary - Baseline Communications
2
3 // Set the dimensioner variable to the type of dimensioner in use on this tunnel.
4 // Options include: Dimensioner.None, Dimensioner.CS900, Dimensioner.A1000
5 var dimensioner = Dimensioner.A1000;
6 dimensioner.registerOnTriggerHandler();
```

The basic script and the script with the A1000 change can both be downloaded from the [MIB 1Vision Page](#)

The background of the slide is a dark blue circuit board with glowing blue lines and components. A large, stylized yellow arrow points from the bottom left towards the center. The word "COGNEX" is written in yellow, italicized, sans-serif font. Below it, the words "FASTER FORWARD" are written in a large, bold, yellow, 3D-style font with a white outline. The text is positioned within the yellow arrow.

COGNEX

**FASTER
FORWARD**

**Questions/
Thank You**