



AS200 Alignment Sensor Quick Start Guide

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Overview

The AS200 Alignment Sensor is an all-in-one compact sensor designed for vision-guided alignment applications with a motion stage or robot controller.

The AS200 Alignment Sensor application consists of at least the following components:

- AS200 camera (up to 2)
- AS200 Alignment Sensor software (optional during run time)
- User-supplied motion system and controller (PLC/Robot/PC)¹
- Network switch

The AS200 Alignment Sensor software provides an easy-to-use graphical user interface to configure the network settings, image acquisition parameters, and part position locators. After you configure the AS200 Alignment Sensor software, use the external controllers, such as PLC or robot controller, to complete the hand-eye calibration, golden pose training, and runtime alignment.

Getting Started

This *Quick Start Guide* provides the following information:

- Install the AS200 Alignment Sensor
- Configure the AS200 Alignment Sensor software

¹ The AS200 Alignment Sensor requires that the motion system uses a right-handed coordinate system.

Regulations/Conformity

Note: For the most up-to-date CE declaration and regulatory conformity information, please refer to the Cognex online support site:
<http://www.cognex.com/Support>.

Safety and Regulatory	
Manufacturer	Cognex Corporation One Vision Drive Natick, MA 01760 USA
European Compliance 	In-Sight 2000 Series Vision Sensor: Regulatory Model R00039 In-Sight 2000 Mini Series Vision Sensor: Regulatory Model 1ABD  CAUTION: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. The CE mark on the product indicates that the system has been tested to and conforms with the provisions noted within the 2014/30/EU Electromagnetic Compatibility Directive and the 2011/65/EU RoHS Directive. Cognex Corporation shall not be liable for use of our product with equipment (i.e., power supplies, personal computers, etc.) that is not CE marked.
FCC	FCC Part 15, Class A This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.
KCC 	R-REM-CGX-R00039 MSIP-REM-CGX-DM260 MSIP-REM-CGX-IS2000
Canadian EMC Compliance	This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Safety and Regulatory	
UL and CUL NRTL Statement 	UL 60950-1, 2nd Edition, 2014-10-14 CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10
CB	UL IEC/EN 60950-1. CB report available upon request.
EU RoHS	Compliant to the latest applicable Directive.

China RoHS



Hazardous Substances 有害物质						
Part Name 部件名称	Lead (Pb) 铅	Mercury (Hg) 汞	Cadmium (Cd) 镉	Hexavalent Chromium (Cr (VI)) 六价铬	Polybrominated biphenyls (PBB) 多溴联苯	Polybrominated diphenyl ethers (PBDE) 多溴二苯醚
Regulatory Model R00039 Regulatory Model 1ABD	X	O	O	O	O	O
This table is prepared in accordance with the provisions of SJ/T 11364. 这个标签是根据SJ / T 11364 的规定准备的。 O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB / T26572 - 2011. 表示本部件所有均质材料中含有的有害物质低于 GB / T26572 - 2011 的限量要求。 X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB / T26572 - 2011. 表示用于本部件的至少一种均质材料中所含的危害物质超过 GB / T26572 - 2011 的限制要求。						

For European Community Users

Cognex complies with Directive 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE).

This product has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment, if not properly disposed.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems for product disposal. Those systems will reuse or recycle most of the materials of the product you are disposing in a sound way.



The crossed out wheeled bin symbol informs you that the product should not be disposed of along with municipal waste and invites you to use the appropriate separate take-back systems for product disposal.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You may also contact your supplier for more information on the environmental performance of this product.

Precautions

Observe these precautions when installing the Cognex product, to reduce the risk of injury or equipment damage:

- This device requires the use of an LPS or NEC class 2 power supply. Any other voltage creates a risk of fire or shock and can damage the components. Applicable national and local wiring standards and rules must be followed.
- To reduce the risk of damage or malfunction due to over-voltage, line noise, electrostatic discharge (ESD), power surges, or other irregularities in the power supply, route all cables and wires away from high current wiring or high-voltage power sources.
- Do not install Cognex products where they are directly exposed to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity.
- Do not expose the image sensor to laser light; image sensors can be damaged by direct, or reflected, laser light. If your application requires the use of laser light that may strike the image sensor, a lens filter at the corresponding laser's wavelength is recommended. Contact your local integrator or application engineer for suggestions.
- Service loops should be included with all cable connections. Changes or modifications not expressly approved by the party responsible for regulatory compliance could void the user's authority to operate the equipment.
- Cable shielding can be degraded or cables can be damaged or wear out more quickly if a service loop or bend radius is tighter than 10X the cable diameter. The bend radius must begin at least six inches from the connector.

- This device is certified for office use only and if used at home, there can be frequency interference problems.
- This device should be used in accordance with the instructions in this manual.
- Applicable national and local wiring standards and rules must be followed.
- All specifications are for reference purpose only and may be changed without notice.

Robot Safety Precautions

A robot can pause and then follow with a fast, hazardous movement. Even if you anticipate a pattern of movement, an external signal can trigger a change in operation and result in an unexpected movement. Follow all safety regulations when you enter a safeguarded space.

Before you work with the robot, familiarize yourself with the safety regulations in the robot manufacturer's operating manual.

Set Up Your Alignment Sensor

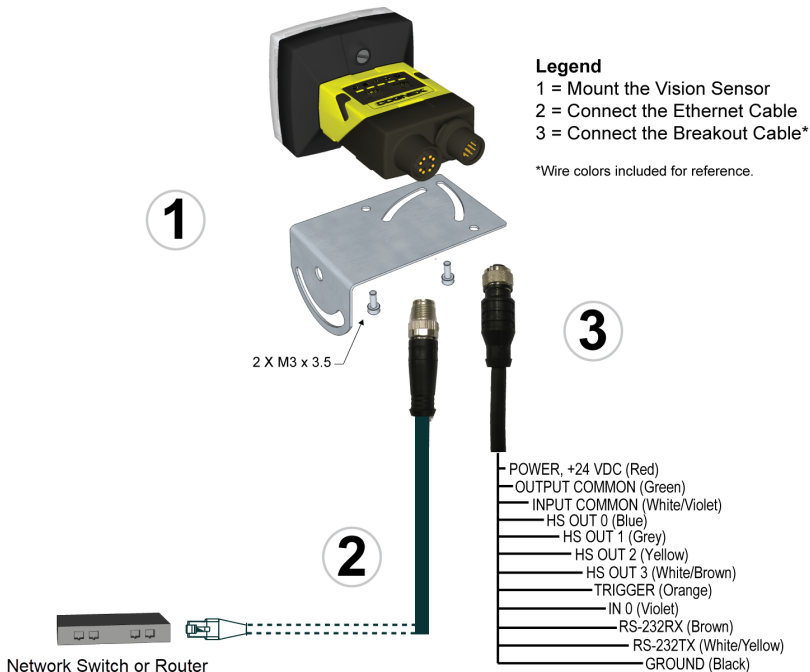
The AS200 Alignment Sensor leverages the In-Sight 2000 Series hardware. You can find detailed installation procedures and specifications in the *In-Sight® 2000 Series Vision Sensor Reference Guide*, which you receive with the Cognex Alignment Sensor software.

Note:

- Disregard any references to In-Sight Explorer software in the In-Sight 2000 Series Vision Sensor Reference Guide. Instead, configure the AS200 Alignment Sensor with the AS200 Alignment Sensor software as described in the "AS200 Alignment Sensor User Interface" topic in this document.
- Cables are sold separately.
- If any of the standard components appear to be missing or damaged, immediately contact your Cognex Authorized Service Provider (ASP) or Cognex Technical Support.



CAUTION: All cable connectors are “keyed” to fit the connectors on the vision sensor; do not force the connections or damage may occur.



Connect the Ethernet Cable

1. Connect the Ethernet cable M12 connector to the vision sensor Ethernet connector.
2. Connect the Ethernet cable RJ-45 connector to a switch/router, as applicable.

Connect the Breakout Cable

 **Note:** Unused wires can be clipped short or tied back using a tie made of non-conductive material. Keep all bare wires separated from the +24VDC wire.

1. Verify that the 24VDC power supply being used is unplugged and not receiving power.
2. Optionally, connect the I/O or serial wires to an appropriate device (for example, a PLC).
3. Attach the Breakout cable +24VDC (red wire) and GROUND (black wire) to the corresponding terminals on the power supply.



CAUTION: Never connect voltages other than 24VDC. Always observe the polarity shown.

4. Attach the Breakout cable M12 connector to vision sensor Power and I/O connector.
5. Restore power to the 24VDC power supply and turn it on if necessary.

Install Alignment Sensor Software

To configure your sensor, install the AS200 Alignment Sensor software on a computer that is connected to a network. The AS200 Alignment Sensor software is available as a free download from the Cognex support site:
<https://support.cognex.com/en/downloads/alignment-sensor>.

Supported Operating Systems

- Microsoft® Windows® 10 Professional (64-bit)
- Windows 7 Professional, Service Pack 1 (64-bit)
- Windows Server 2008 R2, Service Pack 1 (64-bit)

Supported Cameras

- Align 2000, 1.3MP



Note: The AS200 Alignment Sensor software works only with alignment sensor models. The AS200 Alignment Sensor software does not work with the standard In-Sight vision systems or sensors.

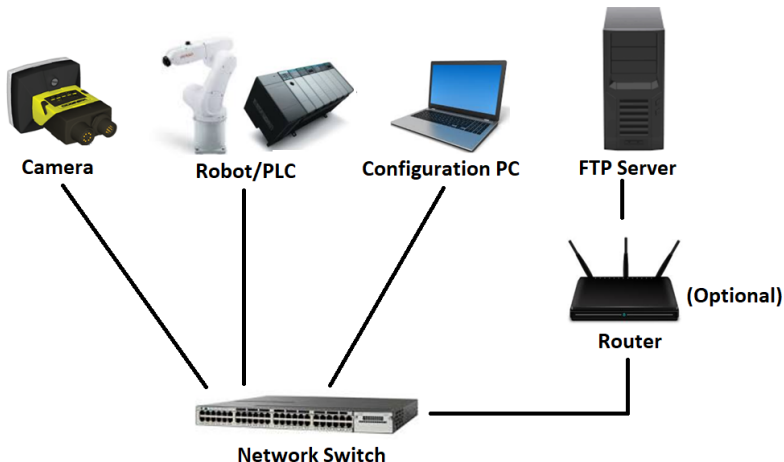
Supported Communication Protocols

The AS200 Alignment Sensor supports two communication protocols: TCP/IP and SLMP Scanner. You can use TCP/IP with robots and programmable controllers (PLCs). You can use the SLMP Scanner protocol only with programmable controllers (PLCs).

Network Layout

To network with the AS200 Alignment Sensor, use the following guidelines:

- All components must have a static IP addresses.
- All components must be in the same subnet, except the FTP server. If the FTP server is on a different subnet, you must connect it to a router through a default gateway address.



Alignment Sensor Command Overview

To program robots and PLCs to control the vision sensor at run time and perform requested tasks, you use the command interface of the AS200 Alignment Sensor. The interface contains the following degree of freedom coordinates:

Coordinate	Description
X	The X coordinate of the pose
Y	The Y coordinate of the pose
Z	The Z coordinate of the pose
A	The rotation angle about the Z axis, in degrees
B	The rotation angle about the Y axis, in degrees
C	The rotation angle about the X axis, in degrees

The command interface requires all six pose coordinates. However, as a 2D system, the Alignment Sensor only accepts X, Y, and A and ignores Z, B, and C.

PLC/Robot Commands

The AS200 Alignment Sensor supports the following commands. How the commands are referenced in PLC/Robot functions differs based on the communication protocol (TCP/IP or SLMP Scanner).

Command	Purpose	Referenced in TCP/IP functions as:	Referenced in SLMP Scanner functions as:
ACB	Initiates an automatic calibration	ACB	2030
AC	Executes an automatic calibration	AC	2031
HEB	Initiates a hand-eye calibration	HEB	2020
HE	Performs a hand-eye calibration	HE	2021
HEE	Completes and computes a hand-eye calibration	HEE	2022
CCB	Initiates a hand-eye calibration	CCB	2040

Command	Purpose	Referenced in TCP/IP functions as:	Referenced in SLMP Scanner functions as:
CC	Performs a custom calibration	CC	2041
CCE	Computes a custom calibration	CCE	2042
TA	Trains the target golden position	TA	3010
XA	Aligns the trained target with the golden position	XA	3011
TT	Locates the trained target and stores its position	TT	3010
TTR	Receives the position that the robot selected, and stores that position along with the trained target position	TTR	4011
XT	Executes the position that TTR stores, and adjusts the position, if needed	XT	4012

For information about dependencies and command syntax, see the *AS200 Alignment Sensor User Guide*.

AS200 Alignment Sensor User Interface

The AS200 Alignment Sensor User Interface is software that enables you to control the AS200 Alignment Sensor. You use this program to:

- View Alignment Sensor images
- Create, and modify sensors and recipes
- Monitor a running sensor



Note: For more information about the user interface elements, see the *AS200 Alignment Sensor User Guide*.

Run Mode (Home)

You can monitor a running AS200 Alignment Sensor.



Number	Element	Description
1	Home Button	Open the Home screen.

Number	Element	Description
2	Setup Navigation Pane	Builds an AS200 Alignment Sensor.
3	Exit Button	Close the AS200 Alignment Sensor software.
4	Information Bar	Displays the sensor and recipe currently in use.
5	Image Viewer Controls	Zooms in, zooms out, or fits image to the display.
6	Live Mode Toggle	Displays a live video image to use when you adjust the cameras lens and the field of view.
7	Rotate Image Controls	Rotates the image 90 degrees clockwise or counterclockwise.
8	Save Image Button	Saves images.
9	Language Selection	Selects the language to use in the AS200 Alignment Sensor user interface.
10	Access Control	You can log on to the AS200 Alignment Sensor as the Admin or Operator. After you log off, you can still use the AS200 Alignment Sensor as the Monitor.
11	Help	Opens the <i>AS200 Alignment Sensor Quick Start Guide</i> .
12	Camera Image View	Displays the sensor's view.
13	Message Window	Displays the sensor's log.
14	Calibration Quality Indicators	Displays the calibration quality of the sensor's camera(s).
15	Status Bar	Displays the user, version, and date, and time information.

Note:

When a sensor uses two cameras, the following controls apply to only the selected camera that displays in a white frame:



- Image View controls
- Live Mode toggle
- Rotate Image controls
- Open Image button

Setup Mode (Sensor)

You can configure, modify and delete sensors.

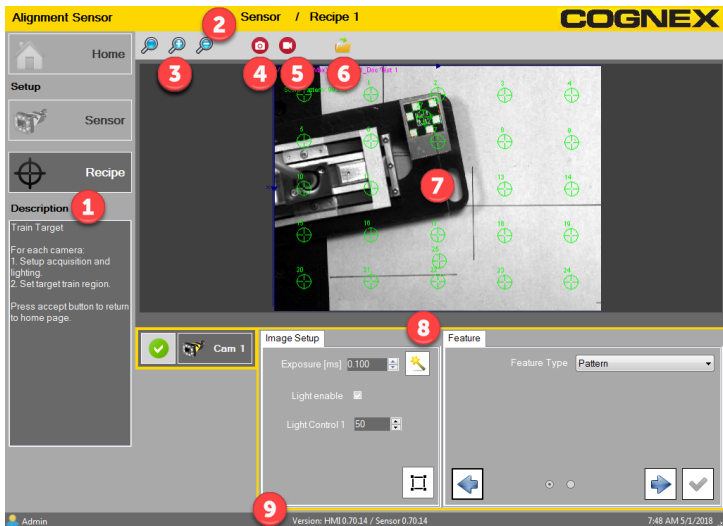
The screenshot shows the COGNEX Setup Mode (Sensor) interface. The top bar is yellow with 'Alignment Sensor' and 'Sensor / Recipe 1' on the left, and the 'COGNEX' logo on the right. Below the bar, there's a 'Home' button and a 'Sensor' dropdown menu. The main area is divided into three sections: 'Description' (left), 'Available Cameras' (middle), and 'Settings' (right). The 'Description' section contains a 'Configure Sensor' button and a list of instructions: 1. Enter sensor name, 2. Select cameras, 3. Select Master camera, 4. Configure communication protocol. The 'Available Cameras' section has a table with columns 'Name', 'IP Address', and 'DHCP'. The 'Settings' section has fields for 'Name' (Sensor), 'Description', 'Cameras' (with a table of ID, Name, IP Address, Master), 'PLC/Robot Communication' (TCP/IP, SLMP Scanner), and 'Port Number PLC/Robot' (7890). A 'DHCP' section at the bottom left has fields for 'Name', 'IP Address', and 'Subnet Mask'. A 'DHCP' checkbox is also present. A 'Settings' section at the bottom right has a 'Port Number PLC/Robot' field and a '7890' button. A 'Settings' button is at the bottom left, and a 'Check' button is at the bottom right. Numbered callouts 1 through 7 point to various elements: 1. Description section, 2. Sensor dropdown, 3. Available Cameras section, 4. Description field, 5. Description field, 6. Settings button, 7. Check button.

Number	Element	Description
1	Context Help Pane	Displays the instructions.
2	Information Bar	Displays the sensor and recipe currently in use.
3	Setup Windows	Configures, modifies, and deletes sensors.

Number	Element	Description
4	Backup Data Button	Backs up sensor's recipe, calibration, and configuration data.
5	Restore Data Button	Restores the recipe, calibration, and configuration data to a sensor.
6	Advanced Settings Button	Opens the Advanced Settings window.
7	Status Bar	Displays the user, version, and date, and time information.

Setup Mode (Recipe)

You can configure, modify, and delete recipes.



Number	Elements	Description
1	Context Help Pane	Displays the instructions.
2	Information Bar	Displays the sensor and recipe currently in use.

Number	Elements	Description
3	Image Viewer Controls	Zooms in, zooms out, or fits image to the display.
4	Trigger Button	Acquires one new image from the camera(s).
5	Live Mode Toggle	Displays a live video image to use when you adjust the cameras lens and the field of view.
6	Open Image Button	Saves images.
7	Camera Image View	Displays the sensor's view.
8	Setup Windows	Configure, modify, and delete Recipes.
9	Status Bar	Displays the user, version, and date, and time information.

Note:

When a sensor uses two cameras, the following controls apply to only the selected camera that displays in a white frame:



- Image Viewer controls
- Trigger button
- Live Mode toggle
- Open Image button

Set Up Sensor

In the Sensor step, you create a sensor by completing the following tasks:

- Discover cameras
- Configure the camera's static IP address setting
- Define the camera's master/slave settings
- Configure the sensor's communication settings

You can create a sensor that has one or two cameras. The following procedures explains how to use one camera to configure a sensor.

Discover Cameras

You can discover a camera by completing the following steps.

1. Click  to log on as an Admin user. Leave the Password field empty.
2. Click **Sensor** in the Setup Navigation pane. The Available Cameras tab and the Settings tab open.
3. If your camera settings are factory defaults with DHCP enabled, click  on the Available Cameras tab. The New Cameras dialog box opens.



Note: If your camera has the static IP address, go to *Configure a Sensor* on page 25.

4. Select a camera to configure a sensor, and then enter the static IP address for the camera in the IP Address text box. If necessary, modify the camera Name and Subnet Mask.

5. To accept the changes, click . To cancel, click .
6. The Available Cameras tab displays the camera.

Configure a Sensor

Once you discover a camera, you can configure a sensor by completing the following steps:

1. On the Settings tab, type sensor name in the **Name** text box.
2. On the Available Cameras tab, ensure that the selected camera is highlighted.
3. To move the camera to the Settings tab, click .
4. On the Settings tab, ensure that the Master check box is selected.
5. Configure the PLC/Robot Communication settings.

If you use the TCP/IP protocol, select **TCP/IP** and configure the Port Number PLC/Robot setting.

If you use the SLMP Scanner protocol, select **SLMP Scanner** and configure the PLC settings.

 **Note:** For more information about the PLC/Robot Communication settings, see the *AS200 Alignment Sensor User Guide*.

6. Click . You have configured the sensor.

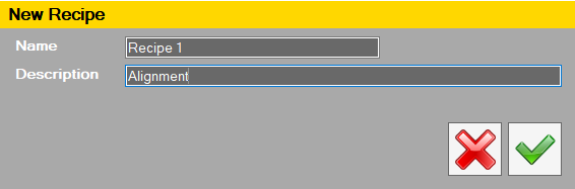
Set Up a Recipe

After you create a sensor, you can create a recipe, set up the image, and train the feature on a part. Each recipe corresponds with a trained target.

You can set up a recipe for one or two cameras. The following document explains how to set up a recipe for one camera.

Create a Recipe

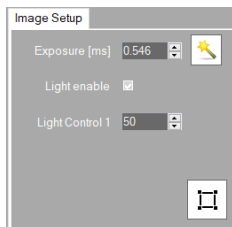
1. Click **Recipe** in the Setup Navigation pane.
2. To open the New Recipe dialog box, click .
3. Type the **Name** and **Description** of the recipe.

The image shows a 'New Recipe' dialog box with a yellow title bar. It contains two text input fields: 'Name' with the value 'Recipe 1' and 'Description' with the value 'Alignment'. At the bottom right, there are two buttons: a red 'X' button and a green checkmark button.

4. Click , to save the new recipe and exit the New Recipe dialog box.
5. To open the Image Setup and Train Feature page, click  at the bottom of the page.

Set Up Image

You can use the Image Setup tab to adjust the lens focus and image brightness.



Adjust Brightness

1. Click  to trigger an image acquisition and automatically determine the exposure setting.

By pressing the  button, the exposure time is adjusted automatically to get the best image. Also, if you type a fixed value in the **Exposure (ms)** text box, you can set the exposure time (in milliseconds) for your image acquisition.

2. If needed, use the **Light Control 1** text box to adjust the LED light intensity.

 **Note:** By default, the **Light Enable** check box is selected. If you clear the **Light Enable** check box, you disable the **Light Control 1** option. The camera's LED light is turned off, and the camera is dependent on ambient (room) lighting.

Adjust Region

1. To adjust the auto image brightness region, click  to enter the interactive graphics mode.
2. Position the region around the image area that the camera will use to determine the automatic exposure settings. Ideally, this region should contain all features you want to locate during run time.
3. To accept the region and exit the interactive graphics mode, click  on the right top corner of the screen.



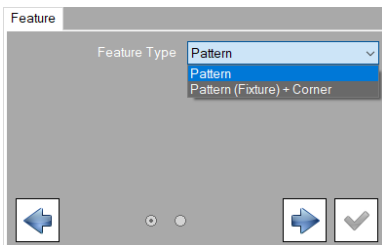
Tip: To accept the region and exit the interactive graphics mode, you also can double-click on the region.

Adjust Focus

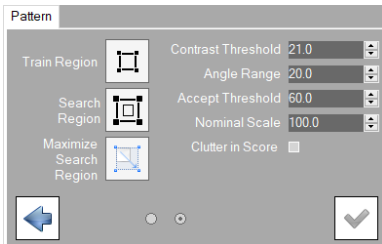
1. To enter the Live Video mode, which enables you to adjust the lens focus, click  above the image display.
2. Adjust the focus of the lens to ensure that the feature details are clear and highly contrasted.
3. When you are satisfied with the quality of your image, click  again to exit the Live Video mode.

Train Feature

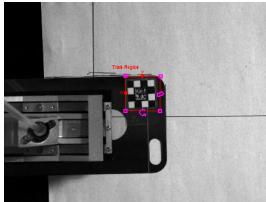
1. From the **Feature Type** drop-down list, select **Pattern**.



2. Click , the **Pattern** tab opens.



- Click  to set the train region over the pattern that you will use as the training model. Ensure that the train region covers only the feature of the pattern.



- Click  on the right top corner of the display to confirm the train region.
- The  icon replaces the train region, which indicates the location and angular orientation of the found pattern.



6. (Optional) Click  to set the search region. Ensure that search region covers the areas in the image where you expect to see the pattern. By default, the search region covers the entire field of view.



Tip: To increase the performance of the tool, create a smaller search region. A smaller search region can increase the processing speed and reduce the cycle time.

7. Click  on the right top corner of the display to confirm the search region.
8. After you configure the pattern settings, load images and adjust the parameters, as necessary, to compensate for your expected ranges of variations.
9. Click  to exit the **Recipe** step. The sensor is now set up and ready for the sensor calibration.

After finishing this initial setup with the AS200 Alignment Sensor software, you need to complete the sensor calibration and golden pose training. To perform these tasks, you need to use the command interface of the AS200 Alignment Sensor with external controllers, such as PLC or Robot.

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