





OMRON

Model **FH-SMDA-GS050B**

3D VISION SENSOR

INSTRUCTION SHEET

Thank you for selecting OMRON product. This sheet primarily describes precautions required in installing and operating the product.

Before operating the product, read the sheet thoroughly to acquire sufficient knowledge of the product. For your convenience, keep the sheet at your disposal.

TRACEABILITY INFORMATION:

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The following notice applies only to products that carry the CE mark:

Notice:  
This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.



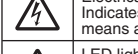

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SAFETY PRECAUTIONS










●Meaning of signal words




















	<b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
	<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.








●Meanings of Alert Symbols

	General Prohibition Indicates general prohibitions, including warnings, for which there is no specific symbol.
	General Caution Indicates general cautions, including warnings, for which there is no specific symbol.
	Electrical Hazard Indicates the possible danger of electric shock under specific conditions. The left-hand icon means a precaution of the above possibility (including warning).
	LED light Harm may be caused by LED light. The left-hand icon means a precaution of the above possibility (including warning).

●Alert statements in this Manual

	<b>WARNING</b>
This product must be used according to the instruction manual. Failure to observe this may result in impairment of functions and performance of the product.	
This product is not designed or rated for ensuring safety of persons. Do not use it for such purposes.	
Never connect the AC power supply with this product. When the AC power supply is connected, it causes the electric shock and a fire.	
Visual impairment might be caused by continuously looking at LED light in rare cases. If a specular object is used, take care not to allow reflected light enter your eyes.	
Do not touch the terminals while the power supply is ON. Doing so may result in electrical shock.	
Please take external safety measures so that thesystem as a whole should be on the safe side even if a failure of the 3D Vision Sensor or an error due to an external factor occurred. An abnormal operation may result in serious accident.	
Please take fail-safe measures on your side in preparation for an abnormal signal due to signal conductor disconnection and/or momentary power interruption. An abnormal operation may result in a serious accident.	
FH series must be handled by those who have the expertise in electricity. Read the reference manuals carefully to understand the contents well, and make the proper use of this product accordingly. Keep this document safely for ready reference at any time. Note that this document does not include detailed information on the use of this product, including safety precautions. Please obtain manuals and instructions of the devices and equipment that constitute the system, and thoroughly read precautions such as "Safety Precautions", "Precautions for Safe Use", and "Precautions for Correct Use" before using the system.	

	<b>WARNING</b>
According to Article 36, 31 and 32 of the Occupational Health and Safety Regulations, work to teach, inspect, repair and adjust industrial robots falls under "dangerous or harmful work" as defined in the Occupational Health and Safety Act. Under Article 59 of the Occupational Safety and Health Act, operators are obliged to provide workers with "special training for safety or health".	
Check the measurement results before operating the robot. Otherwise the robot may act in an unintended manner. Change the workpiece position and angle of picking/placing and check the operation thoroughly.	
The scene variables and system variables that are set in advance for the scene loaded with the environment copy function are automatically set using operations on the dialog box. Do not directly set them using the processing item setting screen or the TDM editor.	
FH series does not comply with the laws and regulations for industrial robot safety. When using the FH series in a robot system that includes an industrial robot, be sure to check for compliance with laws and regulations regarding the safety of industrial robots. Take steps to ensure safety as needed.	
It is your responsibility to implement appropriate safety measures based on the results of risk assessment. Compliance with the Robot Safety Guide and all of the information contained in our Robotic System Product Information does not guarantee that personal injury or damage to equipment caused by an industrial robot will be avoided.	
During maintenance, disconnect the robot's AC power supply and lock out or tag out the power supply to prevent powering up. If the following safety measures are not taken, the subject robot may cause death or serious injury or damage to the robot itself or its peripheral equipment. -Workers who install, operate, teach, program, or maintain the system should read the "Robot Connection Guide" and "Robot Safety Guide" and take a training course on their responsibilities with the robot. -Those who design a robot system must read this document and the Robot Safety Guide, and follow the safety regulations and laws in the area where the robot will be installed. -Do not use the subject robot for any purpose other than those described in this document and the manuals referred to in the Robot Connection Guide. If you are not sure whether your application is compatible, please contact us. -The user is responsible for installing safety barriers around the robot to prevent workers from entering the work area and coming into contact with it while it is in operation. -During maintenance, the power to the robot and the main power supply must be locked out and tagged out (measures and indication of prohibition from being turned on) to prevent them from being turned on. Reference "I590 Robot Safety Guide"	
If you proceed to the next step before registering the hand-eye calibration start position, the robot may operate unintentionally. Be sure to register the start position.	
The robot is driven by pressing the Jog Move button and the Robot Move button. The operation must be done by shoes who have completed special health and safety training. The system must be operated so that it can be stopped at any time by an emergency stop button.	
Check the measurement results before operating the robot. Otherwise the robot may act in an unintended manner. Change the workpiece position and angle and check the operation thoroughly.	
If the robot is operated with an incorrectly shaped hand, the robot may pick and hold the workpiece in an unintended position and/or posture, damaging the workpiece, container, or hand and causing it to fly out into the environment. Check the dimensions of the drawing and the actual product, and make registration securely. Change the workpiece position and angle of picking/placing and check the operation thoroughly. The system must be operated so that it can be stopped at any time by an emergency stop button.	
If the robot is operated with an incorrectly selected picking and holding DB or hand data, the robot may pick and hold the workpiece in an unintended position and/or posture, damaging the workpiece, container, or hand and causing it to fly out into the environment. Select the proper picking and holding DB in the picking and holding plan setting. Make sure to perform offline measurement before operating the robot to confirm that the proper hand is selected.	
If the robot is operated with incorrect environment data, it may act in an unintended manner, resulting in contact with humans, scattering of workpieces, and contact with surrounding objects. Make sure that the proper environment file for the robot is loaded.	
If the robot is operated after changing the floor or container height, it may collide with the floor. If the container position or floor level is changed, register the floor level and container again.	
If the sensor shape is not registered, the sensor may collide with the container and be damaged. Please register the sensor shape when you register the hand data.	
Do not perform camera calibration during the warm-up operation of the 3D Vision Sensor.	
Measurement errors occur when the geometric positional relationship between the lighting section and imaging section of the 3D Vision Sensor changes due to factors such as aging, temperature changes, or impact on the 3D Vision Sensor. Perform a camera calibration check on a regular basis and calibrate the camera if necessary.	
Do not perform hand-eye calibration during the warm-up operation of the 3D Vision Sensor.	
Complete sensor calibration before performing hand-eye calibration.	

	<b>CAUTION</b>
If the camera calibration is performed with the target tilted, the measurement error may deteriorate. Ensure that the calibration target is placed in a stable position on a flat floor.	
If the camera calibration is performed while the target is dirty, the measurement error may deteriorate. If the camera calibration target is dirty, wipe out a wet towel, wipe it clean, and dry it with a soft cloth before performing the calibration.	
If the camera calibration is performed while the 3D Vision Sensor is dirty, the measurement error may deteriorate. If the window surface of the imaging unit or lighting unit of the 3D Vision Sensor is dirty, wipe out a wet towel, wipe the dirt off, and dry with a dry cloth.	
When operating the jog, check the actual robot visually instead of the camera image.	
The robot is driven when using the motion sample program. The operation must be done by shoes who have completed special health and safety training. The system must be operated so that it can be stopped at any time by an emergency stop button.	
If the operation range of hand-eye calibration is not set correctly, the robot may act in an unexpected position and/or posture that may result in contact with surrounding objects. Make sure that the calibration trajectory is clear and that there are no obstacles or people in the vicinity. The system must be operated so that it can be stopped at any time by an emergency stop button.	

Precautions for Safe Use

Please observe the following precautions for safe use of the products.

1. Installation Environment

- Do not use the product in areas where flammable or explosive gases are present.
- Do not install the product close to high-voltage devices and power devices in order to secure the safety of operation and maintenance.
- Avoid installation in a place exposed to vibration as much as possible.

2. Power Supply and Wiring
- Make sure to use the product with the power supply voltage specified. If a DC voltage exceeding the rating or an AC voltage is applied, the circuit parts may be burnt or exploded.
  - Do not connect the power supply with polarity reversed.
  - Use a DC power supply with power measures against high-voltage spikes (safety extra low-voltage circuits on the secondary side).
  - Use an independent power source for this product. Do not use a shared power source.
  - Never apply more than the rated voltage or AC power supply to this product. It may cause malfunction.
  - The recommended power supply is as follows:
    - use S8VK-G06024 (OMRON) or S8VS-06024 (OMRON).
  - Wire high-voltage cables or power cables separately from the cables of this product. If the same cable or duct is used, the product may receive induction and it may cause malfunctioning or breakage.
  - Do not short-circuit load on the open collector output.
  - Apply load not exceeding the rating.
  - Before wiring an I/O cable, attach a crimping terminal. Do not connect cables just twisted together to the power supply or terminal block directly.
  - Insulate unnecessary signal cables so that they do not contact any other signal cables.
  - After wiring the cables, confirm if the power supply is appropriate, if there is miswiring such as short-circuit of load, if the load current is appropriate, and if FG is connected appropriately. Otherwise, the product may be broken due to miswiring etc.
  - Do not put load on the cables and connectors before wiring them.
  - Be sure to apply type D grounding (100Ω or lower grounding resistance) to the FG wire of the I/O cable.
  - Do not share the ground wire with some other device or connect it with the optical axis of the building. The product may be adversely affected.
  - Determine the contact point as near as possible to shorten the ground wire as much as possible. The product may be adversely affected.
  - For positive ground, please refer to cautions described in the setup manual.
  - Do not touch the optical surface of the sensor or the lighting section during wiring or installation. It may affect the characteristics.
3. Mounting
- When doing the following, be sure to turn OFF the power of the 3D Vision Sensor main unit or connected peripheral devices. Not doing so leads to a product failure.
    - Cable connection and wiring
    - Connector mounting/removal
  - Tighten the mounting screws securely using the defined torque and order.
  - Do not apply torsional stress to the cable. Doing so may cause cable breakage.
  - Secure the minimum bending radius of the cable. If it cannot be secured, the cable may be broken.
4. Others
- Use only the dedicated cable (FHV-V□BX/FH-VSDX-□BX). Otherwise, the product may malfunction or be broken.
  - If anything abnormal occurs, for example, strange smell/sound is detected, the main unit gets very hot, or a smoke comes, stop using the product, turn OFF the product, and consult OMRON's branch or sales office.
  - Do not disassemble, deform by pressurizing, incinerate, repair, or alter this product.
  - When disposing of the product, treat as industrial waste.
  - Do not drop the product or expose it to abnormal vibration or impact. Doing so may lead to product failure.
  - When operating the robot by using the 3D Vision Sensor measurement results, be sure to check the measurement result data on the robot side and take fail-safe measures, such as operating the robot only after confirming that the data is within the robot's range of motion.
  - 3D Vision Sensor measurements are relative, not absolute. It cannot be used as a measurement sensor.
5. Camera Calibration Target
- Install and store the product in a location that meets the following conditions:
    - Ambient temperature and relative humidity do not exceed the range of specifications
    - No rapid changes in temperature (place where dew does not form)
    - No presence of corrosive or flammable gases
    - Place free of dust, salts and iron particles
    - Place free of vibration and shock
    - Place out of direct sunlight
    - Place where it will not come into contact with water, oils or chemicals
  - Do not drop the product or expose it to abnormal vibration or impact. Doing so may cause malfunction or burning.
  - Place the camera calibration target in a stable position on a flat floor.
  - Set the camera calibration target within the measurement distance and measurement range of the 3D Vision Sensor to calibrate the camera.
  - Before performing camera calibration automatically, make sure that the robot is in a coordinate position that does not collide with the target.
6. Hand-eye Calibration Target
- Install and store the product in a location that meets the following conditions:
    - Ambient temperature and relative humidity do not exceed the range of specifications
    - No rapid changes in temperature (place where dew does not form)
    - No presence of corrosive or flammable gases
    - Place free of dust, salts and iron particles
    - Place free of vibration and shock
    - Place out of direct sunlight
    - Place where it will not come into contact with water, oils or chemicals
  - Do not drop the product or expose it to abnormal vibration or impact. Doing so may cause malfunction or burning.
  - Set the hand-eye calibration target within the measurement distance and measurement range of the 3D Vision Sensor to performing hand-eye calibration.
  - When performing hand-eye calibration, make sure that there is no workpiece around the hand-eye calibration target.
  - Install the hand-eye calibration target on a flat floor in a stable condition without vibration.
  - If the hand-eye calibration target is dirty, wipe out a wet towel, wipe off the dirt, and dry with a soft cloth.
  - If the window surface of the imaging unit or lighting unit of the 3D Vision Sensor is dirty, wipe out a wet towel, wipe the dirt off, and dry with a dry cloth.
  - Check that the hand-eye calibration result shows an error of approximately 1 or less.
7. Regulation of KC marking
- 사용자안내문  
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Precautions for Correct Use

- In order to prevent the product from becoming inoperable or malfunction, and to prevent other adverse effects to the performance or equipment, please observe the following.
1. An installation location that meets the following conditions.
- A location where the ambient temperature does not exceed the rated range (operating: 0 to 40°C, storage: -25 to 60°C).
  - A location where the temperature does not vary sharply (condensation does not occur).
  - A location where relative temperature does not exceed a range of 35-85%RH.
  - A location not exposed to corrosive gases or combustible gases.
  - A location not exposed to dust, salt, or metal powder.
  - A location not exposed to direct vibration or impact.
  - A location not exposed to strong disturbance light (laser light, arc welding light, or ultraviolet light).
  - A location not near a heating appliance or exposed to direct sunlight.
  - A location not exposed to mist of water, oil, or chemicals or misty atmosphere.
  - A location not exposed to strong magnetic/electric fields.
  - A location not near a high-voltage device or power device
2. Power supply, connection, and wiring
- If using a commercially available switching regulator, earth the frame ground terminal.
  - If the power supply line has surge, connect a surge absorber according to the operational environment to use the product.
  - Turn on the power of the 3D Vision Sensor at the same time as or before turning on the power of the FH Controller.
  - When turning OFF the power, confirm that data have been saved completely before starting operations.
  - When data are saved by operating the 3D Vision Sensor, the saving process must have been completed and the following user operations must be possible.
    - When data are saved using communication commands, processing of the applicable commands must have been completed and the busy state is OFF.
  - Attach the cable straight with the terminal correctly aligned. Forcibly attaching the cable may bend the terminal, resulting in failure or communication error.
3. Maintenance
- Turn OFF the power and confirm safety before starting maintenance.
  - Remove dirt on the window surface of the imaging unit or lighting unit of the 3D Vision Sensor using the special cloth for lens or an air brush.
  - Do not use thinner, alcohol, benzene, acetone, or kerosene to clean his product.
4. Optical axis
- The field of view may vary from product to product. Be sure to check the image on the FH controller on installation.
5. Image sensor
- For this product, a line may appear depending on the measurement condition or sensitivity because of the specification of the image sensor. However, this is not a fault or failure of the product. In addition, although there may be multiple defective pixels, this is not a fault or failure of the product. Use the product as confirming the actual image.
6. Warm-up
- The correct brightness and focus may not be achieved or may fluctuate until the product function is stabilized (approximately 15 minutes) after power-on. Check the WARM UP indicator LED or the warm-up completion flag in the camera image input processing item on the FH software before using the product.
7. Sensor installation
- In an environment exposed to high humidity and sharp temperature fluctuation, the window surface of the imaging unit or lighting unit of the 3D Vision Sensor may become cloudy in rare cases.

8. Connection & Operation with the Robot
- For an example design of a robot program to build an application, see the sample program (fhsample\_main()) of the Robot Connection Guide.
  - For the processing to move the robot to the imaging position, refer to the Robot Connection Guide.
9. Camera Calibration Target
- Do not use thinner, alcohol, benzene, acetone, or kerosene to clean his product.
  - Before calibrating the camera, make a backup of the AOS camera information file.
  - After calibrating the camera, check the results to confirm that the calibration was successful. When an abnormal AOS camera information file is read, the measurement error increases and the wrong coordinate position is output.
  - When disposing of this product, treat it as industrial waste and never heat or incinerate it at 100 °C or higher.
10. Hand-eye Calibration Target
- Do not use thinner, alcohol, benzene, acetone, or kerosene to clean his product.
  - When disposing of this product, treat it as industrial waste and never heat or incinerate it at 100 °C or higher.

■ Relevant Manuals

Please refer to the following manual.

Manual name	Man.No.	Model
Vision System FH-Series Robot Vision Application Construction Guide	Z446	FH-5050 FH-SMDA-GS050B
Vision System FH-Series Robot Connection Guide (OMRON Viper Series)	Z448	
Vision System FH-Series Robot Connection Guide (OMRON TM Series)	Z447	
Vision System FH-Series Hardware Setup Manual (3D Robot Vision Application)	Z436	
Vision System FH-Series Processing Item Function Reference Manual (3D Robot Vision Application)	Z445	FH-5050
Vision System FH-Series User's Manual	Z365	
Vision System FH/FHV-Series Processing Item Function Reference Manual	Z341	
Vision System FH-Series Macro Customization Function Programming Manual	Z367	
Vision System FH/FHV-Series User's Manual (Communications Setting)	Z342	

■ Package Contents

The following is packaged together with this product. Please confirm these items.

- 3D Vision Sensor x 1
- Instruction Sheet (Japanese/English) x 1
- Compliance Information x 1

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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