OPTICON



M-12M

2D Imager Scanner

Integration Guide

The information in this document is subject to change without notice.

Document History

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SUPPORT

USA
Phone: 800-636-0090
Email: support@opticonusa.com
Web: www.opticonusa.com

Rest of World
Phone: +31235692728
Email: support@opticon.com
Web: www.opticon.com

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1. Abstract

This guide provides instructions for installing the in-counter M-12M 2D imager scanner (hereafter called “scanner”) and is intended for engineers who are responsible for integrating the scanner into their product. To maximize performance and minimize problems, read this integration guide carefully and follow all instructions to properly integrate the scanner. Following these recommended instructions will help to ensure that the scanner will properly capture images. To further test image capturing, you should use image capturing tools to capture images. These tools are available from the Opticon website.

2. Exit Window

The scanner has a scan window and can be installed without requiring an exit window on a device. However, if controlling reading distance or protecting the scanner is required, install an exit window on the device.

This section describes the conditions and precautions regarding the selection and placement of the exit window:

- Selection of the exit window: Material selection and how to handle the exit window.
- Size and placement of the exit window: Window size that does not affect the scanner's illumination and field of view. The window distance setting prevents the illumination from appearing within the field of view.

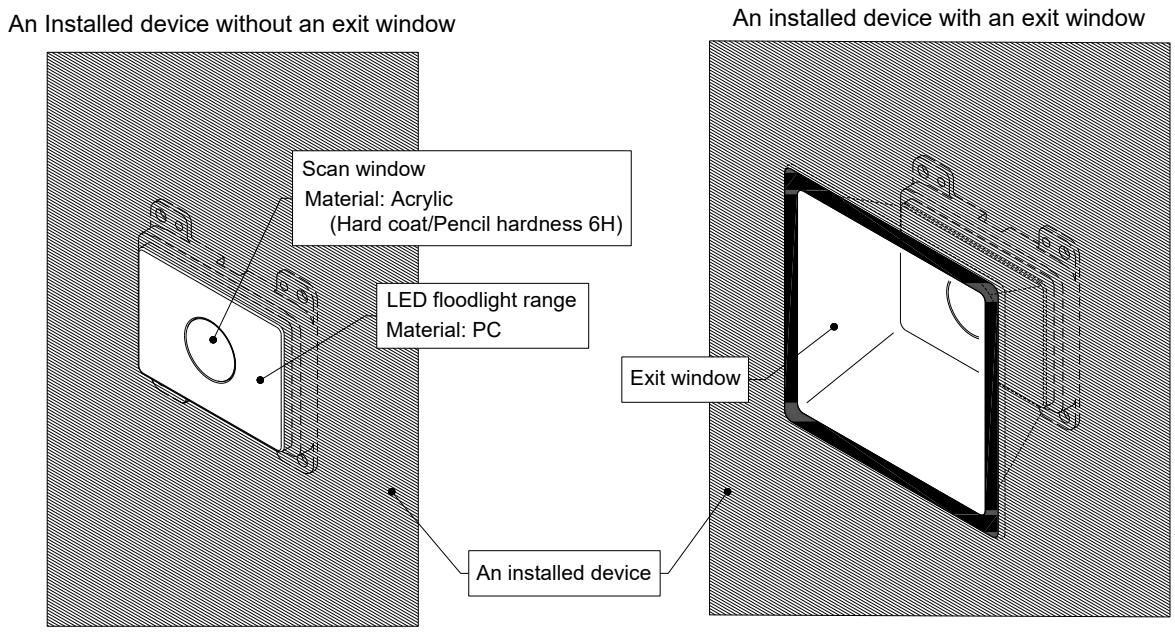


Figure 1: With or Without Exit Window

2.1. Exit Window Material

To help prevent reflection from the LED off the exit window and degradation of the image by scratches and dirt, follow these recommendations to construct the exit window:

- For the best optical quality, use acrylic material (cast or extruded).
- Select high-quality achromatic acrylic material with a smooth, flat surface without scratches and dents.
- Apply an anti-scratch coating to the surface of the exit window to protect it from scratches during operation. Hard coated acrylic sheets are readily available. This coating greatly enhances anti-scratch properties without degrading the optical characteristics of the acrylic material.
- To protect the exit window from dust, stains, and scratches during assembly, most manufacturers cover the raw material with a protective sheet that stays attached during the entire production process of the exit window. Remove this protective sheet during the final stage of the production process, before operation.
- After removing the protective sheet, use an ion blower to remove any dust that may have been attracted by static electricity.

Recommended acrylic material:

Nitto Jushi Kogyo Co., Ltd.:	Clarex Precision Thin Sheet
MITSUBISHI CHEMICAL CO., LTD.:	Shinkolite
FUKUVI Chemical Industry CO., LTD.:	HARZLAS AR

2.2. Window Size and Optical Path Clearance

This section describes the exit windows placement and size design.

2.2.1. Window Placement and Size Recommendation

Window Design Recommendations

Item	Recommendation
Window size	48 x 36 mm or more*
Distance from the Scanner	Within 15 mm

* Use a matte black material with low reflectivity for the light-blocking parts.

2.2.2. Precautions When Exceeding Recommendation

Follow these precautions if the window design exceeds the previously specified recommendations.

- Windows size of 48 x 36 mm:
  The scanner illumination emitting surface is 48 x 36 mm. Using an aperture size smaller than that will block off the light path and reduce the illumination efficiency. Be aware of this limitation when designing a small aperture size.

- Distance from the scanner:
  - As the distance from the window increases, the LED illumination reflected onto the window increases. Therefore, a distance of L = 15 mm or less is recommended.
  - The figure below shows the image at a distance approximately L = 70 mm. Some elements of the QR code are not visible.
  - Even at close distances, including the recommended distance, the reflected light is mitigated, but the reflection still occurs.
  - Depending on the printed code specification and quality to be read, even at close distance, reflection may affect reading.
  - Design the window after capturing the image and sufficiently evaluating reading performance.
  - The reflection will not occur when illumination is OFF in display reading mode.

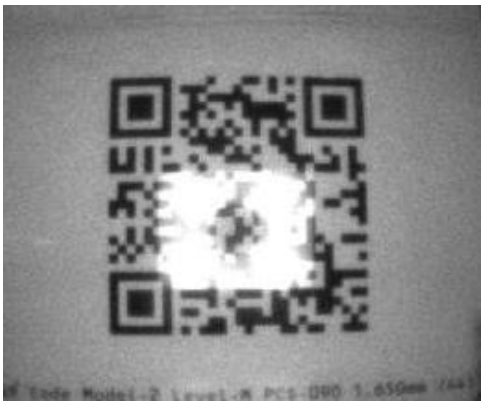


Figure 2: Image of LED Illumination Reflection at a Distance of L = 70 mm

Note: The scanner images can be obtained using UniversalConfig. Contact your sales offices to get this tool.

2.2.3. Image Field of View Size

The following figure and table show the image field of view size * for different distances in the M-12M as a design reference.

Note that the imaging range for the close distance is narrow toward the end.

When the window is installed beyond L = 15 mm, the field of view may be larger than the recommended window size.
* The field of view is the imaging range. Reading code by the entire field of view is not guaranteed.

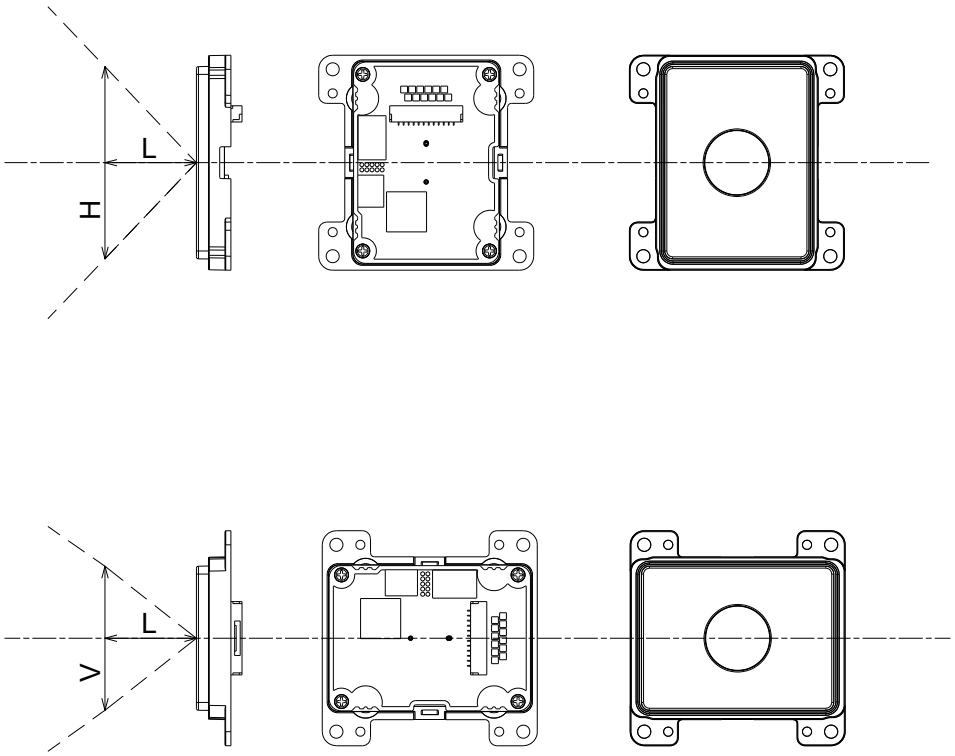


Figure 3: View Angle Dimensions

L	[mm]	1.0	2.0	3.0	4.0	5.0	10.0	15.0	20.0	25.0
H	[mm]	10	14	18	21	25	42	50	70	90
V	[mm]	6	9	11	13	15	26	36	48	58

3. Installation

This section describes practical guidelines for the mechanical installation of the scanner.

3.1. Installation Method

- The scanner can be secured with screws using the screw holes on the housing.
  The screw holes are through-holes, and tightening from either the front or back is possible.
  There are four mounting holes (φ2.3 mm) for an M2 screw, and four mounting holes (φ3.3 mm) for an M3 screw. Use the appropriate screw holes for the screw you are using.

- The back side of the scanner has electronic components mounted. Ensure sufficient space to prevent interference between the circuit board components and surrounding objects.

- When using the scanner in continuous operation mode, such as auto trigger mode, certain components on the back side of the scanner may become hot. Opticon recommends using a design that uses high-thermal-conductivity materials, like metal, near the components and using a heat dissipation sheet to improve heat dissipation efficiency.

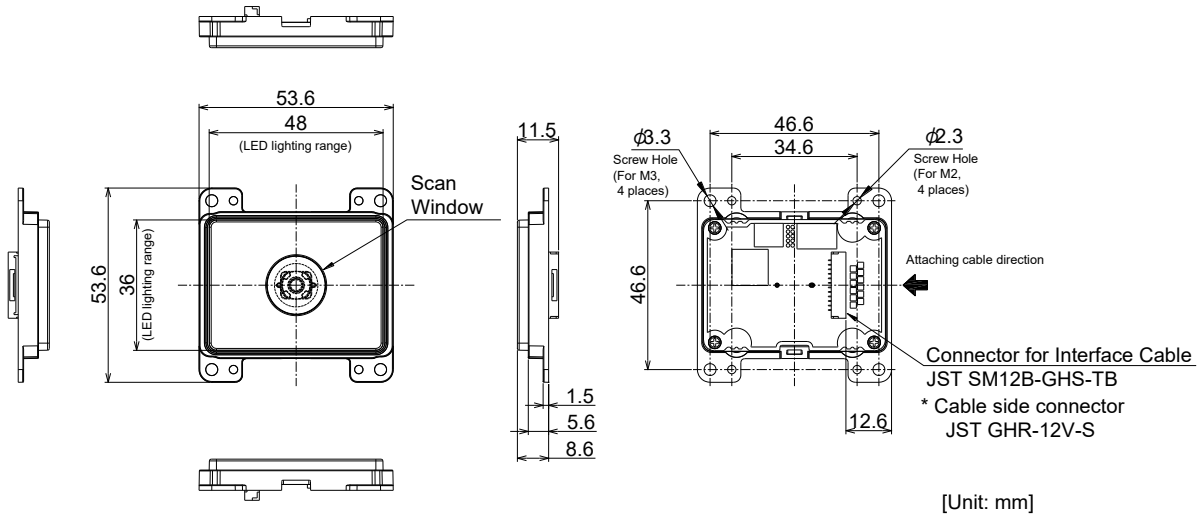


Figure 4: Detailed View

3.2. Image Capture Direction

This section describes the M-12M default settings for image capture vertical direction and view angle size ratio. Determine the direction according to the operation when image capture is required.

- The reading code performance is not affected by the vertical direction of the image. It can be read from any angle.
- The aspect ratio of the field of view size is different from the one previously described. Examine the installation orientation based on the type of code to be read and the operating conditions.
  Note: If the field of view margin is insufficient for the code size, the rotated code may not be read.
- This can be changed in the image direction settings. For more information, refer to the Software Interface Manual.

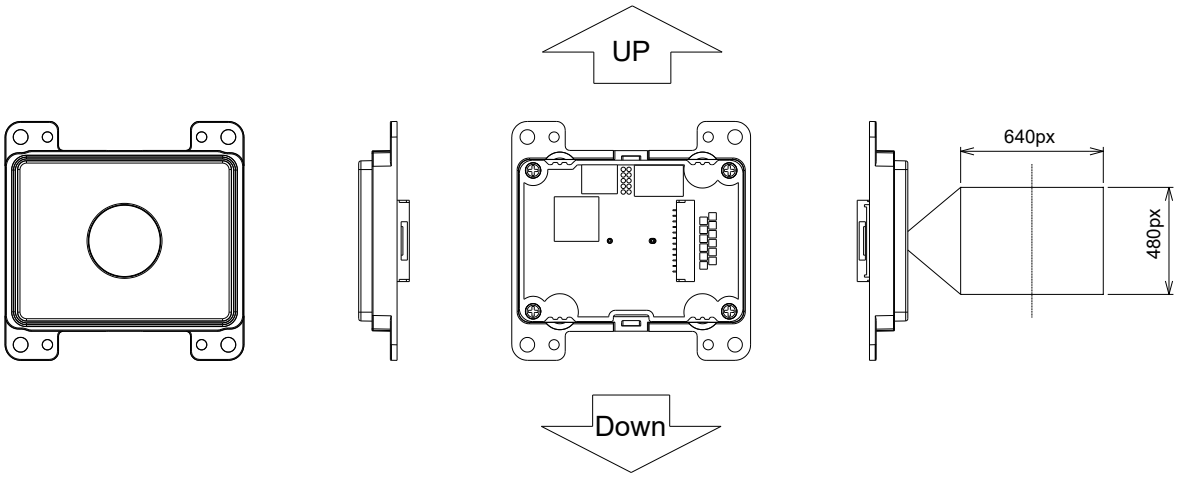


Figure 5: Image Direction and Field of View

3.3. Dustproof and Waterproof

If dustproof and waterproof conditions are required between the M-12M and the installed device, install a rubber gasket around the LED projection area.

The next illustration shows recommended examples for shapes.

* Dustproof and waterproof performance depends on materials and dimensional accuracy. So, ensure performance with the actual device.
* Consult with the manufacturer to determine parts dimensions and tolerances.

Recommended shape example 1: O-ring (molded product)

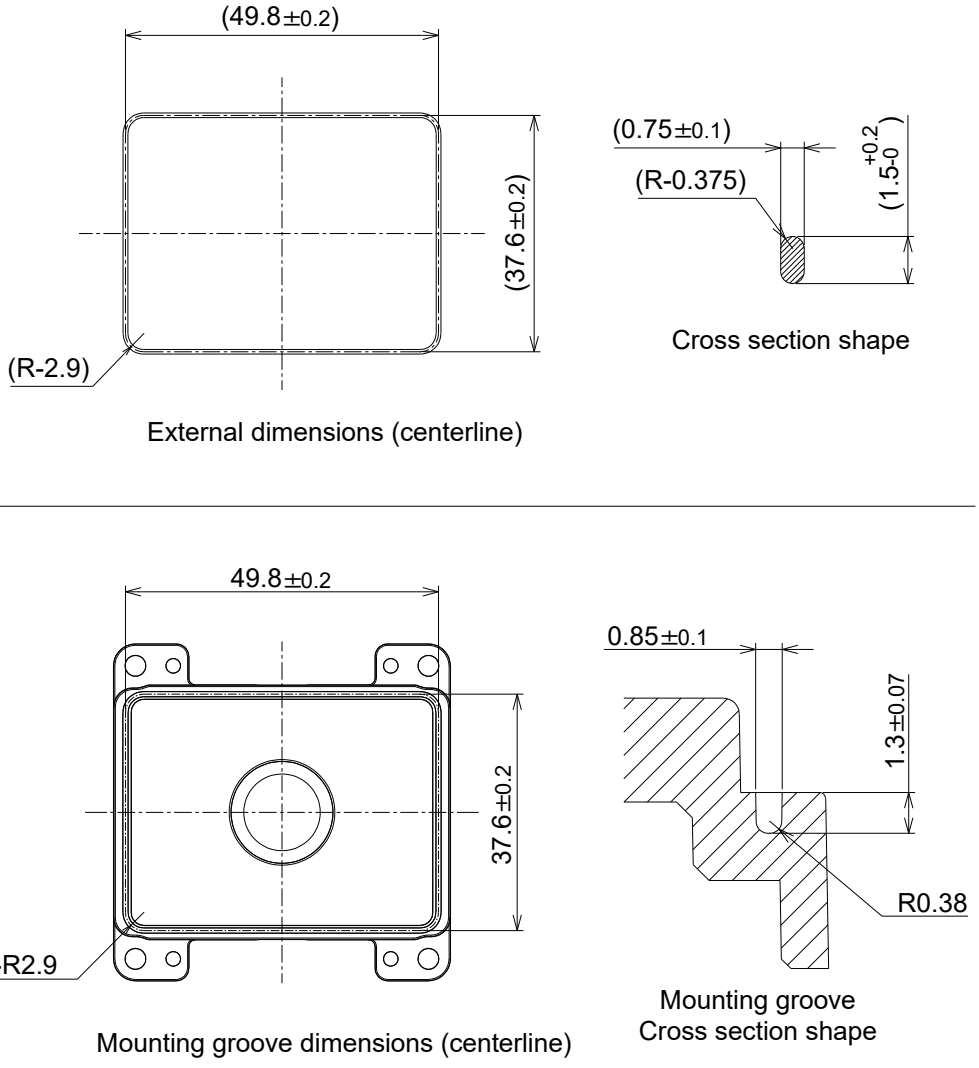


Figure 6: O-Ring Recommended Shape Example

Recommended shape example 2: Rubber sheet (die-cut product)

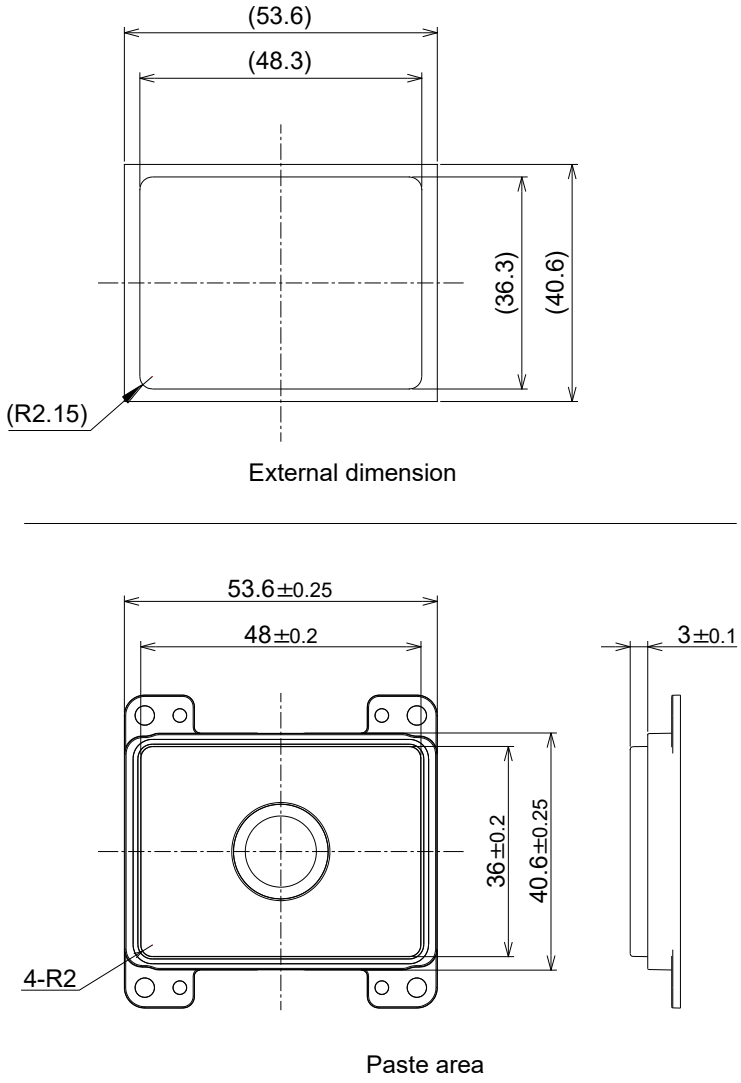


Figure 7: Rubber Sheet Recommended Shape Example

4. Handling Requirements

Follow these recommended handling conditions for incorporating the M-12M into your device:

- To avoid damage to the electronic components from electrostatic discharge, use anti-static measures, such as wearing a grounded hand strap before handling the scan engine.
- Only hold the side of the scanner. Do not touch the scan window, LED illumination parts, or the circuit board.
- Do not touch the electronic components or the terminals on the circuit board.
- To protect the imaging lens and scan window from dust, only install the scanner in a clean environment.
- To avoid contaminating the optical elements, operators should always wear gloves.
- Do not drop the M-12M.

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