Swift-E Reconfigurable 3D Sensor

Catalog Number OI-E1480

Allen-Bradley by ROCKWELL AUTOMATION

odos imaging A Rockwell Automation Company

User Manual

Original Instructions

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

These labels may also be on or inside the equipment to provide specific precautions.

SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

The following icon may appear in the text of this document.

Identifies information that is useful and can help to make a process easier to do or easier to understand.

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Specifications

About This Publication

Industry is evolving. Consumer expectations for personalization result in a growing demand for greater product variability, and ultimately drive the need for more flexible manufacturing and increased spatial awareness. The new Swift-E is a fully reconfigurable 3D sensor that enables you to adapt to new market trends. The capability to adapt to product changes or conditions makes the Swift-E sensor an ideal solution for production lines that require high flexibility.

The Swift-E sensor includes a built-in capability for distance or height measurement, with configuration via an easy-to-use interface that requires no additional software. Firmware updates can extend the capabilities of the Swift-E sensor.

The Swift-E sensor integrates quickly and easily with Allen-Bradley® Logix controllers via EtherNet/IP™, providing real-time data access to help maximize productivity and avoid unplanned downtime.

Who Should Use This Manual

This manual is intended for qualified personnel. Familiarity with the Rockwell Automation Studio 5000® environment and EtherNet/IP networking is necessary. Swift-E is an advanced sensor with an EtherNet/IP interface that uses the principle of time of flight to measure distance. See product documentation before attempting to use Swift-E devices.

Product Features

Features of Swift-E reconfigurable 3D sensors include:

- Sensing area of 640 x 480 individual distance points, arranged in a field of view of 43° x 33°.
- Capability to add up to 64 user-defined Virtual Sensing Zones (VSZ) per template.
- Storage for up to 255 templates (user-defined combinations of VSZs).
- VSZ typical measurement precision of ±1 cm (0.39 in.).
- Operating range from 0.5…6 m (1.5…20 ft).

Download Firmware, AOP, EDS, and Other Files

Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes from the Product Compatibility and Download Center at rok.auto/pcdc.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated Product Selection section	7
Updated Hardware and Software Compatibility section	8
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Updated EtherNet/IP Wiring section	12
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Warning and Caution Summary

ATTENTION: According to IEC 62471:2006, the light-emitting diodes (LEDs) that are used in the Swift-E sensor are classified as exempt. This classification is considered safe and represents no photobiological hazard. As with any light source, the light-emitting diodes must be used consistent with their intended use. Do not stare directly at the infrared light-emitting diode output through the windows on the front of the device.

Device Maintenance

IMPORTANT The Swift-E sensor contains no user-serviceable parts. To open or dismantle the device invalidates the warranty, and causes breakage on board calibration.

If necessary, the windows on the front of the device can be gently cleaned with a microfiber or lint free cloth and distilled water.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Swift-E Reconfigurable 3D Sensor Installation Instructions, publication OI-IN001	Provides detailed information on the physical installation of Swift-E devices.
EtherNet/IP Network Devices User Manual, ENET-UM006	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
ODVA EtherNet/IP Media Planning and Installation Manual (link)	Describes how to plan, install, verify, troubleshoot, and certify you network.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website rok.auto/certifications and odos-imaging.com/certification/	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Chapter 1

Introduction

Device Summary

Swift-E is a reconfigurable 3D sensor. It uses time of flight (ToF) technology to measure the distance to each one of 640 x 480 individual distance points within the sensing area (over 300,000 points in total).

The WebConnect interface allows for the creation of arbitrary shaped selections of distance points - each selection of points is called a Virtual Sensing Zone (VSZ). Virtual Sensing Zones are arranged on a template. Templates can be defined either as a distance templates or height templates. The Swift-E sensor measures either the mean distance to each VSZ, or the mean height measured from the reference (captured during configuration).

Capability to store up to 255 unique templates, each with up to 64 VSZ.

Over an EtherNet/IP™ network, the Swift-E sensor delivers the measurement for each VSZ directly into the controller. The controller is able to define which template to use, allowing the controller to reconfigure the sensing area as required. That is, the controller is able to decide based on a user-defined VSZ arrangement.

Product Selection

Table 1 - Swift-E Sensor Catalog Numbers and Accessories

Description		Cat. No.
Swift-E reconfigurable 3D sensor		OI-E1480
24V DC power supply (90 W)		1606-XLB*x*
DC Micro-style (M12) concave cordset for use with industrial power supply (or similar)	4-pin	889D-F4AC-*x*
	5-pin	889D-F5AC-*x*
Shielded M12 X-code Ethernet cable [1]		1585D-*x*8*x*G*xx*-*x*
Mounting plate with 1/4-20 UNC thread for standard tripod mount		OI-TMOUNT

(1) See rockwellautomation.com/en-us/products/hardware/allen-bradley/connection-devices/network-media/ethernet/1585-m12-and-variant-1.html for details.

Quick Start

To prepare the Swift-E reconfigurable 3D sensor to work on an EtherNet/IP network:

1. Mount the Swift-E sensor (see Mounting Options on page 12).
2. Connect the power and network cables (see Sensor Connections on page 11 and EtherNet/IP Wiring on page 12).
3. Confirm that the computer has an Ethernet interface that is configured in the 192.168.1.xx subnet (see Network Setup on page 16).
4. Use the WebConnect interface to configure (see Configure with WebConnect on page 19).
5. Add the device to a Studio 5000® application and connect a Logix 5000® controller (see Connect to Logix 5000 Controllers on page 39).

After successfully completing these steps, you can configure the Swift-E sensor with a WebConnect browser session, and connect the device to an Allen-Bradley Logix 5000 controller.

Hardware and Software Compatibility

Table 2 - Firmware Compatibility

Cat No.	Firmware Revision / Software Release
OI-E1480	Firmware revision 2.002 and later

Table 3 - Application Compatibility

Product	Firmware Revision / Software Release
Studio 5000 environment	V20 or later
Logix 5000 controllers	Any with EtherNet/IP support
RSLinx® software	2.56 or later (or FactoryTalk® Linx)
Internet browser	Any, tested with Desktop Chrome v80, Mozilla Firefox v74 and Microsoft® Edge v80

Swift-E and Time of Flight (ToF) Technology

The Swift-E sensor uses ToF technology to measure the distance to each individual distance point within the sensing area.

The principle of operation is as follows:

1. A short flash of invisible infrared light (850 nm wavelength) is emitted from the sensor.
2. A small amount of this light is reflected back to the device from objects in the sensing area.
3. A lens focuses light onto the ToF sensor, and the round-trip time is measured. The speed of light is a known constant, and therefore the round-trip distance to the object that reflected the light can be calculated based on the time for the reflected pulse to arrive.

IMPORTANT	For optimal measurement performance, light must be returned directly from the target object to the Swift-E sensor.

Like many electro-optic measurement devices, objects like the following can prove challenging. These objects allow infra-red light to:

- Pass through (translucent objects like clear glass or plastic bottles).
- Reflect away (mirrored surfaces).
- Absorb entirely (dark matte surfaces).

For such objects, you must employ an alternative method of distance measurement.

Effect of Ambient Light

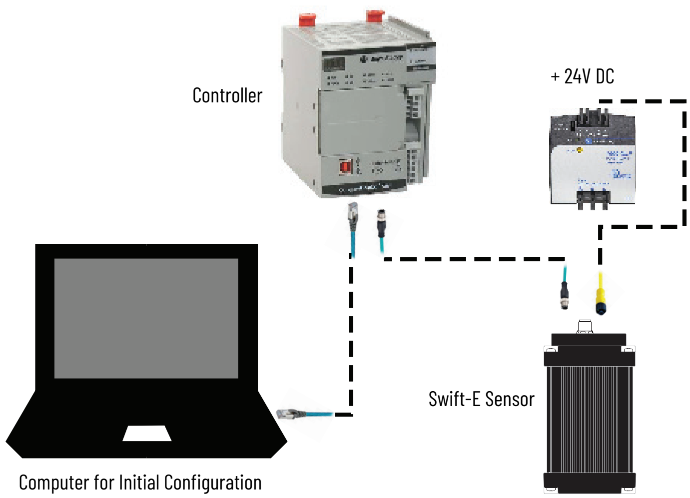
The effect of ambient light from normal indoor light sources is not detected in the Swift-E sensor measurement.

However, in some cases, direct sunlight on the sensing area can cause an error in the measurement. For installations where measurement accuracy is critical, and there is a chance of direct sunlight, we recommend using a shade.

Where there are multiple Swift-E devices in the same area, take care that the sensing areas are well separated to avoid cross-talk between the devices. In these situations, it is possible to pause the illumination while a device is not actively measuring (see Table 13 on page 42 for more details).

Example System Setup

Figure 1 - Example System Setup Illustration



Notes:

Installation

Sensor Connections

An industrial 24V DC power supply powers the Swift-E sensor via the 4-pin or 5-pin M12 power connector (see Figure 2 and Table 4). EtherNet/IP™ connection to the host is via M12 Xcode patchcord.

IMPORTANT The Swift-E sensor requires a 24V DC power supply.

Figure 2 - Sensor Connections

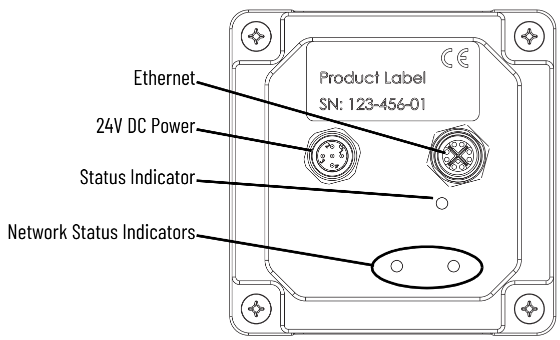


Table 4 - M12 Power Connector on Device

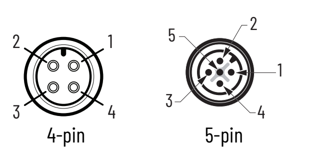
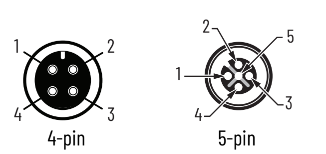
Face View of Convex DC Micro	Pin	Signal/Receiver
 4-pin, 5-pin	1	Reserved
	2	24V DC
	3	Ground
	4	Reserved
	5	Shield/ground

Table 5 - M12 Power Cable Connections

Face View of Concave DC Micro	Pin	Color (1)	Signal/Receiver
 4-pin, 5-pin	1	Brown	Reserved
	2	White	24V DC
	3	Blue	Ground
	4	Black	Reserved
	5	Gray	Shield/ground

(1) The wire colors listed refer to the recommended Bulletin 889D cordsets (see Table 1 on page 7).

Grounding and Power Requirements

The ground/0V/negative power input to the Swift-E sensor must normally be connected to earth ground. Ground is directly connected to the metal housing of the Swift-E sensor for shield purposes, and the shells of all connectors. For concerns for ground loops in the application, we recommend that you keep the connection short from the power supply to the Swift-E sensor. We also recommend that you disconnect the shield of the Ethernet cable at the opposite end, if the connected equipment also has a low-ohmic DC connection to ground. If there is a suspicion of noise problems in operation, keep power cables short, use shielded cables where possible, and apply clip-on ferrites near the Swift-E unit.

Power requirements for the Swift-E sensor can vary based on the illumination settings. In addition, there can be a requirement to support up to 50% inrush on power-up. Therefore, we recommend that you use a power supply of sufficient rating (90 W or greater), for example, the Allen-Bradley® 1606-XLBx power supply.

See publication 1770-4.1.

EtherNet/IP Wiring

ATTENTION: To comply with the limits for a Class A digital device according to Subpart J of Part 15 of the FCC Rules, the use of a shielded Ethernet cable is required.

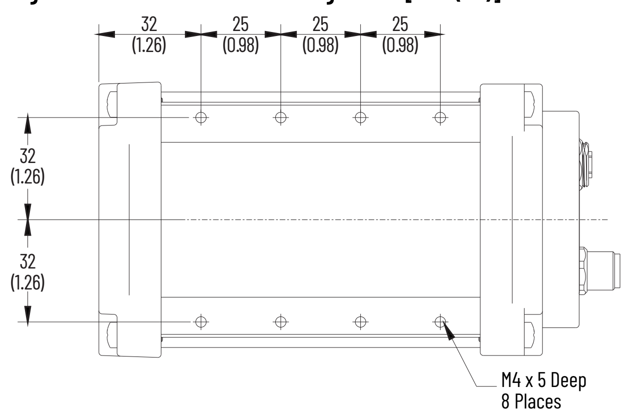
A suitable Gigabit Ethernet cable (for example, CAT5E or CAT6) must be used with the Swift-E sensor. For best immunity to RFI in noisy environments, and to minimize any radiated RF emission from the unit, a shielded Ethernet cable (for example, S/FTP type) is recommended, and can be required for compliance with EMC regulations in some cases. A range of suitable cables is available from Allen-Bradley (rockwellautomation.com/en-us/products/hardware/allen-bradley/connection-devices/network-media/ethernet/1585-m12-and-variant-1.html). See the ODVA EtherNet/IP Media Planning and Installation Manual (see Additional Resources on page 6).

Mounting Options

The Swift-E sensor supports two different methods of mounting:

- The sensor has 16 threaded screw holes (M4) for flexible attachment to a structure, see Figure 3.
- An optional tripod-mount plate accessory (catalog number OI-TMOUNT) can be ordered. The mount plate offers a standard 1/4-20 UNC thread for attaching to any standard camera mounting device.

Figure 3 - Location of M4 Mounting Points [mm (in.)]



For initial evaluation, the Swift-E sensor can be mounted using a flexible approach (for example, clamp or camera grip) and the tripod mount accessory (catalog number OI-TMOUNT), to optimize the setup.

For permanent mounting, we recommend a custom mount. A custom mount can be designed according to the application requirements. Direct mounting onto a metal structure helps dissipate heat from the Swift-E sensor housing. The housing is normally warm or even hot to the touch.

CAD files are available for download from:
configurator.rockwellautomation.com/#/browse;pid=OI-E1480

Height Requirements and Field-of-View

When positioned perpendicular to a surface, the Swift-E sensing area is a rectangle. The width of the rectangle is approximately 0.8 x height from the Swift-E sensor to the surface. The height of the rectangle is approximately 0.6 x height from the Swift-E sensor to the surface.

Due to optical limitations, measurement reliability in the center is better than at the extremities and corners of the sensing area.

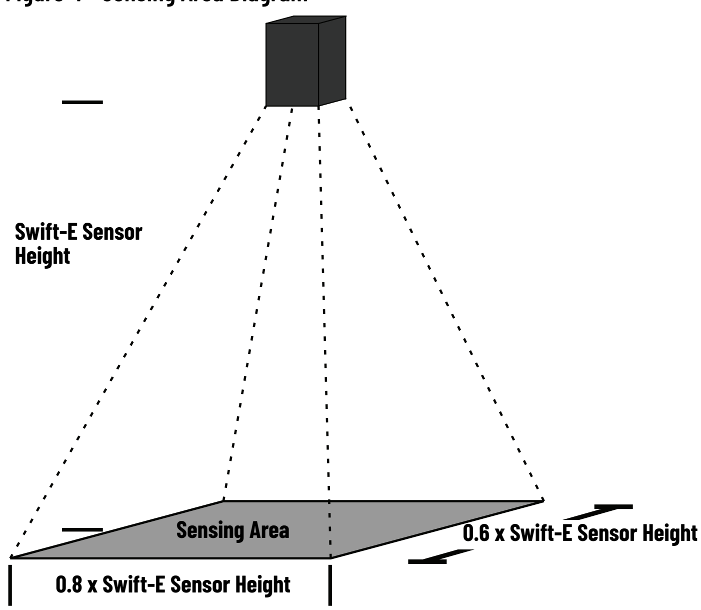
Table 6 - Sensing Area Requirements [m (ft)] (1)

Installation Height (2)	Approximate Sensing Area		Min Recommended Detectable Object Area (3)
	Width	Height	
0.5 (1.46)	0.4 (1.32)	0.3 (0.98)	0.5 x 0.5 (1.46 x 1.46)
1.0 (3.28)	0.8 (2.62)	0.6 (1.97)	1.0 x 1.0 (3.28 x 3.28)
1.5 (4.92)	1.2 (3.94)	0.9 (2.95)	1.5 x 1.5 (4.92 x 4.92)
2.0 (6.56)	1.6 (5.25)	1.2 (3.94)	2.0 x 2.0 (6.56 x 6.56)
2.5 (8.20)	2.0 (6.56)	1.5 (4.92)	2.5 x 2.5 (8.20 x 8.20)
3.0 (9.84)	2.4 (7.87)	1.8 (5.91)	3.0 x 3.0 (9.84 x 9.84)
4.0 (13.12)	3.2 (10.50)	2.4 (7.87)	4.0 x 4.0 (13.12 x 13.12)
5.0 (16.40)	4.0 (13.12)	3.0 (9.84)	5.0 x 5.0 (16.40 x 16.40)
6.0 (19.68)	4.8 (15.75)	3.6 (11.81)	6.0 x 6.0 (19.68 x 19.68)

(1) Size of the sensing area with increasing installation height. Closer positioning achieves optimal measurement performance is achieved with closer positioning.
(2) Maximum. For operating ranges greater than 3 m (10 ft), the quality of measurement can be reduced.
(3) The minimum recommended detectable object area is based on the ability to position a Virtual Sensing Zone accurately, consisting of 88 individual distance points, with the zoom feature in WebConnect (see Zoom Tools on page 32).

In summary, the greater the distance between the Swift-E sensor and target objects, the larger the sensing area, see Figure 4. Note the pyramid shape with the sensing area at the base.

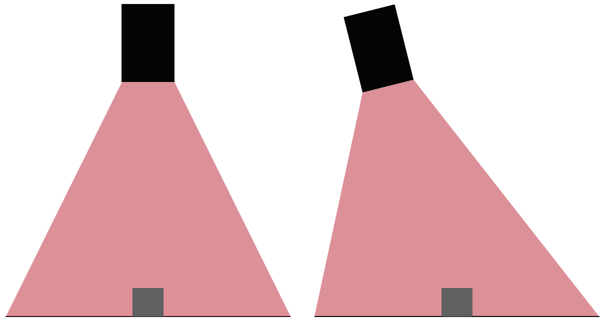
Figure 4 - Sensing Area Diagram



Illumination can spill beyond the sensing area, therefore take care if Swift-E devices are positioned in proximity to each other.

Device Positioning

Figure 5 - Example Mounting Options



The Swift-E sensor must be mounted no closer than 0.5 m (1.64 ft) to the target objects. The maximum operating range is 6 m (19.68 ft), however at longer operating ranges [greater than 3 m (9.84 ft)], quality of measurement can reduce.

Use the most suitable method to mount the sensor, according to the application. In some circumstances (particularly with highly reflective target objects), the signal light that the sensor generates can reflect directly back to the device. This situation can cause saturation of the time of flight measurement, see VSZ Measurements on page 36. In such situations, mount the device at a slight angle (for example, 10°) from the target objects.

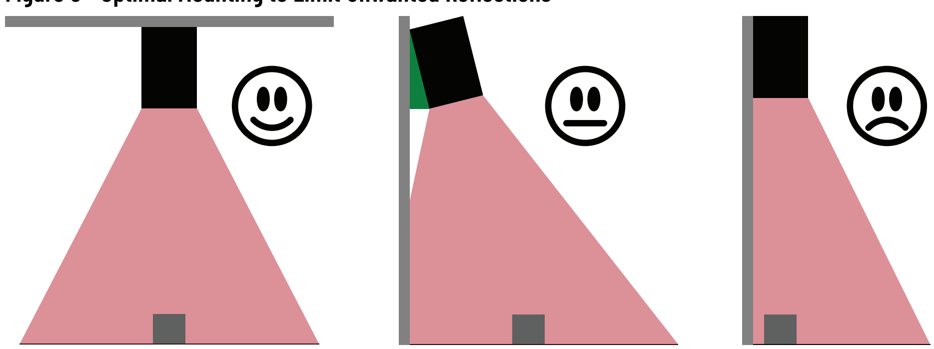
Consider any changes in the measurements that result from the change in application geometry, that is, any target plane is at an angle from the Swift-E sensor. In these applications, it is useful to use height-based templates, see Distance/Height Selection on page 35.

Optimal Mounting Configurations

Any unwanted material or object that is within the field-of-view of the Swift-E sensor (the sensing area at the base of the pyramid shape) can cause unwanted reflections, and potentially introduce a measurement error.

If possible, no objects other than the target objects and background must be within the pyramid. If it is not possible to limit objects within the pyramid, confirm that any large objects are fixed and use height templates where possible.

Figure 6 - Optimal Mounting to Limit Unwanted Reflections



Object Shadowing

Like many optical sensors, objects closer to the Swift-E sensor can block the view of objects further away, which limits the possibility of a measurement from the more distant object. Similarly, objects on the same plane, and close to the external border of the sensing area, can produce a shadow over smaller objects further towards the extremity.

Object Parameters

Object Size

Consider the size of the object to be measured. Small objects can present challenges even at short distances. In general, the larger the object, the easier it is to create proper Virtual Sensing Zones (VSZ) and for the Swift-E sensor to make accurate measurements. If the size of the object requires a small VSZ, the number of individual sensing points to be used for the measurement is low and the quality of measurement can be compromised. Even if an object is large, mounting the Swift-E sensor too far away can result in a small VSZ and create the same challenge. Minimum detectable object areas are shown in Table 6 on page 13. The larger the VSZ over the object, the more accurate the measurement.

For optimal reliability in presence or absence applications, we recommend that you allow a measurable difference of 30…40 mm (1.18…1.57 in.) between the object surface (present state) and the background surface from where the object must be discerned (absent state).

Object Motion

The Swift-E sensor is also suitable for use in applications where the objects are moving (for example, conveyor belts). However, in these applications, there are several items to consider:

1. The size of the object affects the capability of the Swift-E sensor to measure while the object is moving. The larger the object, the smaller the impact of movement on the object.
2. The speed of movement has an impact on the timing of the measurement. Since timing is dependent on each particular situation, we recommend the use of a variable timer to control the time between object detection (for example, use a photoelectric sensor) and the measurement trigger. In many cases, the Swift-E sensor can measure the movement of objects at average conveyor belt speeds (around 1 m/s or 200 ft/min). If the Swift-E sensor is positioned further from the belt, which effectively slows the lateral speed of the object across the sensing area, measurement or detection of faster objects are more reliable.
3. You can develop a template and a controller program to allow the Swift-E sensor to self-trigger. A self-trigger means that the controller selects a particular template that is based on the result of a measurement change that is identified in another template. A self-trigger requires custom code in the controller.
4. Patterned or textured objects can be more difficult for the Swift-E sensor to measure accurately when the objects are moving. We recommend that you configure the VSZ on an area of the object that is uniform, if possible. For example, for a moving carton, configure the VSZ on a blank area, not on any label or logos.

Status Indicators

The Swift-E sensor has one, multicolor status indicator on the rear of the housing with two network status indicators below it (see Figure 2 on page 11).

Table 7 - Network Status Indicator States

Status Indicator	Color	Status
Left/LED0	Off	1 Gbps
	Flashing/steady orange	100 Mbps or 10 Mbps
Right/LED1	Flashing/steady green	Ethernet activity

Table 8 - Status Indicator States During Startup and Operation

Sequence	Status Indicator	Sensor Status
Startup	Off (15 s)	Initial boot of the device
	Green (0.5 s), red (0.5 s), then green	Power up sequence
	Steady red	Boot failure (cycle power to the device to redress the error)
	Steady blue	Boot failure (cycle power to the device to redress the error)
Operation	Flashing blue	The device powered up in an out-of-box condition [1]
	Flashing green	The device is started, Edit mode is enabled, and the device is available for configuration. See WebConnect Mode of Operation on page 21.
	Steady green	The device is started and running
	Flashing red	Major recoverable fault
	Steady red	Major nonrecoverable fault

(1) Out-of-box condition means that the IP address is default (192.168.1.40), and no password has been set on the device. You must set a password to open the WebConnect interface.

Network Setup

Address and Subnet

When connecting with a Swift-E device for the first time, it is necessary that the computer is on the same subnet as the device. The Swift-E sensor ships by default with the following configuration:

- IP address: 192.168.1.40
- Subnet: 255.255.255.0

The Swift-E sensor can only be used with static IP addressing. BOOTP and DHCP protocols are not supported.

The IP address identifies each node on the Ethernet network (or system of connected networks). Each TCP/IP node on a network must have a unique IP address.

The IP address is 32 bits long and has a Net ID part and a Host ID part. Networks are classified A, B, C, or other. The class of the network determines how an IP address is formatted.

It is possible to distinguish the class of the IP address from the first integer in its dotted-decimal IP address, see Table 9.

Table 9 - Classes of IP Address

Range of First Octet	Class
0…127	A
128…191	B
192…223	C
224…255	Other

Each node on the same logical network must have an IP address of the same class and must have the same Net ID. Each node on the same network must have a separate Host ID, which gives it a unique IP address.

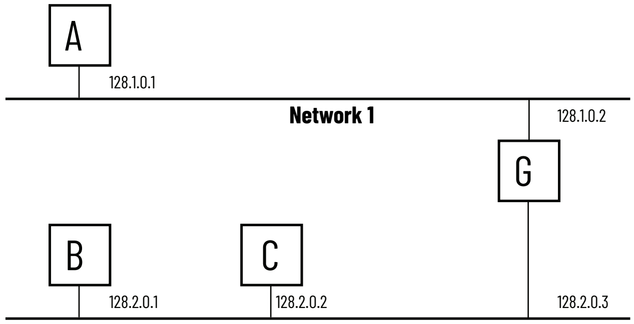
IP addresses are written as four decimal integers (0...255) separated by periods where each integer gives the value of 1 byte of the IP address.

Gateway Address

Skip this section if the controller is in use, the Swift-E sensor and computer are all on the same network. This section applies to multi-network systems. The gateway address is the default address of a network and provides one domain name and point of entry to the site. Gateways connect individual networks into a system of networks.

When a node must communicate with a node on another network, a gateway transfers the data between the two networks. Figure 7 shows gateway G that connects Network 1 with Network 2.

Figure 7 - Two Network Connection with Gateway G



When host B with IP address 128.2.0.1 communicates with host C, B knows from the IP address of C that both are on the same network. In an Ethernet environment, host B then resolves the IP address of C into a hardware address (MAC address) and communicates with C directly.

When host B communicates with host A, B knows from the IP address of A that A is on another network (the net IDs are different). To send data to A, B must have the IP address of the gateway that connects the two networks. In this example, the IP address of the gateway on Network 2 is 128.2.0.3.

The gateway has two IP addresses (128.1.0.2 and 128.2.0.3). Hosts on Network 1 must use the first and hosts on Network 2 must use the second. To be usable, the gateway of a host must be addressed using a net ID that matches its own.

Establish a WebConnect Session

To connect with the Swift-E sensor, the Ethernet interface on the host computer must have an IP address within the same subnet. The interface settings in the device must have:

- IP address: 192.168.1.xx (xx = any number 0…255, except 40)
- Subnet: 255.255.255.0

With network settings correctly configured, open a browser (Chrome, Edge, or Mozilla Firefox recommended) and navigate to the default address (http://192.168.1.40) to establish a connection to the device and present the WebConnect page.

Reset of Network Settings

If the network settings are lost or forgotten, the Swift-E sensor can be reset to default network settings by implementing a hard reset. A hard reset removes the password, and returns IP address settings to default 192.168.1.40.

Cycle power to the device five times in succession to achieve a hard reset. On each cycle, power must be removed within a specific time window:

- After startup (when the status indicator initially becomes green)
- Before 60 seconds after power is applied

If power remains for longer than 60 seconds, the cycle count is resets. After the fifth power cycle, the Swift-E sensor can take up to 90 seconds for the WebConnect interface to become available.

A hard reset does not remove any stored templates.

Notes:

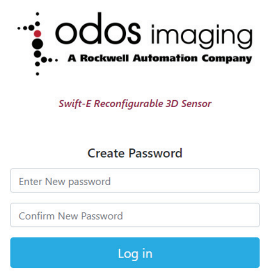
Configure with WebConnect

The Swift-E sensor is tightly integrated with the controller mode of operation. For the simplicity of the first-time configuration, we highly recommend that the Swift-E sensor is not connected to a controller.

First-time Login

When connecting to the device for the first time (or after a password reset function), you must create a password. The password can be 0…64 characters long and can contain any character. Be sure to note the password used.

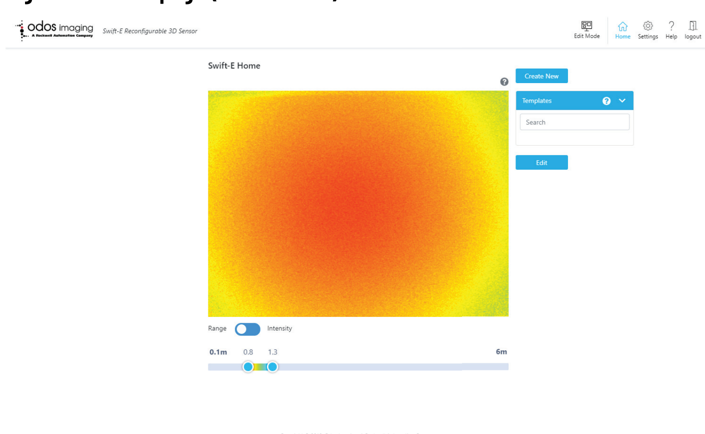
Figure 8 - First-time Login



Enter a password, confirm it in the second box, and select Log in.

The Home page shows once you are logged, see Figure 9. The top bar is common to all pages in the application.

Figure 9 - Home page (in Edit Mode)



If a controller is present in Run mode and the Swift-E sensor is configured in its I/O tree, then the sensing area can display the text Waiting for Trigger. In this case, we recommend that you either place the controller into Program mode, set the WebConnect Enable bit in the output assembly, or temporarily disconnect that the Swift-E sensor from the controller.

Forgotten Password

If the device password is lost, the only way to access the Configuration pages is to perform a hard reset. See Reset of Network Settings on page 17.

Contextual Help

Across the application, there are several instances of the icon, click the icon to open a popup with quick contextual help.

WebConnect Mode and Menu

The top bar indicates WebConnect mode and also functions as a menu bar. Depending on the state of the controller and the login authentication, there are a number of icons visible:

- Edit Mode or Edit Lock
- Home
- Settings
- Help
- logout or login

The Edit Mode and Edit Lock icons indicate WebConnect mode. Depending on WebConnect status, certain functions are or are not available.

Edit Mode

- In Edit mode, you can configure the Swift-E sensor, and create and edit templates.
- To enable Edit mode, authentication is required; enter the password at the Login page. The device is either disconnected from a controller or, if connected, the controller is in Program or Run mode and WebConnect Enable is set.

Edit Lock

- In Edit Lock, the Swift-E sensor is in a read-only mode, and can be monitored over WebConnect, but not configured.
- If Edit Lock is displayed, the controller is connected and in Run mode, and WebConnect Enable is not set.

WebConnect modes are explained in more detail in WebConnect Mode of Operation on page 21.

Swift-E Sensor Mode of Operation

Depending on the controller state and the state of the WebConnect Enable, the Swift-E sensor operates in either Free-running (continuous measurement) mode, or responds to a trigger (see Table 13 on page 42).

- In a free-running mode, Virtual Sensing Zones (VSZ) measurements on the active template are continuously delivered to the controller.
- In Triggered mode, VSZ measurements are delivered only in response to receipt of a trigger request from the controller.

Table 10 - Swift-E Sensor Mode of Operation

Controller State	WebConnect Enable	Mode
Program or Disconnected	0 or 1	Free-running
Run	0	Triggered
	1	Free-running

WebConnect Mode of Operation

The possible level of interaction via the WebConnect interface depends on a number of factors: controller state, authentication state, and WebConnect Enable state.

Table 11 - WebConnect Mode of Operation

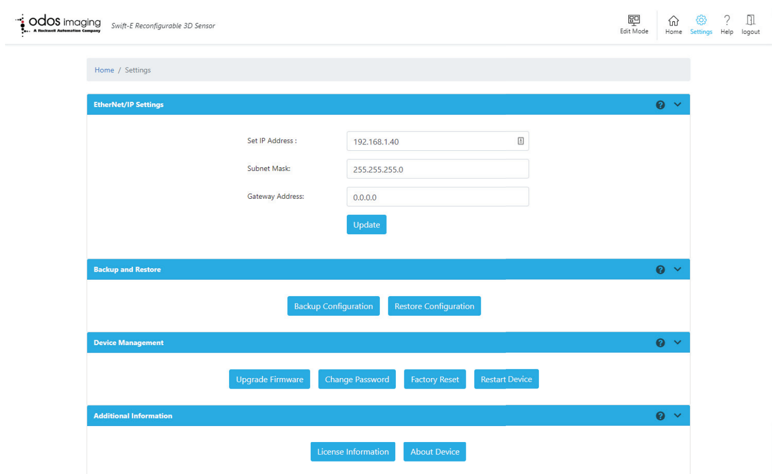
Controller State	WebConnect Enable	Authentication State	WebConnect Mode
Program or Disconnected	0 or 1	Authenticated	Edit Mode
		Not authenticated	No access
Run	1	Authenticated	Edit Mode
		Not authenticated	No access
	0	Authentication bypass	Edit Lock

IMPORTANT If you change the controller state or the WebConnect Enable status when authenticated, the device can be forced from Edit mode to Edit Lock. This switch to Edit Lock can cause loss of work (for example, if done while editing a template).

Device Settings Page

To access the device settings, click the Settings icon on the right of the top bar. The Device Settings page displays, see Figure 10.

Figure 10 - Device Settings Page



In the top gray bar, there is a link to Home on the left and the current firmware revision of the device on the right.

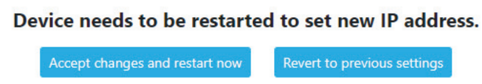
EtherNet/IP Settings

You can set the preferred IP address, subnet mask, and (if necessary) gateway address here. Select Update to confirm.

If no gateway is used for the communication of this device with the controller or computer (most common scenario), leave the gateway field set as 0.0.0.0

To proceed with the IP address change, select Accept Changes and Restart Now. This option applies the new IP address and restarts the device (IP address change does not take effect until the device restarts). A link to the new address is offered upon restart.

Figure 11 - IP Address change confirmation request



To discard changes, select Revert to Previous Settings.

If the EtherNet/IP™ settings are lost or incorrectly set, perform a hard reset to restore the device to default (192.168.1.40). See Reset of Network Settings on page 17.

Configuration Backup and Restore

Backup

During backup, the device creates and downloads a file to the browser that you can use to restore templates if a device factory reset or replacement is needed.

1. Click Backup Configuration.
2. Enter the device password when prompted.
3. A backup file is assembled on the device, which can take a few moments (up to 30 seconds if there are many templates).
4. The backup file is called 'yyyy mm dd hhmm.swiftecfg' and is downloaded to the default download location that is defined in the browser settings. This location is typically the Downloads folder for the current user.

Restore

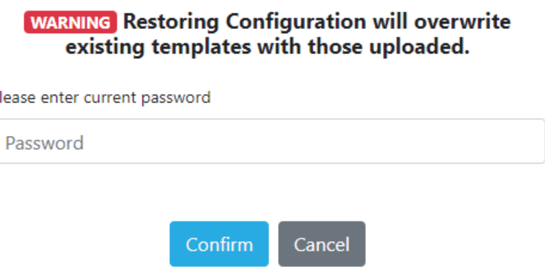
The restore process does not update either the device password or IP address, but replaces any existing templates with templates in the backup file being restored.

1. Click Restore Configuration.
2. Enter the device password when prompted.
3. Select the file to be restored in the dialog box. Only files with extension .swiftecfg can be restored.
4. The file is uploaded to the Swift-E sensor and the restoration initiates (which can take up to 30 seconds, depending on the number of templates in the file).
5. The Swift-E sensor restarts automatically and shows the Login page. The restored templates are shown in the Template Management list.

Due to manufacturing tolerances, there can be slight differences in measurements or lens alignment between devices. We recommend that you revalidate VSZ measurements, alignments, and any background after restoration of the configuration from one device into another.

Only files with extension .swiftecfg can be restored.

Figure 12 - Restore a Saved Configuration



Device Management

Firmware Update

IMPORTANT	This process is only for firmware revisions before 2.002. The process to update firmware changed in revision 2.002 and an update via web is not available.

Firmware files are provided by Odos Imaging® and are uploaded to the device via this interface. A typical firmware update process follows these steps:

1. Download the latest firmware file from rok.auto/pcdc.
2. Click Upgrade Firmware.
3. Enter the device password when prompted.
4. Click Choose File (see Figure 13) and select the new firmware file from the download location. Only files with extension .swifte can be uploaded. Click OK, the file uploads to the device (see Figure 14). Firmware files can be more than 40 MB, and can take a few minutes to upload depending on the speed of the Ethernet connection between the host computer and the Swift-E sensor.
5. When the file has been fully transferred, the upgrade procedure begins (see Figure 15). The upgrade can take 5…10 minutes to complete. Do not turn off the device during this time.
6. When the upgrade procedure is complete (see Figure 16), the device automatically restarts and shows the login page.

Figure 13 - Firmware Update (1)

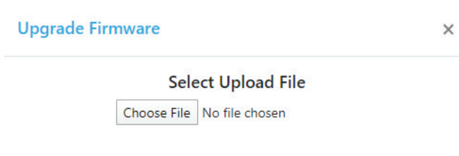


Figure 14 - Firmware Update (2)

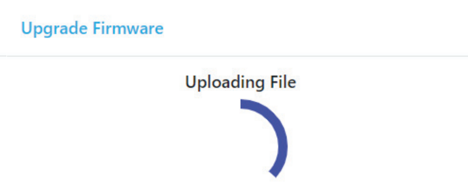


Figure 15 - Firmware Update (3)

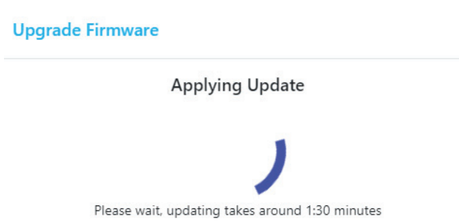
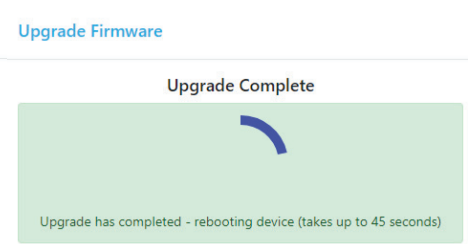


Figure 16 - Firmware Update (4)



Change Password

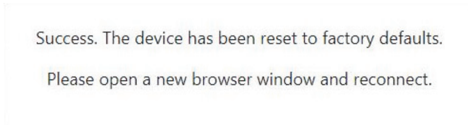
You can change the Swift-E sensor authentication password. Reauthentication is required before you enter a new password.

Factory Reset

You can return all user settings (templates, password, and network settings) to factory default. Reauthentication is required before you initiate a factory reset.

Factory reset requires approximately 45 seconds to complete the reset and restart cycle.

Figure 17 - Factory Reset Confirmation



After the device restarts, close the current WebConnect session, open a new session in a new browser window and navigate to the Swift-E sensor with the default IP address (192.168.1.40). Create a password to log in as normal. See Establish a WebConnect Session on page 17.

Restart Device

This function initiates a device restart. Reauthentication is not required. A restart requires approximately 45 seconds to complete, and the interface automatically returns to the login page.

Additional Information

It is possible to view Device License Information. Select About Device to show detail on firmware revision and build, serial number and hardware ID.

Home Page

The home page shows after login. In this page, you can:

- Create templates.
- Edit existing templates.
- Delete existing templates.

If a controller is present on the same network, the Swift-E sensor is configured in its I/O tree, and the controller is in Run mode, then the frame can display the text Waiting for Trigger. In this case, we recommend that either the controller is placed into Program mode, the WebConnect Enable bit is set in the output assembly, or the Swift-E sensor is temporarily disconnected from the controller.

When Edit mode is enabled, the WebConnect Mode icon is Edit Mode. See WebConnect Mode of Operation on page 21 for more information regarding modes of operation.

Range Representation

In the center of the home page, there is a representation of the sensing area. The representation is a real-time view of each individual sensing point that the Swift-E sensor measures.

The colors that are used represent the distance [0.1...6 m (0.33...19.68 ft)] from the device to the object in the sensing area (red is closer, blue is farther). The bar in the bottom allows adjustment of the color scale for optimal visibility of the target objects.

Colors do not affect the measurement in any way.

Figure 18 - Color Scale Bar

Move the two controls (low and high limits), to select the range for which the color scale applies.

Even if the Swift-E sensor is pointed directly at a flat surface, colors can change from the center of the representation to the edges. The Swift-E sensor measures distance radially - that is, the distance to the edge of the representation is farther from the Swift-E sensor than the distance to the center. See Figure 41 on page 35.

For example, Figure 19 shows a range of 0.1…0.8 m (0.33…2.62 ft), Figure 20 shows a range of 0.5…1 m (1.64…3.28 ft) for the same conditions. The narrower the range (within the application needs) the more the variation in color and the more the colors are separated between objects of different distance.

Figure 19 - Case 1

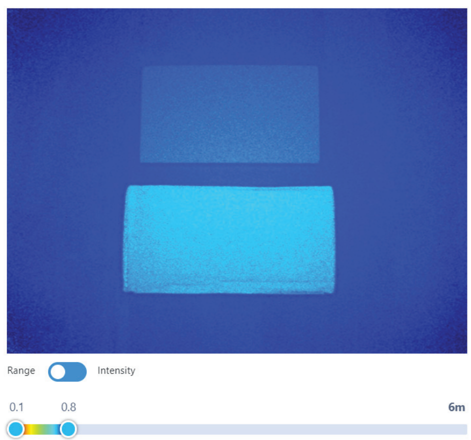
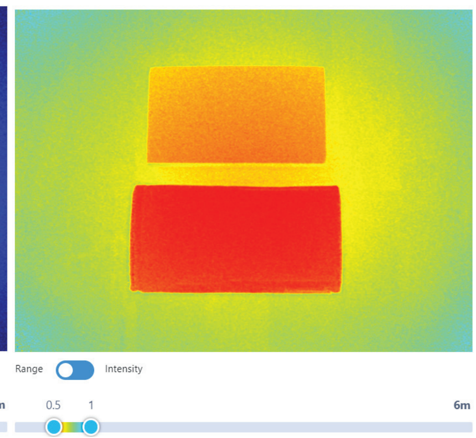


Figure 20 - Case 2



Default values for the color scale are 0.5…3 m (1.64…9.84 ft). Color scale settings return to default values each time the Swift-E sensor power is cycled. Colors do not affect the measurement.

- Any sensing points that are closer than the minimum distance (left slider) is colored deep red.
- Any sensing points that are further than the maximum distance (right slider) is colored deep blue.
- Any sensing points that are colored black are either:
  - Saturated (see Basic Parameters on page 28). Reduce the illumination power to resolve.
  - Thresholded out (see Advanced Parameters on page 29). Reduce the signal strength threshold to resolve.
  - No return light from the object (see Swift-E and Time of Flight (ToF) Technology on page 8). Increase the illumination power and/or reduce the signal strength threshold to resolve.

Intensity Representation

The Range/Intensity switch allows selection between the range (color scales by distance) or intensity (active infrared) representations.

If Intensity is selected, the bottom bar changes to an intensity scale (1…65535) that allows adjustment of the representation for optimal visibility. This adjustment does not affect the measurement.

Intensity is similar to a brightness setting - we recommend setting the left slide to the default minimum value (100), and adjust the right slider until an acceptable intensity representation is achieved.

Figure 21 - Intensity Scale Bar

Default values for the intensity scale are 100…3000. Intensity scale settings return to default values each time the Swift-E sensor power is cycled. Intensity (brightness) settings do not affect the measurement.

Figure 22 - Intensity Representation

- Any sensing points that have an intensity lower than the minimum intensity (left slider) is colored black.
- Any sensing points that are colored white can have either:
  - Intensity higher than the maximum intensity (right slider).
  - Saturated due to too much illumination (see Basic Parameters on page 28).

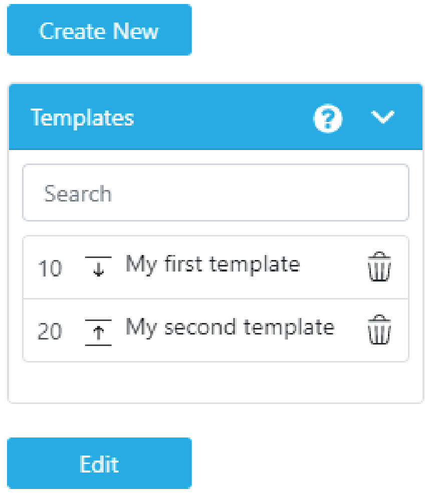
Objects out of the measurement range [6 m (19.68 ft)], but still visible in the intensity representation, are illuminated as a result of ambient infrared light. No measurement is possible beyond 6 m (19.68 ft).

ATTENTION: While the intensity representation can be useful for accurate positioning of VSZ, the range representation gives a better indication of illumination and clearly shows any saturation (see VSZ Measurements on page 36). We highly recommend that you use the range representation to conduct VSZ configuration.

Template Management

A selection of controls for template management is on the right of the home page.

Figure 23 - Template Management



Select Create New to create a template. When templates are created, they show in the Templates list box. It is possible to filter, select, and delete templates from this box. Select Edit to edit the currently selected template.

To copy templates, select 'Edit an existing template' and save with a new name. The new name leaves the original template intact.

Templates in the list are marked with either a (distance template) or (height template). The template ID is shown in the Template Management box. The controller in the Template To Use tag must set this number to take a measurement with that particular template.

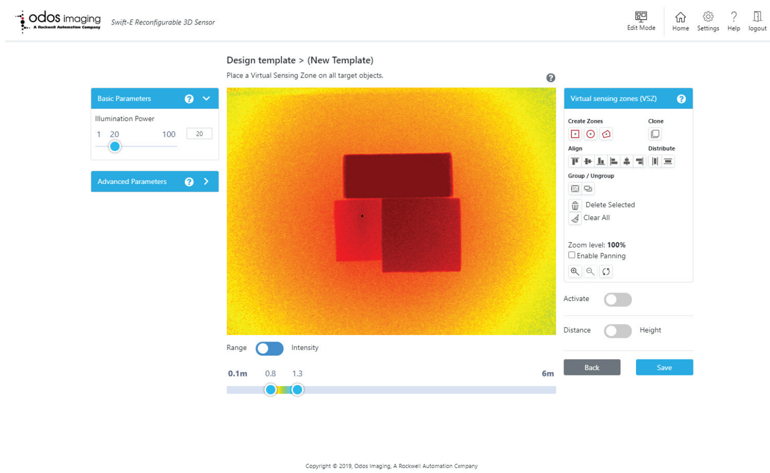
Template Editor

Design or Edit a Template

The Design Template page opens when you select Create New or Edit from the template management area. In this page, you can set acquisition parameters and place VSZ on the template.

The representation in the center of the page is the same as in the Home page, and it is still possible to switch between range and intensity representations and to adjust the color or intensity scale bars.

Figure 24 - Figure 4.17: Design Template Page



To create a template:

1. Set basic acquisition parameters (see [Basic Parameters](#)).
2. *Optional:* Set advanced acquisition parameters (frequently not required) (see Advanced Parameters on page 29).
3. *Optional:* Set upper and lower levels on the color scale bar (see Range Representation on page 24).
4. *Extra step for height template:* Remove all target objects, acquire a background, replace target objects (see Distance/Height Selection on page 35).
5. Create and place VSZ on the template (see Create Zones on page 32).
6. Save the template (see Save Template on page 37).

Acquisition Parameters

On the left of the representation, there are Basic and Advanced acquisition parameter controls for the Swift-E sensor.

Figure 25 - Basic Parameters

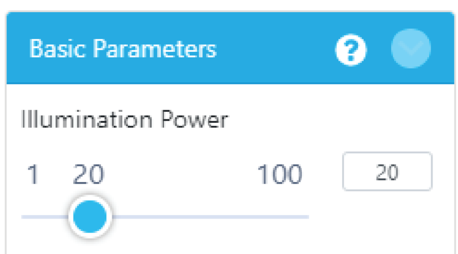
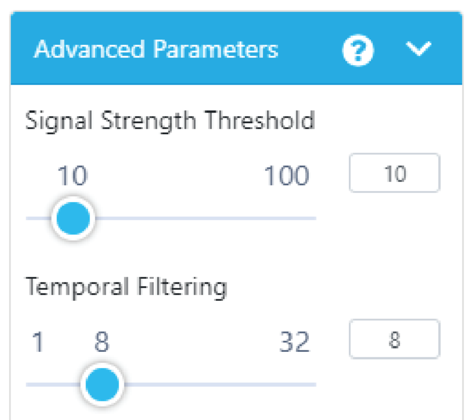


Figure 26 - Advanced Parameters



Basic Parameters

Illumination Power controls the amount of illumination that the device generates. The higher the number, the more illumination (infrared light that is used to measure distance) is generated.

At higher levels of illumination (greater than 60), the Swift-E sensor is noticeably hot to touch. We recommend that you keep illumination to the lowest acceptable level that allows target objects to be successfully measured. Avoid large black areas where the VSZ are positioned which indicates where the measurement is saturated, meaning there is too much light. Lower illumination keeps the device temperature to a minimum and minimizes the chance of causing crosstalk.

The stability of the measurement can improve with increased illumination. In applications where repeatability is an important parameter [for example, measurement or detection of objects under 100 mm (3.94 in.)], we recommend you use higher levels of illumination, but confirm that no part of the target object is saturated.

In Figure 27, the object on the left has excessive signal, and is saturated (no measurement is possible on black areas of the image). In Figure 28, illumination is reduced, and the return signal level is acceptable.

Figure 27 - Excessive Illumination

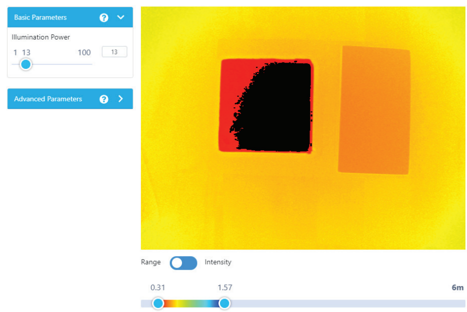
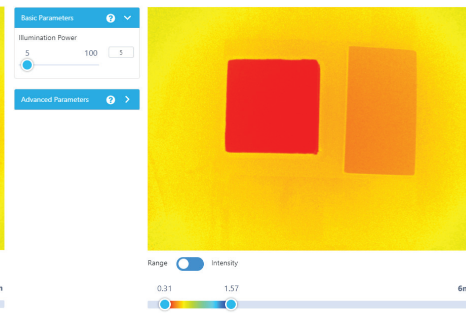


Figure 28 - Good Illumination



Illumination cannot be disabled. If necessary (for example, to minimize crosstalk between multiple the Swift-E sensors), then the Illumination Pause tag can be set in the controller.

Requirements for cyclical control of the pause feature are in the footnotes of the table in Table 13 on page 42.

Advanced Parameters

The Advanced Parameter box is minimized by default, as most applications do not require these parameters to be modified. In applications where optimization of the data acquisition is required, the following parameters can be adjusted.

The Signal Strength Threshold parameter controls the filter for distance points with lower signal.

This parameter has no effect on the intensity representation.

When this value increases, the minimum signal strength that is needed for a point to be considered usable also increases. When the value increases, the result is black areas appear in the representation that correspond to the distance points that have been filtered out. Any measurements from VSZ that are entirely black is out of range (see VSZ Measurements on page 36 for more details on VSZ measurements). By default, this parameter is set to 10.

Figure 29 - Threshold Setting 0 (Off)

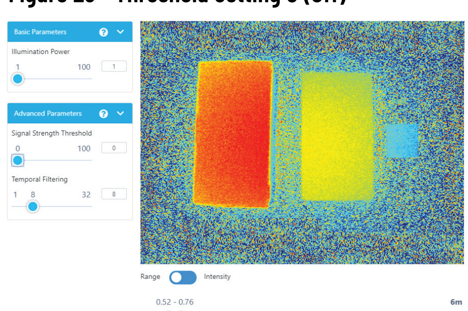
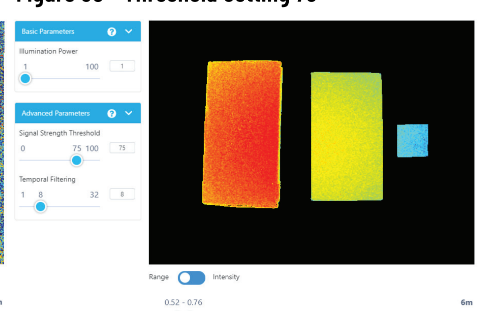


Figure 30 - Threshold Setting 75



Signal Strength Threshold can help to highlight the object to be measured while helping to minimize nonrelevant data.

In Figure 31, the background area is returning a limited signal (distance points have many different colors, which indicate wide variability). The introduction of a threshold setting of 75 (see Figure 32) minimizes all noisy distance points, and the 3x target objects can be clearly identified. This approach can also be useful for presence and absence detection of even small objects - the small blue square on the right is one sheet of paper, yet is clearly distinguished from the background - which has been thresholded out.

This example shows the flexibility of the Swift-E sensor in application changes.

The Temporal Filtering slider allows a level of control over the optimization of measurement quality. The Swift-E sensor contains powerful internal processing capability; this processing optimizes measurement quality in static applications. However, Temporal Filtering allows a level of control of this processing, which supports applications where target objects are in motion. Although in practice, the internal filtering is higher performing than a simple temporal filter.

Figure 31 - Temporal Filter Off

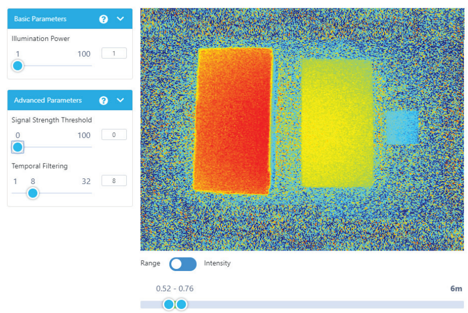
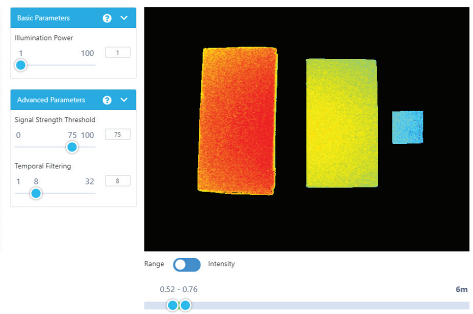


Figure 32 - Temporal Filter Max



This parameter helps reduce noise in measurements, but with higher values, there is a risk for errors in VSZ measurement.

Figure 31 shows that temporal filtering is off (set to 1), and the individual distance points are highly variable (in this example, the background is returning a low level of signal).

In Figure 32, temporal filtering is set to maximum (32), and the colors are more uniform (lighter blue in the center, and darker blue to the corners).

If objects in the sensing area are static, then higher numbers increase the filtering (and measurement stability) without affects to performance. For objects in motion, setting the filtering too high could result in poor quality measurements. Default value is 8.

Temporal filtering can produce a cleaner representation, but at the risk of error in the measurement if the object is in motion. If your application measures objects in motion, keep this value as low as possible.

Effect on Response Time

Illumination and Signal Strength Threshold Parameters

Response time (the time for data to arrive in the controller after receiving a trigger is ~100 ms. A change of Illumination or Signal Strength Threshold parameters adds up to an additional ~100 ms. Therefore, switching between templates that have different parameters could require around ~200 ms from the trigger until data is available in the controller.

The Swift-E sensor minimum response time (~100 ms) occurs when consecutively triggering with the same template, or when different templates use the same acquisition settings.

If the application demands that the Swift-E sensor is rapidly switching between templates, we recommend that all templates are saved with the same acquisition settings. If this setup is not possible (for example, if the application has large dynamic range requirements), then confirm that sufficient time is allowed for the Swift-E sensor to alter the acquisition settings for Illumination and Signal Strength Threshold t(~200 ms minimum, but longer is preferred). Switching too quickly can result in lost measurements and/or reduced measurement accuracy under some conditions. Do not attempt rapid switching between templates with different settings for temporal filtering (an unrecoverable error can occur).

Temporal Filtering Parameter

The Temporal Filtering function has a significant impact on the internal measurement acquisition process. Therefore, we do not recommend quickly changing between templates with different settings for Temporal Filtering. If change cannot be avoided, then allow at least 60 seconds for data acquisition to settle after changing temporal filtering.

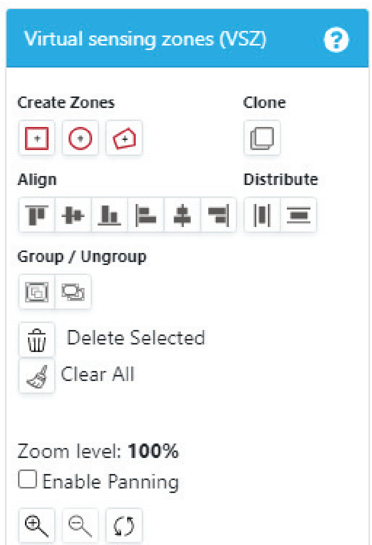
Allow sufficient time in your controller application when switching between templates with different acquisition settings.

ATTENTION: If the application requires fast switching between templates, it is not recommended to use templates with different temporal filtering. Only use templates with different temporal filtering as a last resort, and when switching happens infrequently, less than once per minute.

Add Virtual Sensing Zones (VSZ) to Template

There is the VSZ palette on the right of the representation of the sensing area.

Figure 33 - VSZ Palette



How VSZ Work

VSZ represent an average of distance or height that every distance point that is contained in the VSZ reports. VSZ measurements are in centimeters.

VSZ allows the creation of zones of interest on a template where distance or height is evaluated. The measurement that each VSZ record is delivered to the controller, and that VSZ appears in the controller as a physical sensor with the same measurement.

The Swift-E sensor provides full flexibility for definition of what is measured, and the capability to change this setup every time the device produces new data (by changing templates).

Every VSZ within a template has a unique number (1…64), which is related to the corresponding tag in the EtherNet/IP input assembly. For example, a VSZ labeled 1 (in the active template) has measurement results available in tag Data VSZ1.

Create Zones

Create Zones allows the creation of new VSZ by placing them directly on the representation of the sensing area. The drawing tools are similar to tools found in common graphics creation software. To do so click one of the icons to create a square, circular or polygon VSZ:

- Select a square to create a VSZ immediately. You can use the handles to resized, shaped into a rectangle, or rotated square VSZ.
- Select a circle to create a VSZ immediately. You can use the handles to resized, shaped into an ellipse, or rotated circular VSZ.
- Select a polygon draw a custom VSZ in the sensing area. To do so, click the starting point in the image and then move to the next corner and click again. Continue this cycle of click and move until the polygon is closed by clicking again on the red dot (origin point). After creation, polygons can only be resized. They cannot be rotated, nor can any edits be made to individual nodes in the polygon.

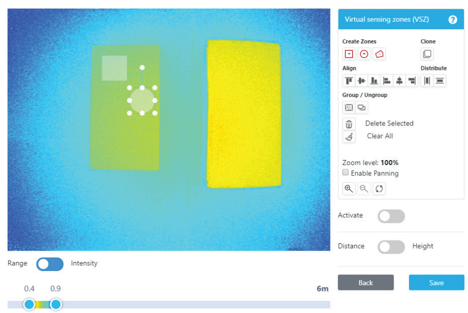


Figure 34 - Squares and Ellipses

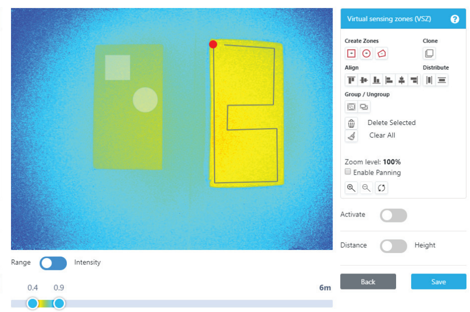


Figure 35 - Polygons

Measurements from each VSZ are generated when VSZ are active. See Activate VSZ on page 34 for details on how to activate VSZ. VSZ cannot be edited when active.

IMPORTANT	The Create New function always uses default acquisition settings: Illumination 20, Threshold 10, Temporal Filter 8. Settings (and backgrounds) can be inherited from another template. First, edit the template, then use the Save and New function.

Zoom Tools

The zoom tools are useful for accurate positioning of small VSZ. When zoom is used, check Enable Panning to pan the representation to the area of interest. You must disable Enable Panning to manipulation of VSZ. Reset restores the zoom to default.

To easily size and position small VSZ, create the initial VSZ larger than required, then use a corner handle to reduce the size.

Clone VSZ

Clone allows the duplication of VSZ. To use this function, first select a VSZ (or a group of VSZ), and press Clone to duplicate. The newly created VSZ can be moved to the desired position.

To select multiple VSZs, press and hold Shift on the keyboard and click each VSZ, or draw a selection area around the VSZ. To remove VSZ from a group, press and hold Shift on the keyboard and click each VSZ to deselect.

VSZ Numbering

VSZ are numbered consecutively and start with 1. When multiple VSZ are copied, they are numbered accordingly.

If VSZ1, VSZ2 and VSZ3 are created and then VSZ2 is then deleted, the remaining VSZ retain their original numbering (VSZ3 does not replace VSZ2). Instead, the next VSZ created will be VSZ2. This numbering confirms the correlation of sensor data between the device and the controller.

Every VSZ within a template has a unique number (1…64) which is related to the corresponding tag in the EtherNet/IP input assembly. Data from each VSZ (1…64) is available in tags Data VSZ1…VSZ64.

Group VSZ

Group and Ungroup functions are used to manage groups of VSZ. These functions are useful for handling and aligning many VSZs.

Groups are not saved, and are only maintained during the current session. Multilevel groups (groups of groups) are not supported.

Delete VSZ

Individual (or groups of) VSZ) can be deleted from the template with the Delete Selected tool. Remaining VSZ are not renumbered (see VSZ Numbering). Clear All removes all VSZ from the template.

Align and Distribute VSZ

The Align and Distribute functions allow large arrays of VSZ to be quickly and easily created (especially when used with the Group tool). Available functions include:

- Align Top, Middle, or Bottom allow for vertical positioning.
- Align Left, Center or Right allow for horizontal positioning.
- Distribute Horizontally allows for even positioning between the leftmost and rightmost VSZ in a selection
- Distribute Vertically allows for even positioning between the top and bottom VSZ in a selection

Figure 36 - Square Sensor - Created, Resized, And Cloned

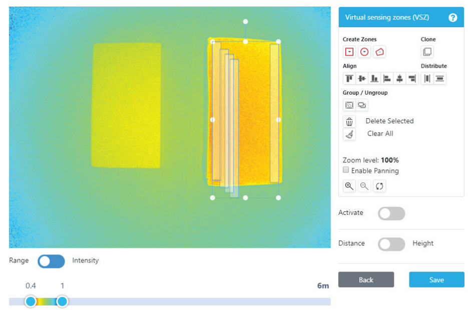


Figure 37 - After Top Alignment and Horizontal Distribution

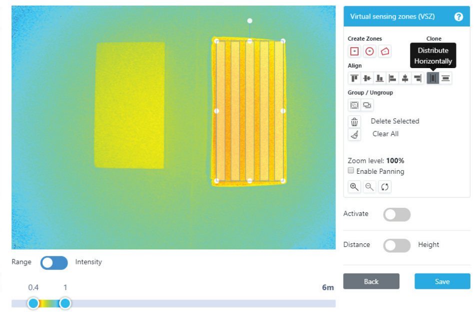


Figure 38 - A Square Sensor - Created, Resized, And Cloned

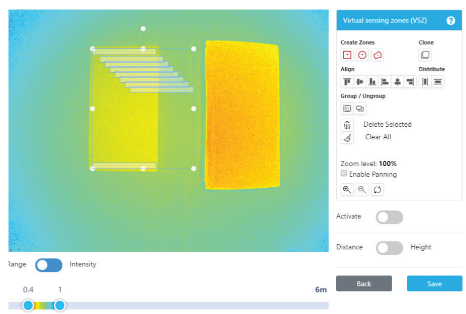
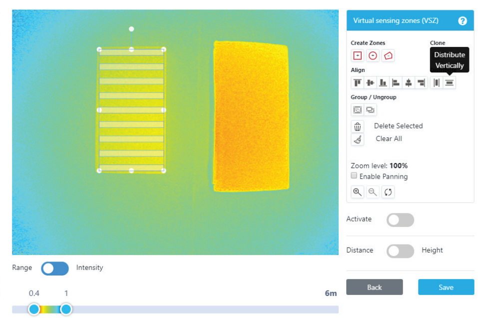


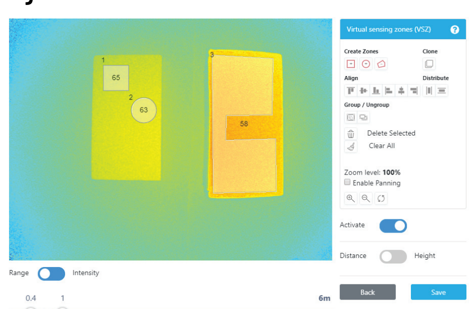
Figure 39 - After Left Alignment And Vertical Distribution



Activate VSZ

After VSZ are created, the Activate switch allows the Swift-E sensor to acquire live measurements to each VSZ. The measurement is in centimeters. The measurement for each VSZ is transmitted to the controller over EtherNet/IP. VSZ cannot be edited or moved when active.

Figure 40 - VSZ Activated and Measurements Taken



Data Refresh

The refresh rate of the distance representation is slower than the rate of the actual measurement - both in the WebConnect session and the measurements that are delivered to the controller over EtherNet/IP. This delay is intentional and is designed to minimize the impact of producing the graphics and data for the WebConnect session, which require a considerable amount of the available processing power on the Swift-E sensor. The Swift-E sensor is optimized for headless operation to maximize performance and repeatability.

ATTENTION: Performance at the controller level is slower (by about 50…100 ms) when the WebConnect session consumes live data either in Edit Mode or Edit Lock. We advise that a WebConnect session is not active during normal/production operation.

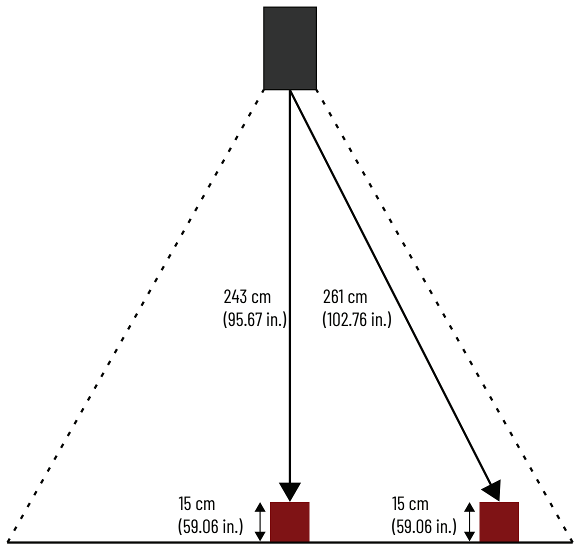
Distance/Height Selection

During template design, you can set VSZ to produce either distance or height measurements. It is not possible to have a mixed template with distance and height VSZ.

Distance Templates

Templates are set to distance measurement by default. In a distance template, the VSZ measurement is the average of all distances from the sensor to each individual point grouped in the VSZ. As a result, objects in a plane produce a slightly larger measurement the farther they are from directly in front of the center of the Swift-E sensor as shown in Figure 41.

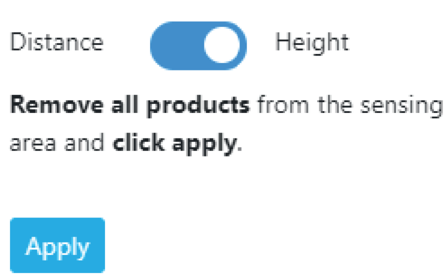
Figure 41 - Distance Measurement Concept



Height Templates

Templates can be configured to provide height measurements for VSZ by toggling the Distance/Height switch to Height. A popup requests removal of all products from the sensing area, click Apply (see Figure 42).

Figure 42 - Apply a Background



The process behind this step is depicted in Figure 43 on page 36. The Swift-E sensor captures a reference distance to every distance point in the sensing area (a background).

After the background is set, all VSZ measurements are height. That is, processed as the difference between the background and the actual distance measured (in the center VSZ in Figure 43 and Figure 44 on page 36 this measurement is 258 - 243 = 15 cm).

Height can be a negative value if the VSZ average distance is larger than the background distance.

Figure 43 - Acquisition of Background

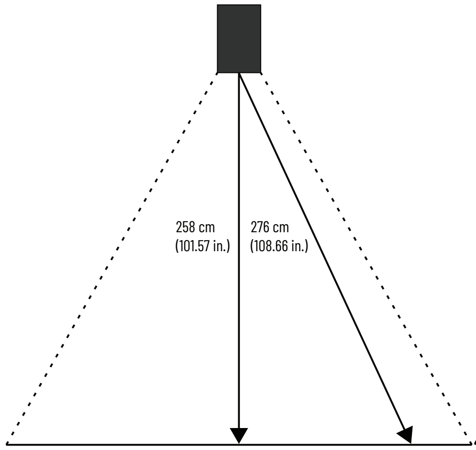
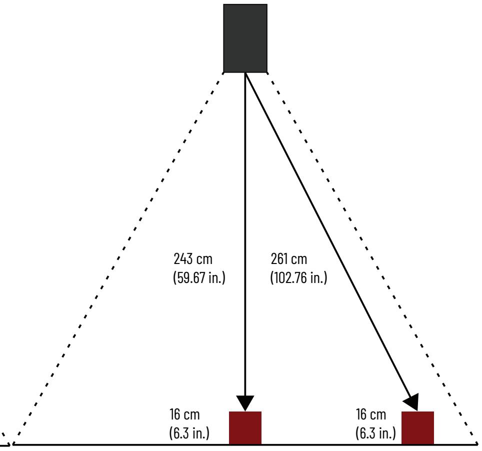


Figure 44 - Height Measurement After Background Acquired



In many cases, the use of a height template can result in more stable measurements. We recommend that you use height in applications that validate the presence or absence of objects.

A change from height to distance measurements removes the background. Switching back to height requires reacquisition of background.

VSZ Measurements

VSZ measurements are in centimeters, and are typically within the range 0…600 (negative measurements can be possible in height templates). The measured number that is shown in WebConnect is the number that is delivered to the controller. If Out Of Range (OOR) is observed, then there is no measurement possible for that VSZ. The controller receives 999 in Result VSZn for any VSZ that shows OOR in WebConnect, and Status VSZ is set to 1. VSZ can be OOR for one of two possible reasons:

- Excessive signal light is returned to the Swift-E sensor from the target object, which causes saturation of the sensor.
- Insufficient signal light is returned to the Swift-E sensor from the target object.

For more detail on appropriate settings for illumination, see Basic Parameters on page 28.

Figure 45 - VSZ is Saturated, Measurement is OOR

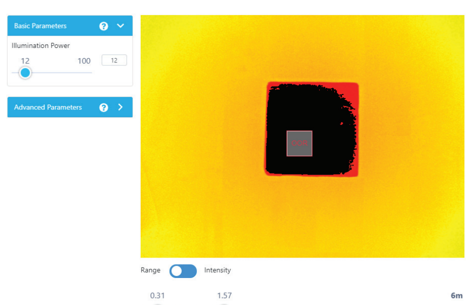
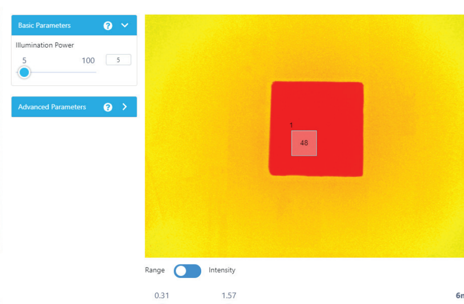


Figure 46 - VSZ is Not Saturated, Measurement is OK



Excessive Signal

Excessive signal results in an OOR measurement, and is most likely to occur when the target object is close to the device, and illumination is set too high on the active template. Reduce illumination power for the active template. See Basic Parameters on page 28. It can also be necessary to adjust physical setup. See Device Positioning on page 14.

Insufficient Signal

Similarly, insufficient signal results in an OOR measurement, and is most likely to occur when the target object is far from the device or the target object is of a non-reflective material. Increase illumination power for the active template or move the Swift-E sensor closer to the target object. See Basic Parameters on page 28.

Save Template

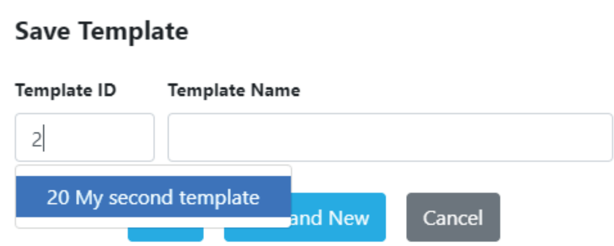
Click Save to open the Save Template popup. Templates require a template ID and a template name. The template ID is a number from 1…255, the name is a text string for user-friendly naming, and easy identification of templates in the Template Manager. The controller can instruct the Swift-E sensor to use the given template by writing its template ID in the Template To Use tag. After a trigger is issued, the controller then confirms the template that is used for measurement in Template In Use.

The template ID is the number that the controller uses to instruct the Swift-E sensor to use a given template. The template name is for user reference only, and is a convenient way to identify templates in the Template Manager.

As you enter the template ID, a live search indicates if another template has already allocated the chosen template ID (see Figure 47).

Save returns to the Home page with the new template activated. Save and New saves the template, returns to the Design Template page, and retains the background and currently set acquisition parameters. Cancel closes this dialog without any action.

Figure 47 - Save Template Popup



Save and New is a convenient and easy way to create many similar templates after the acquisition of a just one background. Save and New also retains all current acquisition parameters for the new template.

Application Considerations

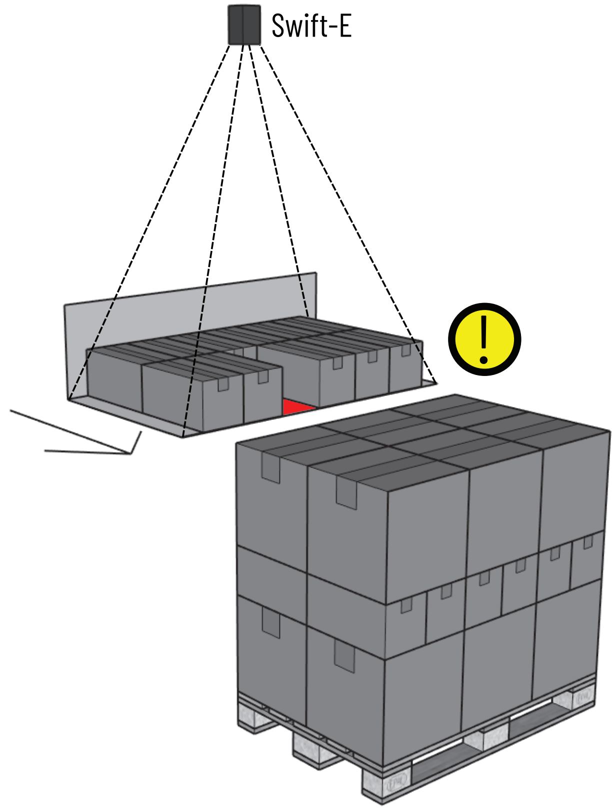
In some applications, distance measurements can provide a better outcome, while in other applications, height provides a better measurement.

Typically, applications that require validation of the presence or absence of objects are best suited to the use of height-based templates (use of a reference). See Distance/Height Selection on page 35. For optimal reliability, we recommend that a measurable difference of 3…4 cm (1.2…1.6 in.) is allowed between the object surface (present state) and the background (absent state). This difference allows easy thresholds to be set in the controller logic for presence/absence decision-making.

Examples of presence/absence applications include:

- Validation of product in case: Typically used in secondary packaging, confirmation that a product is properly positioned/located in the case.
- Pallet layer verification: In palletizing/depalletizing applications, the Swift-E sensor can be used to confirm that a layer of a pallet has been properly formed (for example, when using a robot palletizer) or removed. When the Swift-E sensor is positioned above the pallet (in a fixed location), we recommend building another template for each of the layers of the pallet (and repeat for different product sizes if necessary). An example is shown in Figure 48 on page 38.

Figure 48 - Example - Layer Verification on a Push Palletizer



Some examples of applications where distance measurement can be preferred include:

- Flexible distance measurement: As one sensor with wide operating range and easy to use configuration interface, the Swift-E sensor is an ideal alternative for many fixed distance measurement devices.
- Arrays of laser measurement devices: Many applications can benefit from the use of the Swift-E sensor to replace an array of laser measurement devices sensors (or other type of measurement devices) to provide the flexibility and reconfigurability that the application might require. the Swift-E sensor requires minimal installation, configuration, and wiring.

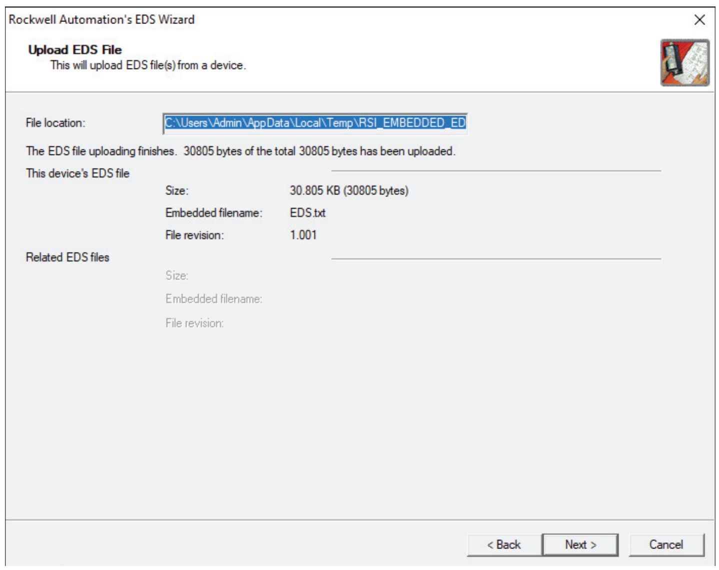
Connect to Logix 5000 Controllers

EDS File

The Swift-E sensor ships with an embedded EDS file. When the device is connected to a computer, the EDS file can be uploaded directly from the device. To do this, open the RSLinx® Classic application (use FactoryTalk® Linx) and confirm that a driver is configured for the EtherNet/IP™ network (for more information, consult RSLinx Classic application documentation).

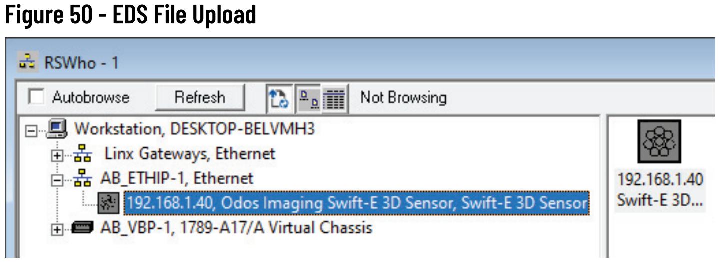
Once the Swift-E sensor shows in RSWho, right-click the device and select Upload EDS File From Device. This action initiates the upload of the EDS file.

Figure 49 - EDS File Upload



Once the upload finishes, click Next until the process is complete. Then, click Finish. The Swift-E sensor now shows in the RSLinx application (Figure 50).

Figure 50 - EDS File Upload



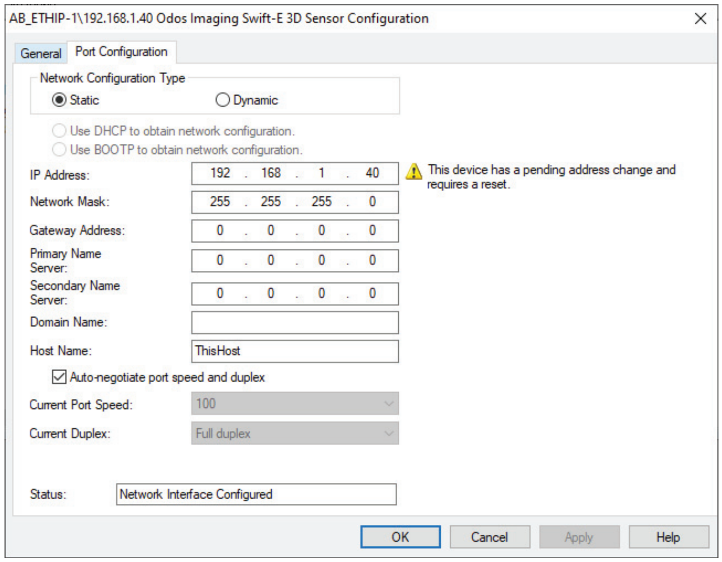
Alternatively, you can download the Swift-E sensor EDS file from the Rockwell Automation Product Compatibility and Download Center rok.auto/pcdc.

Change Swift-E Sensor IP Address

Use the RSLinx application to change the Swift-E sensor IP address. Right-click on the device and select Module Configuration. Click Port Configuration to change the IP address. When the IP address is set, restart the Swift-E sensor.

You can use the WebConnect interface to restart the Swift-E sensor (Restart Device on page 24). Until restart, the WebConnect interface continues to be available on the old IP address. The Swift-E sensor Module Configuration is shown in Figure 51.

Figure 51 - RSLinx Pending Address Change



If the RSLinx application flags the error that is shown in Figure 52 during the setting of a new IP address, then the controller is connected to the Swift-E sensor and the Swift-E sensor is configured in the controller I/O tree.

Figure 52 - Address Error in RSLinx

You can still change the Swift-E sensor IP address by conducting any of the following steps:

1. Use the WebConnect interface (EtherNet/IP Settings on page 21).
2. Physically disconnect the device from the controller, and reapply the desired IP address change.
3. To change the IP address from within the RSLinx application, open the Studio 5000 Logix Designer® application, and in the Swift-E Add-on Profile (AOP), go to Connection and select Inhibit Module. This action temporarily inhibits the connection with the controller. Once the IP address is changed, you must update the AOP with the new one, and you must unchecked Inhibit Module.

After settings are changed in RSLinx application, the Swift-E sensor continues to be available on the old IP address until restart.

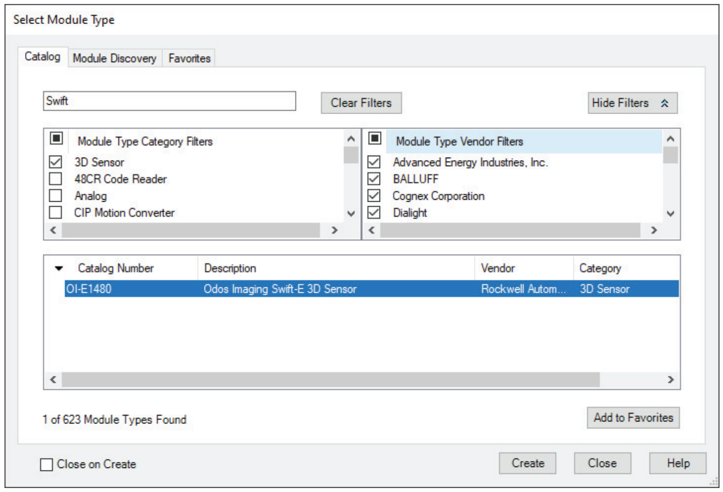
Add Swift-E to Studio 5000 Logix Designer Application

The Swift-E sensor connects via EtherNet/IP with Logix 5000® controllers. To establish a connection between the Swift-E sensor and the controller, open a new or existing Studio 5000 Logix Designer application. On the I/O configuration tree, right-click on the controller Ethernet port where the Swift-E sensor is connected, and select New Module.

Make sure that both the Swift-E sensor and the port that is used in the controller are in the same EtherNet/IP subnet.

In the Catalog tab, enter Swift in the Search text box (you can search for Odos, OI-E1480, or 3D Sensor).

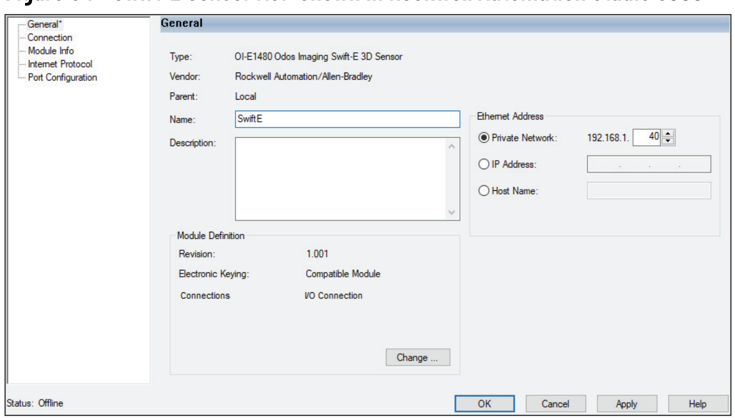
Figure 53 - Adding Swift-E to Studio 5000 as a New Module



Click OI-E1480 in the bottom box and then Create.

A New Module window appears. Enter a name for the device, and the Ethernet Address that is selected while configuring the device (default is 192.168.1.40).

Figure 54 - Swift-E Sensor AOP Shown in Rockwell Automation Studio 5000



In most cases, you can leave everything else as default. However, if needed, you can adjust the Connection RPI to match the application needs. The minimum possible RPI for the Swift-E sensor is 10 ms.

The Swift-E sensor default RPI is 20 ms, with Unicast connection and cyclic input trigger.

Once all configuration is completed, select OK to close the window.

The Swift-E sensor is now added to the I/O configuration tree of the controller application.

Input and Output Assembly Tags

Once the Swift-E sensor is added to the controller application, its Input and Output data assemblies appear in the Controller Tags database. The tags show as:

- Input assembly - [device name]:I. tag name
- Output assembly - [device name]:O. tag name

Table 12 - Input Assembly

Tag	Type	Description
ConnectionFaulted	BOOL	• 0 when connected • 1 when the connection to the device is lost
Status	SINT	Provides the status of the last measurement: • 0 - OK (default) • 63 - In Progress (measurement is in progress, but not yet finished) • 64 - Warning/Recoverable Fault • -128 - Internal Error
Template_In_Use	INT	Template number used for the last valid measurement
Number_of_VSZ	SINT	Number of VSZ in the template used for the last valid measurement
Trigger_Counter	INT	Increases by one every time a new measurement is completed after a trigger (resets to 0 once it reaches 32767)
Data_VSZn (1)	INT	Measurement data for VSZn in centimeters, is 999 if measurement is out of range
Status_VSZn (2)	BOOL	• 0 if normal • 1 if out of range or other error is present
Used_In_Template_VSZn (3)	BOOL	• 1 if VSZn is present in the active template • 0 if not
Type_VSZn (4)	BOOL	Indicates the type of VSZ in the template: • 0 - the data is DISTANCE data • 1 - the data is HEIGHT data

(1) There are 64 Data tags in the input assembly (Data VSZ1…VSZ64), which correspond to the distance or height measurement that is provided by each of the 64 possible VSZ on the active template.
(2) There are 64 Status tags in the input assembly (Status VSZ1…VSZ64), which correspond to the status of each of the 64 possible VSZ on the active template.
(3) There are 64 Used In Template tags in the input assembly (Used In Template VSZ1…VSZ64), which correspond to each of the 64 possible VSZ on the active template.
(4) As templates can be either distance or height, Type VSZn is the same for all VSZ used in a given template.

Table 13 - Output Assembly

Tag	Type	Description
Template_To_Use (1)	INT	Template ID to be passed to the device for the Next measurement.
Trigger (2)	BOOL	This tag is a pulse, toggle it to 1 to initiate the measurement.
Illumination_Pause (3)	BOOL	When set, this tag inhibits the infrared illumination that is used for distance measurement (used to minimize crosstalk when using two or more devices are close). If there is only one Swift-E sensor in the application, we recommend keeping this set to 0
Web_Connect_Enable	BOOL	This bit enables WebConnect Edit mode, even if the controller is in Run mode. This function is intended to support the in-line testing and debug process during device implementation. During normal operation, this bit must be set to 0, unless you desired to receive VSZ data in a free-running mode (not triggered)
Reset_Trigger_Counter	BOOL	Resets the trigger counter when changed to 1
Clear	BOOL	all input data clears when this tag set to 1 (if you require to clear the data between measurements)

(1) It is important to make sure that Template To Use is set before setting Trigger to initiate a measurement.
(2) When triggering, make sure that Trigger is pulsed to 1 for a duration longer than twice the device RPI (20 ms by default). If not, some of the triggers might not reach the device. We recommend keeping Trigger = 1, at least until Status ≠63 or Trigger Counter increases by 1.
(3) For optimal measurement performance, it is critical that the device maintains a regular state of temperature. Therefore, if Illumination Pause is used to avoid crosstalk between the Swift-E sensor, we recommend that all Swift-E devices have illumination that is activated in a regular cycle. This cycle allows the internal temperature regulation to achieve a steady state. Take care that measurements are consistent and repeatable when developing such complex applications.

Specifications

Swift-E Sensor Specifications

Attribute	Value
Sensing area	640 x 480 individual distance points
Field-of-view	43° x 33° (H x V, measured in center)
Measurement resolution	1 cm (0.39 in.)
Measurement precision	±1 cm (0.39 in.) [typical at 2 m (6.56 ft), varies with return signal level]
Illumination	7 light-emitting diode (LEDs) at 850 nm
Operating range	0.5…6 m (1.5…20 ft)
Output data	Height, distance
Response time (1)	~100 ms (trigger to data)
Protocol	EtherNet/IP™
Power supply	24V DC / 25 W (typical), 70 W (peak)
Operating temperature (2)	-20…+50 °C (-4…+122 °F)
Environmental rating	IP65
Virtual sensing zones	Up to 64 virtual sensing zones can be created for every template
Number of templates	Up to 255 templates can be created

(1) Response time is dependent on controller RPI. Response time is longer if a WebConnect session is active, or if there are changes to acquisition parameters between trigger requests. See Effect on Response Time on page 30 for details.

(2) If communication is not established within 1 minute of powering on the sensor below 0 °C (32 °F), it may be necessary to cycle the power to the unit. The unit operates normally once communication is established. For best performance at low or high temperatures, allow the temperature of the unit to stabilize after application of power and use height measurements where possible.

Notes:

A

B

C

D

E

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Notes:

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Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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