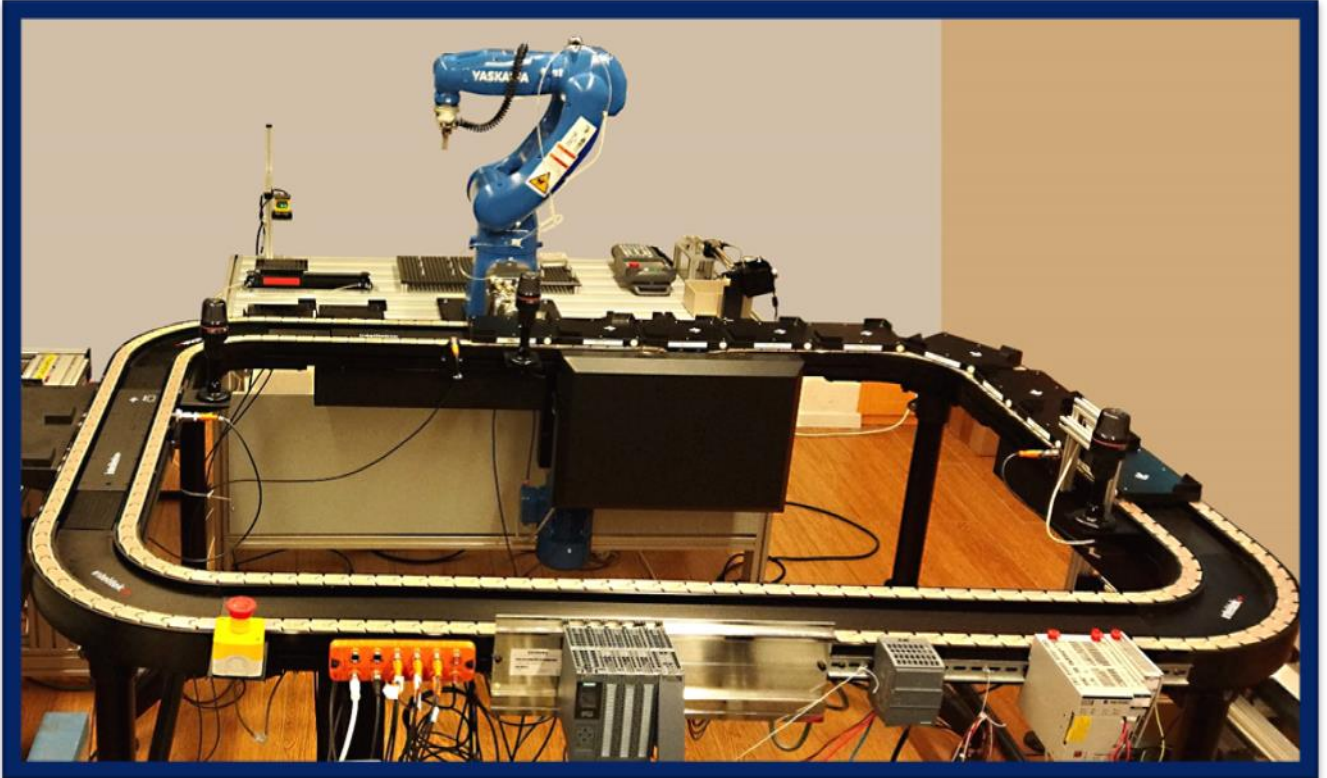


# Smart Device Experimentation Package

With SmartCIM 4.0



LAB ACTIVITY GUIDE

*Catalog #34-8000-0024 Rev. A*

intelitek▶▶<sup>®</sup>

INDUSTRY 4.0

Copyright © 2022 Intelitek Inc.

Tel: (603) 625-8600

Smart Device with SmartCIM 4.0 Lab Activity Guide

Fax: (603) 437-2137

Cat. # 34-8000-0024 Rev. A

October 2022

website: <http://www.intelitek.com>

email: [info@intelitek.com](mailto:info@intelitek.com)

Intelitek software and documentation are available at <http://intelitekdownloads.com>.

All rights reserved. No part of this publication may be stored in a retrieval system, or reproduced in any way, including but not limited to photocopy, photography, magnetic, or other recording, without the prior agreement and written permission of the publisher. Program listings may be entered, stored, and executed in a computer system, but not reproduced for publication.

Every effort has been made to make this book as complete and accurate as possible. However, no warranty of suitability, purpose, or fitness is made or implied. Intelitek is not liable or responsible to any person or entity for loss or damage in connection with or stemming from the use of the software, hardware and/or the information contained in this publication.

Intelitek bears no responsibility for errors that may appear in this publication and retains the right to make changes to the software, hardware, and manual without prior notice.

## Table of Contents

1.	Getting Started.....	4
1.1.	Overview .....	4
1.2.	Integrating CIM.....	4
1.3.	Prerequisites.....	4
1.4.	Where are the Lab Activities?.....	4
2.	Materials .....	5
3.	Navigating the Lab Activities.....	6
3.1.	Overview and Preparation.....	6
3.1.1.	General Preparation .....	6
3.1.2.	Software Installation .....	6
3.1.3.	Controller and IO-Link Master IP Addresses .....	16
3.2.	Videos and QR Codes.....	17
4.	List of Lab Activities .....	18

# 1. Getting Started

## 1.1. OVERVIEW

Thank you for purchasing the Intelitek *Smart Sensor Experimentation Package* for use in your classroom or laboratory. IO-Link is a communication protocol common to industrial automation systems, and the *Smart Sensor Experimentation Package* is meant to provide a scaled-down IO-Link system that is usable in an educational setting, while still providing users with authentic, industry-recognized hardware and software.

This guide is meant to help you get started with the laboratory curriculum and provide you with access to the various lab activities.

## 1.2. INTEGRATING CIM

The lab activities in this package require access to a CIM system with at least four stations.

For more information about the JMTS, its setup, and its accessory components, visit <https://www.intelitekdownloads.com/Manuals/IndustrialMaint/> and download the relevant user guides.



*An IO-Link master and S7-1200 controller mounted onto the SmartCIM conveyor*

## 1.3. PREREQUISITES

Participants must complete both the *IO-Link Proximity and Distance Kit* lab activities, the *IO-Link Identification Kit* lab activities, and the *IO-Link PLC Kit* lab activities (with the PLC equipped onto your SmartCIM) before participating in these *IO-Link with SmartCIM 4.0 Kit* lab activities.

It is also recommended that you complete Intelitek's Level 1 and Level 2 Industry 4.0 courses before performing these lab activities as well as have a basic knowledge of the base CIM system and its components. To learn more about the CIM system, enroll in Intelitek's [CIM Curriculum](#) courses.

## 1.4. WHERE ARE THE LAB ACTIVITIES?

You can find a list of lab activities in Section 4, List of Lab Activities, on page 18. All lab activities are available on downloadable and printable PDF documents.

## 2. Materials

Materials required for each lab activity are listed at the beginning of each activity. Ensure that all materials are ready before the beginning of each lab period.

### Provided Materials

Part	Part No.
IO-Link Master AL1302 (PROFINET) or AL1322 (EtherNet/IP)	10-1400-3000/1
Ultrasonic Sensor	10-1400-3002
Pressure Sensor	10-1400-3003
Speed Monitor	10-1400-3004
RFID Read/Write Head	10-1400-3005
Smart Signal Lamp (Stack Light)	10-1400-3006
Vibration Sensor	10-1400-3008
230V/24V IO-Link Power Supply	430755
M12-RJ45 Ethernet Cables	410492
Smart RFID Tags	410489
PLC (S7-1200 or CompactLogix)	
SmartCIM 4.0 System with templates and pins	

### Additional Required Materials

Part	Amount
Wrench	1
Computer	1
Ethernet Switch	1

### Required Software

<b>Package</b>
LR Device
Ethernet Configuration Tool (Hilscher)
PLC Programming Software (TIA Portal / Studio 5000)

Intelitek software and documentation are available at <http://intelitekdownloads.com>.

# 3. Navigating the Lab Activities

## 3.1. OVERVIEW AND PREPARATION

### 3.1.1. General Preparation

Lab activities include tasks that must be performed using the IO-Link smart devices and the SmartCIM system.

Participants are assigned with reading the lab activity PDFs (see Section 4, List of Lab Activities, below) and performing the tasks. Both participants and instructors are encouraged to read through the activities ahead of each lab period as preparation.

All activities require instructor verification to ensure that the work of the participants meet the requirements in the performance objectives. Performance objectives are listed at the beginning of each lab activity.

### 3.1.2. Software Installation

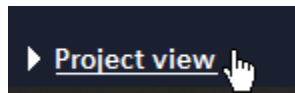
PLC Programming software is required in order to complete the lab activities. Ensure that Siemens TIA Portal (for the S7-1200 PLC) or Rockwell Studio 5000 (for the CompactLogix PLC) is installed before beginning the lab activities.

#### 3.1.2.1. Preparing the TIA Portal Software

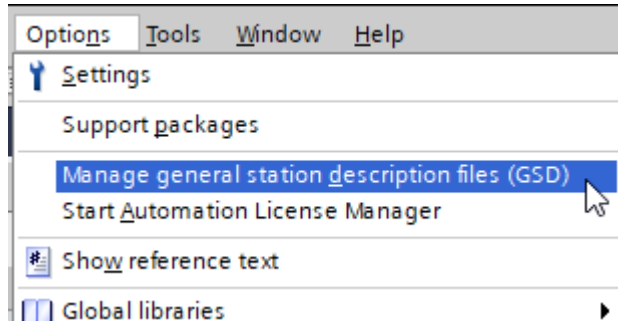
In order for Siemens TIA portal and your Siemens PLC to be able communicate with the IO-Link devices in the *Smart Sensor Module*, the relevant startup software package must be installed in TIA Portal. The installation procedure only needs to be performed once for each workstation with TIA Portal.

To perform the installation procedure:

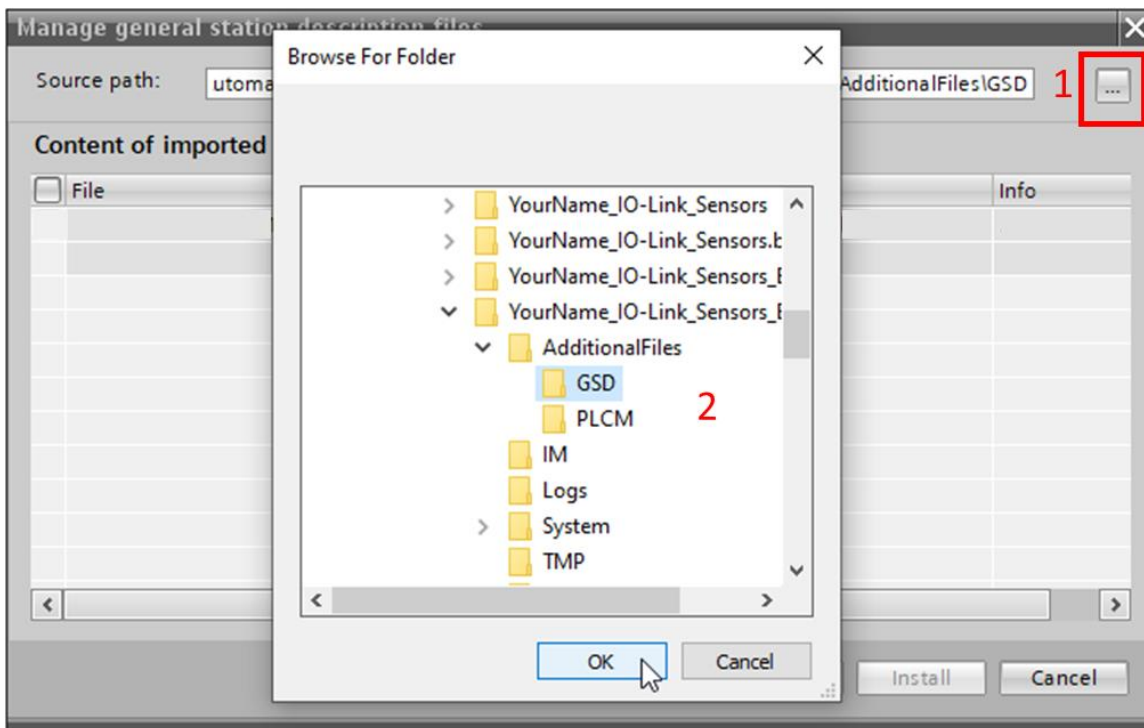
1. Download the Siemens S7 – TIA startup package from the IFM downloads site.
2. Unzip the downloaded package.
3. Run **Siemens TIA Portal**.
4. In the bottom-left corner (of the Portal view), click **Project view**.



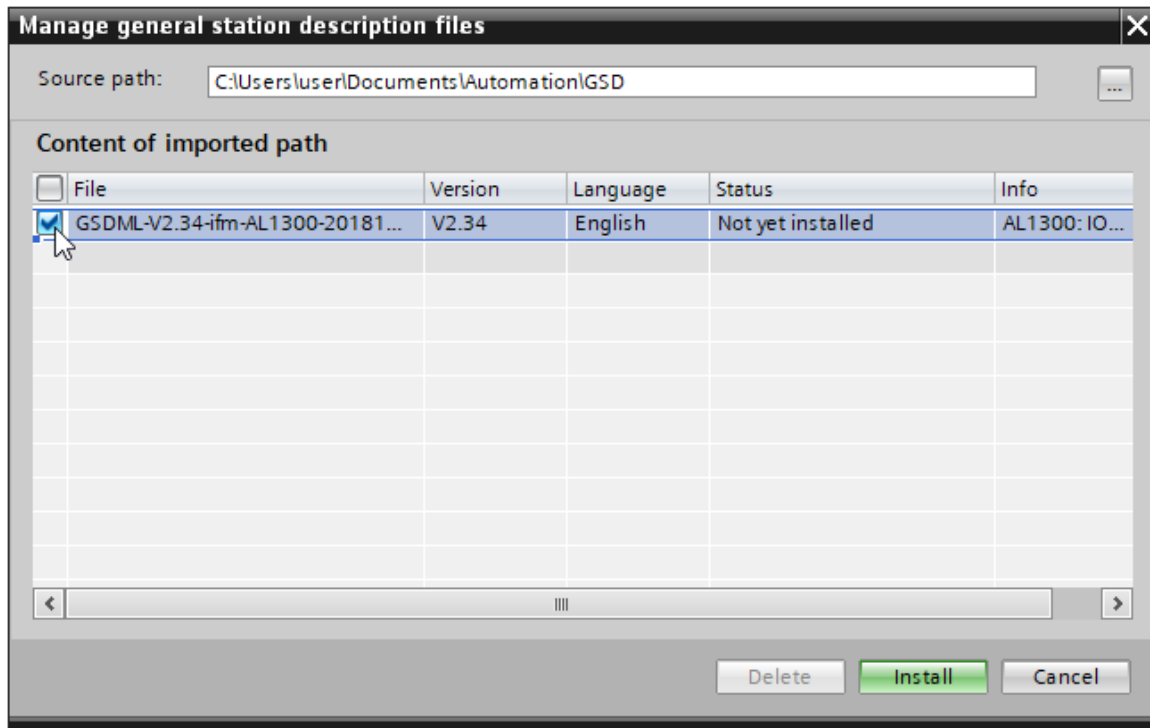
- In Project view, in the top menu, navigate to **Options > Manage general station description files (GSD)**.



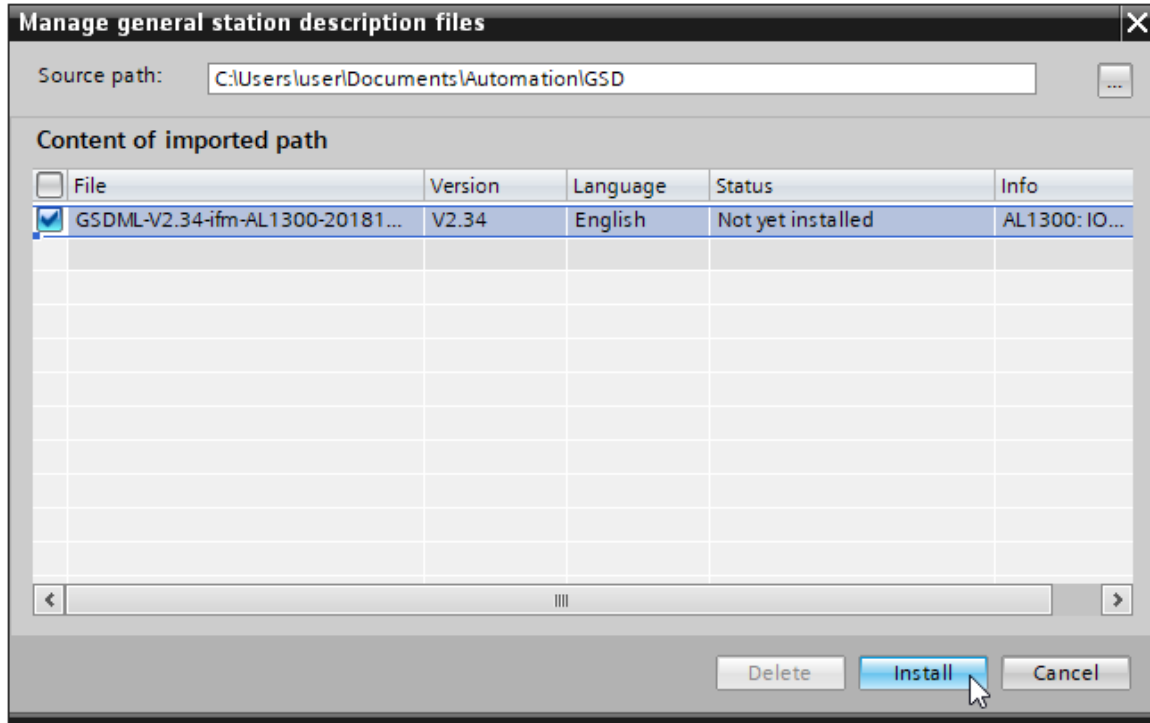
- The Manage general station description files window opens. In the Source path area at the top, click the three-dot button and browse to where you saved the downloaded startup package. Click **OK**.



- From the table, select your IO-Link master's GSD file.

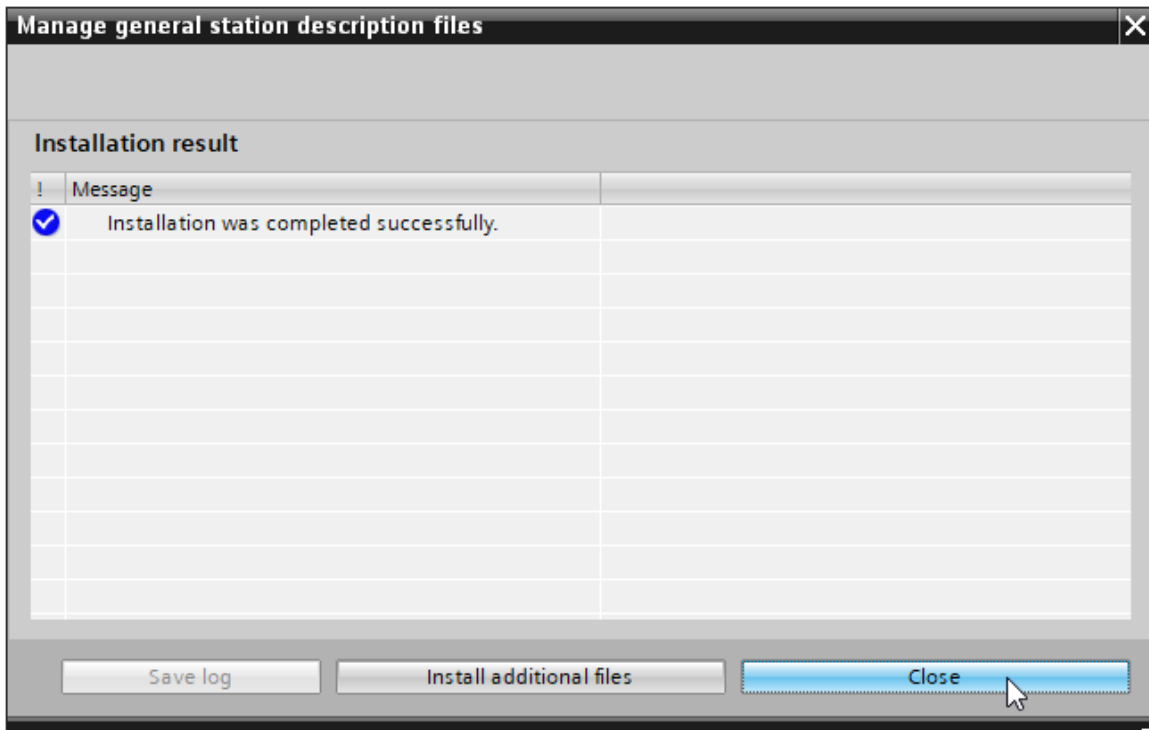


- Click Install.

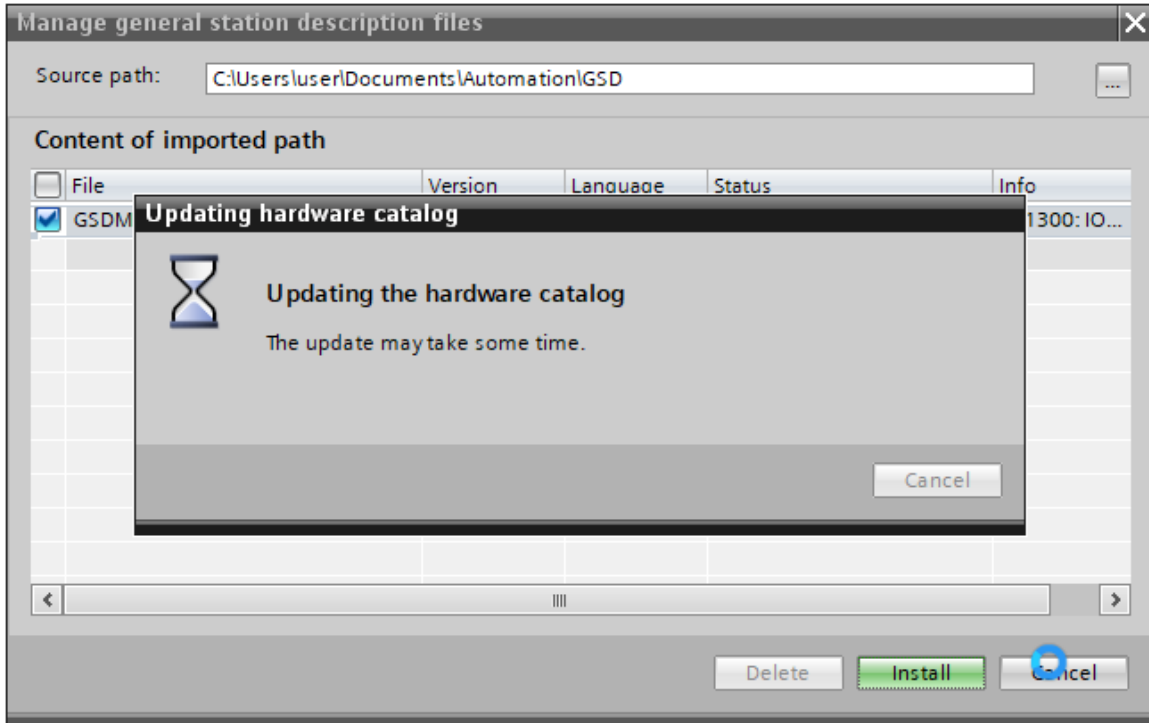




9. Once the installation is complete, click **Close**.



10. The hardware catalog is updated. The window closes automatically.



### 3.1.2.2. Preparing the Studio 5000 Software

If using the Allen-Bradley CompactLogix PLC, participants in this package’s lab activities will be required to add the IO-Link master to their Studio 5000 Logix Designer projects. In order for the master to be available in the list of modules that can be added to a project, the relevant .eds file must be installed.

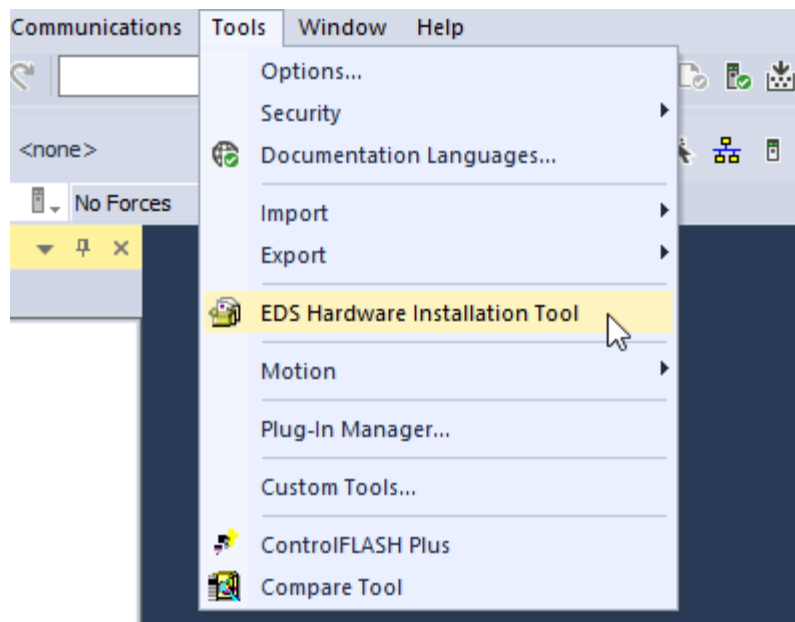
To perform the installation procedure:

1. From the IFM website, download the Allen-Bradley EtherNet/IP PLC Setup package.

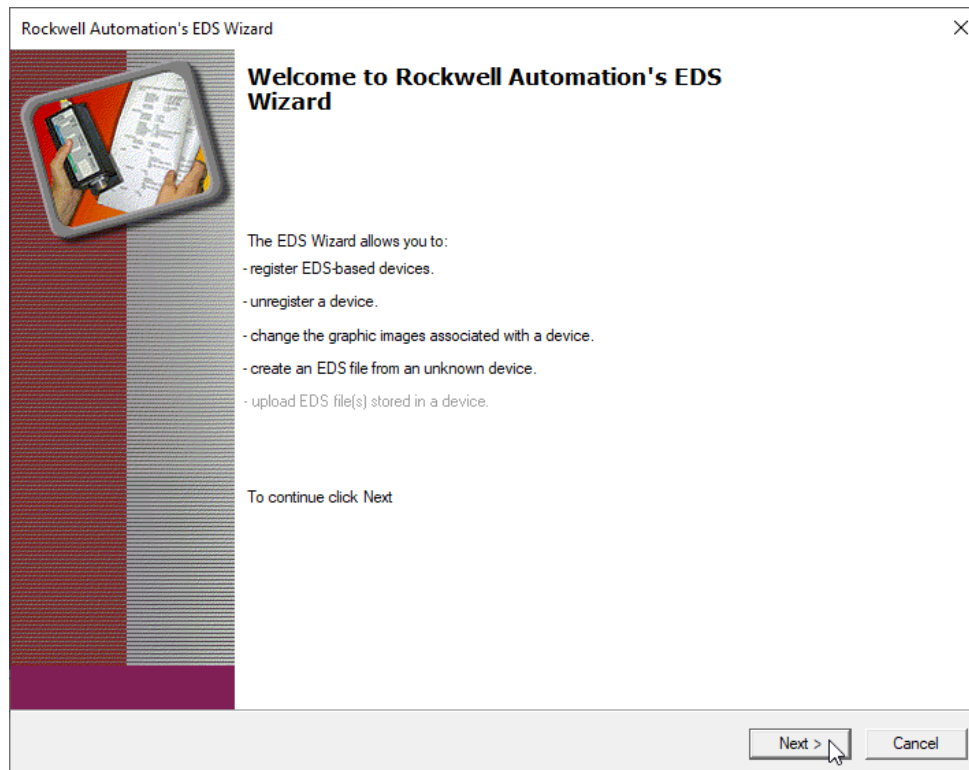
The screenshot shows the 'Downloads' tab of a website. Under the heading 'Startup Package - EtherNet/IP', there is a list of PLC models: AL1120 | AL1121 | AL1122 | AL1123 | AL1220 | AL1221 | AL1222 | AL1223 | AL1320 | AL1321 | AL1322 | AL1323 | AL1420 | AL1421 | AL1422 | AL1423 | AL1920 | ZZ1120. Below this is a table with columns for Name, Description, File info, and a Download button.

Name	Description	File info	
Allen Bradley	EtherNet/IP PLC Setup   Manuals   EDS   IO-Link Device AddOn   V30.0.0	.zip (70.9 MB) SHA-256	Download
Schneider M580	EtherNet/IP PLC Setup   Manuals   EDS   IO-Link Device AddOn   V28.0.0	.zip (58.2 MB) SHA-256	Download
ABB AC800M	EtherNet/IP PLC Setup   Manuals   EDS   V1.0.0	.zip (71.8 MB) SHA-256	Download

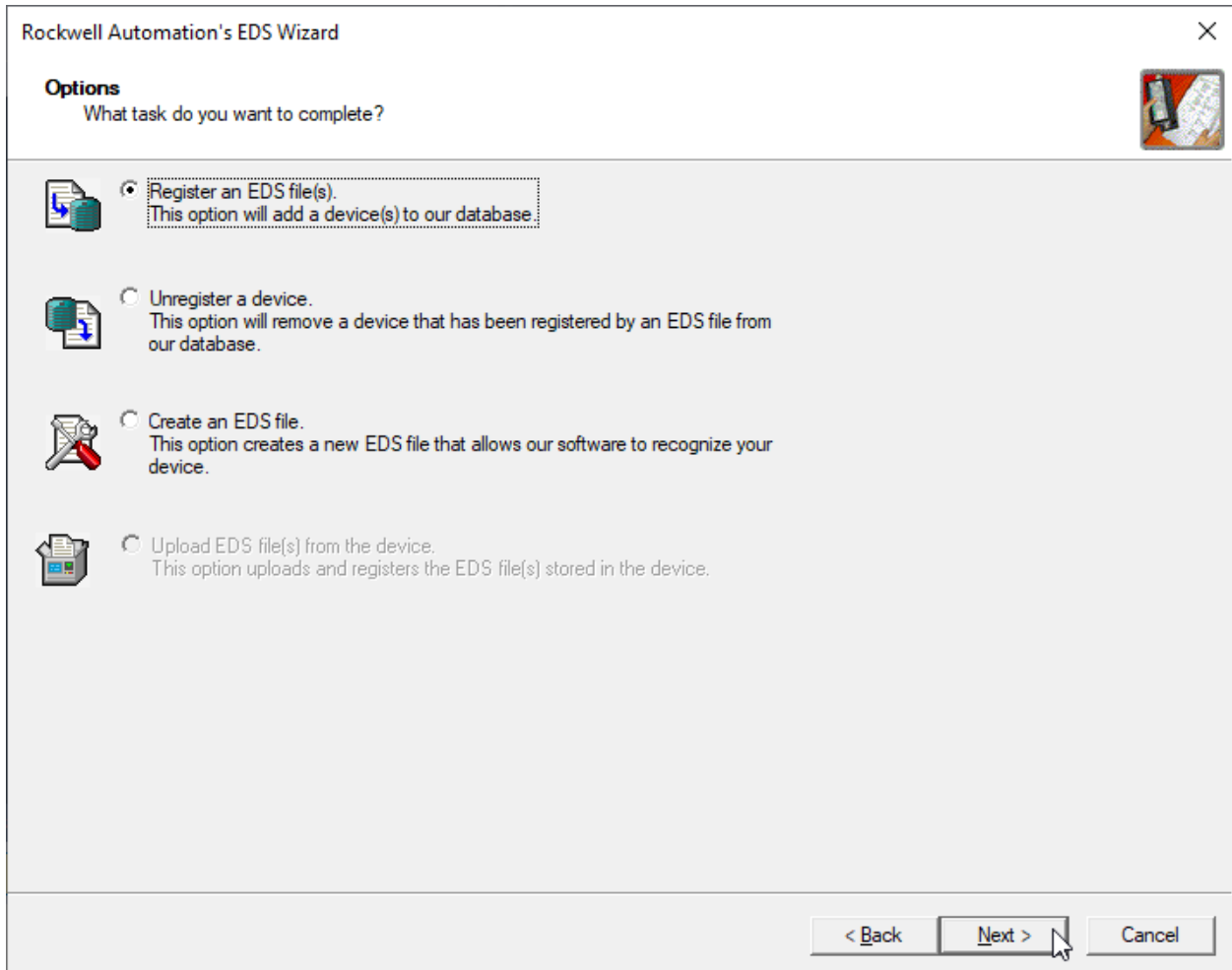
2. Unzip the downloaded folder.
3. In Logix Designer, select **Tools > EDS Hardware Installation Tool**.



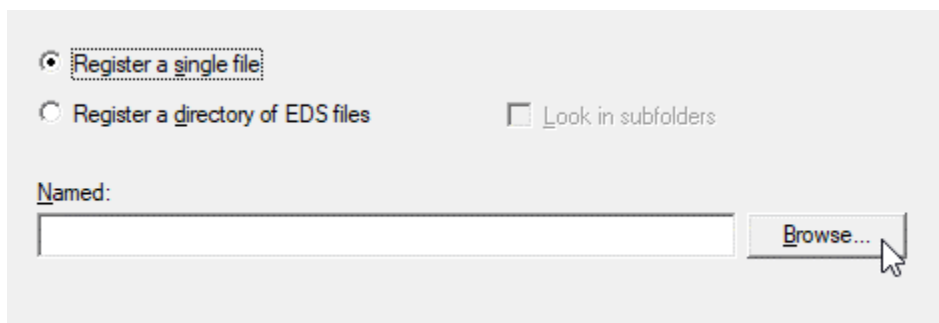
4. The EDS Wizard opens. Click **Next**.



5. Select **Register an EDS file(s)** and then click **Next**.



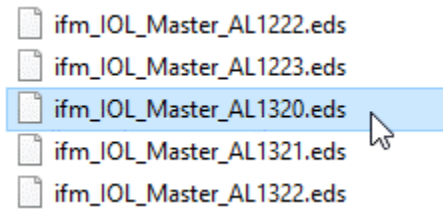
6. In the Registration window, click **Browse**.



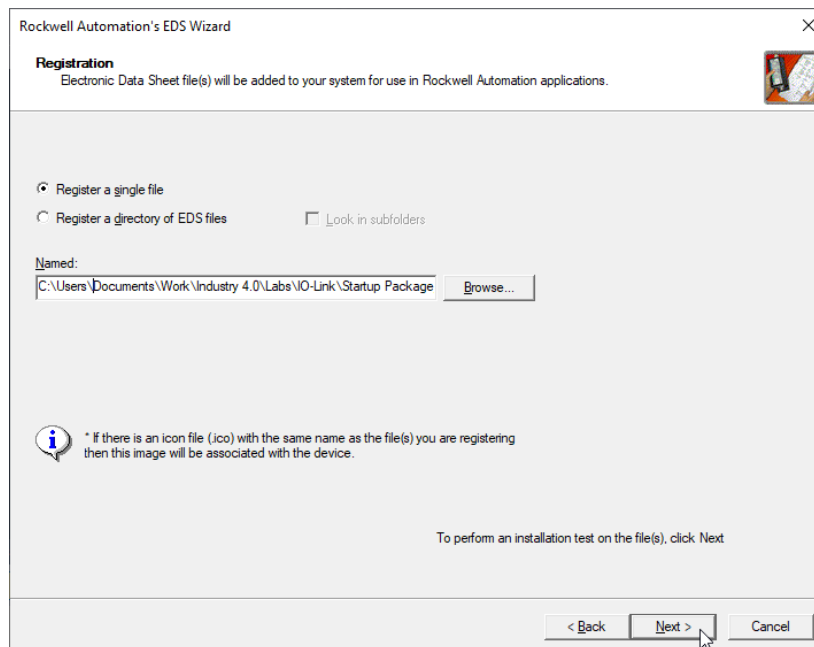
7. Browse to folder that you downloaded. Open the **9.EDS** folder.

Name	Date modified	Type
1. IP Address Setting	8/4/2022 9:58 AM	File folder
2. PLC Setup	8/4/2022 9:58 AM	File folder
3. AddOn	8/4/2022 9:58 AM	File folder
4. Acyclic Commands	8/4/2022 9:58 AM	File folder
5. Device Replacement	8/4/2022 9:58 AM	File folder
6. AL1x2x Sample Program	2/2/2022 8:34 AM	File folder
7. Digital Inputs & Outputs	8/4/2022 9:58 AM	File folder
8. Manuals	8/4/2022 9:58 AM	File folder
9. EDS	8/4/2022 9:58 AM	File folder

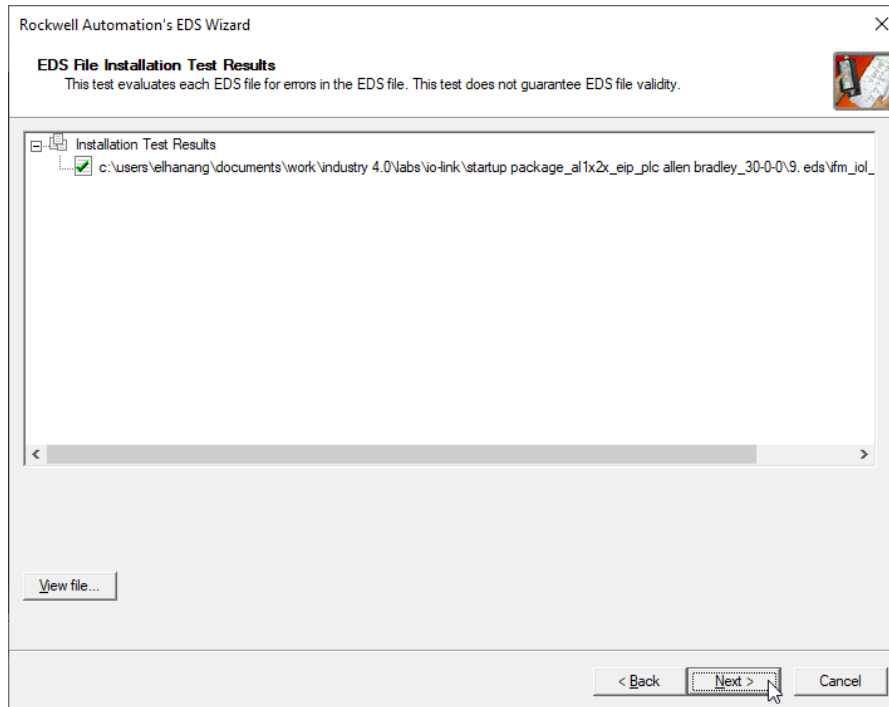
8. Double-click ifm\_IOL\_Master\_AL1320.eds to open it.



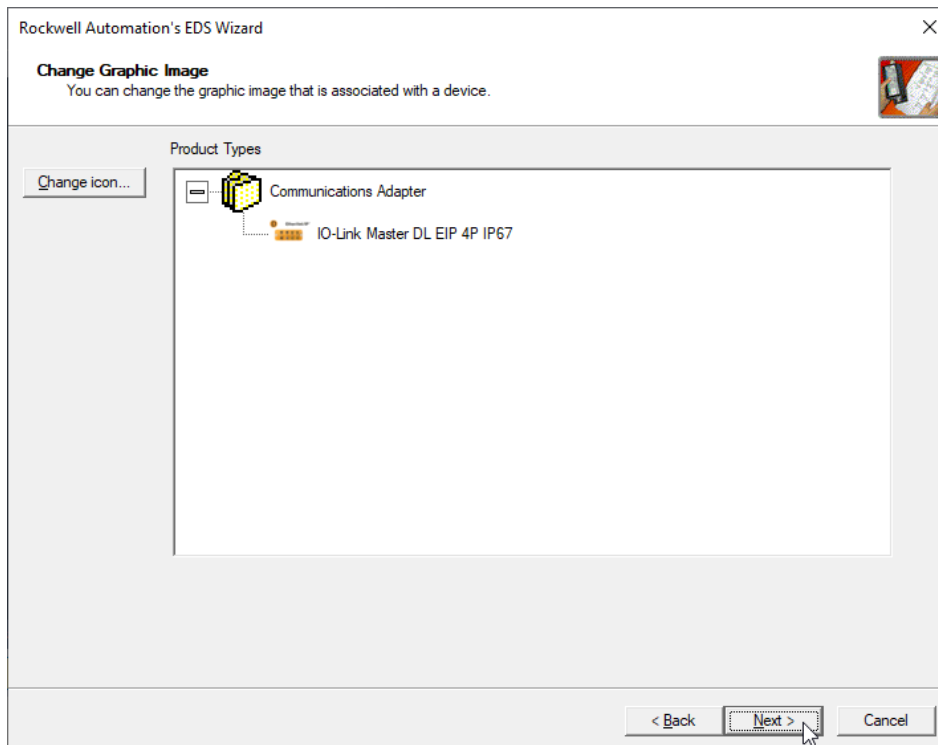
9. The file is added to the registration window. Click **Next**.



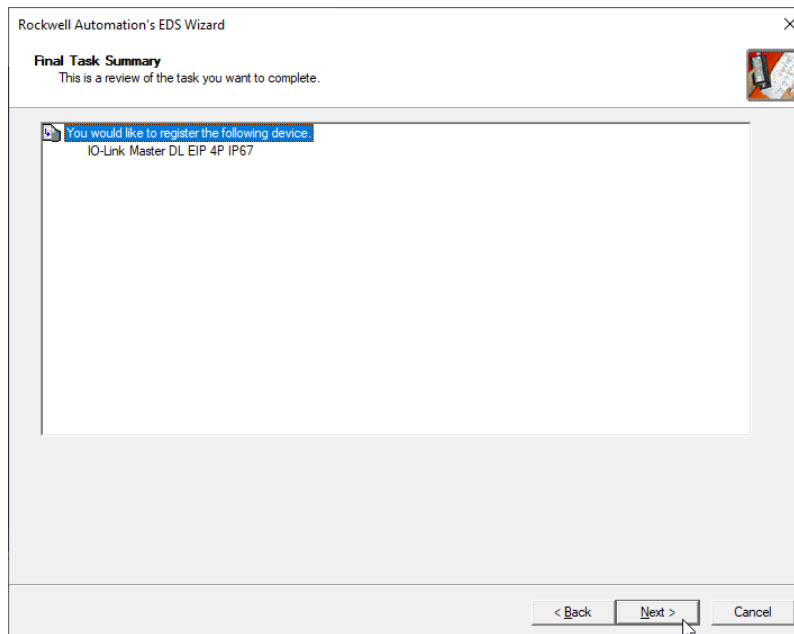
10. The EDS File Installation Test Results are displayed. Click **Next**.



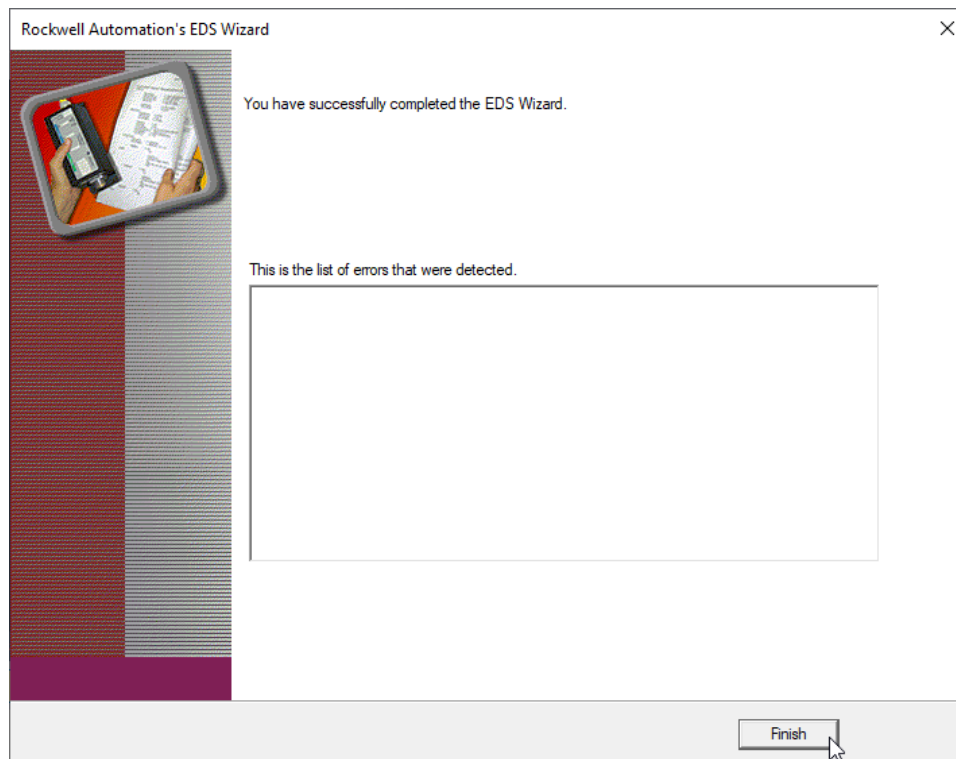
11. The Change Graphic Image window is displayed. Click **Next**.



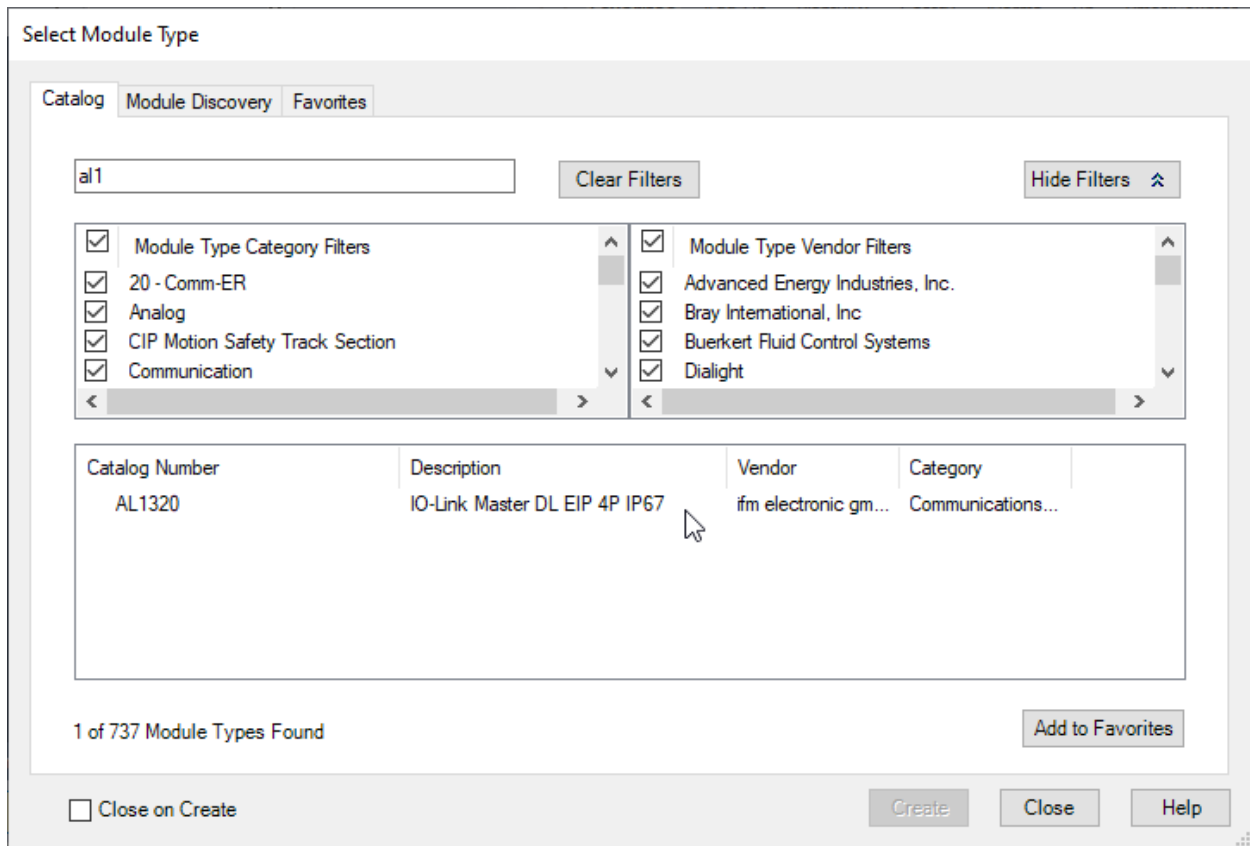
12. The Final Task Summary window is displayed. Click **Next**.



13. Click **Finish**.



The AL1320 can now be selected during I/O configuration.



### 3.1.3. Controller and IO-Link Master IP Addresses

A PLC requires a static IP address on the same subnet as the computer in order to communicate with it. Refer to the PLC's documentation in order to configure a static IP address.

The IO-Link Master also requires a static IP address on the subnet. The IP address can be configured using the Hilscher Ethernet Device Configuration tool.



## 3.2. VIDEOS AND QR CODES

Lab activities contain QR codes such as the one below. Click these codes or scan them with your smartphone to watch instructional or illustrative videos that are relevant for the specific lab activity task.

An example QR code is given here:



*IO-Link Master IoT port blinking green. Click or scan the above QR code to watch the video.*

## 4. List of Lab Activities

Below is the list of lab activities in the *Smart Device with SmartCIM 4.0 Experimentation Package*.

- ① **Note:** Lab activities may be password protected. Contact [support@intelitek.com](mailto:support@intelitek.com) if you have not received passwords for the activities.

No.	Title	Description
1	<a href="#">PLC Setup for SmartCIM 4.0</a>	Create a template PLC programming project that includes the PLC, IO-Link masters, and slave devices.
2	<a href="#">The Vibration Sensor</a>	Build a ladder logic project in which the output of the stack light is dependent on the readings of the vibration sensor. Create a virtual HMI to monitor sensor values.
3	<a href="#">The Rotation Monitor and the Air Pressure Sensor</a>	Integrate two different sensors into a PLC program in order to facilitate the monitoring of machine health.
4	<a href="#">The Ultrasonic Distance Sensor</a>	Identify different types of products that pass the sensor on their way to production.
5A	<a href="#">Pallet Tracking: Part 1</a>	In this two-part lab activity, program the PLC to read and write information to and from RFID tags on CIM system pallets and operate the stack-lights on the CIM stations based on the information on the RFID tags.
5B	<a href="#">Pallet Tracking: Part 2</a>	