



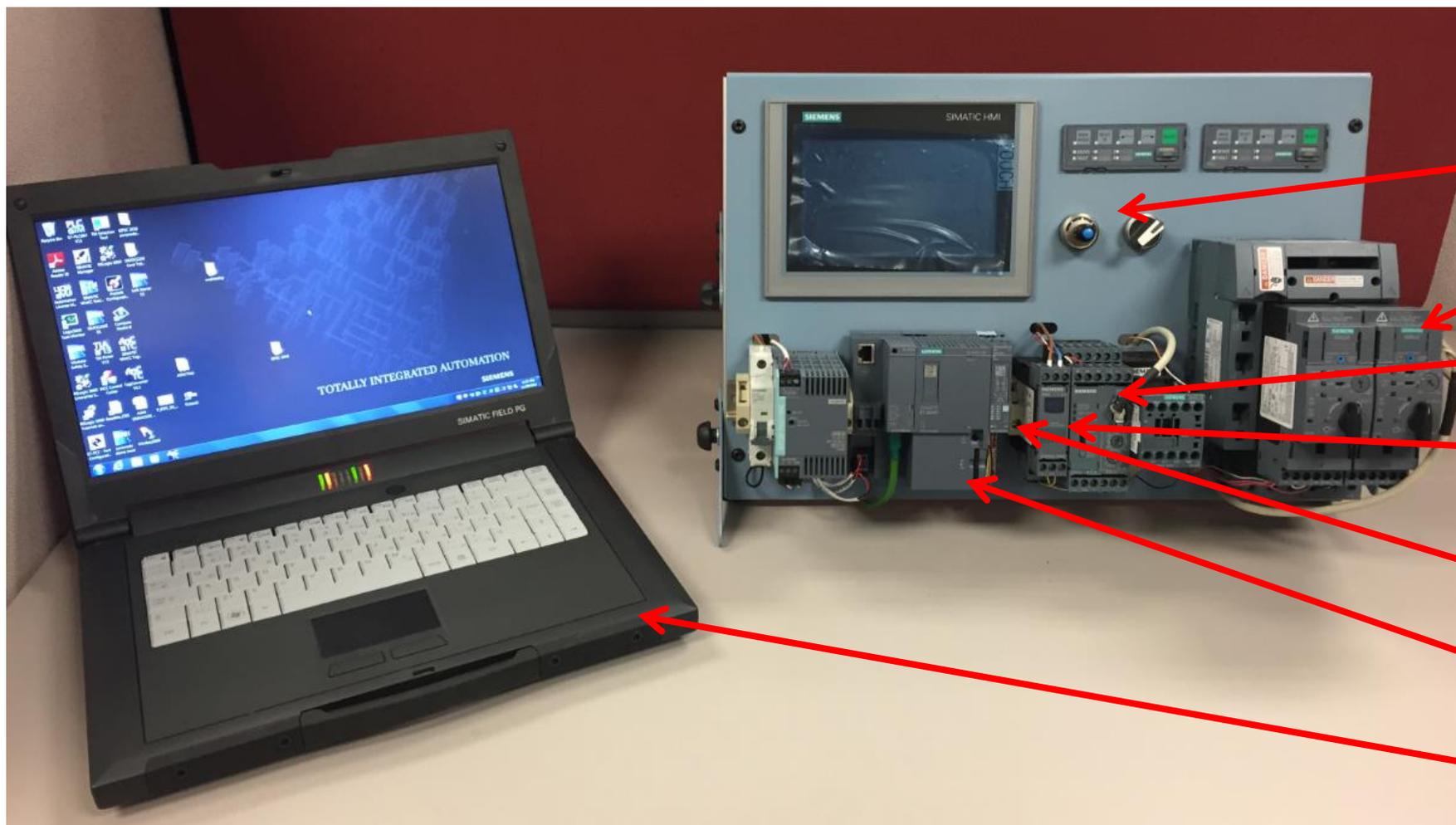
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Hands On: Deep Dive IO-Link into TIA

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Hands On Demo Setup



IO-Link Devices

- RFID Key Switch
- Compact Starters
- Overload Relay
- Voltage Monitoring Relay

IO-Link Master

PLC

PC

Agenda

- 1. Open existing project**
- 2. Configure IO-Link Master**
- 3. Download in PLC**
- 4. Test our project**

Open Existing Project

The screenshot shows the Siemens Totally Integrated Automation PORTAL interface. The main window is titled 'Open existing project'. On the left, there is a sidebar with various options: 'Start', 'Devices & networks', 'PLC programming', 'Motion & technology', 'Drive parameterization', 'Configuration of control devices', 'Visualization', 'Online & Diagnostics', 'Welcome Tour', 'First steps', 'Installed software', and 'Help'. The 'Open existing project' option is selected in the sidebar. The main area displays a table of recently used projects:

Project	Path	Last change
IO-Link Hands On Lab for MA	D:\Users\burnj\2017 MA\IO-Link Hands On Lab for MA	3/19/2017 8:59:04 AM
Single Panel IO-Link Demo	D:\Users\burnj\310 - SIMOCODE pro\Single Panel IO-Link Demo	2/18/2017 4:03:16 PM
Trailer 2016 - Use this one for events	D:\Users\burnj\2017 Trailer Design\Trailer 2016 - Use this one for events	1/16/2017 4:35:08 PM
New ASIsafe demo with ET200SP	D:\Users\burnj\Automation\New ASIsafe demo with ET200SP	3/10/2017 1:22:28 PM
Allied	D:\Users\burnj\Automation\Allied	2/27/2017 5:15:59 PM
IO-Link Demo for PA	G:\IO-Link Demo for PA	
IO-Link Demo for Brad	F:\IO-Link Demo for Brad	
IO-Link Demo for Brad	D:\Users\burnj\SITEC 2016\IO-Link Demo for Brad	10/27/2016 2:17:10 PM
HMI Project for 2017 trailer	F\HMI Project for 2017 trailer	
IO-Link Demo for PA	D:\IO-Link Demo for PA	
63481236_CODE_TP700_v11_V13_SP1	D:\Users\burnj\2017 Trailer Design\63481236_code_01_v11\63481236_CODE_TP700_v11_V13_SP1	2/13/2017 8:19:15 AM
Trailer 2016 Master File - 03-29-16	D:\Users\burnj\2017 Trailer Design\Trailer 2016 Master File - 03-29-16	1/21/2017 8:51:45 AM
Trailer 2016 Master File - 03-29-16	D:\Users\burnj\Desktop\Trailer 2016 Master File - 03-29-16	5/13/2016 12:15:50 PM

At the bottom of the dialog, there are buttons for 'Remove', 'Browse', and 'Open'. A red arrow points to the 'Open' button.

- Step 1) Select existing project “IO-Link Hands On Lab for MIA”
- Step 2) Click “Open”

Select Project View

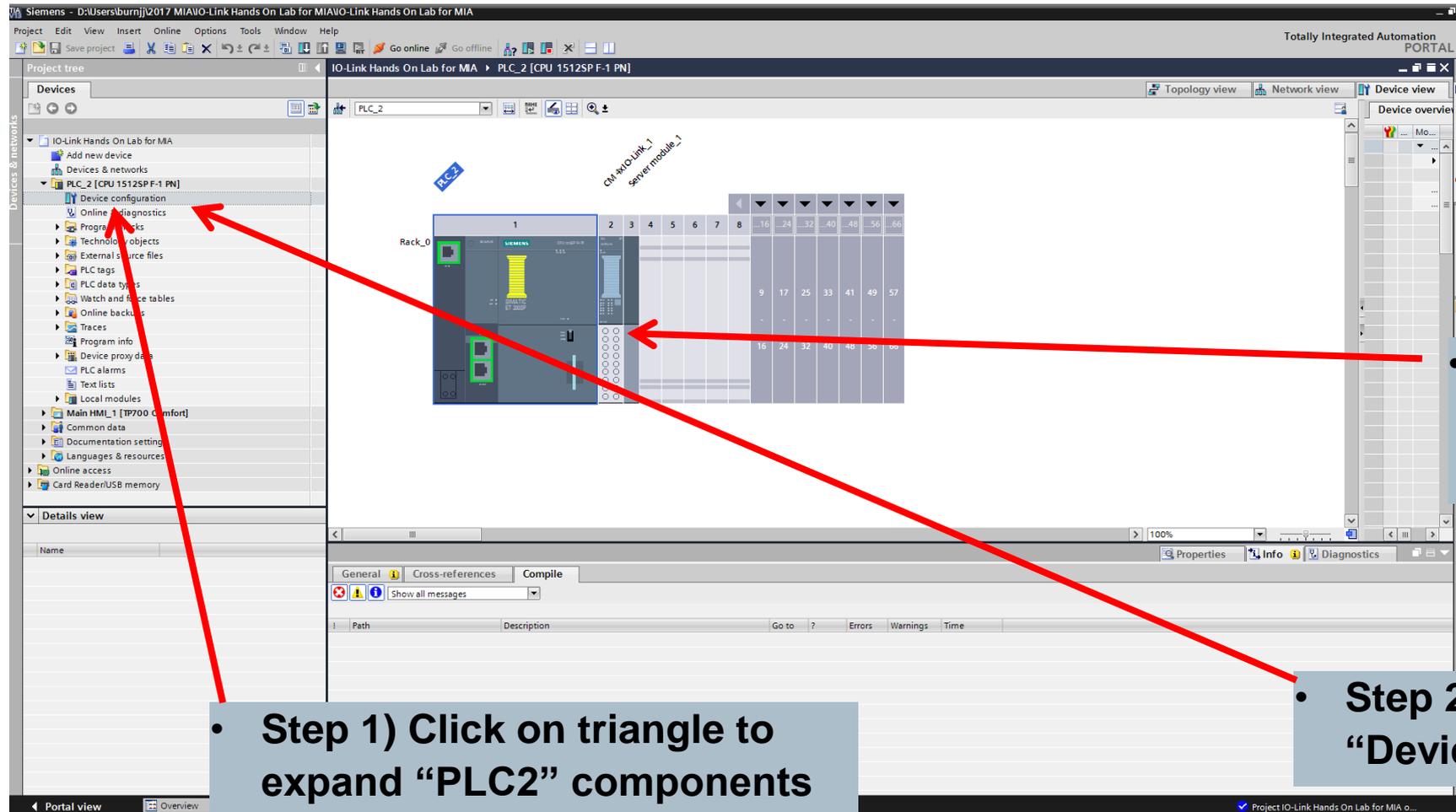
The screenshot shows the Siemens TIA Portal interface. On the left is a navigation sidebar with categories like 'Start', 'Devices & networks', 'PLC programming', 'Motion & technology', 'Drive parameterization', 'Configuration of control devices', 'Visualization', and 'Online & Diagnostics'. The main area is titled 'First steps' and contains a message: 'Project: "IO-Link Hands On Lab for MIA" was opened successfully. Please select the next step:'. Below this message is a list of options, each with an icon and a description:

- Start (icon: building)
- Devices & networks (icon: cubes) - Configure a device
- PLC programming (icon: cube with chip) - Write PLC program
- Motion & technology (icon: gear) - Configure technology objects
- Drive parameterization (icon: cube with arrow) - Parameterize drive
- Control devices (icon: cube with chip) - Configure/select a device
- Visualization (icon: cube) - Configure an HM screen
- Project view (icon: arrow) - Open the project view

The 'Project view' option is highlighted with a red arrow pointing to it from the bottom right. At the bottom left of the interface, there is a status bar with 'Project view' and a red arrow pointing to it.

• Step 3) Click “Project View”

Open Device Configuration

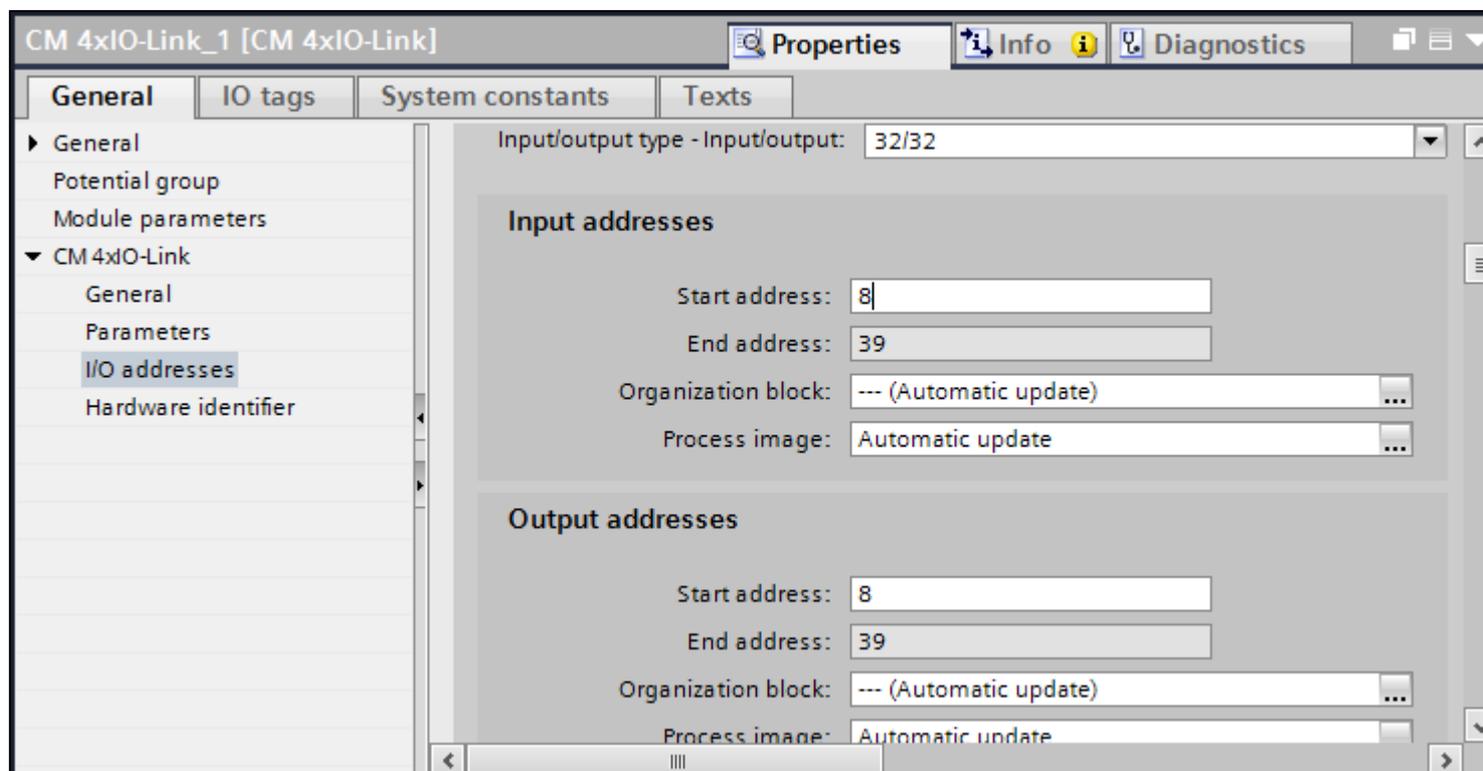


• Step 1) Click on triangle to expand "PLC2" components

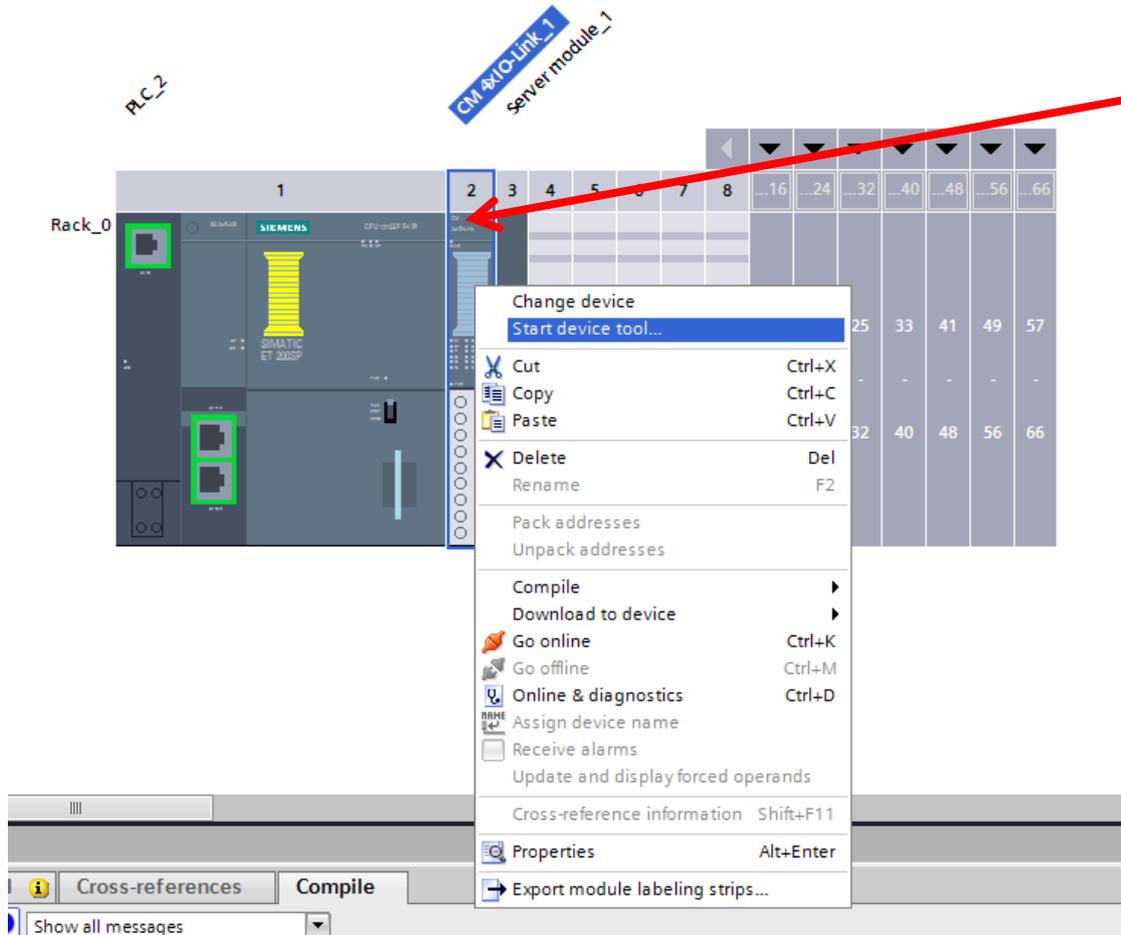
• Step 2) Double Click "Device Configuration"

• Step 3) Device Configuration will appear here

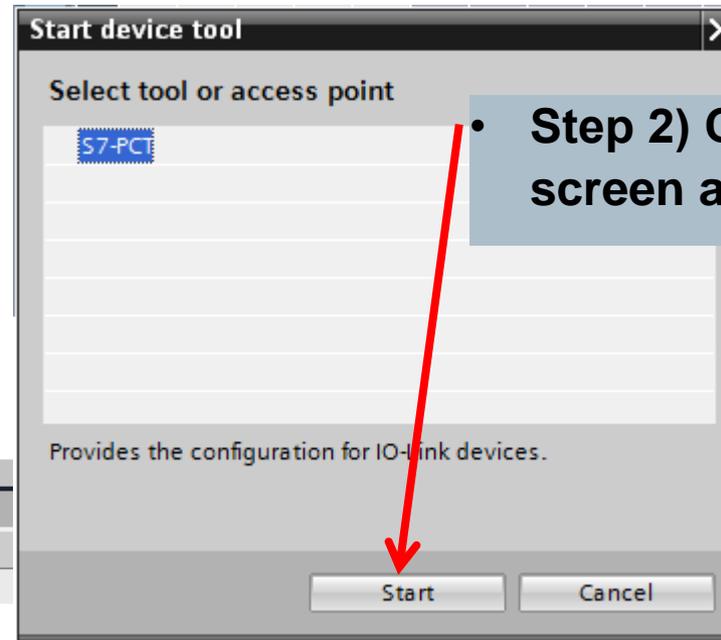
I/O Address Assignment



Configure IO-Link Master

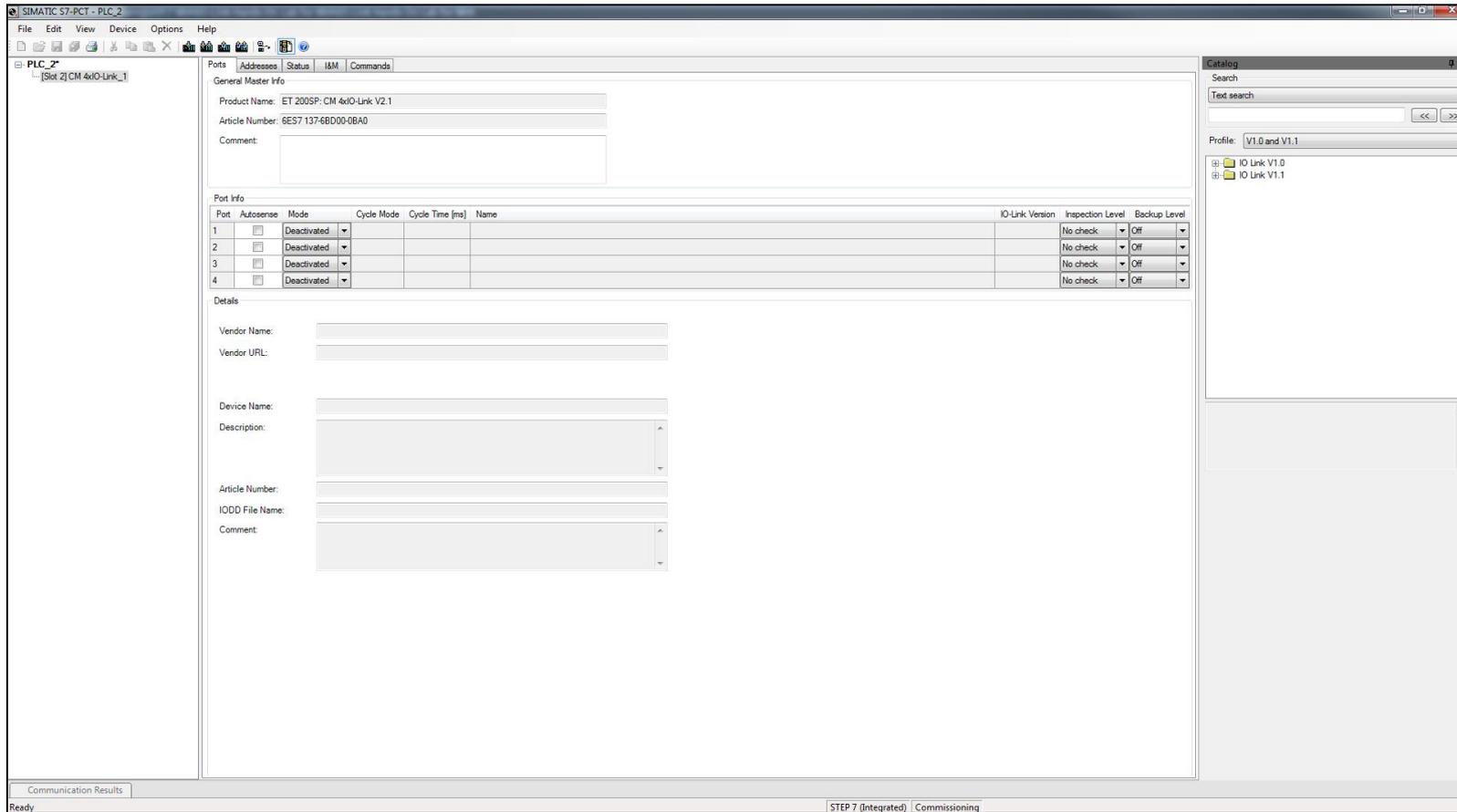


• Step 1) Right Click on IO-Link Master and select “Start Device Tool”



• Step 2) Click “Start” when this screen appears

Port Configuration Tool (PCT)



Add Device to Port 1

The screenshot shows the SIMATIC Manager interface for a SIMATIC S7-300 PLC. The main window displays the configuration for 'Port 1' of the 'CM 4xIO-Link' module. The 'Port Info' table shows that Port 1 is selected and highlighted in blue. The 'Details' section below the table is empty, indicating that no device has been assigned to this port yet.

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name	IO-Link Version	Inspection Level	Backup Level
1	<input type="checkbox"/>	Deactivated					No check	Off
2	<input type="checkbox"/>	Deactivated					No check	Off
3	<input type="checkbox"/>	Deactivated					No check	Off
4	<input type="checkbox"/>	Deactivated					No check	Off

The 'Catalog' window on the right shows a tree view of the device catalog. The 'SIEMENS AG' folder is expanded, and the 'SIRIUS Monitoring Relay' folder is also expanded. The '3UG4832 Voltage Monitoring Relay for IO-Link' is selected and highlighted in blue. A red arrow points from this selection to the 'Details' section of the main window, indicating the next step in the process.

• **Step 1) Click on Port 1 to highlight it in blue**

• **Step 2) Expand the V1.1 catalog tree and Double Click on a 3UG4832 Voltage Monitoring Relay**

Add Device to Port 2

The screenshot shows the SIMATIC Manager interface for a PLC. The 'Ports' table is as follows:

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name	IO-Link Version	Inspection Level	Backup Level
1	<input type="checkbox"/>	IO-Link	Asynchronous	10	SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link	V1.1	Type compatible	Backup&Restore
2	<input type="checkbox"/>	Deactivated					No check	Off
3	<input type="checkbox"/>	Deactivated					No check	Off
4	<input type="checkbox"/>	Deactivated					No check	Off

The 'Catalog' window shows the following tree structure:

- IO Link V1.0
 - im electronic gmbh
 - SIEMENS AG
 - Ident systems
 - Input Modules
 - SIRIUS ACT Devices
 - SIRIUS Monitoring Relay
 - SIRIUS Overload Relay
 - SIRIUS Overload Relay IO-Link 3RB24**
 - SIRIUS switching device
 - SIRIUS temperature Monitoring Relay
- STANDARD
- IO Link V1.1

The 'Details' section for the selected device (3RB2483-4A*1) shows:

3RB2483-4A*1
SIRIUS Overload Relay IO-Link 3RB24, processing unit for full motor protection (monostable) with IO-Link, size S00...S12, class 5...30, stand-alone installation; main circuit: -; aux. circuit: -4AA1 (screw connection); -4AC1 (spring-loaded terminal); manual-automatic-reset. Firmware V0.0.0. Hardware E0.0.0. Device Family SIRIUS Overload

Communication Results: Ready

STEP 7 (Integrated) | Commissioning

- **Step 1) Click on Port 2 to highlight it in blue**

- **Step 2) Expand the V1.0 catalog tree and Double Click on a 3RB24 Overload Relay**

Add Device to Port 3

The screenshot shows the SIMATIC Manager interface for a PLC. The 'Ports' table is as follows:

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name	IO-Link Version	Inspection Level	Backup Level
1	<input type="checkbox"/>	IO-Link	Asynchronous	10	SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link	V1.1	Same type	Backup&Restore
2	<input type="checkbox"/>	IO-Link	Asynchronous	3	SIRIUS Overload Relay IO-Link 3RB24	V1.0	No check	Off
3	<input type="checkbox"/>	Deactivated					No check	Off
	<input type="checkbox"/>	Deactivated					No check	Off

The 'Catalog' window on the right shows the 'SIRIUS ACT Devices' tree expanded to 'IO Link V1.1'. The 'SIRIUS ACT Electronic Module for ID key-operated switch' is highlighted in blue. A red arrow points from this item to a text box.

• Step 1) Click on Port 3 to highlight it in blue

• Step 2) Expand the V1.1 catalog tree and Double Click on "ID key-operated switch"

Add Device to Port 4

The screenshot displays the SIMATIC Manager interface for a PLC project. The 'Ports' table is as follows:

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name	IO-Link Version	Inspection Level	Backup Level
1	<input type="checkbox"/>	IO-Link	Asynchronous	10	SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link	V1.1	Type compatible	Backup&Restore
2	<input type="checkbox"/>	IO-Link	Asynchronous	3	SIRIUS Overload Relay IO-Link 3RE24	V1.0	Same type	Off
3	<input type="checkbox"/>	IO-Link	Asynchronous	24.8	SIRIUS ACT Electronic Module for IO key-operated switch for IO-Link	V1.1	Type compatible	Backup&Restore
4	<input type="checkbox"/>	Deactivated					No check	Off

The 'Catalog' window shows the following tree structure:

- IO Link V1.0
 - em electronic gmbh
 - SIEMENS AG
 - Ident systems
 - Input Modules
 - SIRIUS ACT Devices
 - SIRIUS ACT Monitoring Relay
 - SIRIUS Overload Relay
 - SIRIUS switching device
 - SIRIUS Compact Starter IO-Link 3RA6 (highlighted)
 - SIRIUS Function Module IO-Link 3RA27
 - STANDARD
 - SIRIUS Temperature Monitoring Relay
- IO Link V1.1

The 'Details' section for the selected device shows:

3RA64/65
SIRIUS Compact Starter IO-Link 3RA6, Compact Starter, direct and reversing starter, 690 V, max. 32 A, max. voltage DC 24 V, IP20, with spring loaded terminal and screw terminal, Firmware -- Hardware -- Device Family SIRIUS switching device, Release Date 2016-06-02
IODD File Name: Siemens-SIRIUS-3RA6-20160602-IODD1.0.1.xml

Communication Results: STEP 7 (Integrated) Commissioning

- Step 1) Click on Port 4 to highlight it in blue

- Step 2) Expand the V1.0 catalog tree and Double Click on "Compact Starter"

Port Configuration Tree

The screenshot shows the SIMATIC Manager interface for configuring a PLC. The left-hand tree view displays the configuration structure for 'PLC_2'. The main configuration area shows details for the selected device, including a table of port configurations and a detailed description. The right-hand catalog shows the available device options.

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name	IO-Link Version	Inspection Level	Backup Level
1	<input type="checkbox"/>	IO-Link	Asynchronous	10	SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link	V1.1	Type compatible	Backup&Restore
2	<input type="checkbox"/>	IO-Link	Asynchronous	3	SIRIUS Overload Relay IO-Link 3RB24	V1.0	Same type	Off
3	<input type="checkbox"/>	IO-Link	Asynchronous	24.8	SIRIUS ACT Electronic Module for ID key-operated switch for IO-Link	V1.1	Type compatible	Backup&Restore
4	<input type="checkbox"/>	IO-Link	Asynchronous	5	SIRIUS Compact Starter IO-Link 3RA6	V1.0	Same type	Off

Details:
 Vendor Name: SIEMENS AG
 Vendor URL: <http://www.siemens.com/io-link>
 Device Name: SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link
 Description: Digital Monitoring Relay, Voltage monitoring, 22.5mm, for IO-Link, 10 to 600V AC/DC, Over- and Undervoltage, Hysteresis 0.1 to 300V, On-delay time, Tripping delay time, 1 Change-over contact, 1AA40 Screw terminal, 2AA40 Spring-loaded terminal, Device Family SIRIUS Monitoring Relay, Release Date 2016-06-02
 Article Number: 3UG4832-AA40
 IODD File Name: Siemens-SIRIUS-3UG4832-20160602-IODD1.1.xml
 Replaceable Device IDs:
 Compatibility: The device is compatible with the IO-Link revisions 1.0 and 1.1

Callout Box:
 PLC_2*
 [Slot 2] CM 4xIO-Link_1
 [1] SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link
 [2] SIRIUS Overload Relay IO-Link 3RB24
 [3] SIRIUS ACT Electronic Module for ID key-operated switch for IO-Link
 [4] SIRIUS Compact Starter IO-Link 3RA6

Note : The tree on the left hand windows expands as you add devices to the ports

Change Port 2 Device Parameters

The screenshot shows the SIMATIC Manager interface with the following structure:

- PLC_2*
 - [Slot 2] CM 4xIO-Link_1
 - [1] SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link
 - [2] SIRIUS Overload Relay IO-Link 3RB24
 - [3] SIRIUS ACT Electronic Module for ID key-operated switch for IO-Link
 - [4] SIRIUS Compact Starter IO-Link 3RA6

The 'Parameters' tab is active, displaying a table of parameters for the selected device (3RB24):

Parameter	Value	Unit	Status	Help
Parameters				
Parameters				
3RB24				
index131 - Ground fault detection	Disable		Initial value	
index131 - Cold start	Disable		changed	
index131 - Rated operational current I _e	Disable		Initial value	
index131 - Trip class [CLASS]	Enable		Initial value	
index131 - Response to overload - thermal motor model	Tripping without restart		Initial value	
index131 - Response to overload - thermistor	Tripping without restart		Initial value	
index131 - Thermistor - monitoring	No		Initial value	
Operator panel				
index130 - Operator panel available	Yes		Initial value	
index130 - Operation at Preset <> Actual Configuration	Enable		Initial value	

• Step 1) Click on Port 2

• Step 2) Select the "Parameter" tab

• Step 3) Change "Cold Start" from "Disable" to "Enable"

Change Port 4 Device Parameters

The screenshot shows the SIMATIC Manager interface for a SIMATIC S7-300 PLC. The left pane displays the hardware configuration tree for 'PLC_2*' under '[Slot 2] CM 4xIO-Link_1'. It lists four modules: [1] SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link, [2] SIRIUS Overload Relay IO-Link 3RB24, [3] SIRIUS ACT Electronic Module for ID key-operated switch for IO-Link, and [4] SIRIUS Compact Starter IO-Link 3RA6. The right pane shows the 'Parameters' tab for the selected module. A table lists parameters for four starters (Starter 1 to Starter 4). The 'DS130 - starter available' parameter for Starter 4 is highlighted, and a dropdown menu is open, showing 'yes' selected and 'no' as an option. A yellow warning icon is visible next to the 'no' option.

Parameter	Value	Unit	Status	Help
Parameters				
Parameters				
Starter 1				
DS130 - type of starter	any		Initial value	
DS130 - starter available	yes		Initial value	
DS130 - Operation at Preset <> Actual Configuration	deactivate		Initial value	
Starter 2				
DS130 - type of starter	any		Initial value	
DS130 - starter available	yes		Initial value	
DS130 - Operation at Preset <> Actual Configuration	deactivate		Initial value	
Starter 3				
DS130 - type of starter	any		Initial value	
DS130 - starter available	no		changed	
DS130 - Operation at Preset <> Actual Configuration	deactivate		Initial value	
Starter 4				
DS130 - type of starter	any		Initial value	
DS130 - starter available	yes		Initial value	
DS130 - Operation at Preset <> Actual Configuration	no		Initial value	
operator panel				
			Initial value	
			Initial value	

• Step 1) Click on Port 4

• Step 2) Select the "Parameter" tab

• Step 3) Change "Starter Available" from "Yes" to "No" for starters 3&4

Load Configuration

The screenshot displays the SIMATIC Manager interface for a SIMATIC S7-300 PLC. The left pane shows the device tree for 'PLC_2*' with the following components:

- [Slot 2] CM 4xIO-Link_1
 - [1] SIRIUS 3UG4832 Voltage Monitoring Relay for IO-Link
 - [2] SIRIUS Overload Relay IO-Link 3RB24
 - [3] SIRIUS ACT Electronic Module for ID key-operated switch for IO-Link
 - [4] SIRIUS Compact Starter IO-Link 3RA6

The right pane shows the 'Port Info' table for the selected module:

Port	Autosense	Mode	Cycle Mode	Cycle Time [ms]	Name
1	<input type="checkbox"/>	IO-Link	Asynchronous	10	SIRIUS 3UG4832 Voltage
2	<input type="checkbox"/>	IO-Link	Asynchronous	3	SIRIUS Overload Relay IO
3	<input type="checkbox"/>	IO-Link	Asynchronous	24.8	SIRIUS ACT Electronic M
4	<input type="checkbox"/>	IO-Link	Asynchronous	5	SIRIUS Compact Starter IO

Two red arrows originate from the 'Slot 2' label in the device tree and point to the 'Load with Devices' icon in the toolbar.

- Step 1) Click on “Slot 2”
- Step 2) Click on “Load with Devices” icon with 2 arrows

OB1 – Cyclic Data Control

Siemens - D:\Users\burnij\2017 MIAIO-Link Hands On Lab for MIAIO-Link Hands On Lab for MIA

Totally Integrated Automation PORTAL

Project tree: IO-Link Hands On Lab for MIA > PLC_2 [CPU 1512SP F-1 PN] > Program blocks > Main [OB1]

Name	Data type	Default value	Comment
1	Input		
2	Bool		Initial call of this OB
3	Bool		=True, if remanent data are available

Block title: "Main Program Sweep (Cycle)"

Network 1: %M24.0 "HMI Motor Start Req" → %Q10.0 "Motor Start Cmd"

Network 2: %DB9 "Date_and_Time_DB" → %B4 "Date_and_Time"

Network 3: AND Word block with inputs %MW12 "Motor Current Raw" and 2#0000000101111111, output %MW100 "Motor Current Filtered"

FB3 – Acyclic Data

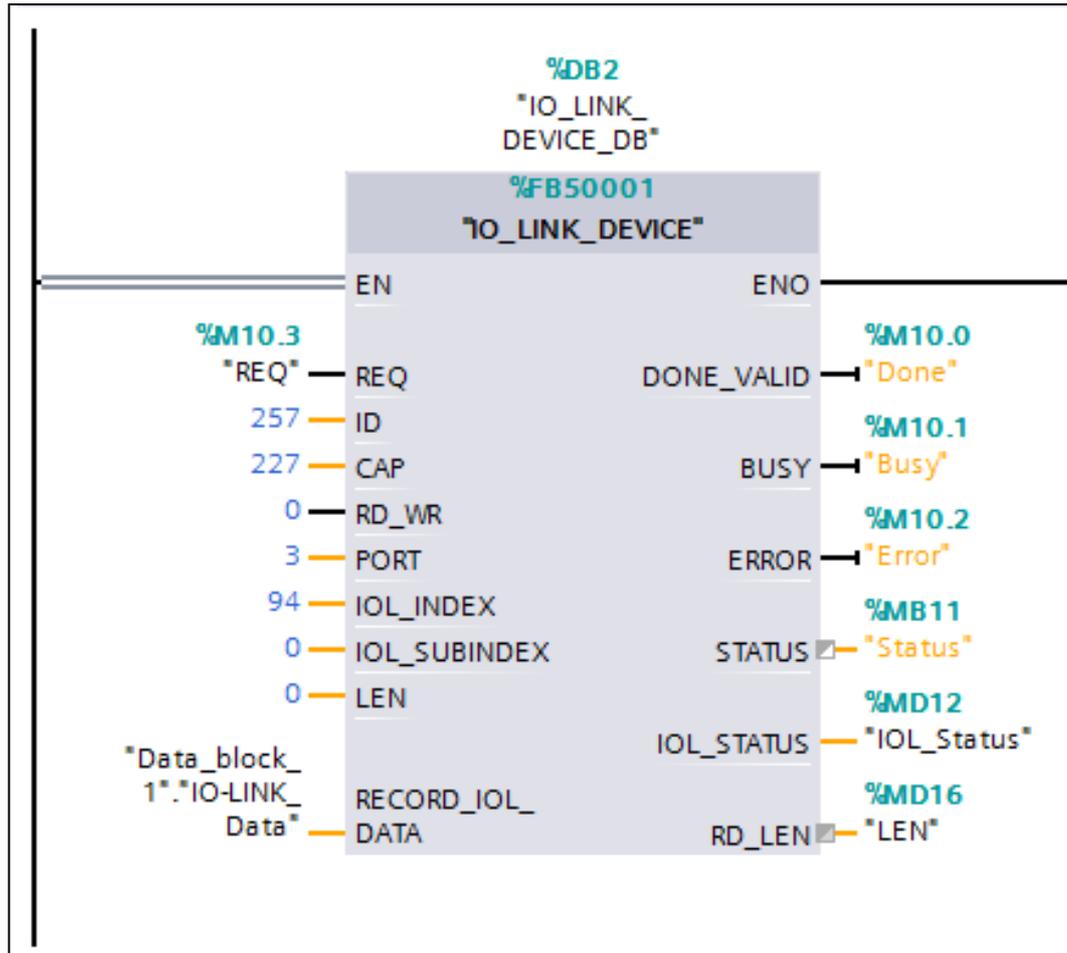
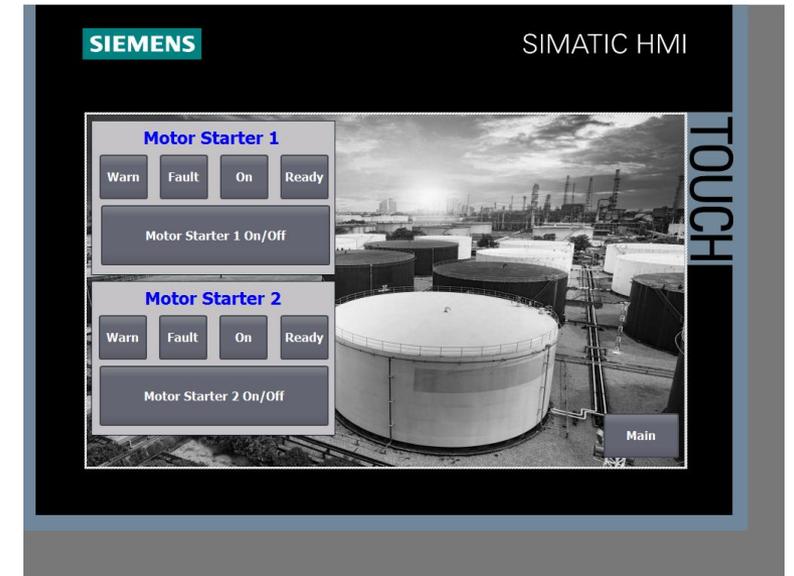
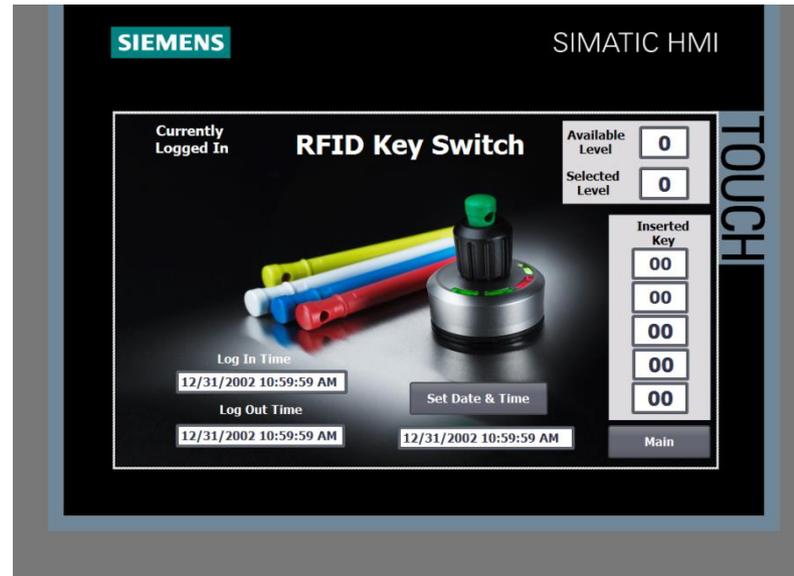


Table A- 9 Data set (index) 94 (ID keys)

Byte.Bit	Subindex	Description
0.0 ... 15.7	1 ... 3	Reserved
16.0 ... 20.7	4	Identification number of the individually codable ID key
21.0 ... 21.2	5	Authorization level
21.3 ... 21.5	6	Key position

Test Configuration



Questions

SIEMENS



IO-Link (A New Approach to Improving Control Panels)



John Burns

Lead Application Consultant
SII DF CP

5300 Triangle Parkway

Norcross, GA 30092

Fax: +1 (678) 297-7250

Cell: +1 (678) 575-3086

E-mail:

john.burns@siemens.com

www.usa.siemens.com