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Smart Camera weQube with Profinet





Interface Protocol



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1. Use for Intended Purpose

The Smart Camera weQube is able to communicate with a PLC via Profinet. Thus, an exchange of process data between the Smart Camera and the PLC is possible. Furthermore, the Smart Camera sends a status to the PLC, which in turn can send commands to the Smart Camera.



NOTE!

In the manual, the Profinet integration is shown at a Siemens S7-1200 PLC with TIA Portal V15.

2. Electrical Connection and Network Overview

Connect port 1 of the Smart Camera to 18...30 V DC. Connect pin 1 (wenglor standard cable: Brown) to the plus pole and pin 2 (wenglor standard cable: Blue) to the minus pole.

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| S89 | | | |
|-----|-----------------|---|--------|
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| | 2 | ĺ | |
| | 3 | | WH |
| | <u>4</u> | | GN |
| | 5 | | PK |
| | <u>56</u> | | YE |
| | <u>5</u> | | BK |
| |) | | GY |
| | $\frac{9}{10}$ | | RD |
| | $\frac{10}{11}$ | | VT |
| | , 12 | | GYPK |
| | <u> </u> | İ | RDBU |
| | | | 5 |
| | | | |

Connection Diagram, weQube Smart Camera, Port 1

Matching wenglor Connection Equipment

• Connect port 2 of the Smart Camera for Profinet communication with a PLC - directly or via a switch.





Connection Diagram, weQube Smart Camera, Port 2



Matching wenglor Connection Equipment



NOTE!

Port 2 of the Smart Camera supports Profinet communication and further network functionality (e.g. Software uniVision for Windows, website, process data via TCP, UDP and FTP).

Example: The Smart Camera weQube, the PLC and a PC with the software TIA Portal and uniVision are in the same network.

IP Address: 192.168.0.1 Subnet mask: 255.255.255.0



IP Address: 192.168.0.2 Subnet mask: 255.255.255.0

IP Address: 192.168.0.3 Subnet mask: 255.255.255.0



3. Input and Output Data

In the view of the PLC, the following input and output data are available for the Smart Camera:

- Slot 1 (fix): Project number (1 Byte Output of PLC)
- Slot 2 (fix): Status (4 Bytes Input of PLC)
- Slots 3-6 (flexible): User-defined process data (x Bytes Input or Output of PLC)



NOTE!

By default, slots 1 and 2 are always present. Slots 3 to 6 are optional. The number of optional slots and the data types of such user-defined slots are adjustable.

The following example shows the default slot configuration of the Smart Camera weQube with slots 1 and 2.

Example:



3.1 Status

The Smart Camera weQube sends a four-byte status information to the PLC. The status gives feedback as to whether the Smart Camera works correctly or is in an error state:

- Status 0: No error
- Status not 0: Error

In case of an error, the binary number indicates the reason of the respective error. The bit number starts with zero. Bits with value true give more information about the error.

| Bit | Section | Signal | Description |
|-----|------------------|---------------------|---|
| 0 | General | Information | Busy |
| | | | Is high while processing LIMA commands (e.g. |
| | | | because of loading a project or changing any project |
| | | | parameter). |
| 1 | | Warning | There is at least one bit set, level = Warning |
| 2 | | Critical Error | There is at least one bit set, level = Critical Error |
| 3 | | Fatal Error | There is at least one bit set, level = Fatal Error |
| 6 | Peripheral | TCP/IP | There is an error concerning the TCP/IP socket |
| 7 | | UDP | There is an error concerning the UDP socket |
| 8 | | Industrial Ethernet | There is an error concerning industrial ethernet |
| 12 | | UART | There is an error concerning the UART device |
| 13 | | FTP | There is an error concerning the FTP interface. |
| 14 | Memory | Flash | There is an error concerning the flash access |
| 15 | | RAM | There is an error concerning the RAM access |
| 16 | | SD-Card | There is an error concerning the SD card access |
| 17 | | File access | There is an error concerning a general file access. |
| 18 | | Compatibility | There is an error concerning the version of the |
| | | | loaded project |
| 24 | Image Processing | Sequencing | There is an error concerning IData vision engine |
| 25 | | Processing | There is an error concerning a vision module. |
| 26 | | Trigger | There is an error concerning HW trigger |



NOTE!

More details about errors and possible solutions are available in the uniVision software manual.

Example:

The status with the binary number 10 0000 0000 0010 shows an error at bit 1 and bit 13. Consequently, there is a warning that indicates a problem with the FTP interface. An example may be that the Smart Camera is configured to save data on a FTP server, but the FTP server is not available in the network.

| Bit | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------------|----|----|----|----|---|---|---|---|---|---|---|---|---|---|
| Binary number | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |



The following screen shows the status bits of the Smart Camera weQube in TIA Portal in case of the described FTP error.

| Project Edit View Insert Online Options | Tools W ± (2i ± | ándow Help | o online 💋 Go offline | år 18 📭 | * = | <search in="" p<="" th=""><th>roject> 🖓</th><th></th><th></th><th>Totally Integrated Automation PORTAL</th></search> | roject> 🖓 | | | Totally Integrated Automation PORTAL |
|--|--------------------|---------------|-----------------------|---------|--------|---|---|---------------|---------------------|---|
| Project tree 🔲 🖣 | Manual | | | | | | | | _ # = × | Tasks 📑 🗉 🕨 |
| Devices | | | | | | | | 🖅 Tag | s 🔳 User constants | Options 😨 |
| 11 II I | 22 | 🖻 🕑 🖤 🛍 | | | | | | | | |
| 2 | Tag | table 2 | | | | | | | | × Find and replace |
| 👻 🔄 Manual 🔤 💟 🔨 | | Name | Data type | Address | Retain | Acces W | ita Visibl | Monitor value | Comment | |
| Add new device | 1 🗠 | Status Bit O | Bool | %172.0 | | | | FALSE | ^ | Find: |
| Devices & networks | 2 🗲 | Status Bit 1 | Bool | %/72.1 | | | | TRUE | | × 5 |
| 🗄 💌 🚰 PLC_1 (CPU 1212C AC/DC/Rly) 🗹 😣 | 3 🗠 | Status Bit 2 | Bool | %172.2 | | | Image: | FALSE | | D whole woods each: |
| Device configuration | 4 📧 | Status Bit 3 | Bool | %172.3 | | | 2 | FALSE | | whole words only |
| 🖳 Online & diagnostics 🛛 🔤 | 5 🗠 | Status Bit 4 | Bool | %172.4 | | | S | FALSE | | Match case |
| 🕨 😓 Program blocks 🛛 🔵 | 6 🐨 | Status Bit 5 | Bool | %172.5 | | | 2 | FALSE | | Find in substructures |
| Technology objects | 7 🗠 | Status Bit 6 | Bool | %172.6 | | | I | FALSE | | Find in hidden texts |
| External source files | 8 📲 | Status Bit 7 | Bool | %172.7 | | | 2 | FALSE | | Characterized |
| 🔻 🚂 PLC tags 🛛 🕕 | 9 🕤 | Status Bit 8 | Bool | %173.0 | | | 2 | FALSE | - | Use wildcards |
| Show all tags | 10 🚾 | Status Bit 9 | Bool | %173.1 | | | I | FALSE | | Use regular expressions |
| Add new tag table | 11 📧 | Status Bit 10 | Bool | %173.2 | | | 2 | FALSE | | 0.0 |
| 💥 Standard-Variablentab | 12 🗠 | Status Bit 11 | Bool | %173.3 | | | S | FALSE | | O Down |
| ag table_1 (28) | 13 🐨 | Status Bit 12 | Bool | %173.4 | | | 2 | FALSE | | () Up |
| San Tag table_2 [33] | 14 🗠 | Status Bit 13 | Bool | %173.5 | | | I | TRUE | | Find |
| PLC data types | 15 -6 | Status Bit 14 | Bool | %173.6 | | | Image: | FALSE | | |
| Watch and force tables | 16 👁 | Status Bit 15 | Bool | %173.7 | | | 2 | FALSE | | Replace with: |
| Online backups | 17 -6 | Status Bit 16 | Bool | %174.0 | | | 2 | FALSE | | |
| 🕨 📴 Traces | 18 🐨 | Status Bit 17 | Bool | %174.1 | | | 2 | FALSE | | Whole document |
| Device proxy data | 19 🗠 | Status Bit 18 | Bool | %174.2 | | | S | FALSE | | |
| Program info | 20 🚾 | Status Bit 19 | Bool | %174.3 | | | 2 | FALSE | | From current position |
| PLC alarm text lists | 21 🗠 | Status Bit 20 | Bool | %174.4 | | | I | FALSE | | Selection |
| 🕨 🖬 Local modules 🛛 🗹 | 22 🕊 | Status Bit 21 | Bool | %174.5 | | | 2 | FALSE | | Replace Replace all |
| | 23 💽 | Status Bit 22 | Bool | %174.6 | | | 2 | FALSE | | |
| ta Detella view | 24 🗠 | Status Bit 23 | Bool | %174.7 | | | S | FALSE | | Languages & resources |
| Details view | 25 💽 | Status Bit 24 | Bool | %175.0 | | | 2 | FALSE | | ^ |
| | 26 🗠 | Status Bit 25 | Bool | %175.1 | | | S | FALSE | | Editing language: |
| | 27 📲 | Status Bit 26 | Bool | %175.2 | | | 2 | FALSE | | German (Germany) |
| Name Data type | 28 🗠 | Status Bit 27 | Bool | %175.3 | | | | FALSE | | |
| Command Bool 0 (Trig., Bool | 29 🚾 | Status Bit 28 | Bool | %175.4 | | | 2 | FALSE | | Reference language: |
| Command Bool 1 Bool = | 30 💽 | Status Bit 29 | Bool | %175.5 | | | | FALSE | | German (German) |
| Command Bool 2 Bool | 31 💽 | Status Bit 30 | Bool | %175.6 | | | 2 | FALSE | ~ | deman (demany) |
| Command Bool 3 Bool | < | | | | | | | | > | |
| < | | | | | | 10 | Properties | Info 🔡 | Diagnostics 🛛 🗖 🗕 🔶 | |

3.2 Commands

Commands (e.g. trigger commands) are sent from the PLC to the Smart Camera. The Smart Camera weQube supports the following commands:

- Trigger
- · Load project

It is not allowed to send several commands (e.g. trigger and project load commands) at the same time! Before sending the next command, it is necessary to wait until the processing of the last command has finished completely.

NOTE!



When the PLC sends a command to the Smart Camera, the Smart Camera captures an image or loads the project. Commands are executed immediately in contrast to process data, which is only sent or received by the Smart Camera in case of an evaluation that was started by a trigger signal.

3.2.1 Trigger Command

When the PLC sends a trigger command to the Smart Camera, the Smart Camera captures and evaluates an image and sends the results.

The following steps are necessary to set up a trigger command via Profinet:

- 1. Connect to the Smart Camera via the software uniVision for Windows.
- 2. Add Device Industrial Ethernet to the project.
- Set Slot Count to define the number of flexible slots (At least one flexible slot is required for the trigger command).
- 4. Configure one of the flexible slots as 1 Byte Output (8 BOOL)

In the following example, the trigger command via Profinet is sent at slot 3.

| Navigator 🗗 🛪 | | | | | | |
|---|------------------------|-----------|--|--|--|--|
| Module Application | | | | | | |
| > 👰 Device Camera | | | | | | |
| ✓ → → → → → → → → → → → → → → → → → → → | | | | | | |
| Slot Count | | | | | | |
| > Slot #3 | | | | | | |
| > Slot #4 | | | | | | |
| > Slot #5 | | | | | | |
| > Slot #6 | | | | | | |
| Error Handling | | | | | | |
| 📩 Add Module | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Property | Value | | | | | |
| | - | - | | | | |
| Process Time [us] | 0 | ** | | | | |
| Module State | 0 | * | | | | |
| Slot Number | 3 | * | | | | |
| Module ID | 8 | \$ | | | | |
| Submodule ID | 8 | \$ | | | | |
| Data Size | 1 | \$ | | | | |
| Direction | PLC to Device | | | | | |
| Data Nodes | 8 | * | | | | |
| Data Type | 1 Byte Output (8 BOOL) | - 🌣 | | | | |



5. Select Device Camera and link one of the bools of slot 3 to Trigger Input (Industrial Ethernet). In the example, the PLC sends the trigger command at Bool 0 of slot 3.



NOTE!

For triggering via Profinet, the Trigger Mode of Device Camera must be set to Trigger.



- 6. Use the last slot in order to verify that all new results of the image evaluation are available on the PLC. For example, configure slot 6 as "16 Byte Input (4 DINT)" and link the toggle bit and the run counter:
- Integer 1: Fix project number
- Integer 2: Run counter
- Integer 3: Toggle bit



7. Open the software TIA Portal and add slot 3 with the module "1 Byte Output (8 BOOL)" at the Smart Camera. Furthermore, add the other slots according to the configuration in the software uniVision.

 Send the value TRUE to the correct address to send a trigger command to the Smart Camera. With every change from FALSE to TRUE for the trigger command bit, the Smart Camera captures and evaluates an image.

| Pro | Project Edit View Insert Online Options Tools Window Help | | | | | | | | | | | | | |
|------|--|--------------|-----|---|----------------------|---|--------------------|--------------|----|---------------|--------------|-------|---------|---------|
| 2 | 🕆 🕒 🔚 Save project 🚢 🐰 🖄 🖄 🗙 🏷 🖢 🕐 🐇 🗒 🖳 🔛 🔛 📓 🦉 Go online 🖉 Go online 🛔 🖪 📲 🤻 😑 🛄 | | | | | | | | | | | | | |
| | | | Mar | | | | | | | | | | | _ 🖬 🖬 🗙 |
| | Devices | | | | | | | | | | | | | |
| | 11 A | 📃 🖬 | \$ | 2 | n 🛃 🕹 🍠 n 🕫 🦧 | 2 | 1 | | | | | | | |
| E. | | | - | i | Name | | Address | Display form | at | Monitor value | Modify value | 9 | Comment | |
| Ξ. | 🔻 📘 Manual | V 0 ^ | 1 | | "Trigger command" | | %Q1.0 | Bool | - | TRUE | TRUE |] 🗹 🧍 | | |
| am | 🚔 Add new device | | 2 | | "Run counter result" | | %ID96 | DEC+/- | | 2 | | | | |
| - Bo | 📥 Devices & networks | | з | | "Toggle bit result" | | %ID100 | DEC+/- | | 0 | | | | |
| E. | ▼ 1 PLC_1 [CPU 1212C AC/DC/Rly] | V 🔒 | 4 | | | | <add new=""></add> | | | | | | | |

NOTE!

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After capturing and evaluating the image, the Smart Camera sends results in the form of process data (also via Profinet if configured accordingly).

- The processing of the trigger signal and the evaluation of the image is completed when the toggle bit has changed and the run counter has increased by one.
- It is not allowed to send several commands at the same time (e.g. trigger and load project commands).
- After a trigger command has been sent from the PLC to the Smart Camera, wait until the results are available on the PLC before sending the next command.

3.2.2 Load Project Command

The load project command allows loading another project onto the Smart Camera. Up to 255 different projects can be loaded via Profinet.

The following steps are necessary to set up a load project command via Profinet:

- 1. Open the software uniVision for Windows and connect to the Smart Camera weQube.
- 2. Create uniVision projects and save them with a number at the beginning of the filename.

NOTE!

In order to load projects via Profinet, all projects must be saved in the following format: "xxx_testproject.u_p" (x = any integer from 0 to 9). For example "001_MyProject.u_p". Project numbers can be set between 1 and 255 (0 is ignored – default value). Use unique numbers for every uniVision project file. The number of slots and the slot configuration must be identical in all uniVision projects in the Smart Camera in order for the project change to be possible from the PLC.

3. Use the last slot in order to send the project number as a fix result from the Smart Camera to the PLC. This value can be used to verify that the project has finished loading.

| 🏷 uniVision [2.u_p] | |
|--|-----------------|
| File Accounts Settings View Help | |
| 📕 📩 📰 💾 💽 🗸 🕕 Swi | tch to Run Mode |
| Navigator | ₽× |
| Module Application | |
| > 🧕 Device Camera | |
| Y 🧔 Device Industrial Ethernet | |
| ✓ Slot Count | |
| > Slot #3 | |
| > Slot #4 | |
| > Slot #5 | |
| ✓ Slot #6 | |
| Data Nodes | |
| Error Handling | |
| 🚴 Add Module | |
| - | |
| 1 | |
| Property | Value |
| 🖉 Integer 1 | 2 |
| 🔗 Integer 2 | Run Counter 🌼 |
| 🔗 Integer 3 | Toggle Bit 🌼 |
| 🖉 Integer 4 | 0 |

- 4. Open the software TIA Portal.
- 5. Slot 1 (fix) of the Smart Camera is pre-configured for loading uniVision projects.

6. Send the number defined in the filename of the uniVision project from the PLC to the Smart Camera in order to load the project. With every change of the project number sent by the PLC to the Smart Camera, the Smart Camera loads the project (only if the uniVision project is available and if the project number is different to the currently loaded project).

| | Project Edit View Insert Online | Optio | ns | Tools | Window Help | | | | | | |
|--|---------------------------------|-----------------------|-----|-------|---------------------------|--------------------|-----------------------|----------------|--------------|-----|---------|
| 🔮 💽 🖥 Save project 📇 💥 🟥 庙 🗶 🖄 🛨 (* ± 🚡 🔃 🕼 🔛 🕼 🖉 Go online 🖉 Go online 🛔 🖪 🗜 🤽 🚽 📋 🖉 Search in projecto 🙀 | | | | | | | | | | | |
| | Project tree | 1 | E 📢 | Manu | al > PLC_1 [CPU 1212C AC/ | DC/Rly] 🕨 Wa | atch and force tables | • Watch table_ | .2 | | _ # = X |
| | Devices | | | | | | | | | | |
| | 1 1 | | 7 | 2 | * 🚵 🐓 🌆 🐔 🎝 🖉 | oon ▶ 1 | | | | | |
| 2 | n | | | i | Name | Address | Display format | Monitor value | Modify value | 9 | Comment |
| | 🔻 🛅 Manual | | ^ | 1 | "Trigger command" | %Q1.0 | Bool | FALSE | FALSE | 🗹 🔺 | |
| Ę | 💕 Add new device | | 1 | 2 | "Run counter result" | %ID96 | DEC+/- | 0 | | | |
| | Devices & networks | | | 3 | "Toggle bit result" | %ID100 | DEC+/- | 0 | | | |
| E | PLC_1 [CPU 1212C AC/DC/Rly] | $\mathbf{\mathbf{V}}$ | | 4 | "Load project command" | %QB65 | DEC+/- | 2 | 2 | 🗹 🖌 | |
| L L | Device configuration | | = | 5 | "Project number result" | %ID92 | DEC+/- | 1 | | | |
| | 🖳 Online & diagnostics | | | 6 | | <add new=""></add> | | | | | |
| | 🔻 🛃 Program blocks | | | | | | | | | | |
| | Add new block | | | | | | | | | | |

NOTE!

- After loading the project, the Smart Camera initializes all results (e.g. run counter is reset to 0).
- The project has finished loading when the result of the project number is available on the PLC.
- It is not allowed to send several commands at the same time (e.g. trigger and load project commands).
- After a load project command is sent from the PLC to the Smart Camera, wait until the result of the project number is available on the PLC before sending the next command.

NOTE!

After starting the Smart Camera weQube, the startup project defined in the global properties is loaded. It is possible to send a command to load another project from the PLC to the Smart Camera before the booting process is finished, but it is necessary to wait until the Smart Camera responds with the correct project number before sending the first trigger command.

3.3 User-Defined Process Data

All other Profinet values in the uniVision project are process data. Process data is sent from the device to the PLC and vice versa. Details are available in the Smart Camera settings (see section "4.2 Device Industrial Ethernet", page 17).

NOTE!

Compared to commands and status data that are updated continuously, process data is only evaluated and sent when an image is executed because of a trigger signal.

4. Smart Camera Settings

For Profinet communication, the following steps are necessary at the Smart Camera.

NOTE!

- The Smart Camera weQube supports Profinet functionality starting with the Smart Camera firmware version 2.2.0 and the software uniVision version 2.2.0.
- Not all Smart Cameras support Profinet communication. Check the technical data on the wenglor website for details about every Smart Camera version.

4.1 Set Up uniVision Projects

The following steps are necessary in order to create a communication between the Smart Camera and the PLC:

- 1. Install and open the software uniVision for Windows.
- 2. Set up the network configuration and the device name of the Smart Camera via the software uniVision.

NOTE!

It is recommended to directly allocate the network configuration and device name to the Smart Camera that is to be used in the Profinet network later.

- 3. Connect to the Smart Camera.
- 4. Edit and save uniVision projects on the Smart Camera. All projects must contain Device Industrial Ethernet (see section "4.2 Device Industrial Ethernet", page 17).
- 5. Open the Properties of the Smart Camera in the Device List to set up the startup behavior. It is necessary to select a valid startup project with a suitable Profinet configuration.

| | | Property | Value | | | | | |
|-----------------|-----------|-----------------------------|-------------------|--------|--|--|--|----------------|
| Device List | | Name | weaube | | | | | |
| | | Article Number | B50M002 | | | | | |
| | | Serial Number | 600093015 | | | | | |
| Device Quick Se | arch | Description | weQube | | | | | |
| | ~ | Product Version | 2.2.0. | | | | | |
| Status Name | | MAC-Address | 54:4a:05:09:0c:db | | | | | |
| Ok Y CO | ntrol-uni | DHCP | False | | | | | |
| Ok V | digiti | IP-Address | 192.168.100.5 | | | | | |
| Unknown | wecat3d | Subnet Mask | 255.255.255.0 | | | | | |
| Ok co | ntrol-uni | Std. Gateway | 192.168.100.5 | | | | | |
| Ok we | qube | TCP/IP Port | 32001 | | | | | |
| Ok we | weqube1 | UDP State Interval | 5 | | | | | |
| | | Type Of Industrial Ethernet | PROFINET | | | | | |
| | | | Start Project | 1.u_p | | | | |
| | | | | | | | | Startup Policy |
| | | Start Focus Value | -1 | | | | | |
| | | FTP Remote IP-Address | 192.168.100.100 | | | | | |
| | | FTP Remote Username | ftpuser | | | | | |
| | | FTP Remote Password | passwd | | | | | |
| | | Web Interface Password | admin | | | | | |
| | | Display Rotation | False | | | | | |
| | Con | Display Password | 2013 | Delete | | | | |
| | | Display Locked | E False | Delete | | | | |
| | | Display Mode | Text | | | | | |
| | | Display Intensity | Screensaver | | | | | |
| | | Display Language | Deutsch | | | | | |
| | | | | | | | | |

NOTE!

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- Make sure that Type of Industrial Ethernet is set to PROFINET at the properties of the Smart Camera.
- Details about all listed steps are explained in the uniVision software manual.

4.2 Device Industrial Ethernet

Add Device Industrial Ethernet to the uniVision projects from the toolbox to configure the flexible slots. The Smart Camera supports up to four slots to send or receive process data. With one of the flexible slots, it is also possible to send the trigger command to the Smart Camera (see section "3.2.1 Trigger Command", page 8).

NOTE!

- Compared to commands and status data that are updated continuously, process data is only evaluated and sent when an image is evaluated because of a trigger signal.
- Only within one slot is the process data sent and received consistently in one Profinet cycle. The process data from different slots of the Smart Camera to the PLC may be updated in different Profinet cycles. Use the last slot to make sure that all results are refreshed, e.g. by linking the run counter or the toggle bit to a value from the last slot.
- Furthermore, it is recommended to also send the project number as fixed value in the last slot in order to verify on the PLC side that the project loading process is finished.
- After changing the number of slots or the slot configuration, the Smart Camera must be restarted with a suitable start-up behavior (e.g. fixed start-up project) in order for the settings to be applied correctly.
- The number of slots and the slot configuration must be identical in all uniVision projects in the Smart Camera in order for the project change to be possible from the PLC.

🐌 uniVision [2.u_p]

| File Accounts Settings View Help |) |
|--|-------------------|
| 📕 📩 🎟 💾 💽 🗸 🕩 🔊 sw | vitch to Run Mode |
| Navigator | 8 × |
| Module Application | |
| > 🧕 Device Camera | |
| ✓ ♣ Device Industrial Ethernet | |
| ✓ Slot Count | |
| > Slot #3 | |
| > Slot #4 | |
| > Slot #5 | |
| Data Nodes | |
| Error Handling | |
| Add Module | |
| 94 6 | |
| | |
| Property | Value |
| 🦉 Integer 1 | 2 |
| 🔗 Integer 2 | Run Counter 🌼 |
| 🔗 Integer 3 | Toggle Bit 🌼 |
| 🖉 Integer 4 | 0 🌣 |
| | |

| Property | Description | | | | |
|-------------------|---|--|--|--|--|
| Process Time [us] | Time in μ s for processing the module. | | | | |
| Module State | ndicates the status of the module: 0: No error Value different to 0: Error (Details about the error code are available in the uniVi- sion software manual) | | | | |
| Interface Type | ndicates the interface type. | | | | |
| Slot Count | Number of flexible slots (Slots 3 – 6). NOTE! By default, the number of flexible slots is set to 0. Fours flexible slots can be configured at a maximum. | | | | |
| Error handling | If any process data is in error state, it is substituted by a user-defined replacement value (see section "4.2.2 Error Handling", page 22). | | | | |

4.2.1 Slots

Set up the configuration for every Profinet slot.

| Property | Description | | | | | | | | | |
|-------------------|---|--|--|--|--|--|--|--|--|--|
| Process Time [us] | Time in μ s for processing the module. | | | | | | | | | |
| Module State | Indicates the status of the module: • 0: No error • Value different to 0: Error (Details about the error code are available in the uniVi- sion software manual) | | | | | | | | | |
| Slot Number | Indicates the slot number. | | | | | | | | | |
| Module ID | Indicates the Module ID. | | | | | | | | | |
| Submodule ID | Indicates the Submodule ID. | | | | | | | | | |
| Data Size | Indicates the data size in bytes. | | | | | | | | | |
| Direction | Indicates the direction in which data is sent:Device to PLC: Values are sent from the Smart Camera to the PLC.PLC to Device: Values are sent from the PLC to the Smart Camera. | | | | | | | | | |
| Data Nodes | Indicates the number of data nodes. | | | | | | | | | |
| Data Type | Select the data type of the slot. The Smart Camera supports the following data types: • 16 Byte Input (4 DINT) • 16 Byte Input (4 REAL) • 1 Byte Input (8 BOOL) • 128 Byte Input (2 CHAR) • 1024 Byte Input (1 CHAR) • 1024 Byte Input (1 CHAR) • 16 Byte Output (4 DINT) • 16 Byte Output (4 REAL) • 1 Byte Output (8 BOOL) • 128 Byte Output (8 BOOL) • 128 Byte Output (2 CHAR) • 32 Byte Input (2 CHAR) • 64 Byte Input (2 CHAR) • 512 Byte Input (2 CHAR) • 64 Byte Output (2 CHAR) • 32 Byte Output (2 CHAR) • 512 Byte Output (2 CHAR) | | | | | | | | | |
| | NOTE! Use BOOL to send or receive true/false results (e.g. toggle bit). Use REAL to send or receive numbers with positions after decimal point (e.g. x value of a found point). Use DINT to send or receive numbers without positions after decimal point (e.g. pixel count value of Module Threshold). Use CHAR to send or receive text information (e.g. code result). | | | | | | | | | |

| Property | Description | | | | | | | |
|-----------|---|--|--|--|--|--|--|--|
| | Linking results to the different data types works as follows: • BOOL (output) | | | | | | | |
| | Link BOOL result: Returns true or false depending on value of bool | | | | | | | |
| | Link DINT or REAL result: Returns true if the current value is within thresholds (between the minimum and maximum thresholds) and returns false if the current value is out of tolerance (lower than the minimum or higher than the maximum thresholds) | | | | | | | |
| | Link CHAR: Returns true if the text is not empty and returns false if the text is empty. | | | | | | | |
| | • DINT (output) | | | | | | | |
| | - Link BOOL result: Returns 0 for bool value false and 1 for bool value true. | | | | | | | |
| Data Type | Link DINT: Returns current DINT value | | | | | | | |
| | Link REAL: Returns a number without decimal places (no rounding!) | | | | | | | |
| | Link CHAR: Returns the number of digits of the text | | | | | | | |
| | • REAL (output) | | | | | | | |
| | - Link BOOL result: Returns 0 for bool value false and 1 for bool value true. | | | | | | | |
| | Link DINT or REAL: Returns a number with decimal places | | | | | | | |
| | Link CHAR: Returns the number of digits of the text | | | | | | | |
| | • CHAR (output) | | | | | | | |
| | - Link BOOL result: Returns false for bool value false and true for bool value true | | | | | | | |
| | Link DINT or REAL: Returns the number | | | | | | | |
| | Link CHAR: Returns the text | | | | | | | |

In the project tree, data nodes appear below the slot.

4.2.2 Error Handling

If any process data is in error state, the substitution value can be selected for every data type.

| Property | Description |
|-------------------------------|--|
| Substitute Bool Types by | If a bool type used in Device Industrial Ethernet is in error state, it is replaced by low or high (Default: low). |
| Substitute INT Types by | If an INT type used in Device Industrial Ethernet is in error state, it is replaced by any user-defined INT value (Default: 0). |
| Substitute DOUBLE Types by | If a DOUBLE type used in Device Industrial Ethernet is in error state, it is replaced by any user defined DOUBLE value (Default: 0.0000) |
| Substitute STRING Types by | If a STRING type used in Device Industrial Ethernet is in error state, it is replaced by any user-defined STRING value (Default: Error). |

5. PLC Settings

The following settings are necessary on the PLC side.

5.1 GSDML File

GSDML file is available on the wenglor website in the Download section of the Smart Camera. Download the GSDML file, unzip the file and install it on the PLC.

NOTE!

After downloading the zip file, please unzip the file before installing it on the PLC.

In the software TIA Portal V15, the GSDML file is added via "Options" -> "Manage general station description files (GSD)".

| P | roject Edit View Insert Online | Options | Tools Window Help | | | 1 - | | - | | | | | | | | То | tally Integrat | ed Automation | |
|-----|--|-----------|-----------------------------|------------|------|--------|----------|------------|------------|-------------------|------|--------------|-----------|---------------------|-----------------------------|-----------|----------------|---------------|-------------|
| - 6 | Save project 🚢 🐰 🖽 🕻 | T Setting | 19 | | | e 🖉 Go | offline | 12 12 3 | ≮ ⊟ ∐ ⊴∘ | arch in project> | - 14 | | | | | | | PORT | AL |
| | Project tree | Suppor | rt packages | | | | | | | | | | | _ • • = × | Hardware ca | | | | |
| | Devices | Manag | e general station descripti | on files (| GSD) | | | | | Topology v | dew | A Networ | k view | Device view | Options | | | | |
| | 樹 | 3101174 | utomation cicense wanage | | | | 4' 🖬 | Devic | e overview | | | | | | | | | | 티테 |
| | | Shown | eterence text | | | | ^ | - | | | clas | la catalogue | 0.00 | T | ✓ Catalog | _ | | | - \$ |
| Å | 👻 🛅 Manual | Global | libraries | | • | | | | Module | | 103 | Tadoress | Q address | Type | - cuturog | | | and a | |
| | Add new device | | 1 | | | | | | | | 102 | | | | Scalens | | | | <u>" </u> |
| | devices & networks | | | | | | 0 = | | | | 101 | | | | Filter I | Profile: | Alb | | 폐용 |
| | Diagonal PLC_1 [CPU 1212C AC/DC/Rly] | | | | | 4 | <u>с</u> | _ | ▼ PLC 1 | | 1 | | | CPU 1212C AC/DC/RIv | CPU | | | | 9 |
| 1 | Device configuration | | | | | | | _ | DI 8/DO | 5 1 | 11 | 0 | 0 | DI 8/DO 6 | Signal b | poards | | | |
| | 😼 Online & diagnostics | | | | _ | | _ | ~ | AL2 1 | | 12 | 64_67 | | AL2 | Commu | inication | ns boards | | - 2 |
| | Program blocks | • | | 103 | 102 | 101 | 1 | | - | | 13 | | | | Battery | boards | | | 9 |
| | Add new block | | Baugruppenträge | | | | | V | HSC 1 | | 116 | 100010 | | HSC | • <u> </u> | | | | |
| | Hain [OB1] | | | | | | | ~ | HSC 2 | | 1.17 | 100410 | | HSC | • 🛄 DQ | | | | |
| | Technology objects | | | | | | | V | HSC 3 | | 1 18 | 100810 | | HSC | • III DI/DQ | | | | - <u>e</u> |
| | External source files | | | | | - 8 | | ~ | HSC_4 | | 1 19 | 101210 | | HSC | A | | | | - 11 |
| | PLC tags | • | | | | 1 | | _ | HSC_5 | | 1 20 | 101610 | | HSC | P UI AQ | | | | |
| | Show all tags | | | | | | | _ | HSC_6 | | 1.21 | 102010 | | HSC | AllAQ | | | | - 13 |
| | Add new tag table | | | | | _ | | V | Pulse_1 | | 1 32 | | 100010 | Pulse generator (PT | • Commu | inication | is modules | | - S |
| | Standard-Variablentab. | | | | | 1 | i i | V | Pulse_2 | | 1 33 | | 100210 | Pulse generator (PT | • 🛄 Technol | logy mo | dules | | - 6 |
| | Tag table_1 [5] | | | | | | | . 🗸 | Pulse_3 | | 134 | | 100410 | Pulse generator (PT | | | | | - |
| | 🖏 Tag table_2 [33] | | | | | | | - V | Pulse_4 | | 1 35 | | 100610 | Pulse generator (PT | | | | | - 121 |
| | PLC data types | • | | | | | | ~ | PROFINE | T-Schnittstelle_1 | 1 X1 | | | PROFINET interface | 1 | | | | ibi |
| | Watch and force tables | | | | | | | | | | 2 | | | | | | | | 8 |
| | Add new watch table | | | | | | | | | | 3 | | | | 1 | | | | S |
| | Forcetabelle | | | | | | | | | | | | | | | | | | |
| | watch table_1 | | | | | | | | | | | | | | | | | | - 10 |
| | Watch table_2 | ~ | 1 | | | | | | | | | | | | | | | | - 10 |
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| | ✓ Details view | | 1 | | | | | | | | | | | | | | | | - 10 |
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| | Name | | | | | | | | | | | | | | | | | | _ |
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| | | | | | | | | | | Propert | ties | 1 Info | 🖁 Diagno | stics 🔤 🗖 🗏 🔶 | > Informati | ion | | | |

Adjust the correct source path if necessary, select the file and click on "Install". After successful installation, the status switches to "Already installed".

| Manage general sta | tion description files | | | × |
|---------------------|--|-----------------|--------------|-------------------|
| Installed GSDs | GSDs in the project | | | |
| Source path: C:\\ | Jsers\MartinKn\Desktop\PLC tests\weQube\ | Manual\Addition | nalFiles\GSD | 1 |
| Content of imported | ed path | | | |
| File | | Version 🔺 | Language | Status |
| GSDML-V2.3-weng | glor-wenglor ident-20161007-112500.xml | V2.3 | English, Ger | Already installed |
| | | | | |
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| < | | | | > |
| | | | | |
| | | Delete | e Install | Cancel |

5.2 Add Smart Camera to PLC Network

Search in the hardware catalog for "Other field devices" \rightarrow "PROFINET IO" \rightarrow "Ident Systems". Select "wenglor sensoric gmbh" and add "weQube V1.4" to your Profinet network.

| Project Edit View Insert Online Options | Tools Window Help 호 (객 호 등 1년 1월 및 교 Goonline 교 Gootfline 🏰 13 등 대 🗶 - 📋 스earch in projects 🦛 | Totally Integrated Automation PORTAL |
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| Add new device | PLC_1 CPU 1212CA | Silter Profile: wills I I III |
| Devices & networks | CPU 1212C WeQube V1.4 Solution GSD device_1 GSD device | A Castallan |
| PLC_1 [CPU 1212C AC/DC/Riy] | Not assigned weQube V1.4 | |
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| PIC data types | | Power supply & distribution |
| Watch and force tables | | Field devices |
| Online backups | | Other field devices |
| Traces | | Additional Ethernet devices |
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| PLC alarm text lists | • | Encoders |
| Local modules | | 🕨 🚰 Gateway 🐺 |
| Ungrouped devices | | • 🛅 1/0 |
| Security settings | | 👻 🛅 Ident Systems |
| Unassigned devices | | menglor sensoric gmbh |
| Common data | | wenglor ident |
| Documentation settings | | ✓ i wenglor ident |
| Languages & resources | | Control Unit V2.2 |
| × Details view | | weQube V1.1 |
| · beaustick | | weQube V1.4 |
| Module | | Lim PLCs & CPs |
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| Name | | MOHROS DR |
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| Technology objects | |

Then connect the Smart Camera to the PLC in the network view.

5.3 Profinet Network Configuration

Switch to the device view of the Smart Camera and open the Properties. Then set up the network configuration for the Profinet interface of the Smart Camera and select a device name.

NOTE!

It is necessary to use the same network configuration and the same device name on the PLC side and on the software for uniVision side.

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| - R PLC 1 [CPU 1212C AC/DC/RM | area. | | Project Nur | nber_1 | 1 | | 64 | Project Nu | 🕨 🖿 Head n | odule | | |
| Device configuration | Ť | | State_1 | | 2 | 68/1 | | State - | 🕨 🚺 Module | | | |
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| PLC tags | _ | | | | | | | | | | | |
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| Traces | | | | | | | - | | * | | | |
| Device proxy data | X 1 Z 100% | · · · · · · · · · · · · · · · · · · · | | - | - | 1 | _ | | | | | |
| Program info | weqube [weQube V1.4] | | 1 | Propertie | s 选 | . Info 🛛 🕹 Di | agnostics | | 1 | | | |
| PLC alarm text lists | General IO tags Sys | tem constants Texts | | | | | | | | | | L |
| Local modules | h General | 1 | Set IP address | in the project | | | | | | | | |
| Distributed I/O | REOFINET interface [V1] | | | | | | | | | | | |
| Ungrouped devices | General | | IP addre | ISS: 192 . 168 . 1 | 00.5 | | | | | | | |
| Security settings | Ethernet addresses | | Subnet ma | isk: 255 . 255 . 2 | 55.0 | | | | | | | |
| 🕨 🙀 Common data | Advanced ontions | | Synchronize ro | uter settings with IO | controller | | | | | | | |
| Constant at the settings | Interface options | | Use router | | | | | | | | | |
| 🔸 🦲 Languages & resources 🗸 🗸 | Beal time settings | | | | | | | | | | | |
| ✓ Details view | Port 1 [X1 P1] | | Nouter addre | | | | | | | | | |
| Madula | | | IP address is se | et directly at the devi | ce | | | | | | | |
| | | | | | | | | | | | | |
| | | PROFINET | | | | | | | | | | |
| Name | | | | | | | | | | | | |
| Device configuration | | | Generate PROF | INET device name as | tomatical | ly | | | | | | |
| V Online & diagnostics | | PROFINET device name: | weqube | | | | | | | | | |
| Program blocks | | Converted name: | wegube | | | | | | | | | |
| Fechnology objects | | Device number: | 1 | | | | | | | _ | | |
| External source files | | bence hamber. | 1. · | | | | | | > Information | ion | | |

5.4 Configure Input and Output Data

Add the input and output slots according to the project configuration set in the software uniVision.

NOTE!

Slots 1 and 2 are fix. Slots 3 to 6 are adjustable.

The following example shows a 1 Byte Output (8 BOOL) at slot 3, a 1 Byte Input (8 BOOL) at slot 4, a 16 Bytes Input (4 REAL) at slot 5 and a 16 Bytes Input (4 DINT) at slot 6.

5.5 Download Configuration to PLC

Download the configuration to the PLC. Then assign the network configuration and the device name to the Smart Camera via the context menu ("Assign device name").

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| Project tree | ▲ Manual ➤ Ungrou | ped devices 🕨 weqube [weQube V1. | 4] | | | | | | _ # = × | Hardware catalog | |
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| B | 🛃 👉 🔤 weqube [weQu | be V1.4] 💌 🛄 🕎 🏹 📑 | Devic | e overview | | | | | | | 5 |
| | - | ^ | - . | Module | Rack | Slot | Laddress | O address | Type | ✓ Catalog | _ |
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| Add new device | | | | PNHO | 0 | 0.81 | | | weaube | | |
| Devices & networks | | = | | Project Number 1 | 0 | 1 | | 64 | Project Number | Filter Profile: All> | |
| PLC_1 [CPU 1212C AC/DC/Rly] | S 1 | | | State 1 | 0 | 2 | 68 71 | | State | Head module | |
| Device configuration | | | | 1 Byte Output (8 BOC | 0.1 0 | 3 | | 1 | 1 Byte Output | ✓ Module | |
| 😼 Online & diagnostics | | | | 1 Byte Input (8 BOOL | 1 0 | 4 | 1 | | 1 Byte Input (| 1 Byte Input (8 BOOL) | |
| Program blocks | - | Change device | | 16 Byte Input (4 REAL | 1 0 | 5 | 7287 | | 16 Byte Input | 1 Byte Output (8 BOOL) | |
| Technology objects | | Write IO-Device name to Micro Memo | ory Card | 16 Byte Input (4 DINT | 1 0 | 6 | 88 103 | | 16 Byte Input | 1024 Byte Input (1 CHAR[1024]) | |
| External source files | | Start device tool | | | | 7 | | | | 128 Byte Input (2 CHAR[64]) | |
| PLC tags | | V Cut | Other | | 0 | 8 | | | | 128 Byte Output (2 CHAR[64]) | |
| PLC data types | | THE CODY | Ctriac | | 0 | 9 | | | | 16 Byte Input (4 DINT) | |
| Watch and force tables | | Paste | Ctriav | | | 10 | | | | 16 Byte Input (4 REAL) | |
| Online backups | | | - | | 0 | 11 | | | | 16 Byte Output (4 DINT) | |
| 🕨 🔯 Traces | | X Delete | Del | | 0 | 12 | | | | 16 Byte Output (4 REAL) | |
| Device proxy data | | ar Go to topology view | | | 0 | 13 | | | | 256 Byte Input (2 CHAR[128]) | |
| Program info | | 📥 Go to network view | | | | 14 | | | | 256 Byte Output (2 CHAR[128]) | |
| PLC alarm text lists | | Compile | | | | 16 | | | | 32 Byte Input (2 CHAR[16]) | |
| Local modules | | Download to device | | | 0 | 16 | | | | 32 Byte Output (2 CHAR[16]) | |
| Distributed I/O | | 🥩 Go online | Ctrl+K | | | 10 | | | | 512 Byte Input (2 CHAR[256]) | |
| Ungrouped devices | | Go offine | Ctrl+M | | | | | | | 512 Byte Output (2 CHAR[256]) | |
| Security settings | | & Online & diagnostics | Ctrl+D | | | | | | | 64 Byte Input (2 CHAR[32]) | |
| Common data | | Assign device name | | | | | | | | 64 Byte Output (2 CHAR[32]) | |
| Documentation settings | | Update and display forced operands | | | | | | | | | |
| Languages & resources | ~ | Cross-references | E11 | | | | | | | | |
| A Details view | 101 | Cross-reference information | Shift+F11 | | | | | | | | |
| • Details view | - | Show catalon | Ctrl_Shift_C | | | | | | | | |
| Module | | Export module labeling strips | | | | | | | | | |
| | | and a second sec | | | | | | | | | |
| Name | | III Properties | Alt+Enter | | | | | | | | |
| Device configuration | ^ | | | | | | | | | | |
| Online & diagnostics | = | | | | | | | | | | |
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| Technology objects | X 100% | · · · · · · · · · · · · | < | | 1 | _ | | | > | | |
| External source files | × | | | 0 | Properties | 11 Info | Dia | anostics | | > Information | |

Click on "Update list" to see all Smart Cameras in the network. Select the correct Smart Camera, assign the name and close the window.

| Project Edit View Insert Online Options Tools | Window Help | | | | | Totally Integrated Auto | mation |
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| THE PLC 1 CON 1212C ACIDORIA | | | | | hber | Head module | ĝ |
| Device configuration | — | Deviles filters | | | | ▼ 🚺 Module | |
| Conline & diagnostics | | Device filter | | | ut | 1 Byte Input (8 BOOL) | N |
| Program blocks | | Only show device | s of the same type | | | 1 Byte Output (8 BOOL) | 0 |
| Technology objects | | Ophychow device | s with had parameter settin | or | pr | 1024 Byte Input (1 CHAR[1024]) | i i i |
| External source files | | - Only show device | s with bad parameter seturi | A.> | J | 128 Byte Input (2 CHAR[64]) | et |
| PLC tags | | Only show device | s without names | | | 128 Byte Output (2 CHAR[64]) | 0 |
| PLC data types | | Anne and the standard in the second state | | | | 16 Byte Input (4 DINT) | ~ |
| Watch and force tables | | Accessible devices in the network: | | | - 10 | 16 Byte Input (4 REAL) | - |
| Online backups | _ | IP address MAC address Devic | e PROFINET device nam | e Status | - | 16 Byte Output (4 DINT) | |
| Traces | | 192.168.100.5 54-4A-05-09-0C-D8 Weng | lor i weqube | OK CK | - 10 | 16 Byte Output (4 REAL) | a. |
| Device proxy data | | 192.168.100.6 54-4A-05-09-04-47 weng | lori weqube1 | Device name is different | - 10 | 256 Byte Input (2 CHAR[128]) | Ś |
| Program info | | | | | - 10 | 256 Byte Output (2 CHAR[128]) | |
| PLC alarm text lists | | | | | - 10 | 32 Byte Input (2 CHAR[16]) | ų. |
| Local modules | Flash LED | | | | - 10 | 32 Byte Output (2 CHAR[16]) | 6 |
| Distributed I/O | | | | | | 512 Byte Input (2 CHAR[256]) | 27 |
| Ingrouped devices | | <] | | | 2 | 512 Byte Output (2 CHAR[256]) | es |
| Security settings | | | | Update list Assign name | _ | 64 Byte Input (2 CHAR[32]) | |
| 🕨 🙀 Common data | | | | | | 64 Byte Output (2 CHAR[32]) | |
| Documentation settings | | | | | | | |
| Languages & resources | | | | | | | |
| ✓ Details view | Unline status information: | | | | | | |
| Modulo | Search completed. 2 | of 5 devices were found. | | | | | |
| module | Ine PROFINE I device i | name "weqube" was successfully assigned t | 0 MAC address 154-4A-05-09 | -00-081. | | | |
| | | | | | _ | | |
| Name | < | | 1 | | > | | |
| Device configuration | | | | | | | |
| Q Online & diagnostics | | | | | | | |
| Program blocks | | | | Close | - | | |
| Technology objects | | | | | > | | |
| External source files | | | Sector Properties | Linto Diagnostics | | > Information | |

Click on "Go online". Check the status in TIA Portal to analyze if the configurations of the PLC and the Smart Camera fit together.

5.6 PLC Tags

Select PLC tags to add the input and output data to your PLC project.

Example: The example shows the sending process of the Diameter in the Module Measure application as first REAL value of slot 5.

In TIA Portal, the input address of slot 5 starts with 72.

The correct input address must be set in the PLC tags in order to receive the diameter value.

NOTE!

Make sure to check the change of the toggle bit and/or the run counter in the last slot in order to check if all measurement results are already updated.

6. Sample PLC Program

The download area for the Smart Camera at www.wenglor.com contains sample PLC projects for various controllers. The projects show examples of the required settings on the controller side for PROFINET communication with the weQube Smart Camera.

Samples are available for the following controllers:

- Siemens S7-1200 PLC with TIA Portal V15
- Beckhoff TwinCAT 3

How to use the sample PLC programs:

- 1. Download the sample file from the wenglor website and unzip it.
- 2. Open the associated uniVision project file in the Smart Camera, save it as a start-up project, and restart the Smart Camera. The following slot configuration is used in uniVision projects:
 - Slot 3: 1-byte output
 - Slot 4: 1-byte input
 - Slot 5: 16-byte input (4 REAL)
 - Slot 6: 16-byte input (4 DINT)
- 3. Open the sample PLC program, adjust the network configuration, and transfer the program to the PLC, or activate it on the PLC.