SIEMENS

SIMOTION

Motion Control Technology Modules TM Timer DIDQ for SIMOTION SCOUT and SIMOTION SCOUT TIA

Commissioning Manual

Preface

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Valid as of Version 4.5

11/2016

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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℗ 10/2016 Subject to change

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Preface

This manual describes TM Timer DIDQ 10x24V and 16x24V technology modules used with SIMOTION controllers with PROFINET connection.

This manual is aimed at machine manufacturers, plant engineers, commissioning personnel, and service personnel who use technology modules with SIMOTION SCOUT or with SIMOTION SCOUT TIA.

The following information blocks describe the purpose and use of the Commissioning Manual:

- Description
  This section describes the general use of the TM Timer DIDQ technology modules 10x24V and 16x24V.
- Configuring
  Provides information about configuring, parameterizing and commissioning the TM Timer DIDQ technology modules with the SIMOTION SCOUT and SIMOTION SCOUT TIA engineering systems.
- Functions
  This chapter provides an overview of the functions of the TM Timer DIDQ technology modules.
- Service and maintenance
  Provides information on maintenance work that must be implemented on the TM Timer DIDQ technology modules.
- Diagnostics
  Provides information about the available diagnostic information, how to interpret it, and its meaning.

SIMOTION Documentation

An overview of the SIMOTION documentation can be found in the SIMOTION Documentation Overview document.

This documentation is included as electronic documentation in the scope of delivery of SIMOTION SCOUT. It comprises ten documentation packages.

The following documentation packages are available for SIMOTION V4.5:

- SIMOTION Engineering System Handling
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION IT
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C

- SIMOTION P
- SIMOTION D
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

SIMOTION at a glance

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

https://support.industry.siemens.com/cs/ww/en/view/109480700

Additional information

Click the following link to find information on the following topics:

- Documentation overview
- Additional links to download documents
- Using documentation online (find and search manuals/information)

https://support.industry.siemens.com/cs/ww/en/view/109479653

My Documentation Manager

Click the following link for information on how to compile documentation individually on the basis of Siemens content and how to adapt it for the purpose of your own machine documentation:

https://support.industry.siemens.com/My/ww/en/documentation

Training

Click the following link for information on SITRAIN - Siemens training courses for automation products, systems and solutions:

http://www.siemens.com/sitrain

FAQs

Frequently Asked Questions can be found in SIMOTION Utilities & Applications, which are included in the scope of delivery of SIMOTION SCOUT, and in the Service&Support pages in **Product Support**:

https://support.industry.siemens.com/cs/de/en/ps/14505/faq

Technical support

Country-specific telephone numbers for technical support are provided on the Internet under **Contact**:

https://support.industry.siemens.com/cs/ww/en/sc/2090

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Safety notes

1

1.1 Fundamental safety instructions

1.1.1 Safety instructions for electromagnetic fields (EMF)

⚠ WARNING

Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

- Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.1.2 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.

NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.1.3 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under http://www.siemens.com/industrialsecurity..

⚠ WARNING

Danger as a result of unsafe operating states resulting from software manipulation

Software manipulation (e.g. by viruses, Trojan horses, malware, worms) can cause unsafe operating states to develop in your installation which can lead to death, severe injuries and/or material damage.

- Keep the software up to date.
  Information and newsletters can be found at:
  http://support.automation.siemens.com
- Incorporate the automation and drive components into a state-of-the-art, integrated industrial security concept for the installation or machine.
  For more detailed information, go to:
  http://www.siemens.com/industrialsecurity
- Make sure that you include all installed products into the integrated industrial security concept.

1.1.4 Danger to life due to software manipulation when using removable storage media

⚠ WARNING

Danger to life due to software manipulation when using removable storage media

The storage of files on removable storage media involves a high risk of infection, e.g. via viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect the files on removable storage media against harmful software through appropriate protective measures, e.g. virus scanners.

1.1.5 Residual risks of power drive systems

When performing the risk assessment for a machine or plant in accordance with the respective local regulations (e.g. EC Machinery Directive), the machine manufacturer or plant constructor must take into account the following residual risks associated with the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance and repairs caused by, for example:
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices / mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-rays, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage

3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

Description

2

2.1 Introduction

The following provides an overview of the technical characteristics of the TM Timer DIDQ 10x24V and 16x24V technology modules. It also provides information on systems integration with SIMOTION and an overview of typical machinery applications.

Detailed information on the technology modules, including installation, can be found in the SIMATIC documentation. An overview of the available manuals can be found in Chapter SIMATIC documentation (Page 13).

2.2 SIMATIC documentation

Overview of SIMATIC documentation for Timer DIDQ technology modules

The following table lists the SIMATIC documentation that you require when using the Timer DIDQ technology modules.

Note

This manual is intended solely as a supplement for the configuration of TM Timer DIDQ technology modules under SIMOTION SCOUT or SIMOTION SCOUT TIA. The SIMATIC documentation listed in the following table is therefore required when using the technology modules.

Subject	Documentation	Most important content
Description of the system	• ET 200SP Distributed I/O System System Manual • ET 200MP Distributed I/O System System Manual	• Use planning • Mounting • Connecting • Commissioning
	S7-1500 Automation System System Manual	
	Interface Module Manual	• Connecting • Alarms, diagnostic, error and system alarms • Technical specifications • Dimension drawing
	• Manual ET 200SP Technology Module TM Timer DIDQ 10x24V • Manual ET 200MP/S7-1500 Technology Module TM Timer DIDQ 16x24V	• Properties • Connecting • Configuring • Technical specifications

Subject	Documentation	Most important content
Configuring control systems so that they are interference-proof	Designing interference-free controllers Function Manual	• Fundamentals • Electromagnetic compatibility • Lightning protection
Time-based IO	Highly accurate input/output with time-based I/O Function Manual	• Fundamentals • Configuring • Programming • Diagnostics
Isochronous mode	PROFINET with STEP 7 Function Manual	• Benefit • Application • Parameter settings

SIMATIC Manuals

On the Internet (http://www.siemens.com/automation/service&support (http://www.siemens.com/automation/service&support)), all current manuals for SIMATIC products are available as a free download.

2.3 Properties

Properties of the TM Timer DIDQ 10x24V and 16x24V technology modules

The TM Timer DIDQ 10x24V and 16x24V technology modules have the following properties:

TM Timer DIDQ 10x24V technology module	TM Timer DIDQ 16x24V technology module
Technical properties	
4 digital inputs 6 digital outputs	16 digital inputs and outputs, electrically isolated in groups of 8 Various combinations of the digital inputs and outputs can be parameterized: • 0 digital inputs and 16 digital outputs (for cam applications with many outputs) • 3 digital inputs and 13 digital outputs (for mixed applications, involving cams, measuring inputs and incremental encoders) • 4 digital inputs and 12 digital outputs (for flexible mixed operation) • 8 digital inputs and 8 digital outputs (for measuring inputs and incremental encoders) **Note**: As of TIA Portal V14 and SIMOTION SCOUT TIA V4.5, depending on the channel configuration (see above), as many as eight additional digital inputs without technology are available. For further information, see sections Setting options for TM Timer DIDQ 16x24V technology module (Page 48) and Linking symbolic I/O variables with TM Timer DIDQ (Page 55).
24 VDC rated output voltage	
Rated output current 0.5 A or 0.1 A (high-speed operation) per digital output	
24 V encoder supply output, short-circuit proof	
Parameterizable substitute values (per digital output)	
Parameterizable diagnostics	
Two supply voltages L+ (only TM Timer DIDQ 16x24V technology module)	
Supported encoder/signal types for digital inputs	
• 24 V incremental encoder with signal A and B • 24 V pulse encoder with a signal	
Supported functions	
• Time stamp function for inputs and outputs (resolution 1 µs) • Counting (counting range 32 bits) • Oversampling for inputs and outputs • Pulse width modulation	

TM Timer DIDQ 10x24V technology module	TM Timer DIDQ 16x24V technology module
Supported system functions	
• Isochronous mode • Firmware update • I&M identification data	

2.4 System integration

System integration

To integrate and operate the TM Timer DIDQ technology modules, an interface module is always required; for interface module ET 200SP, the IM 155-6 PN HF and for interface module ET 200MP, the standard or HF version.

The following options exist to integrate the TM Timer DIDQ technology modules in a SIMOTION automation solution via PROFINET:

- SIMOTION SCOUT
  When configured using SIMOTION SCOUT, only TM Timer DIDQ 10x24V technology modules with interface module ET 200SP IM 155-6 PN HF can be used.

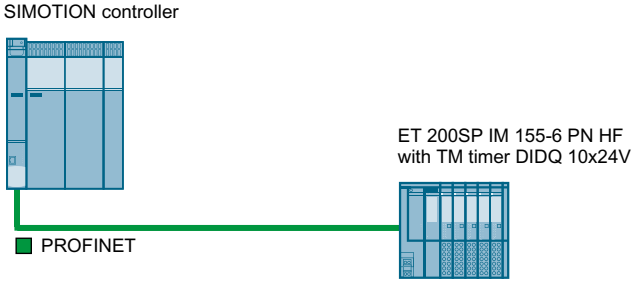

Figure 2-1 Integration in SIMOTION SCOUT

- SIMOTION SCOUT TIA
  During configuration with SIMOTION SCOUT TIA, the technology modules can be integrated as follows:
  - Integration of the TM Timer DIDQ 10x24V technology modules via ET 200SP IM 155-6 PN HF interface module.
  - Integration of the TM Timer DIDQ 16x24V technology modules via ET 200MP standard or HF version.

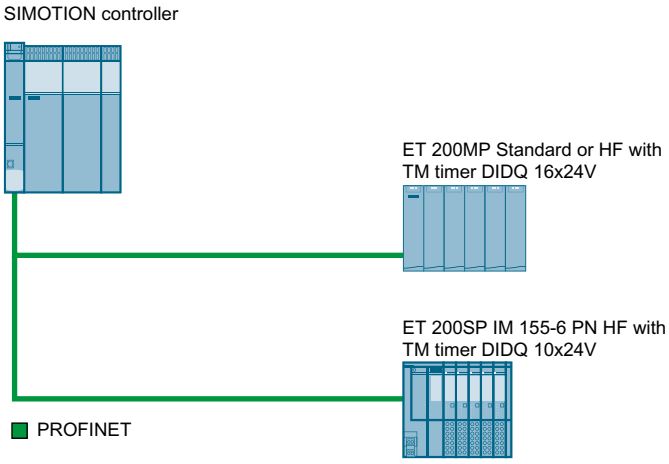

Figure 2-2 Integration SIMOTION SCOUT TIA

Setup

In the *SIMATIC ET 200SP TM Timer DIDQ 10x24V technology module* and *SIMATIC ET 200MP/S7-1500 TM Timer DIDQ 16x24V technology modules* manuals you can find information about the design of the technology modules and a description of the interfaces.

2.5 Machine applications

Many production machines require fast, precise detection of signals or precise switching of digital outputs. The TM Timer DIDQ technology modules therefore represent an optimum solution for the requirements of a wide range of industrial applications.

Applications

Many production machines require fast, precise detection of signals or precise switching of digital outputs. Applications include the following:

- Edge detection
- Quality monitoring (e.g. product is good/bad)
- Product tracking (e.g. product is available / not available)
- Print-mark detection
- Tool monitoring (e.g. presses)
- Machine condition monitoring (e.g. plastic injection molding machines)
- Weft break monitoring (e.g. textile machines)

Applications requiring fast, high-precision output of signals include:

- Position-dependent switching of actuators
  - Camera trigger signal (quality assurance)
  - Control of an air nozzle for blowing away cut-offs
  - Control of nozzles for applying glue tracks
- Product extraction from production line
- Implementation of line motion control systems
- Output of pulse patterns

Application example: Application of glue tracks

In the following example, glue tracks are applied to a workpiece. The glue tracks are applied via glue guns. The control of the glue guns is via digital outputs with cam functionality on the TM Timer DIDQ technology module.

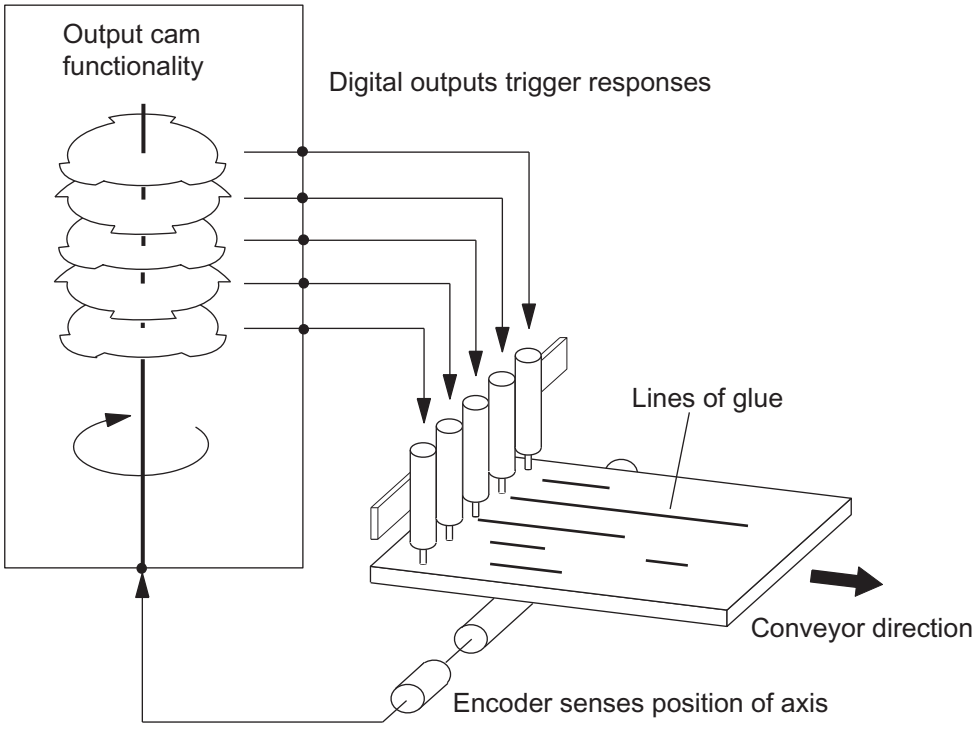

Figure 2-3 Example of an electronic cam control

Depending on the axis position, the SIMOTION "TO outputCam" or "TO camTrack" controls the digital outputs of the technology module.

The output delay times (output delay times of DO / actuators, etc.) are compensated in the technology object. This compensation ensures that the glue placement is always accurate regardless of machine speed.

Configuring 3

3.1 Introduction

The chapter describes the parameterization of the TM Timer DIDQ technology modules and the configuration of the communication under the engineering systems SIMOTION SCOUT and SIMOTION SCOUT TIA. The use of the I/O channels is shown using an interconnection with TO outputCam or TO measuring input and addressing using symbolic variables in the user program.

3.2 SIMOTION SCOUT

3.2.1 Hardware and software requirements

The following requirements must be satisfied in order to be able to work with the TM Timer DIDQ technology modules.

Hardware requirements

- SIMATIC ET 200SP interface module, HF or HS version
- TM Timer DIDQ 10x24V technology module
- SIMOTION controller with PROFINET interface (see section System integration (Page 16))
- PROFINET cables
- External 24 VDC power supply (note the requirements in the *SIMATIC ET 200SP TM Timer DIDQ 10x24V technology module*)

Software requirements

Please observe the following requirements:

- SIMOTION software as of V4.4 HF6
- SIMATIC ET 200SP interface module in the HF version
- SIMATIC Step7 as of V5.5 SP4 and installation of the HSP file, minimum HSP240.V2.2

Note

Download source for the HSP:

http://support.automation.siemens.com/WW/view/de/23183356 (http://support.automation.siemens.com/WW/view/en/23183356)

Instructions to install the HSP for STEP7 V5.x are provided under the following FAQ:

http://support.automation.siemens.com/WW/view/de/22374877 (http://support.automation.siemens.com/WW/view/en/22374877)

The technology modules are integrated into the hardware configuration (HW Config) of the SIMATIC STEP 7 engineering system and are assigned parameters there.

HW Config is used by SIMOTION SCOUT and SIMATIC STEP 7 to configure the hardware of an automation project.

Irrespective of whether you work with SIMATIC STEP 7 or SIMOTION SCOUT, the parameterization is always performed in HW Config.

3.2.2 Requirements for operation

Preconditions

The following preconditions must be met before operating TM Timer DIDQ technology module.

1. Your system hardware including the technology module is installed and wired.
2. You have physically connected the technology module via an ET 200SP interface module, version HF or HS, with a SIMOTION controller via the PROFINET IO interface (see Chapter System integration (Page 16)).
3. You have created a project with a SIMOTION controller with PROFINET interface in SIMATIC STEP 7 or in SIMOTION SCOUT and configured PROFINET IRT. For isochronous operation, the following settings must be made at the SIMOTION controller.

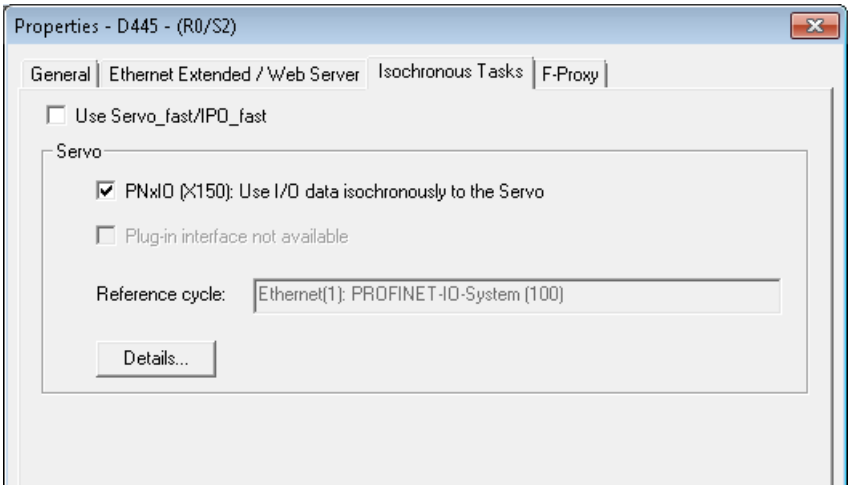

Figure 3-1 Isochronous setting at the SIMOTION controller

Note

For further information on configuration of the PROFINET communication please refer to the *SIMOTION SCOUT Communication* Manual.

Note

The procedures contained in this section assume that the user has a general understanding of SIMATIC STEP 7 and SIMOTION SCOUT.

Note

Please note that interface module ET 200SP – in conjunction with technology module TM Timer DIDQ – is operated with a minimum PROFINET clock cycle of 500 µs depending on the quantity structure.

3.2.3 Creating a technology module and configuring communication

Procedure

1. Open the HW configuration in SIMOTION SCOUT or SIMATIC STEP 7.
2. First, integrate an ET 200 SP interface module, version HF into the project. In the hardware catalog, navigate via PROFINET IO -> I/O -> ET 200SP to the corresponding module.
3. Select the module in the "Hardware Catalog" window.

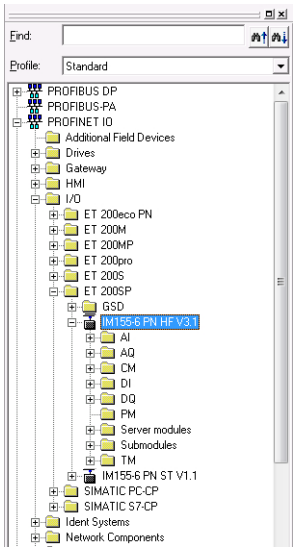

Figure 3-2 Hardware catalog - ET 200SP interface module, version HF

4. Drag and drop the module into the station window on the PROFINET line.

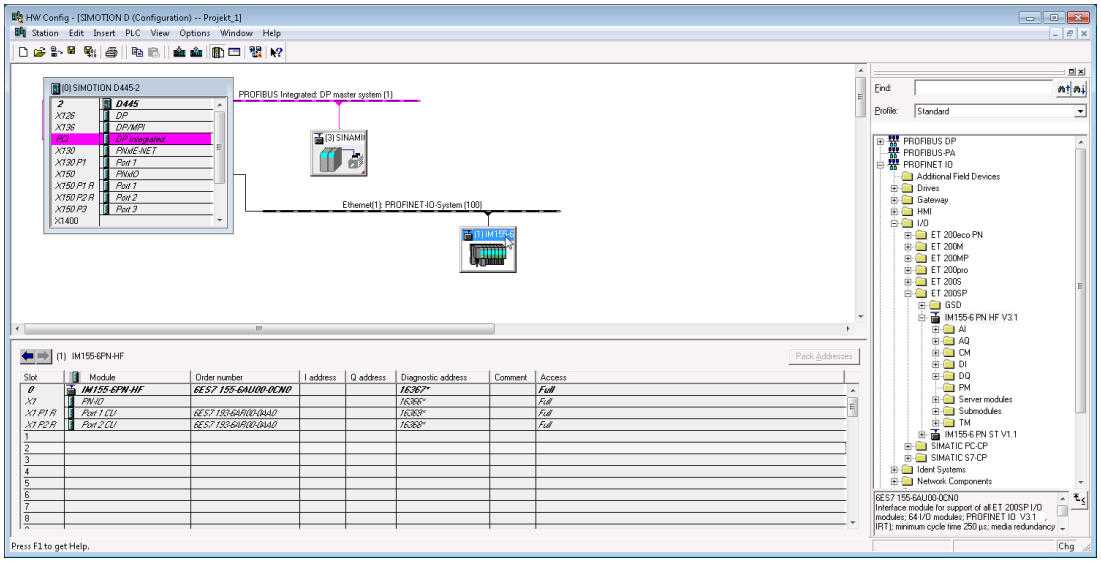

Figure 3-3 ET 200SP interface module inserted in the station window on PROFINET line

5. Now insert the TM Timer DIDQ 10x24V technology module into the project. In the hardware catalog, navigate via PROFINET IO -> I/O -> ET 200SP -> TM -> Time based IO to the module.
6. Select the module in the "Hardware Catalog" window.
7. Drag the module to the detail view under the ET 200SP.

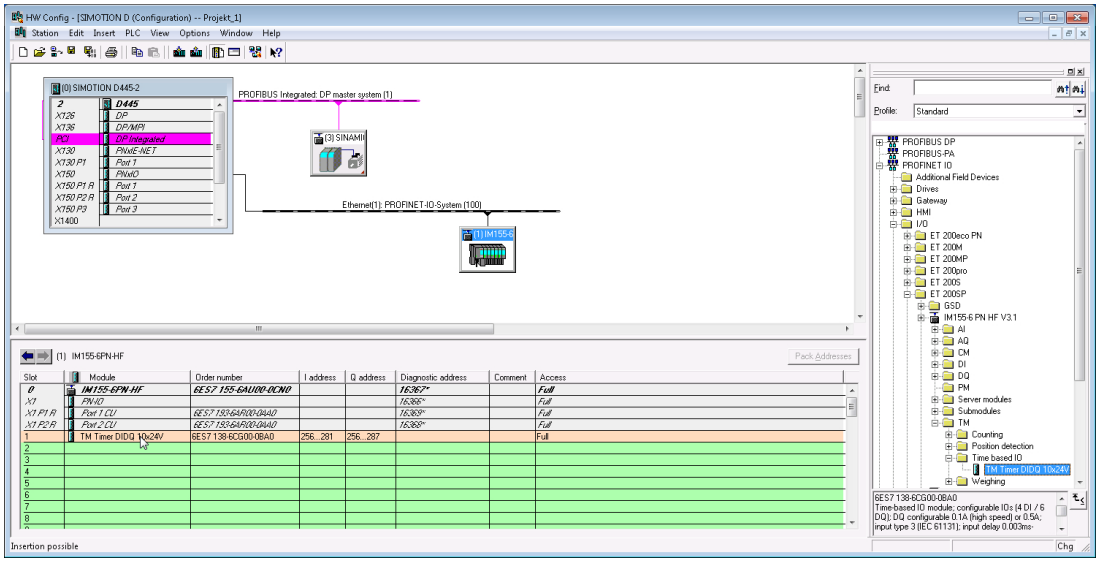

Figure 3-4 TM Timer DIDQ 10x24V technology module in the detail view

8. Then, add another server module to the detail view. With the server module, the ET 200SP distributed I/O system is completed.

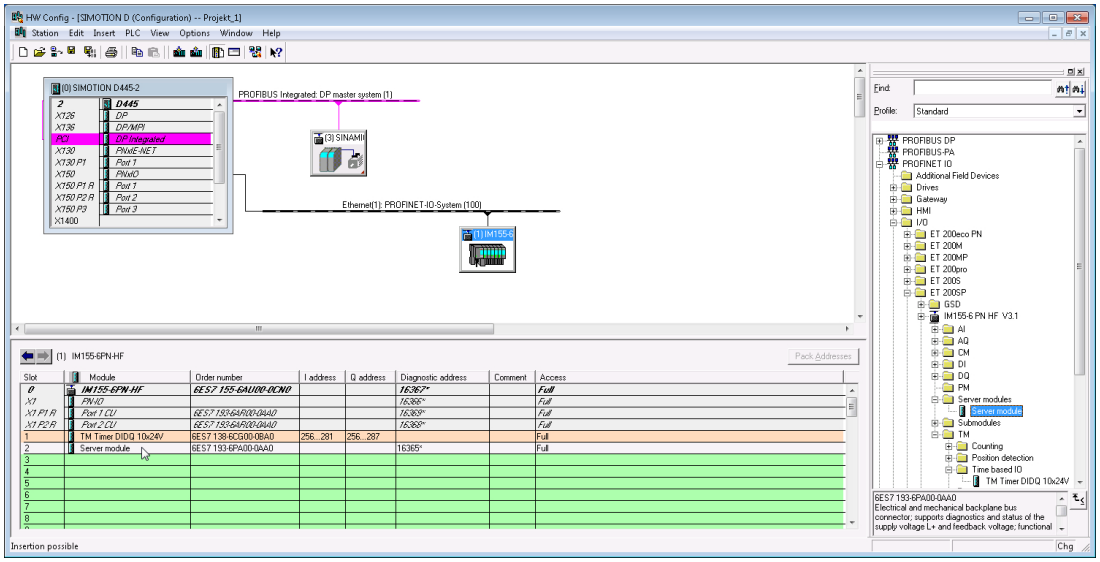

Figure 3-5 Server module in the detail view

Properties of the technology module

The object properties for the TM Timer DIDQ technology modules can be opened in the HW configuration via the context menu or by double-clicking the module in the detail view.

1. To open the context menu, select the TM Timer DIDQ technology module with the right mouse key.
2. Select Object properties. The following dialog box opens.

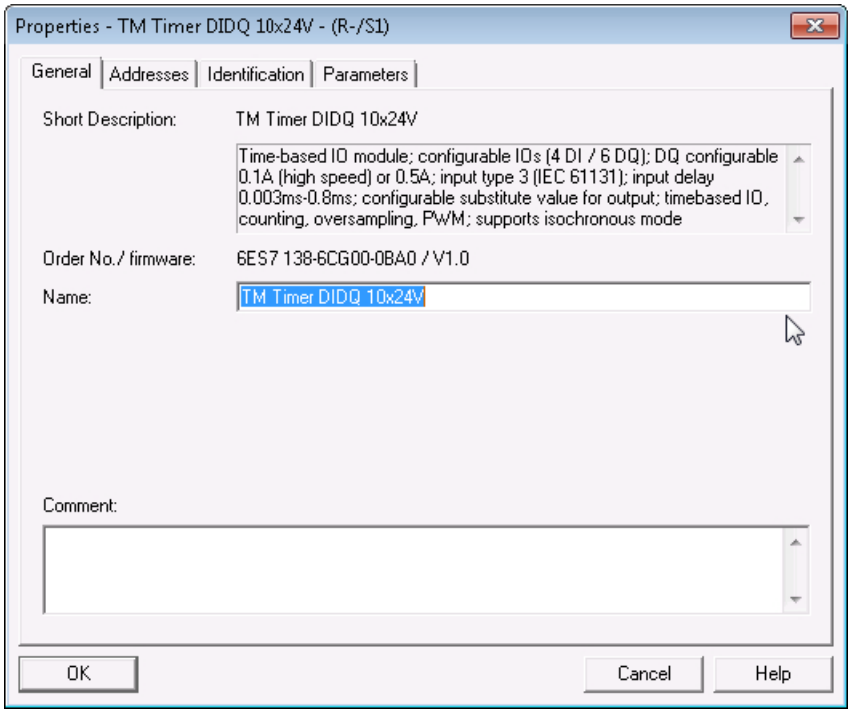

Figure 3-6 Properties of the TM Timer DIDQ 10x24V technology module

You can view or change the following properties in the object properties:

- General tab
  - Short designation, order number, name
    The short designation, the information below it, and the ordering number are identical to the entries in the Hardware Catalog window.
    In the Name field you can find the short description of the module, which can be changed according to your specifications. When you change the description, the new description is displayed in the configuration table.
  - Comments
    You can enter, for example, the application of the module in this field.
- Addresses tab
  Here you can assign the module one start address each for the inputs and outputs. The end addresses are calculated automatically.

- Identification tab
  - Plant ID of the module
  - Location ID of the module
  - Date on which the module was installed.
  - Further information: Free text, which is stored in the module.
- Parameters tab
  In this tab you parameterize the module, for example the configuration of the DQ/DI groups (see Setting options for TM Timer DIDQ 10x24V technology module (Page 29)).

Configuring PROFINET communication

Preconditions

1. The respective ET 200SP interface module is initialized.
2. The ET 200SP interface module is integrated into the topology (prerequisite for operation in IRT mode).
3. The controller is configured as sync master (prerequisite for operation in IRT mode).

Note

For further information on configuration of the PROFINET communication please refer to the *SIMOTION SCOUT Communication* or *SIMATIC Communication* Manuals.

Operating the ET 200SP interface module and TM Timer DIDQ technology module in IRT mode

For use of the channels as cam output or measuring input input, the module must be synchronized with the controller (IRT mode).

To configure PROFINET communication on the PN interface module ET 200SP and on the TM Timer DIDQ technology module in **IRT mode**, please proceed as follows:

1. Configure the PROFINET IO topology.
2. Select the ET 200SP interface module in HW Config.
3. Select the **PN IO** line in the detail view of HW Config. Double-click to open the "Properties - PN IO" dialog box.

4. Switch to the "Synchronization" tab and select "Sync slave" for the **Synchronization role** and "IRT" for the **RT class**.

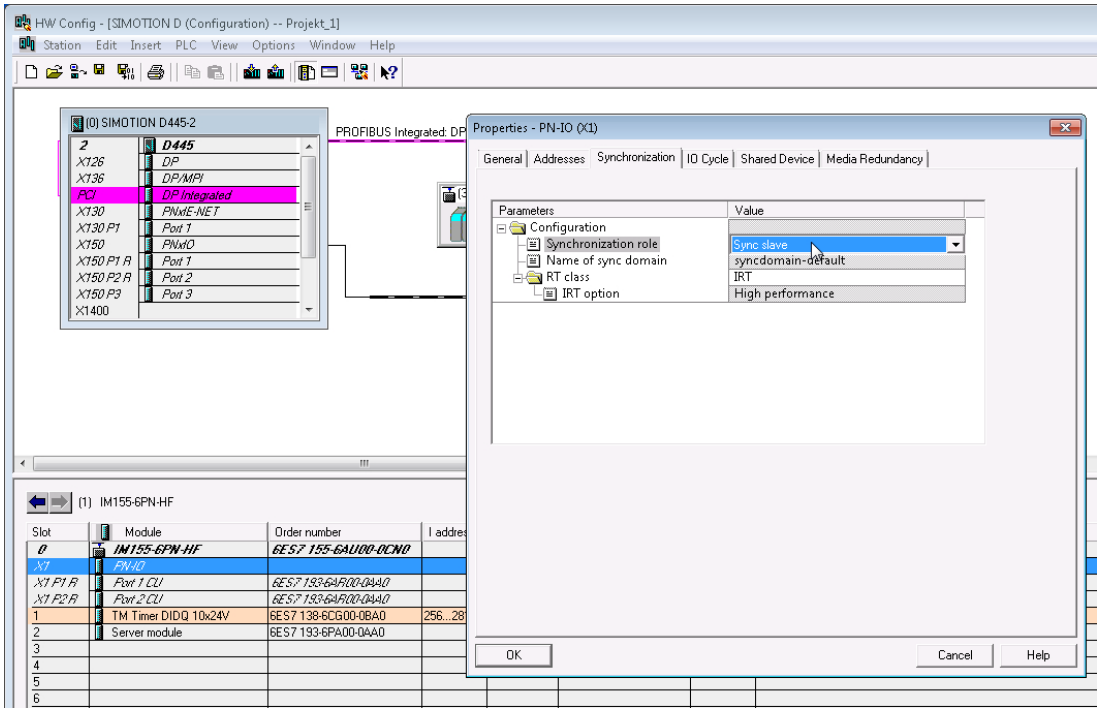

Figure 3-7 Configuring communication (IRT mode) - synchronization

5. Switch to the "IO cycle" tab and select the cycle "Servo" for **Assign IO device isochronously**.

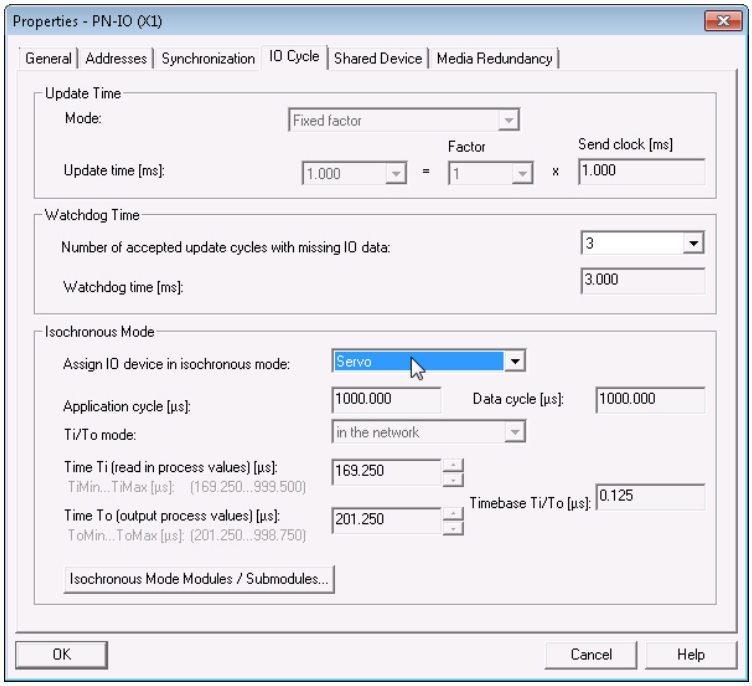

Figure 3-8 Configuring the communication - PROFINET IO cycle

Note

If you operating several ET 200SP interface modules and technology modules TM Timer DIDQ, you must set the isochronous mode at all of the modules.

3.2.4 Configuring I/O channels

3.2.4.1 Setting options for TM Timer DIDQ 10x24V technology module

Overview

The following pages provide an overview of the properties of the TM Timer DIDQ 10x24V technology module and the properties that you can define for the channels. Not all of the parameters are available depending on the settings.

Parameters	Value range	Default
Basic parameters		
PWM period for the digital outputs	• 10 ms • 5 ms • 2 ms • 1 ms • 0.5 ms • 0.2 ms	10 ms
Response to CPU STOP	• Output substitute value • Keep last value	Output substitute value
Enable diagnostics interrupts	• Deactivated • Activated	Deactivated
Channel parameters		
Configuration DQ/DI group (DQ0/DI0 or DQ1/DI1)	• Timer DQ with enable input • Use input/output individually	Timer DQ with enable input
Operating mode of the digital output	• Timer DQ • Oversampling • Pulse width modulation PWM	Timer DQ
Substitute value for the digital output	• 0 • 1	0
High-speed output (0.1 A)	• Deactivated • Activated	Activated
Inverting of the input or output signal	• Deactivated • Activated	Deactivated
HW enable via the digital input	• Level-controlled • Edge-controlled	Level-controlled

Parameters	Value range	Default
Level selection for HW enable	• Active at high level • Active at low level	Active at high level
Configuration DQ/DI group (DQ2/DI2/DI3)	• Incremental encoder (A, B phase shift) • Timer DI2 with enable input DI3 • Timer DQ2 with enable input DI2 • Use inputs individually	Incremental encoder (A, B phase shift)
Invert counting direction (incremental encoder)	• Deactivated • Activated	Deactivated
Operating mode of the digital output	• Numerator • Timer DI • Oversampling	Timer DI
Input delay for the digital input	• none • 0.05 ms • 0.1 ms • 0.4 ms • 0.8 ms	0.1 ms
Signal evaluation for the counter	• With rising edge • With falling edge	With rising edge

Further information

See Manual *ET 200SP TM Timer DIDQ 10x24V technology module*.

3.2.4.2 Configuring I/O channels

Procedure

To configure I/O channels as measuring input input (Timer DI) and output cam (Timer DQ) in the TM Timer DIDQ 10x24V technology module, proceed as follows.

1. Select the ET 200SP interface module in HW Config in the station window. Open the "Properties" dialog by double-clicking on the TM Timer DIDQ 10x24V technology module in the detail view.
2. You can configure the channels in the "Properties" dialog box of the technology module under the "Parameters" tab.
3. In the example, select the value "Use input/output individually" for the DQ0 / DI0 channel group from the "Configuration DQ/DI group" drop-down list. This allows the channels DQ0 and DI0 to be parameterized and used independently of one another.

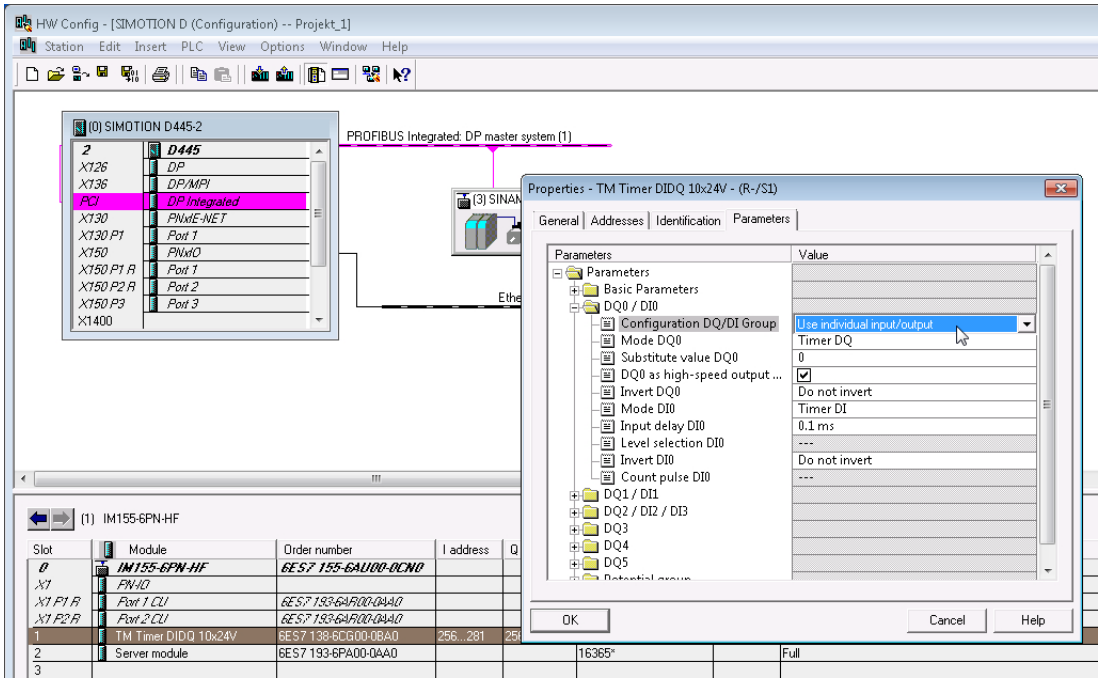

Figure 3-9 Configuring the TM Timer DIDQ 10x24V technology module

Note

This setting allows channel DQ0 to be interconnected as output cam and DI0 as measuring input under SIMOTION SCOUT.

3.2.4.3 Other information

Note

The technology modules and the individual channels may only be reparameterized in offline state. All changes become effective only after saving, compilation and eventual download of your changed user project to the controller (see Chapter Saving and compiling a user project with SCOUT/SCOUT TIA (Page 61)).

3.2.5 Use of I/O channels

3.2.5.1 Introduction

After configuring the technology modules as described in section Configuring I/O channels (Page 29), the channels can be used in your user project.

In Chapter Linking technology objects with TM Timer DIDQ (Page 32) using an example, it is shown how channels **DQ0** (Timer DQ) and **DI0** (Timer DI) are interconnected with technology objects **TO cam** or **TO measuring input** .

In Chapter Linking symbolic I/O variables with TM Timer DIDQ (Page 36), using an example, it is shown in the address list how a variable 'var_QI_MI' can be assigned via symbolic assignment of the quality information **QI** of the measuring input input.

You can find an overview of the I/O points of the channels in Chapter Overview of the I/O points of the channels (Page 39).

3.2.5.2 Linking technology objects with TM Timer DIDQ

In the following example, the configured I/O channels (see section Configuring I/O channels (Page 29)) are linked with one output cam technology object and with one measuring input technology object.

Cam outputs and measuring input inputs are assigned with the assignment partners **CAM_n** or **MI_n**.

Note

This assignment is only possible if Profinet communication was completely configured (see Creating a technology module and configuring communication (Page 24)).

A general understanding of technology objects is therefore required to perform the required configurations.

Note

Technology objects may only access a TM Timer DIDQ technology module once the technology module has completely powered up (see Chapter Synchronization (Page 60)). Otherwise, a technology alarm will be triggered.

TO outputCam

Note

Before you insert an output cam, a TO axis (position or synchronous axis) or a TO external encoder, to which the output cam is assigned, has to be created.

To insert a new output cam:

1. In the project navigator, highlight the OUTPUT CAMS folder under the relevant axis or external encoder.
2. Select Insert > Technology object > Output cam or double-click Insert output cam in the project navigator under the axis or external encoder in the OUTPUT CAMS folder. The Insert output cam window appears.
3. Enter a name for the output cam.
4. Confirm with OK. In the working area, the window for the configuration is displayed and the created output cam TO is shown in the project navigator.

In the Configuration window, define the configuration data values for the output cam.

1. Double-clicking in the project navigator below the output cam on the Configuration element displays the window in the working area.
2. Make the following settings:
   - Activate the "Activate output" checkbox.
   - Under the selection "Cam output on:" select entry "Output cam (CAM)".

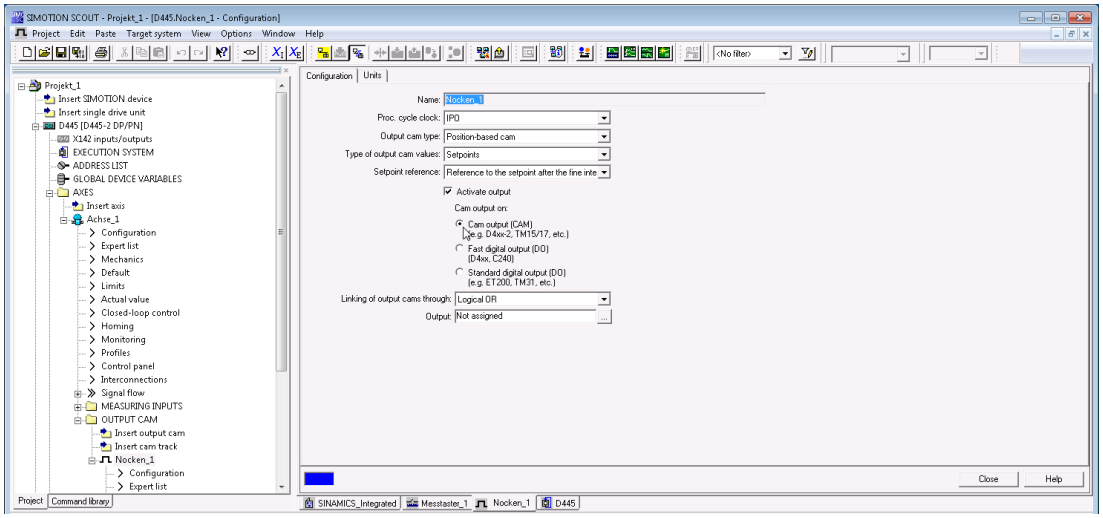

Figure 3-10 Configuring the TO output cam

3. Assign the assignment partner **CAM _0** of the technology module to the output.

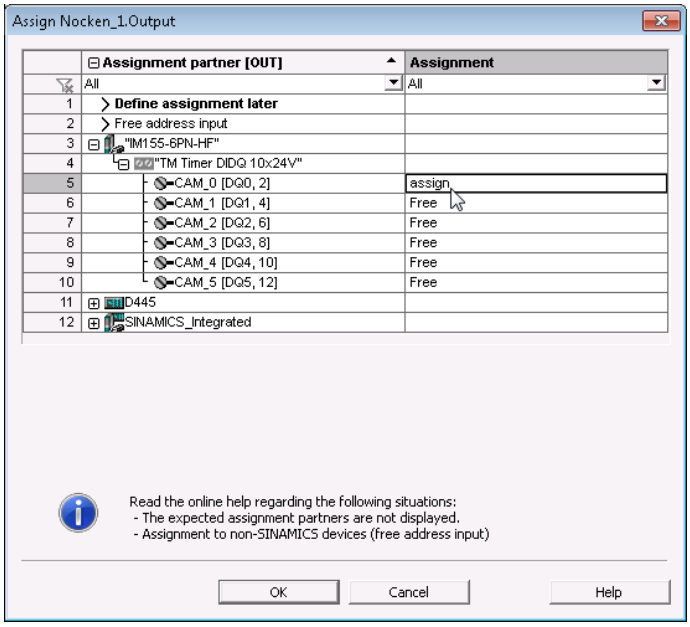

Figure 3-11 Assignment of cam output to TO output cam

4. Confirm with OK.

TO measuringInput

Note

Before you insert a measuring input, the hardware must have been configured – and a TO axis (position or synchronous axis) or a TO external encoder, to which the measuring input is assigned, has to be created.

This is how you enter a measuring input
1. In the project navigator, highlight the folder MEASURING INPUTS under the relevant axis or external encoder.

2. Select Insert > Technology Objects > Measuring Input, or double-click Insert Measuring Input in the project navigator at the axis or external encoder entry in the MEASURING INPUTS folder. The Insert Measuring Input window appears.

3. Enter a name for the measuring input.

4. Confirm with OK. In the working area, the window for the configuration is displayed and the measuring input created is shown in the project navigator.

In the Configuration window, define the configuration data values for the measuring input.

1. Double-clicking in the project navigator below the measuring input on the Configuration element displays the window in the working area.
2. Assign the assignment partner **MI _0** of the technology module to the input.

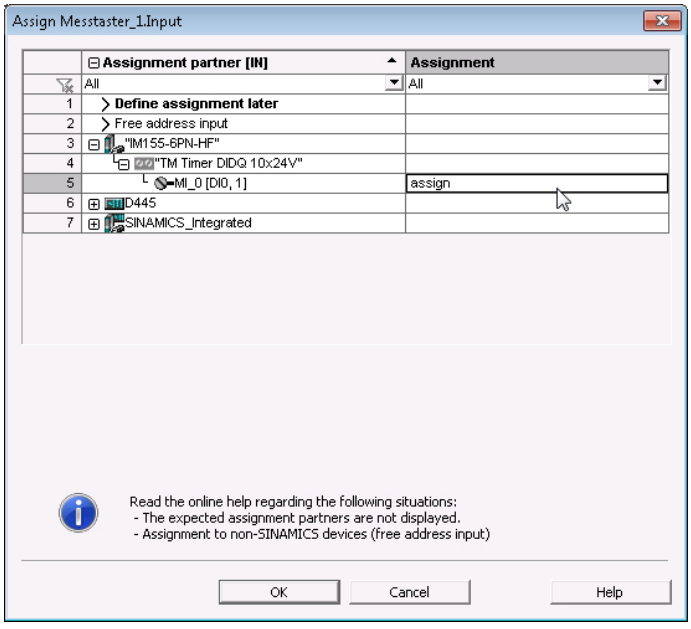

Figure 3-12 Assignment of measuring input input to TO measuringInput

3. Confirm with OK.

Further information

Further information on configuring the output cam and measuring input technology objects can be found in the *SIMOTION Motion Control Output Cams and Measuring Inputs Function Manual*.

See also

Service and maintenance (Page 65)

3.2.5.3 Linking symbolic I/O variables with TM Timer DIDQ

You can address digital I/O channels using symbolic variables in the user program.

Precondition

The I/O channels are configured as described under Chapter Configuring I/O channels (Page 29).

Procedure

In the following example, create variable 'var_QI_MI' and link this with quality information **QI** of the measuring input input **MI_0**.

1. Open the **address list** via the project navigator.
2. In the **View** field, select 'I/Os'.
3. Create the variable 'var_QI_MI', type "BOOL", and select 'IN' in the **I/O address** field.

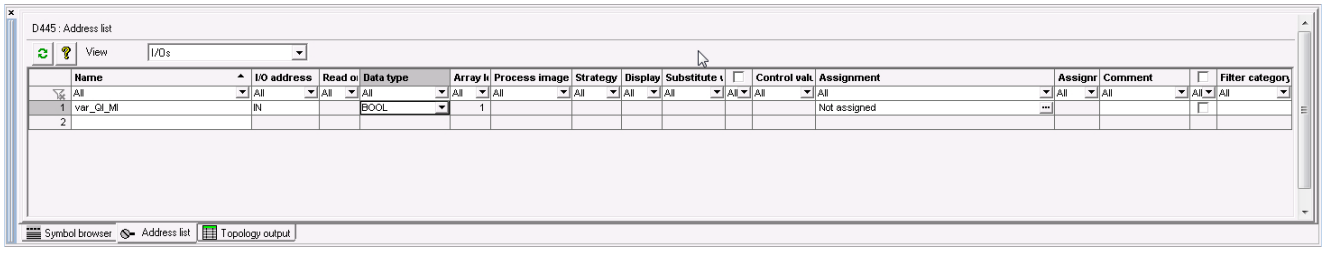

Figure 3-13 Creating variables in the address list

4. In the **Assignment** field, click on ...

5. First select the technology module in the following dialog.

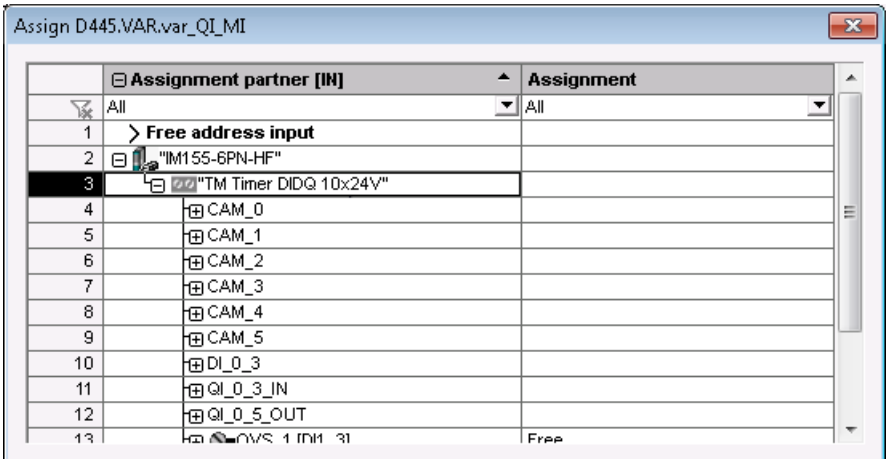

Figure 3-14 Dialog assignment - select module

6. Scroll downwards in the list of assignment partners and from the measuring input input, select the quality information **QI**.

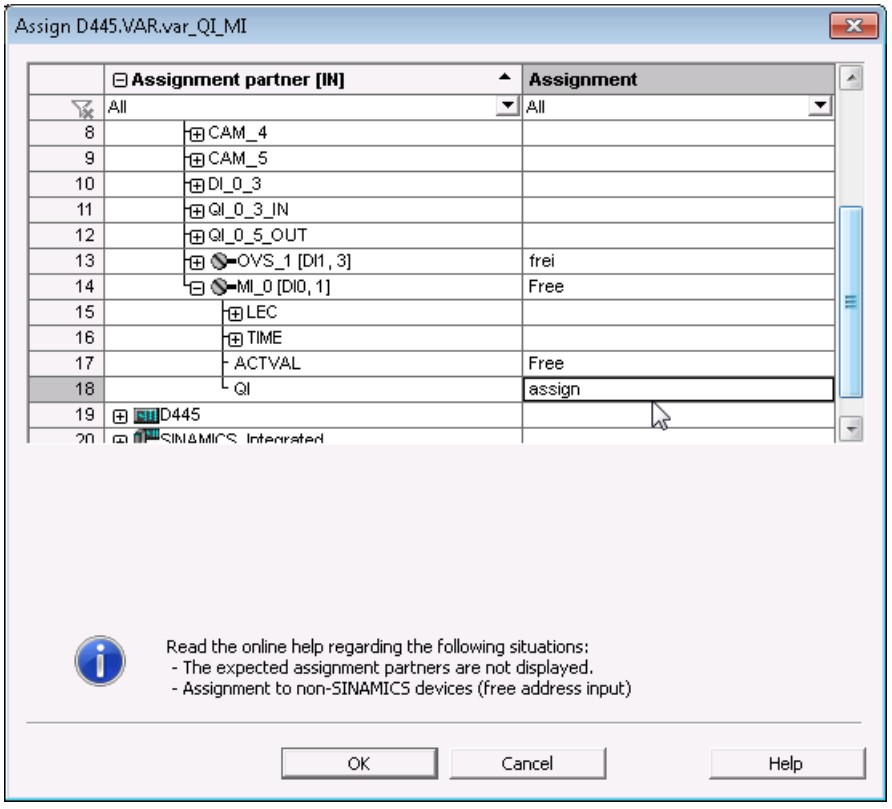

Figure 3-15 Dialog assignment - select QI of the measuring input input

7. Confirm the selection by clicking **OK**.

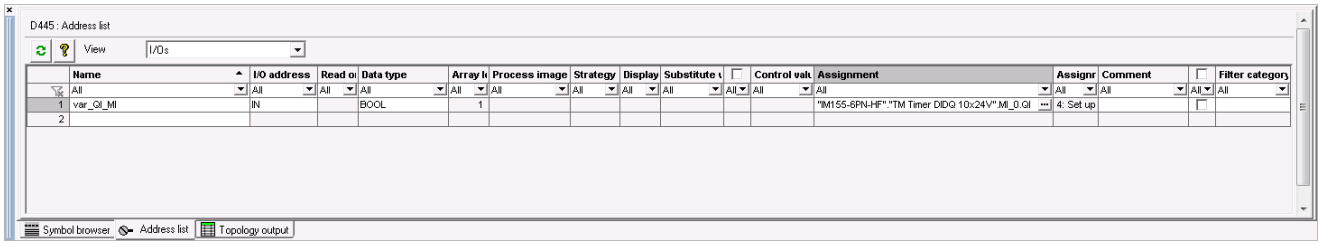

Figure 3-16 Address list following successful assignment

Note

The procedures for generating symbolic variables and for using the process image or direct I/O access are described in detail in the SIMOTION SCOUT Manual.

3.2.5.4 Overview of the I/O points of the channels

I/O points of the channels Timer DI and Timer DQ

Each I/O channel has different cyclic data in the form of I/O points.

I/O point	Input	Output	Function of the channel [1]	Description
ACTVAL	X		Timer DI, Timer DQ	Actual value of the input / reading back the channel status
QI	X		Timer DI, Timer DQ	Quality information
SETVAL		X	Timer DI, Timer DQ	Setpoint
TIME	X		Timer DI	Time stamp Timer DI
		X	Timer DQ	Time stamp Timer DQ
LEC	X		Timer DI	Counter for lost edges on Timer DI
SEL		X	Timer DI	Edge selection at Timer DI; is used by the TO measuring input
SETEN		X	Timer DI, Timer DQ	Enabling signal
EN	X		Timer DI, Timer DQ	Signal state of the enabling signal

1) Timer DI (measuring input), Timer DQ (output cam)

When using technology objects (interconnection of Timer DQ with TO outputCam/camTrack or Timer DI with TO measuringInput), the following I/O points are not relevant, because they are used or processed by technology objects:

- SEL
- TIME
- ACTVAL
- SETVAL

I/O points of the counter, oversampling, incremental encoder and pulse width modulation channels

Each I/O channel has different cyclic data in the form of I/O points.

I/O point	Input	Output	Channel function	Description
ACTVAL	X		Incremental encoder, oversampling, counter	Actual value of input
QI	X		Incremental encoder, oversampling, counter, pulse width modulation	Quality information
EVENTVAL	X		Incremental encoder, counter	Actual count value
REFVAL	X		Incremental encoder	

ACTSAMPLE	X		Oversampling	32 states of the digital input (oversampling pattern)
SETSAMPLE		X	Oversampling	Specification of the 32 states of the digital output (oversampling pattern)
		X	Pulse width modulation	Specification of pulse-pause ratio as percentage value

Further information

Further information on the I/O points of the channels can be found in the Manual *ET 200SP TM Timer DIDQ 10x24V Technology Module in* Chapter *Control and feedback signal interface*.

3.3 SIMOTION SCOUT TIA

3.3.1 Hardware and software requirements

The following requirements must be satisfied in order to be able to work with the TM Timer DIDQ technology modules.

Hardware requirements

- SIMATIC ET 200SP interface module, version HF/HS or SIMATIC ET 200MP interface module, version Standard/HF
- TM Timer DIDQ 10x24V or 16x24V technology module
- SIMOTION controller with PROFINET interface (see section System integration (Page 16))
- PROFINET cables
- External 24 VDC power supply (note the requirements in the *SIMATIC ET 200SP Technology Module TM Timer DIDQ 10x24V* or *SIMATIC ET 200MP/S7-1500 Technology Module TM Timer DIDQ 16x24V" Manual*)

Software requirements

Please observe the following requirements:

- SIMOTION software as of V4.4 HF6
- SIMATIC ET 200SP interface module, version HF or SIMATIC ET 200MP interface module in the Standard/HF version
- TIA Portal as of V13 SP1 as of Update 2

3.3.2 Requirements for operation

Preconditions

The following preconditions must be met before operating TM Timer DIDQ technology module.

1. Your system hardware including the technology module is installed and wired.
2. You have physically connected the technology module via an ET 200SP interface module or an ET 200MP interface module with a SIMOTION controller via the PROFINET IO interface (see Chapter System integration (Page 16)).
3. You have created a project with a SIMOTION controller with PROFINET interface in the TIA Portal (sync master) and configured PROFINET IRT. The SIMOTION controller is configured for isochronous operation.
4. You have inserted an ET 200MP interface module, e.g. IM155-5 PN HF, assigned it to the SIMOTION controller, and configured it as sync slave with PROFINET IRT. The interface module is configured for isochronous operation.

   Note

   If you operating several ET 200SP/ET 200MP interface modules and technology modules TM Timer DIDQ, you must set the isochronous mode at all of the modules.

5. You have integrated the interface module into the PROFINET topology.

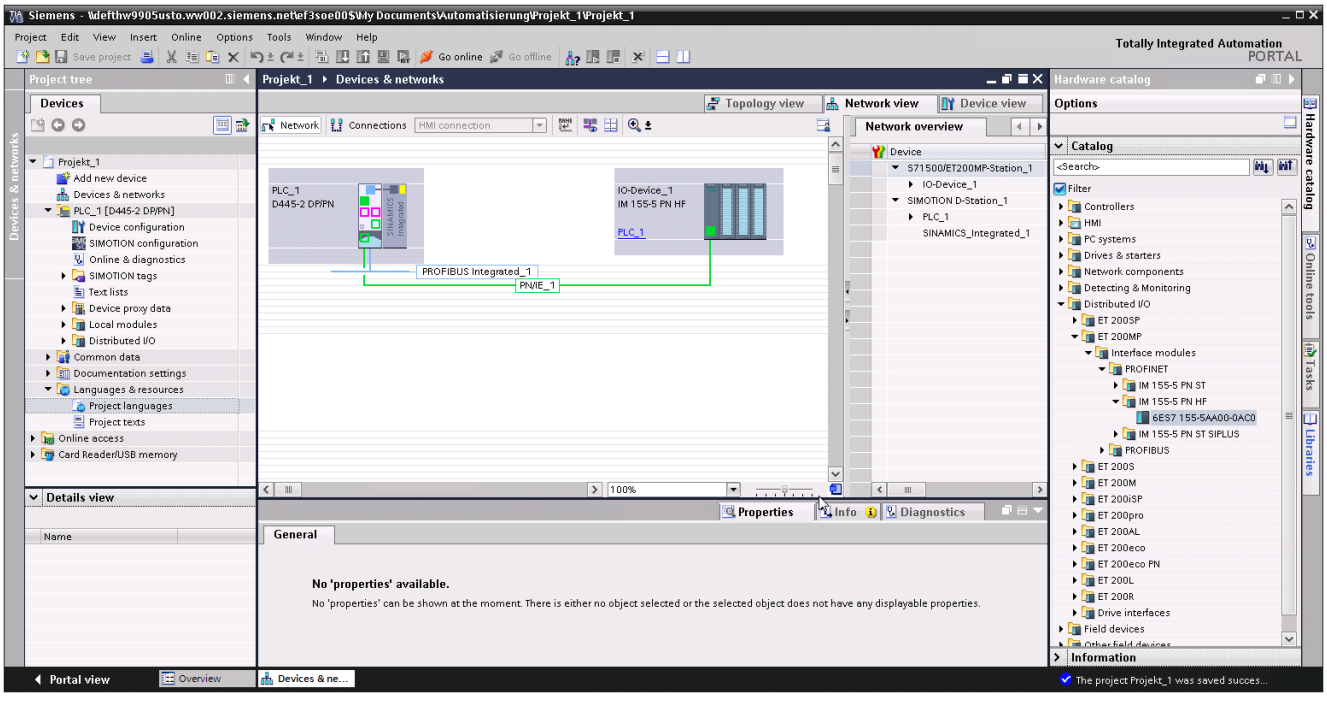

Figure 3-17 Project in the TIA Portal - network view

Note

For further information on configuration of the PROFINET communication please refer to the *SIMOTION SCOUT TIA* Configuration Manual.

Note

The procedures contained in this section assume that the user has a general understanding of TIA Portal or SCOUT TIA.

Note

Please note that interface module ET 200SP – in conjunction with technology module TM Timer DIDQ – can be operated with a minimum PROFINET clock cycle of 500 µs and the ET 200 MP interface module in conjunction with the TM Timer DIDQ technology module, with a minimum PROFINET clock cycle of 250 µs – depending on the quantity structure.

3.3.3 Creating and configuring a technology module

Procedure

1. Switch to the network view in the TIA Portal.
2. The device configuration opens by double-clicking on the ET 200MP interface module.

3. In the "Hardware Catalog" window, navigate to the TM Timer DIDQ 16x24V technology module via Technology modules -> Time-based IO.
4. Drag the technology module to the desired slot in the device view.

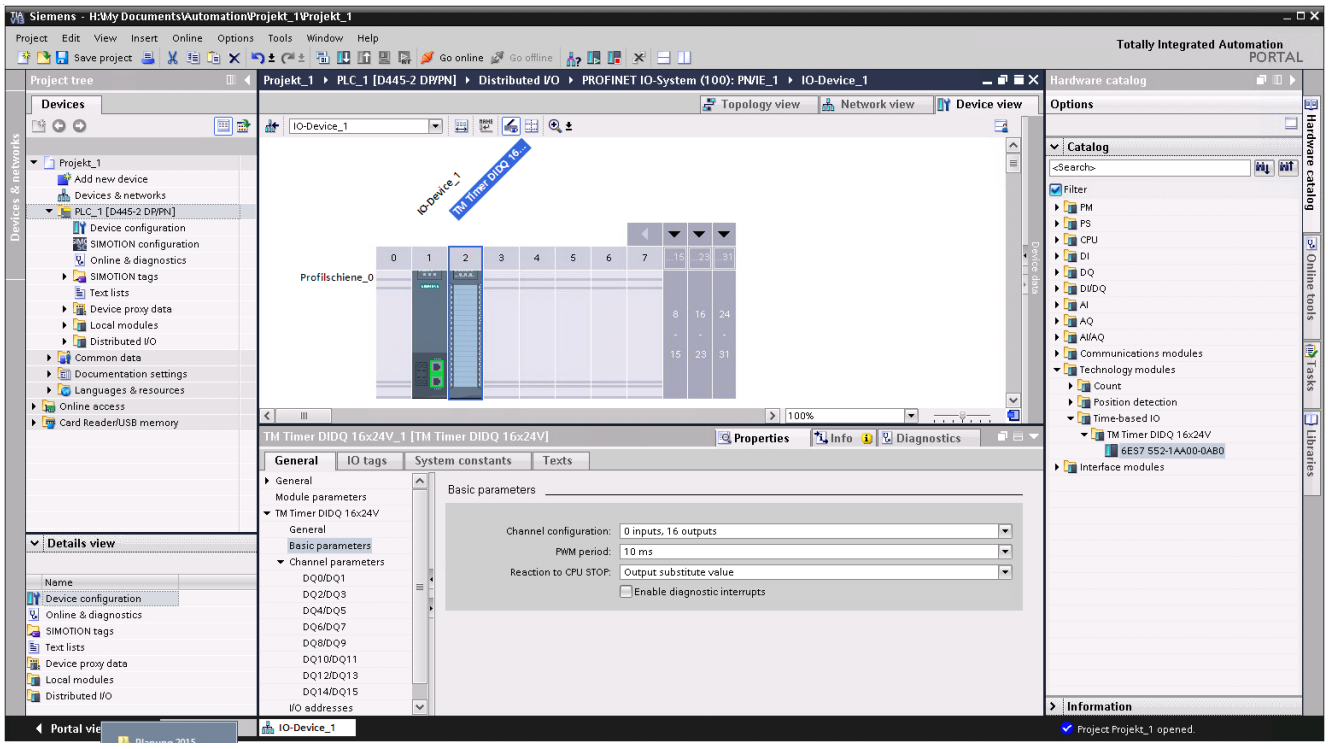

Figure 3-18 TM Timer DIDQ 16x24V technology module inserted in the project

Note

The interface module and the TM Timer DIDQ technology module must be configured for isochronous operation. Check the settings in the inspection window (device configuration of the ET 200MP interface module must be open) under tab PROFINET interface -> Extended options -> Isochronous mode.

Properties of the technology module

The object properties for the TM Timer DIDQ technology modules can be set in the inspection window (the technology module must be selected in the device view) in the "General" tab.

You can view or change the following properties in the object properties:

- General
  - Project information such as name, rack, slot, comment.
    In the Name field you can find the short description of the module, which can be changed according to your specifications. When you change the description, the new description is displayed in the configuration table.
  - Catalog information on the module
  - Identification & Maintenance, e.g. plant ID, date of installation

  Basic parameters
  - Channel configuration
  - PWM
  - Response to CPU STOP
  - Enable diagnostics interrupts
- Channel parameters
  In this tab you parameterize the module, for example the configuration of the DQ/DI groups (see Setting options for TM Timer DIDQ 10x24V technology module (Page 47) and Setting options for TM Timer DIDQ 16x24V technology module (Page 48)).
- I/O Addresses
  Here you can assign the module one start address each for the inputs and outputs. The end addresses are calculated automatically. In addition, you must assign the process image, e.g. servo, to the module.

Configuring the technology module

In the following example, a channel configuration with 4 inputs and 12 outputs is used for the TM Timer DIDQ 16x24V technology module.
The input and output addresses are assigned to the process image "Servo".

1. In the "Channel configuration" drop-down list under "Basic parameters", select the setting "4 inputs, 12 outputs".

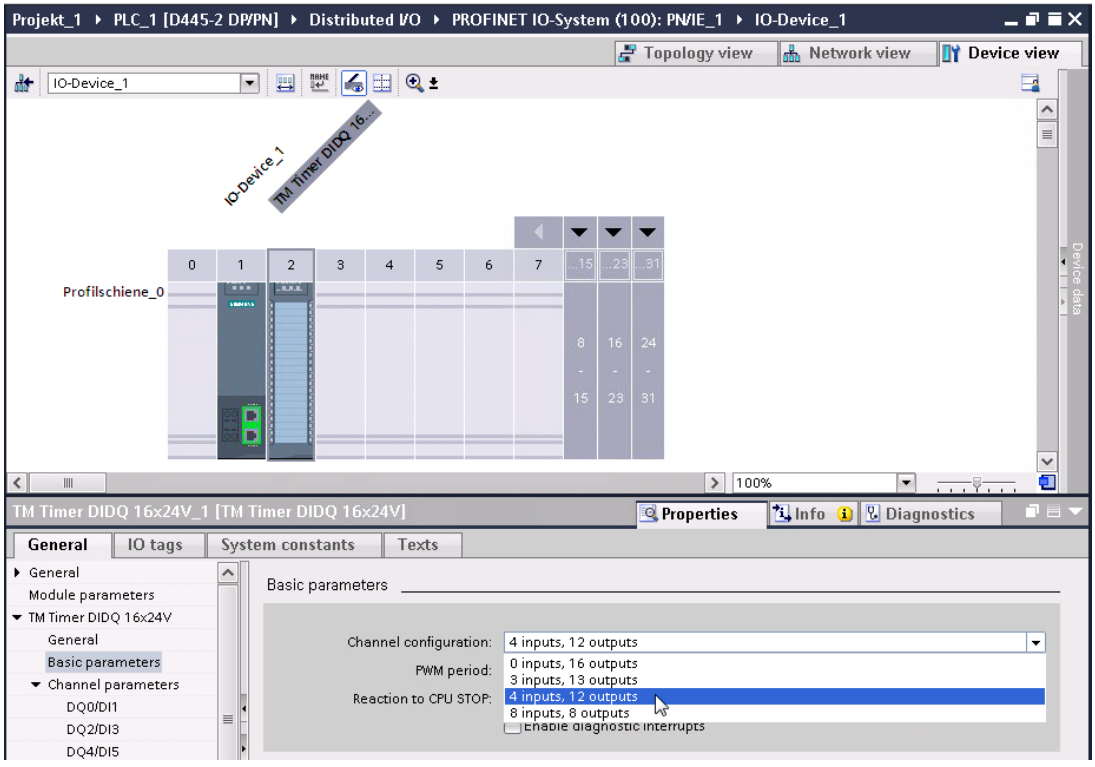

Figure 3-19 Basic parameters - channel configuration

2. In the "Process image" drop-down list under "I/O addresses", uncheck the "Servo" setting for each of the inputs and outputs.
   As start address of the input or output, only use addresses higher than 63; otherwise, when compiling the project, an error message will be output.

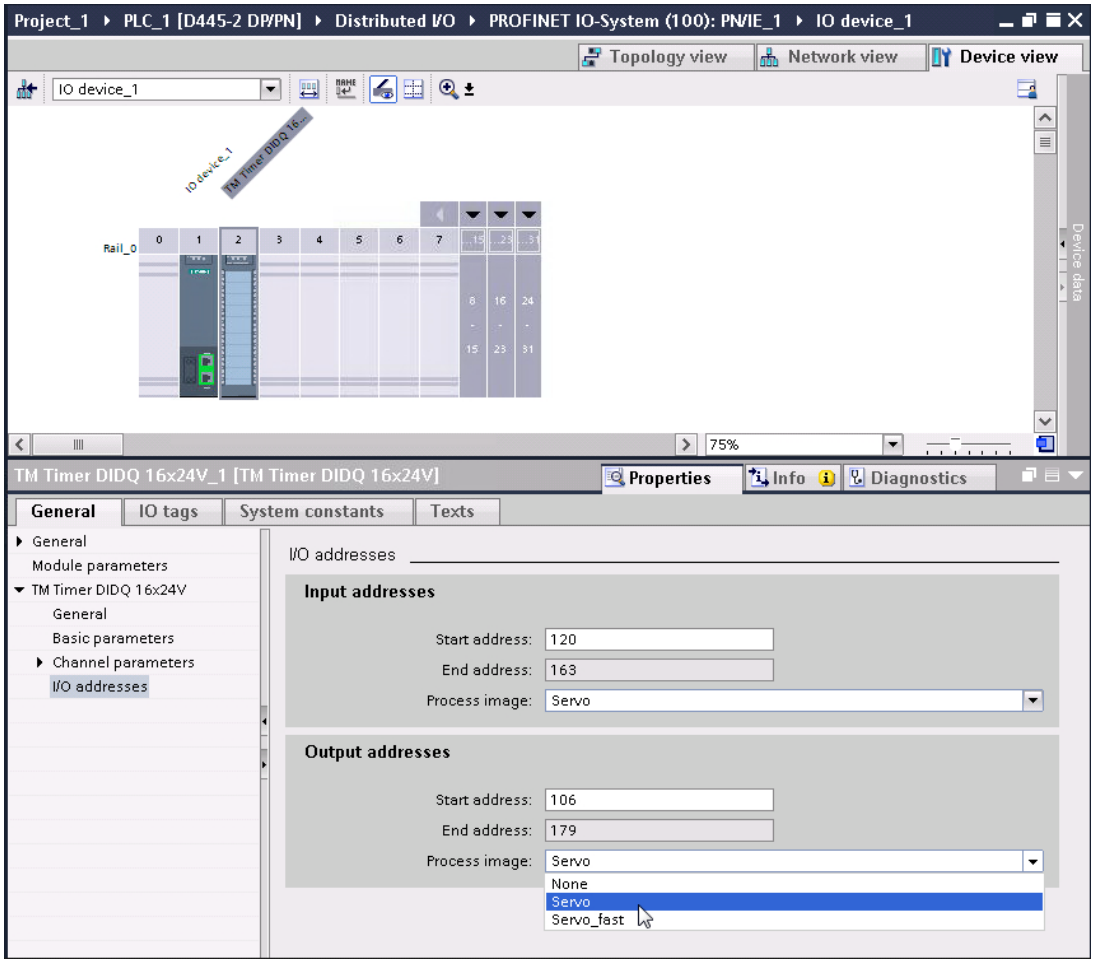

Figure 3-20 I/O addresses - process image

3.3.4 Configuring I/O channels

3.3.4.1 Setting options for TM Timer DIDQ 10x24V technology module

Overview

The following pages provide an overview of the properties of the TM Timer DIDQ 10x24V technology module and the properties that you can define for the channels. Not all of the parameters are available depending on the settings.

Parameters	Value range	Default
Basic parameters		
PWM period for the digital outputs	• 10 ms • 5 ms • 2 ms • 1 ms • 0.5 ms • 0.2 ms	10 ms
Response to CPU STOP	• Output substitute value • Keep last value	Output substitute value
Enable diagnostics interrupts	• Deactivated • Activated	Deactivated
Channel parameters		
Configuration DQ/DI group (DQ0/DI0 or DQ1/DI1)	• Timer DQ with enable input • Use input/output individually	Timer DQ with enable input
Operating mode of the digital output	• Timer DQ • Oversampling • Pulse width modulation PWM	Timer DQ
Substitute value for the digital output	• 0 • 1	0
High-speed output (0.1 A)	• Deactivated • Activated	Activated
Inverting of the input or output signal	• Deactivated • Activated	Deactivated
HW enable via the digital input	• Level-controlled • Edge-controlled	Level-controlled
Level selection for HW enable	• Active at high level • Active at low level	Active at high level

Parameters	Value range	Default
Configuration DQ/DI group (DQ2/DI2/DI3)	• Incremental encoder (A, B phase shift) • Timer DI2 with enable input DI3 • Timer DQ2 with enable input DI2 • Use inputs individually	Incremental encoder (A, B phase shift)
Invert counting direction (incremental encoder)	• Deactivated • Activated	Deactivated
Operating mode of the digital output	• Numerator • Timer DI • Oversampling	Timer DI
Input delay for the digital input	• none • 0.05 ms • 0.1 ms • 0.4 ms • 0.8 ms	0.1 ms
Signal evaluation for the counter	• With rising edge • With falling edge	With rising edge

Further information

See Manual *ET 200SP TM Timer DIDQ 10x24V technology module*.

3.3.4.2 Setting options for TM Timer DIDQ 16x24V technology module

Overview

The following pages provide an overview of the TM Timer DIDQ 16x24V technology module properties and the properties that you can define for the channels. Not all of the parameters are available depending on the settings.

Parameter	Value range	Default
Basic parameters		
Channel configuration of the module	• 0 inputs, 16 outputs • 3 inputs, 13 outputs • 4 inputs, 12 outputs • 8 inputs, 8 outputs See also section "Additional digital inputs without technology function".	0 inputs, 16 outputs

Parameter	Value range	Default
PWM period for the digital outputs	• 10 ms • 5 ms • 2 ms • 1 ms • 0.5 ms • 0.2 ms	10 ms
Response to CPU STOP	• Output substitute value • Keep last value	Output substitute value
Enable diagnostics interrupts	• Deactivated • Activated	Deactivated
Channel parameters		
Operating mode of the digital output	• Timer DQ • Oversampling • Pulse width modulation PWM	Timer DQ
Substitute value for the digital output	• 0 • 1	0
High-speed output (0.1 A)	• Deactivated • Activated	Activated
Inverting of the input or output signal	• Deactivated • Activated	Deactivated
HW enable via the digital input	• Level-controlled • Edge-controlled	Level-controlled
Level selection for HW enable	• Active at high level • Active at low level	Active at high level
Configuration DI group	• Incremental encoder (A, B phase shift) • Timer DI with enable input • Use inputs individually	Incremental encoder (A, B phase shift)
Invert counting direction (incremental encoder)	• Deactivated • Activated	Deactivated
Operating mode of the digital output	• Numerator • Timer DI • Oversampling	Timer DI
Input delay for the digital input	• none • 0.05 ms • 0.1 ms • 0.4 ms • 0.8 ms	0.1 ms

Parameter	Value range	Default
Signal evaluation for the counter	• With rising edge • With falling edge	With rising edge
Configuration DQ/DI group	• Timer DQ with enable input • Use input/output individually	Timer DQ with enable input

Additional digital inputs without technology function

Channel configuration	Number of additional digital inputs without technology function
0 inputs, 16 outputs	8
3 inputs, 13 outputs	5
4 inputs, 12 outputs	4
8 inputs, 8 outputs	0

Unused inputs are available as digital inputs without technology function. The input delay of an input parameter is parameterized on the associated output channel.

Further information

See *SIMATIC ET 200MP/S7-1500 Technology Module TM Timer DIDQ 16x24V* Manual.

3.3.4.3 Configuring I/O channels

Procedure

To configure I/O channels as measuring input input (Timer DI) and output cam (Timer DQ) in the TM Timer DIDQ 16x24V technology module,
proceed as follows.

1. The technology module is selected in the device view. To configure the I/O channels, click on channel parameters in the "General" tab in the inspection window.
2. In the example, select the value "Use input/output individually" for the DQ0 / DI1 channel group from the "Configuration DQ/DI group" drop-down list. This allows the channels DQ0 and DI1 to be parameterized and used independently of one another.

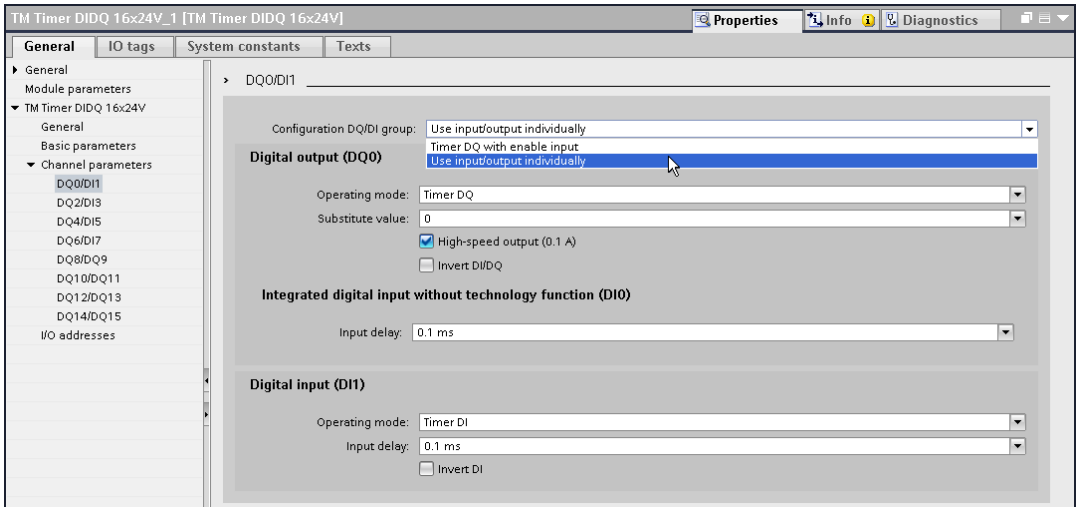

Figure 3-21 Channel parameter - configuration DQ/DI group

In addition to the (DQ0) digital output and the (DI1) digital input, the "Integrated digital input without technology function (DI0)" is also available.

Note

The additional "Integrated digital input without technology function (DI0)" can also be interconnected in SIMOTION SCOUT TIA.

3. Save and compile the project.
4. To interconnect the channels with the technology objects outputCam or measuringInput, open the SIMOTION configuration.

Note

This setting allows channel DQ0 to be interconnected as output cam and DI1 as measuring input input under SIMOTION SCOUT TIA.

3.3.4.4 Other information

Note

The technology modules and the individual channels may only be reparameterized in offline state. All changes become effective only after saving, compilation and eventual download of your changed user project to the controller (see Chapter Saving and compiling a user project with SCOUT/SCOUT TIA (Page 61)).

3.3.5 Use of I/O channels

3.3.5.1 Introduction

After configuring the technology modules as described in section Configuring I/O channels (Page 47), the channels can be used in your user project.

In section Linking technology objects with TM Timer DIDQ (Page 52) using an example, it is shown how channels **DQ0** (Timer DQ) and **DI1** (Timer DI) are interconnected with technology objects **TO cam** or **TO measuring input** .

Chapter Linking symbolic I/O variables with TM Timer DIDQ (Page 55) uses an example to show how in the address list of a 'var_DI' variable the symbolic assignment of the **DI_16** digital input (additional digital input without technology function (DI0)) and a 'var_QI_MI' variable are used to assign the **QI** quality information of the **MI_1** measurement sensing input.

You can find an overview of the I/O points of the channels in section Overview of the I/O points of the channels (Page 59).

3.3.5.2 Linking technology objects with TM Timer DIDQ

In the following example, the configured I/O channels (see section Configuring I/O channels (Page 47)) are linked with one output cam technology object and with one measuring input technology object.

Cam outputs and measuring input inputs are assigned with the assignment partners **CAM_n** or **MI_n**.

Note

This assignment is only possible if Profinet communication was completely configured (see Chapter Requirements for operation (Page 41) and Creating and configuring a technology module (Page 42)).

A general understanding of technology objects is therefore required to perform the required configurations.

Note

Technology objects may only access a TM Timer DIDQ technology module once the technology module has completely powered up (see Chapter Synchronization (Page 60)). Otherwise, a technology alarm will be triggered.

TO outputCam

Note

Before you insert an output cam, a TO axis (position or synchronous axis) or a TO external encoder, to which the output cam is assigned, has to be created.

To insert a new output cam:

1. In the project navigator, highlight the OUTPUT CAMS folder under the relevant axis or external encoder.
2. Select Insert > Technology object > Output cam or double-click Insert output cam in the project navigator under the axis or external encoder in the OUTPUT CAMS folder. The Insert output cam window appears.
3. Enter a name for the output cam.
4. Confirm with OK. In the working area, the window for the configuration is displayed and the created output cam TO is shown in the project navigator.

In the Configuration window, define the configuration data values for the output cam.

1. Double-clicking in the project navigator below the output cam on the Configuration element displays the window in the working area.
2. Make the following settings:
   - Activate the "Activate output" checkbox.
   - Under the selection "Cam output on:" select entry "Output cam (CAM)".

3. Assign the assignment partner **CAM _0** of the technology module to the output.

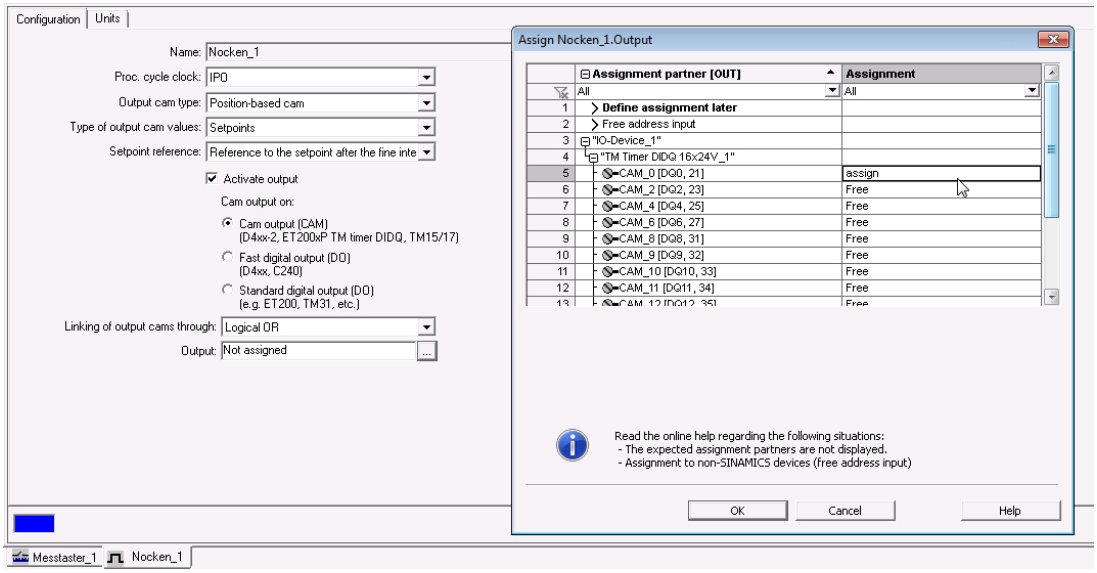

Figure 3-22 Assignment of cam output to TO output cam

4. Confirm with OK.

TO measuringInput

Note

Before you insert a measuring input, the hardware must have been configured – and a TO axis (position or synchronous axis) or a TO external encoder, to which the measuring input is assigned, has to be created.

This is how you enter a measuring input
1. In the project navigator, highlight the folder MEASURING INPUTS under the relevant axis or external encoder.

2. Select Insert > Technology Objects > Measuring Input, or double-click Insert Measuring Input in the project navigator at the axis or external encoder entry in the MEASURING INPUTS folder. The Insert Measuring Input window appears.

3. Enter a name for the measuring input.

4. Confirm with OK. In the working area, the window for the configuration is displayed and the measuring input created is shown in the project navigator.

In the Configuration window, define the configuration data values for the measuring input.

1. Double-clicking in the project navigator below the measuring input on the Configuration element displays the window in the working area.
2. Assign the assignment partner **MI _1** of the technology module to the input.

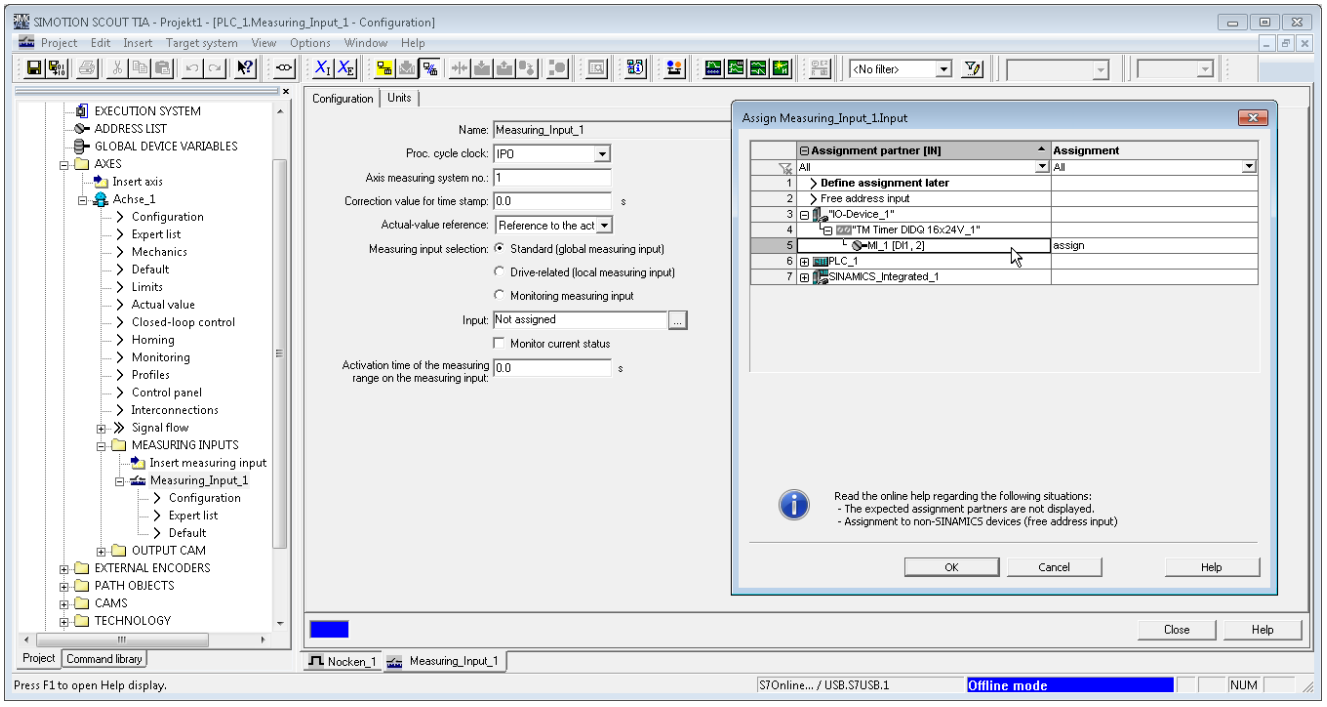

Figure 3-23 Assignment of measuring input input to TO measuringInput

3. Confirm with OK.

Further information

Further information on configuring the output cam and measuring input technology objects can be found in the *SIMOTION Motion Control Output Cams and Measuring Inputs Function Manual*.

See also

Service and maintenance (Page 65)

3.3.5.3 Linking symbolic I/O variables with TM Timer DIDQ

You can address digital I/O channels using symbolic variables in the user program.

Requirement

The I/O channels are configured as described under section Configuring I/O channels (Page 47).

Procedure

In the following example, create the 'var_DI' and 'var_QI_MI' variables. Link the 'var_DI' variable with the **DI_16** digital input (additional digital input without technology function (DI0)), and the 'var_QI_MI' variable with the **QI** quality information of the **MI_1** measuring input input.

1. Open the **address list** via the project navigator.
2. In the **View** field, select 'I/Os'.
3. Create the'var_DI' and 'var_QI_MI' variables of BOOL type, and select 'IN' in each **I/O address** field.

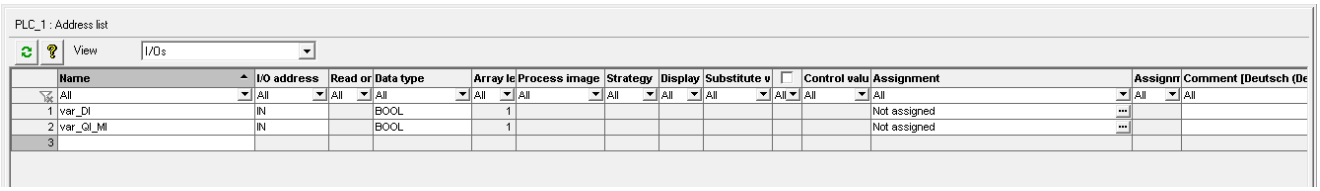

Figure 3-24 Creating variables in the address list

4. Click ... for the 'var_DI' variable in the **Assignment** field
5. First select the technology module in the following dialog.

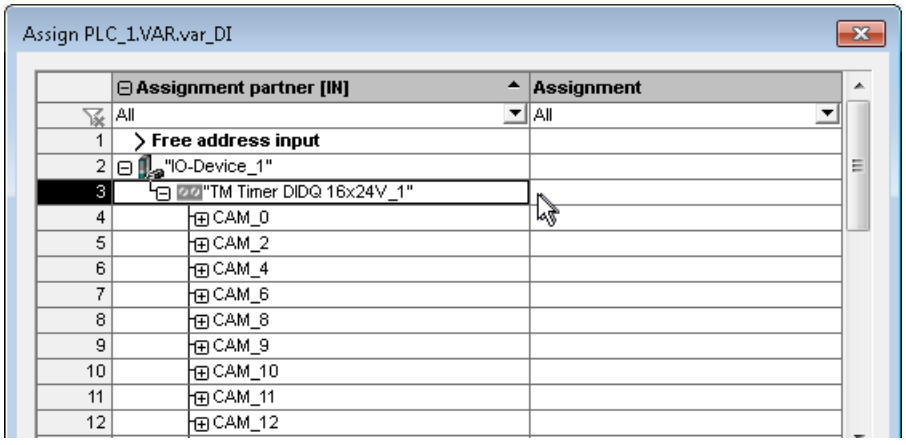

Figure 3-25 Dialog assignment - select module

6. Scroll downwards in the list of assignment partners and select the **DI_16** digital input.

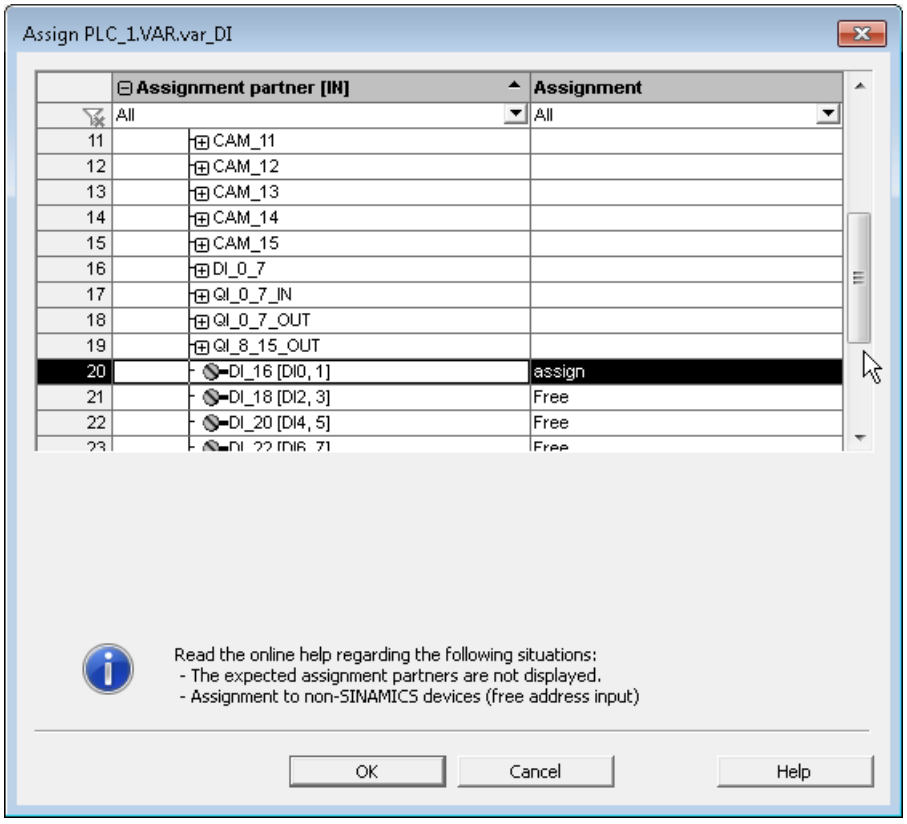

Figure 3-26 Dialog assignment - select DI (without technology function)

7. Confirm the selection by clicking **OK**.
8. Click ... for the 'var_QI_MI'variable in the **Assignment** field

9. Scroll downwards in the list of assignment partners and select the **QI** quality information from the **MI_1** measuring input input.

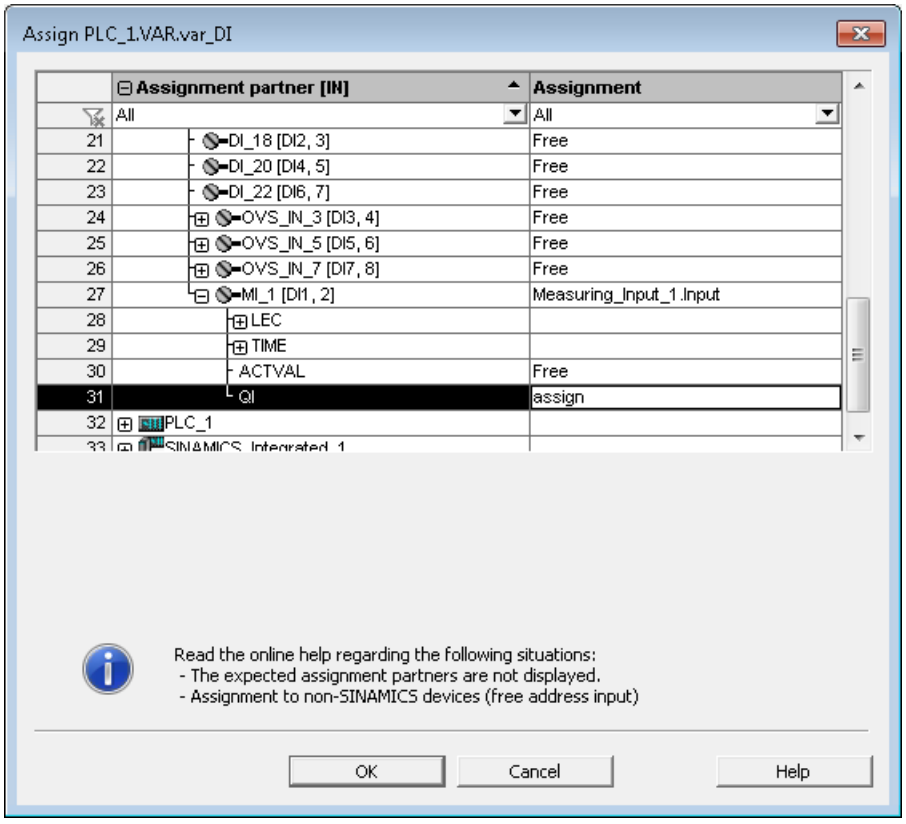

Figure 3-27 Dialog assignment - select QI of the measuring input input

10. Confirm the selection by clicking **OK**.

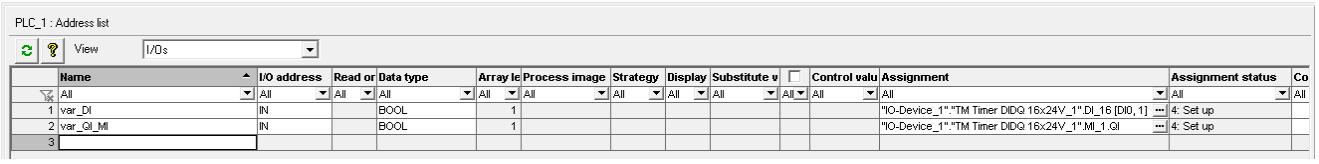

Figure 3-28 Address list following successful assignment

Note

The procedures for generating symbolic variables and for using the process image or direct I/O access are described in detail in the SIMOTION SCOUT TIA Manual.

3.3.5.4 Overview of the I/O points of the channels

I/O points of the channels Timer DI and Timer DQ

Each I/O channel has different cyclic data in the form of I/O points.

I/O point	Input	Output	Function of the channel [1]	Description
ACTVAL	X		Timer DI, Timer DQ	Actual value of the input / reading back the channel status
QI	X		Timer DI, Timer DQ	Quality information
SETVAL		X	Timer DI, Timer DQ	Setpoint
TIME	X		Timer DI	Time stamp Timer DI
		X	Timer DQ	Time stamp Timer DQ
LEC	X		Timer DI	Counter for lost edges on Timer DI
SEL		X	Timer DI	Edge selection at Timer DI; is used by the TO measuring input
SETEN		X	Timer DI, Timer DQ	Enabling signal
EN	X		Timer DI, Timer DQ	Signal state of the enabling signal

1) Timer DI (measuring input), Timer DQ (output cam)

When using technology objects (interconnection of Timer DQ with TO outputCam/camTrack or Timer DI with TO measuringInput), the following I/O points are not relevant, because they are used or processed by technology objects:

- SEL
- ACTVAL
- SETVAL
- TIME

I/O points of the counter, oversampling, incremental encoder and pulse width modulation channels

Each I/O channel has different cyclic data in the form of I/O points.

I/O point	Input	Output	Channel function	Description
ACTVAL	X		Incremental encoder, oversampling, counter	Actual value of input
QI	X		Incremental encoder, oversampling, counter, pulse width modulation	Quality information
EVENTVAL	X		Incremental encoder, counter	Actual count value
REFVAL	X		Incremental encoder	
ACTSAMPLE	X		Oversampling	32 states of the digital input (oversampling pattern)

SETSAMPLE		X	Oversampling	Specification of the 32 states of the digital output (oversampling pattern)
		X	Pulse width modulation	Specification of pulse-pause ratio as percentage value

Further information

Further information on the I/O points of the channels can be found in the *SIMATIC ET 200SP Technology Module TM Timer DIDQ 10x24V*and *SIMATIC ET 200MP/S7-1500 Technology Module TM Timer DIDQ 16x24V*Manuals, in Chapter *Control and feedback signal interface*.

3.4 Synchronization

After recording the connection between the controller and the TM Timer DIDQ technology module (the controller is switched on and powered up, the header module (IM) is switched on and powered up, the TM Timer DIDQ technology module is switched on and powered up, establishing a connection from the controller to the header module (IM) and to the TM Timer DIDQ technology module was successful), the TM Timer DIDQ is parameterized by the controller and the header module (IM) synchronizes to the PN cycle clock.

The cyclic connection is thus established, the cyclic I/O data of the TM Timer DIDQ technology module is now available in the controller (for access by the user program or for technology object access).

Note

The TM Timer DIDQ technology module must only accessed via I/O access if the header module (IM) and the technology module TM Timer DIDQ have been ramped-up. Otherwise, the CPU switches to STOP mode due to an I/O access error during I/O access.

The synchronization can be monitored via the PeripheralFaultTask.

Monitoring of synchronization between a technology module and a SIMOTION controller with PeripheralFaultTask

During the transition from START-UP to RUN, all technology modules with parameterized technology functions are in the "NOT_SYNCHRONIZED" state.

- As soon as the Terminal Modules have been successfully synchronized, the PeripheralFaultTask with interrupt ID "_SC_IO_MODULE_SYNCHRONIZED" (=214) is called.
- If synchronization fails, the PeripheralFaultTask with interrupt ID "_SC_IO_MODULE_NOT_SYNCHRONIZED" (=215) is called.

Example

To synchronize the user task, a user variable **TM_SYNC** is set to **FALSE** in the StartUpTask and set to **TRUE** in the PeripheralFaultTask with interrupt ID = SC_IO_MODULE_SYNCHRONIZED. The status of **TM_SYNC** is queried in the user task before the (first) direct access to the technology module.

The following TaskStartInfo is supplied in the PeripheralFaultTask every time it is called:

```
UDINT   TSI#interruptID      // scan for triggering event
DINT    TSI#logBaseAdrIn     // valid only when not equal to _SC_INVALID_ADDRESS
DINT    TSI#logBaseAdrOut    // valid only when not equal to _SC_INVALID_ADDRESS
DINT    TSI#logDiagAdr       // valid only when not equal to _SC_INVALID_ADDRESS
DWORD   TSI#details          // set to 0
UINT    TSI#eventClass       // set to 0
UINT    TSI#faultId          // set to 0
```

The TaskStartInfo contains the logical address of the relevant technology module.

TSI#logDiagAdr, TSI#details, TSI#eventClass and TSI#faultId do not have any significance for technology modules.

Further information

Further information on synchronization can be found in the SIMATIC manuals, see SIMATIC documentation (Page 13).

For further information on the TaskStartInfo, refer to the *SIMOTION ST Structured Text* Manual.

3.5 Saving and compiling a user project with SCOUT/SCOUT TIA

To save and compile with HW Config or SIMOTION SCOUT, proceed as described below:

Saving and compiling with HW Config

1. Save and compile the project via the menu Station -> Save and compile.
2. Before downloading the hardware configuration, you can select the "Check consistency" option in the Station menu. In this way, you can check whether the hardware configuration has been defined without errors, e.g. with regard to PROFINET settings, etc.
3. Transfer the project to the controller.

Saving and compiling with SIMOTION SCOUT/SCOUT TIA

1. Save and compile the project, e.g. via the Project -> Save and recompile changes menu.
2. You can select the "Check consistency" option in the Project menu of the main SIMOTION SCOUT/SCOUT TIA menu at any time. (For more information, refer to the SCOUT online help.) In this way, you can check whether the configuration, parameterization and programming in SIMOTION SCOUT/SCOUT TIA matches the defined hardware configuration.
3. Transfer the project to the controller.

3.6 Notes for those changing over

When changing over from the TM15/TM17 High Feature Terminal Modules to the TM Timer DIDQ technology modules, the following points must be worked through:

- Modifications must be made in the control cabinet and interconnections adapted.
- The project must be adapted analogously to the procedure described in Chapter Configuring.
- PROFINET communication with isochronous mode must be configured.

Note

The connection to the SIMOTION hardware cannot be realized using DRIVE-CLiQ as is the case for TM15/TM17 High Feature; PROFINET must always be used.

Functions

4

4.1 Overview

For the TM Timer DIDQ technology modules, you can evaluate the signals at the digital inputs and outputs for the following functions:

Function	Designation channel parameterization in HW Config/HWCN	Access point in SCOUT/SCOUT TIA	Use in SCOUT/SCOUT TIA
Inputs			
Measuring input	Timer DI	MI_n	Interconnectable with SIMOTION TO measuringInput and IO variable
Oversampling	Oversampling	OVS_IN_n	Interconnectable with IO variable
Numerator	Numerator	EPC_n	Interconnectable with IO variable
Incremental encoder	Incremental encoder	EPC_n	Interconnectable with IO variable
Outputs			
Output cam	Timer DQ	CAM_n	Interconnectable with SIMOTION TO outputCam/camTrack and IO variable
Pulse width modulation	Pulse width modulation	PWM_n	Interconnectable with IO variable
Oversampling	Oversampling	OVS_OUT_n	Interconnectable with IO variable

Further information

- Additional information on the functions of the technology modules TM Timer DIDQ is provided in the *SIMATIC ET 200SP technology module TM Timer DIDQ 10x24V* and *SIMATIC ET 200MP/S7-1500 technology module TM Timer DIDQ 16x24V* Manuals.
- Further information on configuring output cams and measuring inputs can be found in the *SIMOTION Motion Control Output Cams and Measuring Inputs Function Manual*.

4.2 HW enable for the channels Timer DI and Timer DQ

Precondition

You have parameterized a channel at the TM Timer DIDQ as "Timer DQ with enabling input" or "Timer DI with enabling input".

Edge-controlled HW enable

With an edge-controlled enable, output cams are output at the output only if the enable status exists before the output cam start. The enable status is controlled by a configured Measuring Input Technology Object.

For the edge-controlled enable, the technology object measuring input is only measured if enabled. The enable status is controlled by a configured measuring input technology object linked with the enable channel.

For the measuring input TO, only the "one-time measuring" mode is permitted with the following edge detection:

- Rising edge
- Falling edge
- Both edges

Measuring of "Both edges, first rising" and "Both edges, first falling" and the "Cyclic measuring" mode is not supported.

Via the measuring input TO

- the positions of the enable edges can be evaluated (see SIMOTION Motion Control - Output Cams and Measuring Inputs" Function Manual). Please note that the measuring range is monitored in the IPO, IPO2 or position control cycle clock, depending on the configured measuring input cycle clock.
- Set or reset the enable status.
  The enable status is set when the configured edge arrives.
  The enable status is reset
  - At the beginning of the measuring range configured at the Measuring Input TO (with range setting: "Measure in specified range")
  - using the program command _enableMeasuringInput (with range setting: "Measure without a defined range")

The enable status can be monitored via the I/O area of the enable input.

If the enable status is retracted before the output cam ends, the output cam is still output until the end if it has already started. New output cams are no longer output.

Level-controlled HW enable

Note

Information on level-controlled hardware enable is provided in the *SIMATIC ET 200SP technology module TM Timer DIDQ 10x24V* and *SIMATIC ET 200MP/S7-1500 technology module TM Timer DIDQ 16x24V* in Chapter *Functions*.

Service and maintenance

5

5.1 Replacing a technology module

Information on replacing a TM Timer DIDQ technology module can be found in the system manuals *SIMATIC ET 200SP distributed I/O system* and *ET 200MP distributed I/O system*, Chapter Maintenance -> Replacing an I/O module.

5.2 Firmware update

Information on the firmware update can be found in the system manuals *SIMATIC ET 200SP distributed I/O system* and *ET 200MP distributed I/O system,* Chapter Maintenance -> Firmware update.

Diagnostics

6

6.1 Overview of the diagnostic possibilities

The following diagnostics options are available to you in the TM Timer DIDQ technology modules:

- LEDs (module)
- Quality information (telegram level)
- HW Config/HWCN (engineering system)

Further information

Further information on the diagnostics options can be found in the *SIMATIC ET 200SP Technology Module TM Timer DIDQ 10x24V*and *S7-1500/ET 200MP Technology Module TM Timer DIDQ 16x24V Manuals*.

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