SIEMENS
Ingenuity for life

Connecting SIMOCODE pro and Allen-Bradley Controller via EtherNet/IP

SIMOCODE pro V EIP

https://support.industry.siemens.com/cs/ww/en/view/109748968

Siemens Industry Online Support

Warranty and liability

Note

The Application Examples are not binding and do not claim to be complete regarding the circuits shown, equipping and any eventuality. The Application Examples do not represent customer-specific solutions. They are only intended to provide support for typical applications. You are responsible for ensuring that the described products are used correctly. These Application Examples do not relieve you of the responsibility to use safe practices in application, installation, operation and maintenance. When using these Application Examples, you recognize that we cannot be made liable for any damage/claims beyond the liability clause described. We reserve the right to make changes to these Application Examples at any time without prior notice.
If there are any deviations between the recommendations provided in these Application Examples and other Siemens publications − e.g. Catalogs − the contents of the other documents have priority.

We do not accept any liability for the information contained in this document.
Any claims against us – based on whatever legal reason – resulting from the use of the examples, information, programs, engineering and performance data etc., described in this Application Example shall be excluded. Such an exclusion shall not apply in the case of mandatory liability, e.g. under the German Product Liability Act ("Produkthaftungsgesetz"), in case of intent, gross negligence, or injury of life, body or health, guarantee for the quality of a product, fraudulent concealment of a deficiency or breach of a condition which goes to the root of the contract ("wesentliche Vertragspflichten"). The damages for a breach of a substantial contractual obligation are, however, limited to the foreseeable damage, typical for the type of contract, except in the event of intent or gross negligence or injury to life, body or health. The above provisions do not imply a change of the burden of proof to your detriment.
Any form of duplication or distribution of these Application Examples or excerpts hereof is prohibited without the expressed consent of the Siemens AG.

Security information

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.

Table of contents

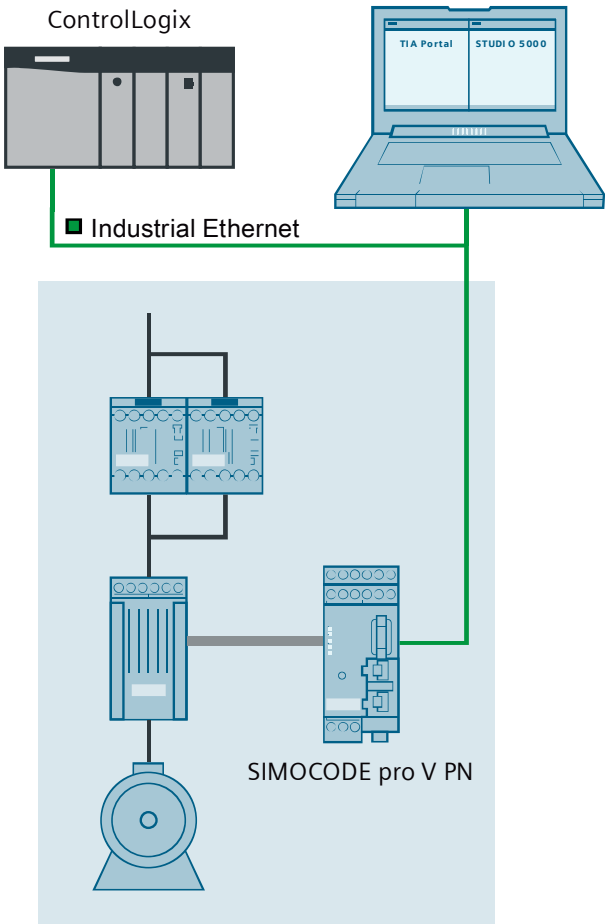
1 Introduction

1.1 Overview

SIMOCODE pro is a flexible, modular motor management system for motors with constant rotation speed in the low voltage range.

The base unit SIMOCODE pro V EIP supports communication via EtherNet/IP and thus can be integrated in Allen-Bradley PLCs for example.

Figure 1-1: Overview



This document describes the parameterization and integration of a SIMOCODE pro V EIP into an Allen-Bradley PLC using Studio 5000 and SIMOCODE ES V14 (TIA Portal).

1.2 Components used

This application example has been created with the following hardware and software components:

Table 1-1: Hardware and software components

Component	Qty.	Article number	Note
SIMOCODE pro V EIP	1	3UF7013-1AB00-0	
Current/voltage measuring module	1	3UF7110-1AA00-0	
Connection cable	1	3UF7932-0AA00-0	For current/voltage measuring module
Contactors	2	3RT2015-1AB01	
Allen-Bradley ControlLogix PLC	1	--	
SIMOCODE ES V14 SP1	1	3ZS1322-4CC12-0YA5	
Allen-Bradley Studio 5000	1	--	

This application example consists of the following components:

Table 1-2: Compnents of the application example

Component	File name	Note
Documentation	109748968_SIMOCODE-EtherNetIP_DOC_V10_en.pdf	This document
User data types & example project	109748968_SIMOCODE-EtherNetIP_PROJ.zip	User data types and example project for Allen-Bradley Studio 5000

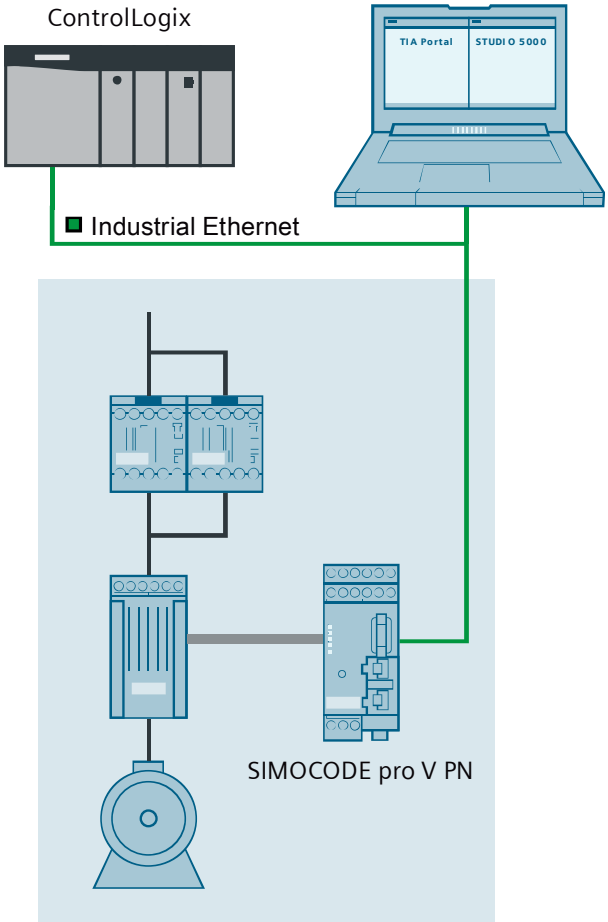
2 Engineering

2.1 Hardware setup

This application example is based on a reversing motor starter but can also be used for different applications.

Connect the components according to the following figure.

Figure 2-1: Hardware setup



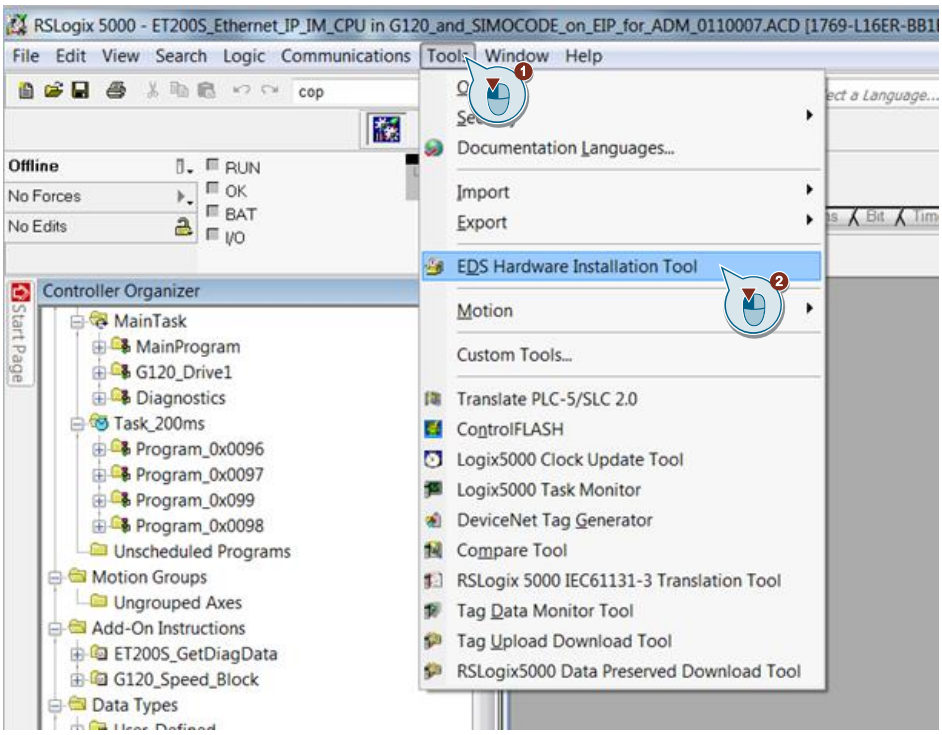
2.2 Configuration

2.2.1 Integrating SIMOCODE pro V EIP into Allen-Bradley Studio 5000

Registering SIMOCODE pro V EIP in Studio 5000

1. Download the EDS file for SIMOCODE pro V EIP:
   https://support.industry.siemens.com/cs/ww/en/view/109741009
2. Unzip the file.
3. Open Studio 5000.
4. Create a new project or open your existing project.
5. From the menu bar select "Tools > EDS Hardware Installation Tool".

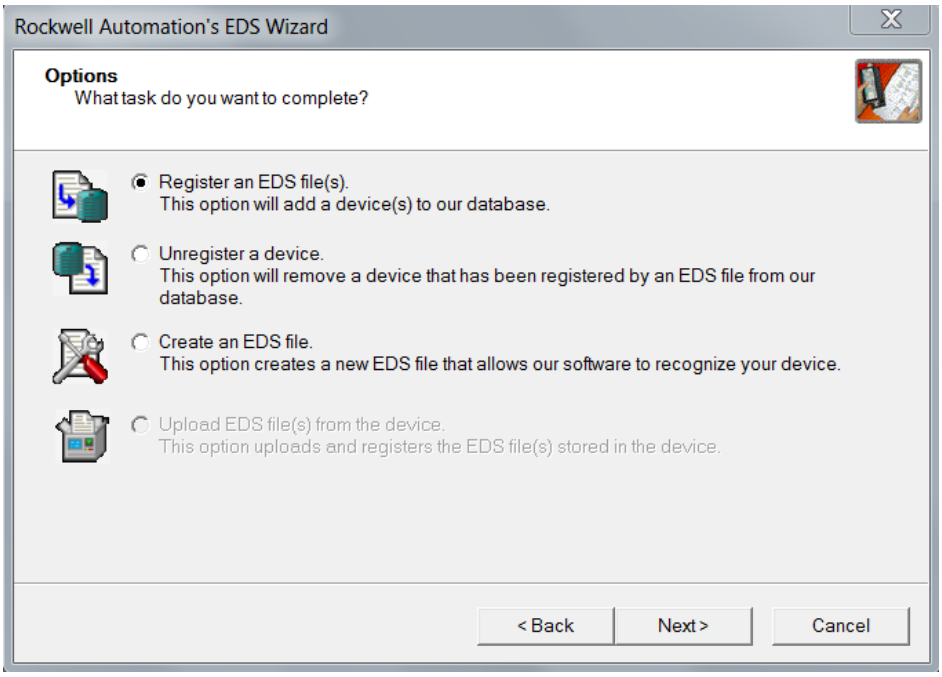
Figure 2-2: Registering SIMOCODE pro V EIP



6. Click "Next" in the wizard window.

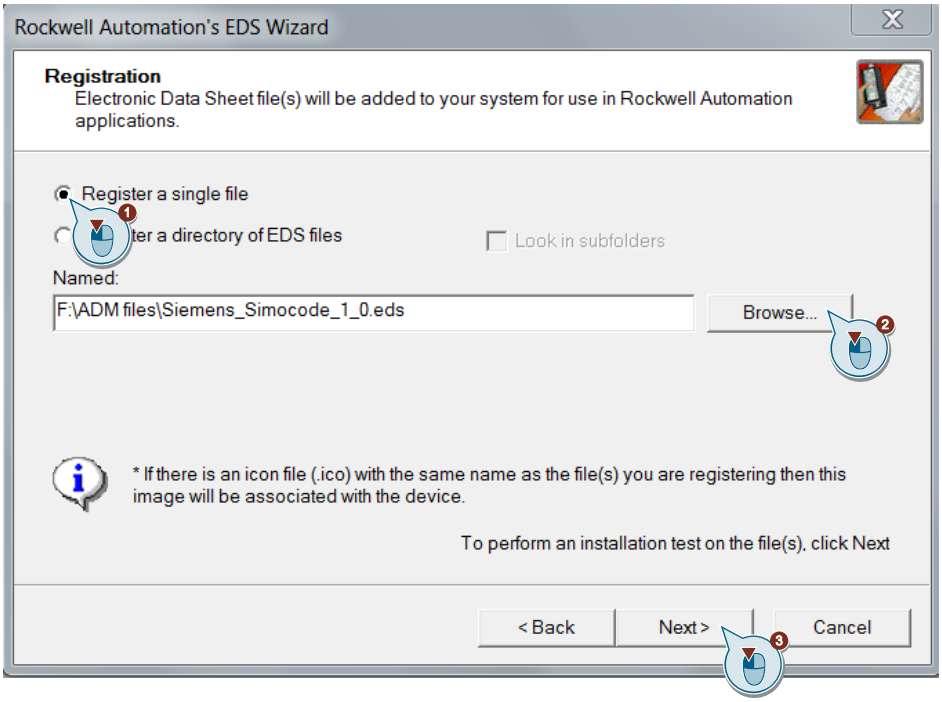
7. Select "Register an EDS file(s)" and click "Next".

Figure 2-3: Registering SIMOCODE pro V EIP



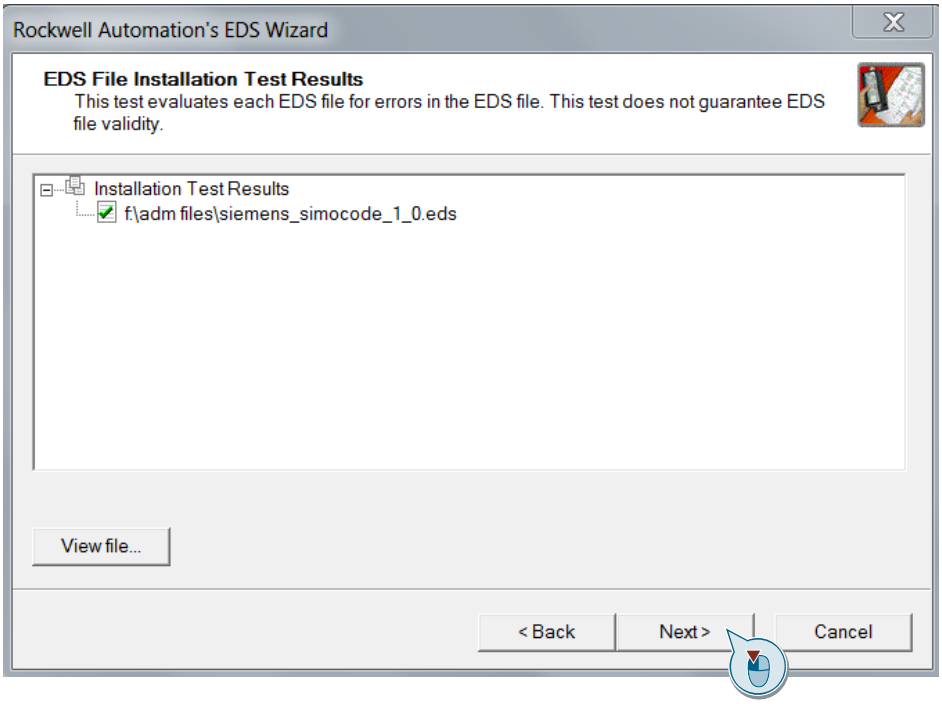
8. Select "Register a single file", click on "Browse", select the downloaded EDS file and click "Next".

Figure 2-4: Registering SIMOCODE pro V EIP



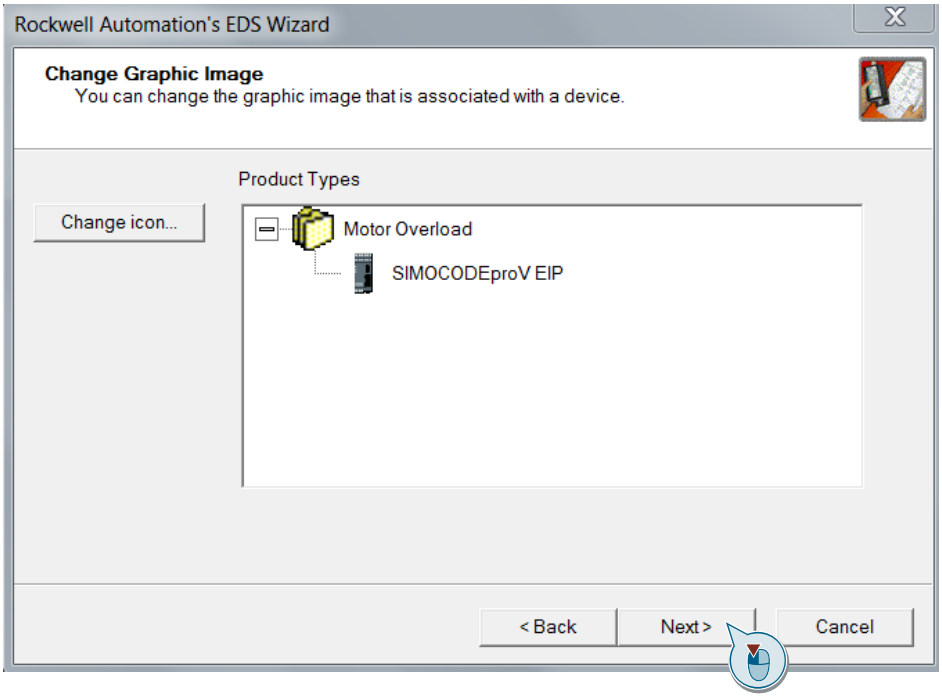
9. Click "Next" on the test results window.

Figure 2-5: Registering SIMOCODE pro V EIP



10. Click "Next" if you do not want to change the graphic image.

Figure 2-6: Registering SIMOCODE pro V EIP

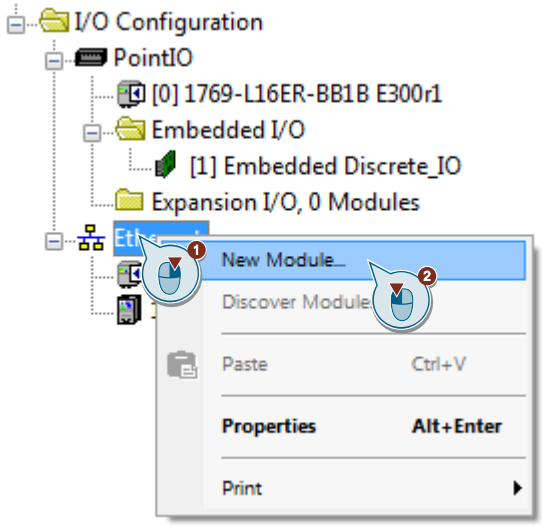


11. Click "Next" on the summary and then "Finish".

Inserting SIMOCODE pro V EIP on EtherNet/IP

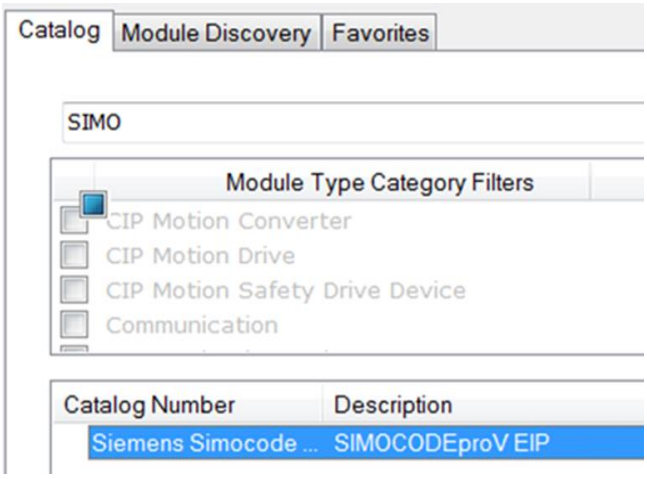
1. In the "Controller Organizer" pane, right-click "Ethernet" and select "New Module…"

Figure 2-7: Adding a new module



2. Search the catalog for "SIMOCODE", select the correct device and click "Create".

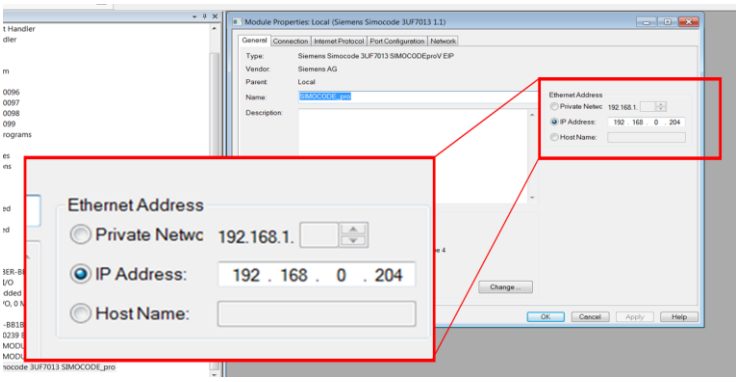
Figure 2-8: Creating a SIMOCODE device



3. Open the module properties and give the device a unique name.

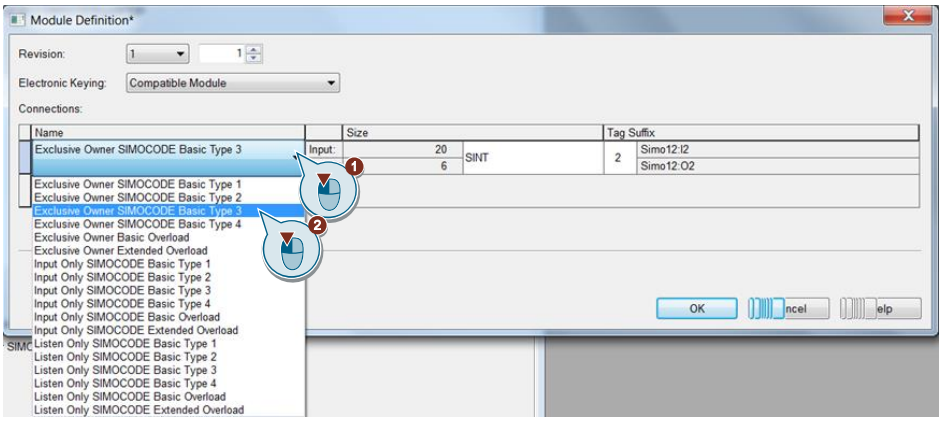
4. Assign an EtherNet/IP address.

Figure 2-9: Assigning an EtherNet/IP address



5. In the module properties, click "Change". Select the size of the input/output window from the drop-down menu.
Notice the "Tag Suffix" field that shows the name assigned to the "Controller Tags" for the cyclic data. Click "OK" to finish.

Figure 2-10



6. Click "OK" to finalize your SIMOCODE pro V EIP device configuration.

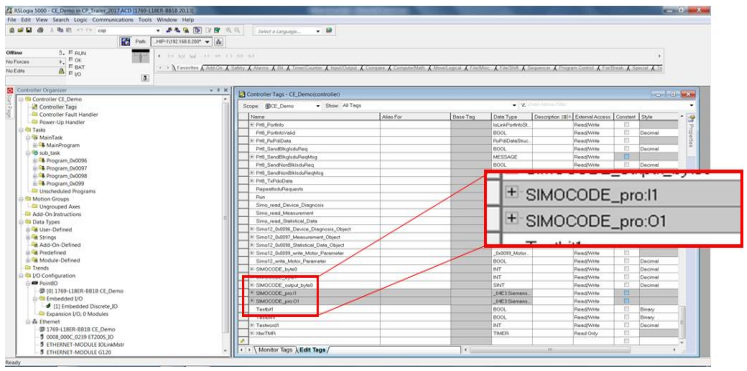
2.2.2 Setting up cyclic data communication

Once you have completed adding a SIMOCODE pro V EIP to the network configuration, input and output cyclic controller tags with the same device name are added to the project.

The number of tags generated is directly related to the selected Basic Type. You can find additional information on Basic Types in chapter 3.1.

1. Click on "Controller Tags" and search for "<Device name>:I1" and "<Device name>:O1", replacing "<Device name>" with your device's name.

   Figure 2-11



2.2.3 Setting up acyclic data communication

The SIMOCODE pro V EIP also supports acyclic communication. This is accomplished in the Allen-Bradley controller with the use of "Message" commands. The SIMOCODE pro V EIP supports four object requests for data transfer.

Table 2-1: Objects

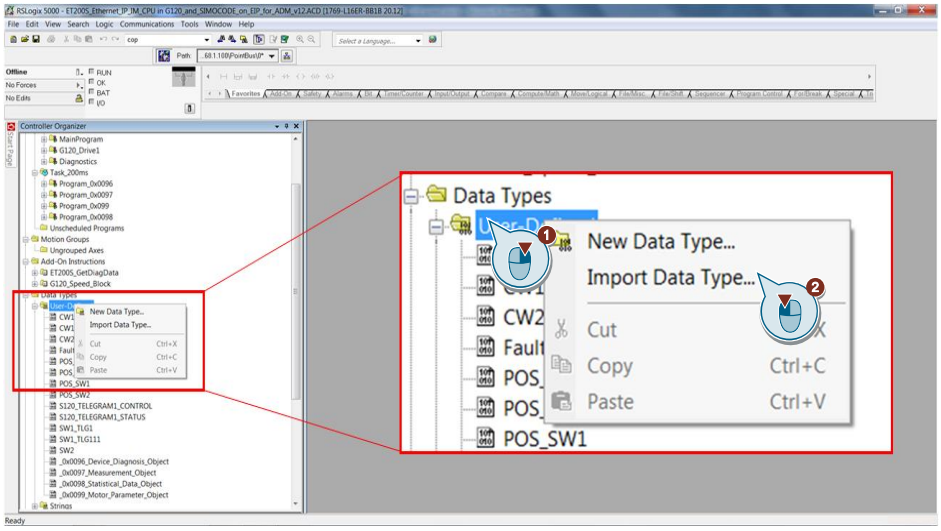
Object	Class code	Length
Device diagnostics	0x0096	46 bytes
Measurement	0x0097	240 bytes
Statistical data	0x0098	228 bytes
Motor parameter	0x0099	116 bytes

In order to simplify the formatting of the available acyclic data, four data types are available for download. Follow these steps to request the data transfer via "Message" commands in Studio 5000:

1. Download the file "109748968_SIMOCODE-EtherNetIP_PROJ.zip" and unzip it:
   https://support.industry.siemens.com/cs/ww/en/view/109748968

2. In the "Controller Organizer" pane, right-click on "User Data Types" and select "Import Data Type…".

Figure 2-12: Importing data types



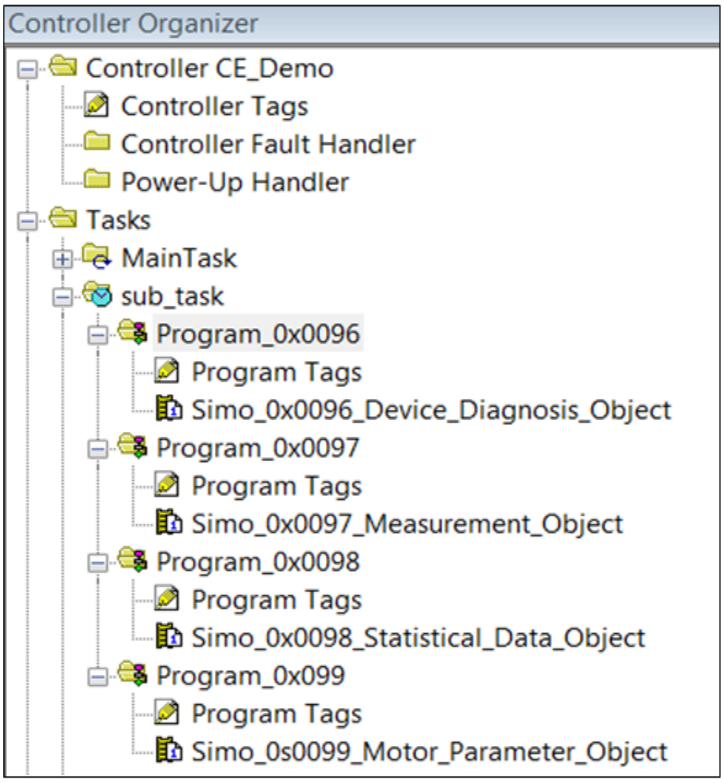
3. Import the downloaded data types.
4. Create a controller tag of each of the imported data types.

Figure 2-13: Creating controller tags for SIMOCODE

Name	Alias For	Base Tag	Data Type
Run			BOOL
Simo_read_Device_Diagnosis			BOOL
Simo_read_Measurement			BOOL
Simo_read_Statistical_Data			BOOL
Simo12_0x0096_Device_Diagnosis_Object			_0x0096_Devic...
Simo12_0x0097_Measurement_Object			_0x0097_Meas...
Simo12_0x0098_Statistical_Data_Object			_0x0098_Statisti...
Simo12_0x0099_write_Motor_Parameter			_0x0099_Motor
Simo12_write_Motor_Parameter			BOOL
SIMOCODE_byte0			INT
SIMOCODE_byte1			INT
SIMOCODE_output_byte0			SINT

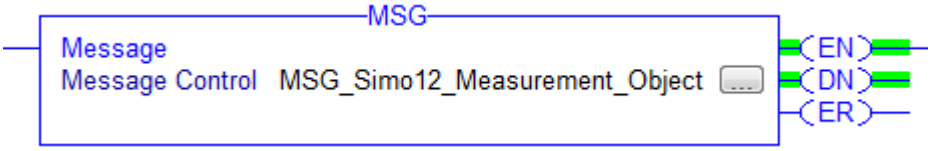
5. Create a program to call the "Message" command for each of the controller tags you just created.

Figure 2-14: Creating programs for communication



6. In each program, use the "Message" command to read or write data to the SIMOCODE pro V EIP unit.

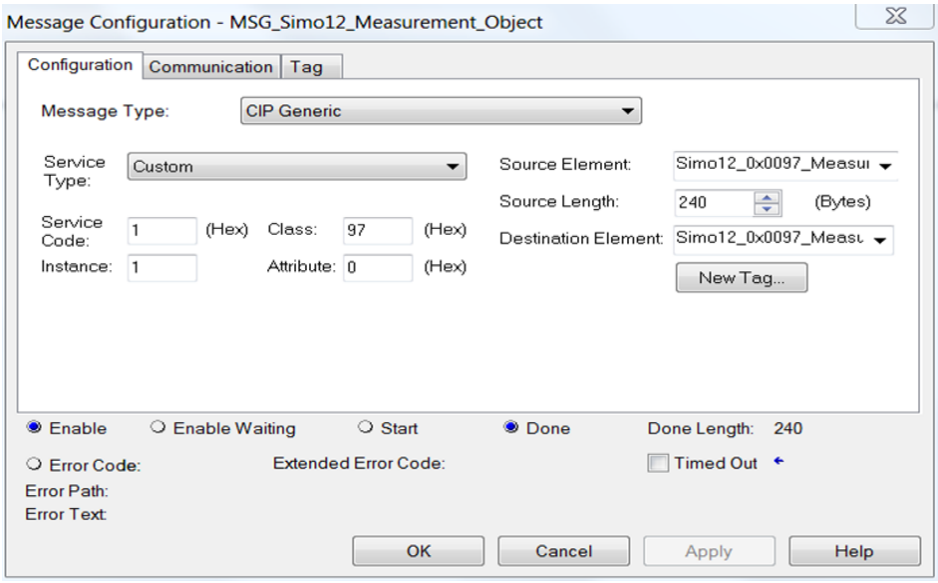
Figure 2-15: Message command



7. To configure the "Message" command, click on the button with the three dots.

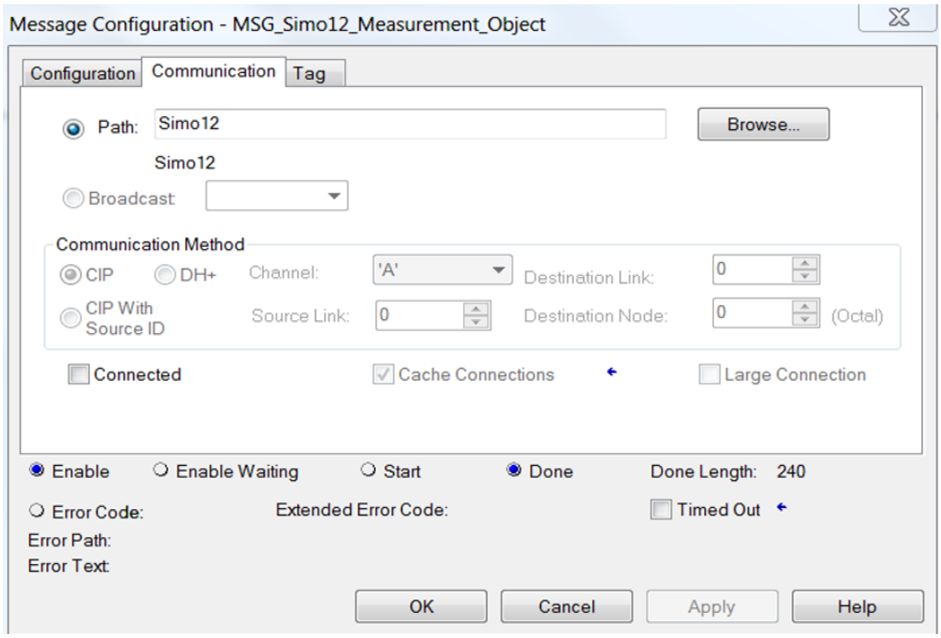
8. On the Configuration tab, select the following values for the Measurement object:
   - Message type: CIP Generic
   - Service type: Custom
   - Service code: 1
   - Instance: 1
   - Class: 97
   - Attribute: 0
   - Source Element: Name of the controller tag of type UDT you created for measured values
   - Length: 240
   - Destination Element: Name of the controller tag of type UDT you created for measured values.

Figure 2-16: Message configuration



9. On the Communication tab, click on "Browse" and select the SIMOCODE pro V EIP unit you wish to read the data from.

Figure 2-17: Message configuration

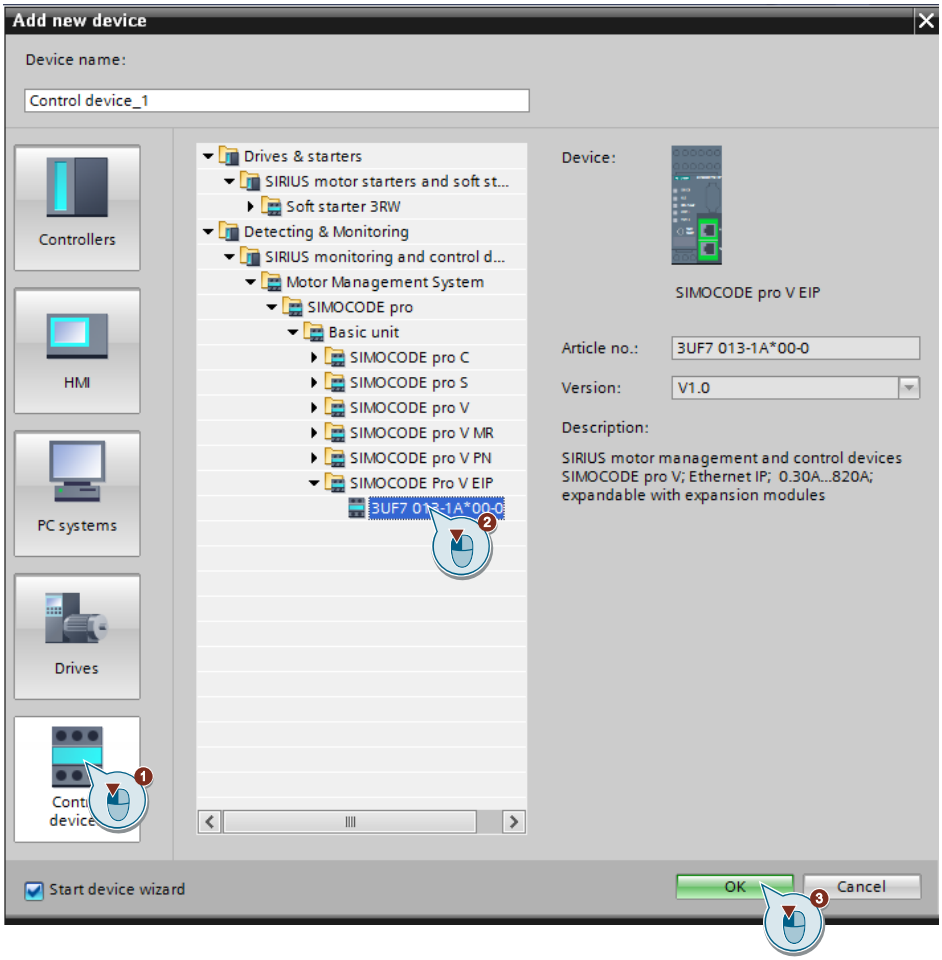


10. Download your configuration.

2.2.4 Configuring SIMOCODE pro V EIP with SIMOCODE ES V14

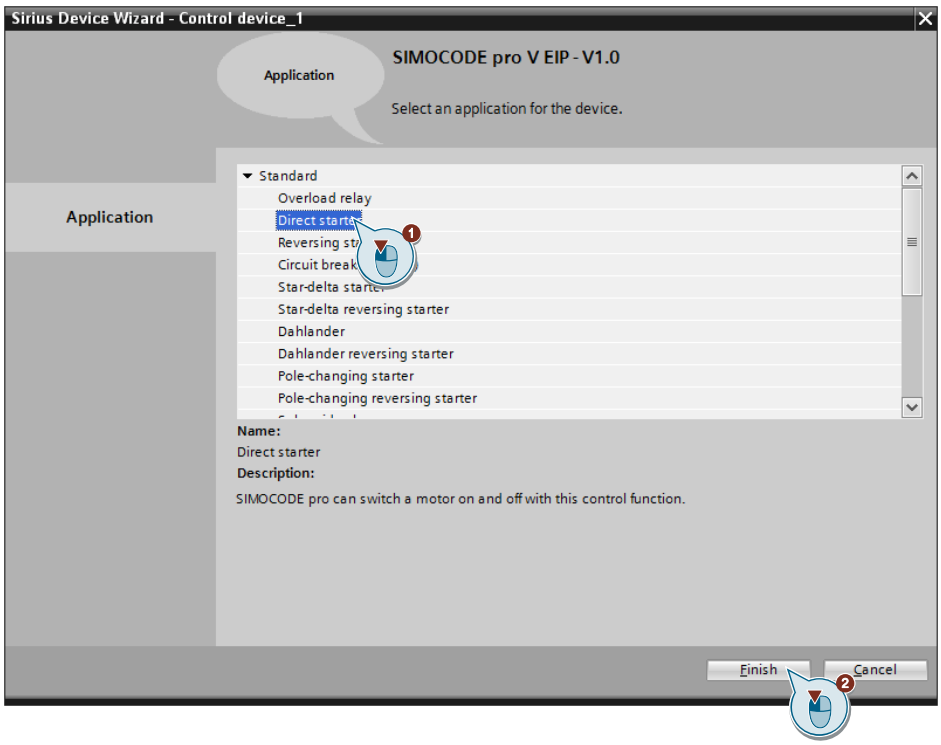
1. Open TIA Portal.
2. Create a new project or open your existing project.
3. Switch to the project view.
4. In the project tree, double-click on "Add new device".
5. Select "Control devices", browse to "Detecting & Monitoring > SIRIUS monitoring and control devices > SIMOCODE pro > Basic unit", select the SIMOCODE pro V EIP device and click on "OK".

Figure 2-18: Add the SIMOCODE device



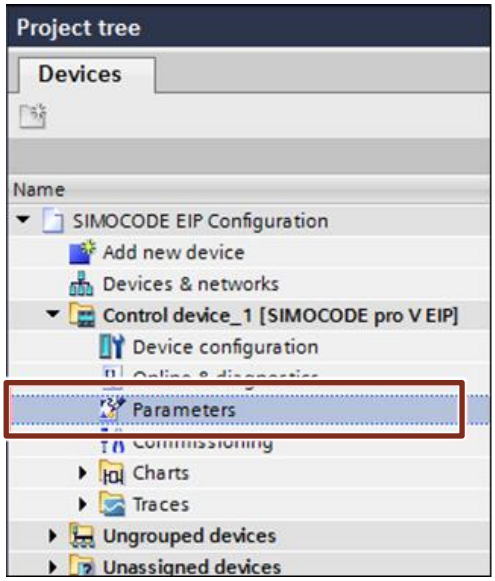
6. Select an application profile and click on "Finish".

Figure 2-19: Application profiles



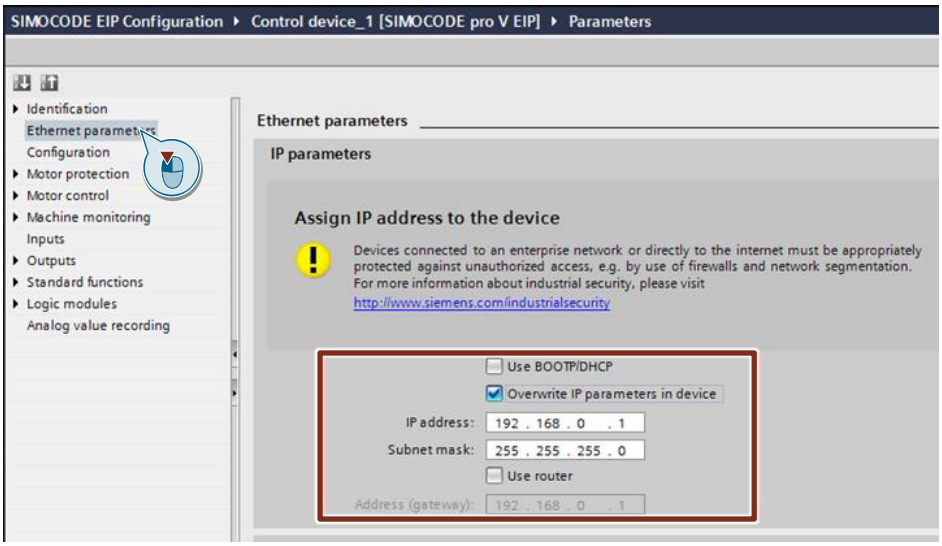
7. If necessary, open "Devices & networks" from the project navigation and adjust the hardware configuration that was created according to the application profile.
8. Open "Parameters" of the SIMOCODE device from the project navigation.

Figure 2-20: Parameters



9. In the area navigation, navigate to "Ethernet parameters" and set the IP address and subnet mask in according to the parameterization in Studio 5000 on page 11.

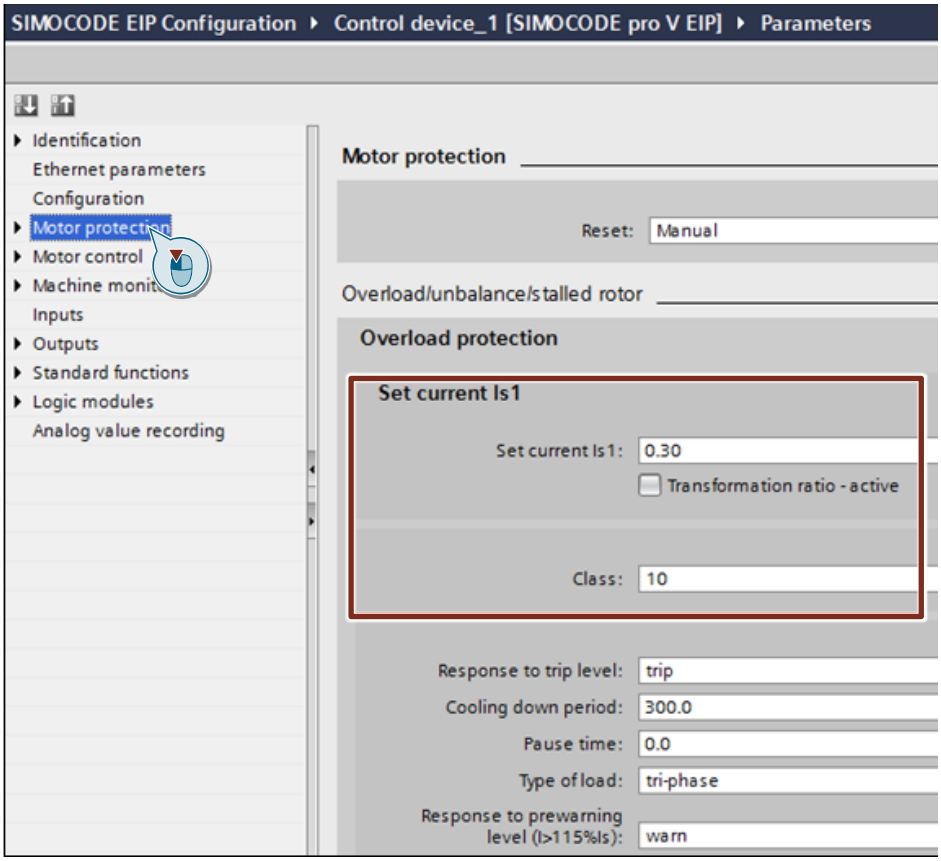
Figure 2-21: Set the IP address



10. Make sure the check box "Overwrite IP parameters in device" is checked.
11. In the area navigation, navigate to "Motor protection".

12. Set the FLA rating for the motor. The default value is the lower range value for the selected measuring module.

Figure 2-22: Set the FLA rating



13. If necessary, adjust the default parameters set by the chosen application profile. For more information on application profiles, refer to chapter 3.2.

2.2.5 Downloading the configuration

1. Select the SIMOCODE pro V EIP device from the project navigation.
2. In the menu bar, select "Online > Download to device".
3. Select the communication path for download.
4. Click on "Load" and then "Finish".

2.3 Operation

Testing communication

For switching the outputs of SIMOCODE pro on or off, you have to set the according bits in "SIMOCODE_pro:O1".

For a reversing starter you set bit 2 to TRUE in your application program in order to start the motor in clockwise direction.

You can find additional information on the cyclic receive data of SIMOCODE in chapter 3.1.

3 Additional information

3.1 Basic Types

Once you have completed adding a SIMOCODE pro V EIP to the network configuration in Studio 5000, input and output cyclic controller tags with the same device name are added to the project.

The number of tags generated is directly related to the selected Basic Type.

Table 3-1: Comparison of data length for different Basic Types

	Input data length	Input assembly	Output data length	Output assembly
Basic Type 1	10 bytes	150	4 bytes	100
Basic Type 2	4 bytes	151	2 bytes	101
Basic Type 3	20 bytes	152	6 bytes	102
Basic Type 4	488 bytes	153	6 bytes	103

For example, Basic Type 3 generates 20 bytes of input tags and 6 bytes of output tags. If you expand the input tags in Studio 5000, you will see tags indexed from (0) to (19) and output tags indexed from (0) to (5).

The input data these tags represent is assigned in "Parameters > Outputs > Cyclic Send Data" in SIMOCODE ES V14. The first 2 bytes are freely assignable to represent 16 discrete signals. The remaining bytes are freely assignable to represent up to 9 analog values.

The following paragraphs show the cyclic receive and send data of Basic Type 4 as an example.

For cyclic receive and send data of other Basic Types and additional information on Basic Types, refer to the SIMOCODE pro function manual:

https://support.industry.siemens.com/cs/ww/en/view/109743960/96438864651

Cyclic receive data of Basic Type 4

The cyclic receive data of Basic Type 3 and Basic Type 4 is identical.

Table 3-2: Cyclic receive data of Basic Type 3 and Basic Type 4

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 – bit 0.7	Cycl. receive byte 0 – bit 0.6	Cycl. receive byte 0 – bit 0.5	Cycl. receive byte 0 – bit 0.4	Cycl. receive byte 0 – bit 0.3	Cycl. receive byte 0 – bit 0.2	Cycl. receive byte 0 – bit 0.1	Cycl. receive byte 0 – bit 0.0
1	Cycl. receive byte 1 – bit 1.7	Cycl. receive byte 1 – bit 1.6	Cycl. receive byte 1 – bit 1.5	Cycl. receive byte 1 – bit 1.4	Cycl. receive byte 1 – bit 1.3	Cycl. receive byte 1 – bit 1.2	Cycl. receive byte 1 – bit 1.1	Cycl. receive byte 1 – bit 1.0
2, 3	Cycl. receive byte 2/3 – analog value 1							
4, 5	Cycl. receive byte 4/5 – analog value 2							

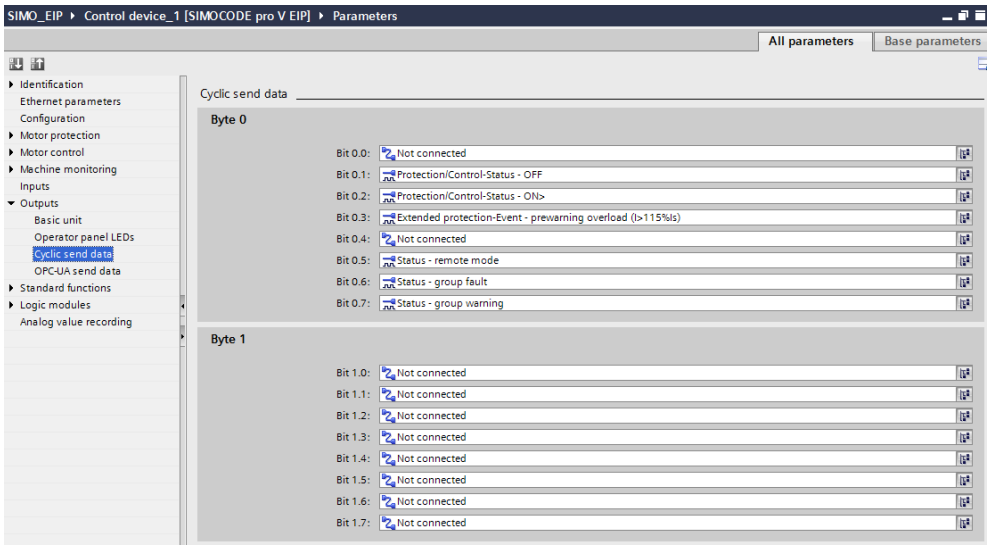
Cyclic send data of Basic Type 4

Basic Type 4 provides 488 input bytes of data. The signals for the first 20 bytes of data are freely assigned by the "Cyclic Send Data" area using SIMOCODE ES V14. The remaining data is pre-assigned as a combination of statistical and measured values.

Table 3-3: Cyclic send data of Basic Type 4

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 – bit 0.7	Cycl. send byte 0 – bit 0.6	Cycl. send byte 0 – bit 0.5	Cycl. send byte 0 – bit 0.4	Cycl. send byte 0 – bit 0.3	Cycl. send byte 0 – bit 0.2	Cycl. send byte 0 – bit 0.1	Cycl. send byte 0 – bit 0.0
1	Cycl. send byte 1 – bit 1.7	Cycl. send byte 1 – bit 1.6	Cycl. send byte 1 – bit 1.5	Cycl. send byte 1 – bit 1.4	Cycl. send byte 1 – bit 1.3	Cycl. send byte 1 – bit 1.2	Cycl. send byte 1 – bit 1.1	Cycl. send byte 1 – bit 1.0
2 … 3	Cycl. send byte 2/3 – analog value 1				Cycl. analog float input 1			
4 … 5	Cycl. send byte 4/5 – analog value 1							
6 … 7	Cycl. send byte 6/7 – analog value 3				Cycl. analog float input 2			
8 … 9	Cycl. send byte 8/9 – analog value 4							
10 … 11	Cycl. send byte 10/11– analog value 5				Cycl. analog float input 3			
12 … 13	Cycl. send byte 12/13 – analog value 6							
14 … 15	Cycl. send byte 14/15 – analog value 7				Cycl. analog float input 4			
16 … 17	Cycl. send byte 16/17 – analog value 8							
18 … 19	Cycl. send byte 18/19 – analog value 9							
20 … 259	Data of the measurement object							
260 … 487	Data of the statistical data object							

Figure 3-1: Assigning the cyclic send data in SIMOCODE ES V14



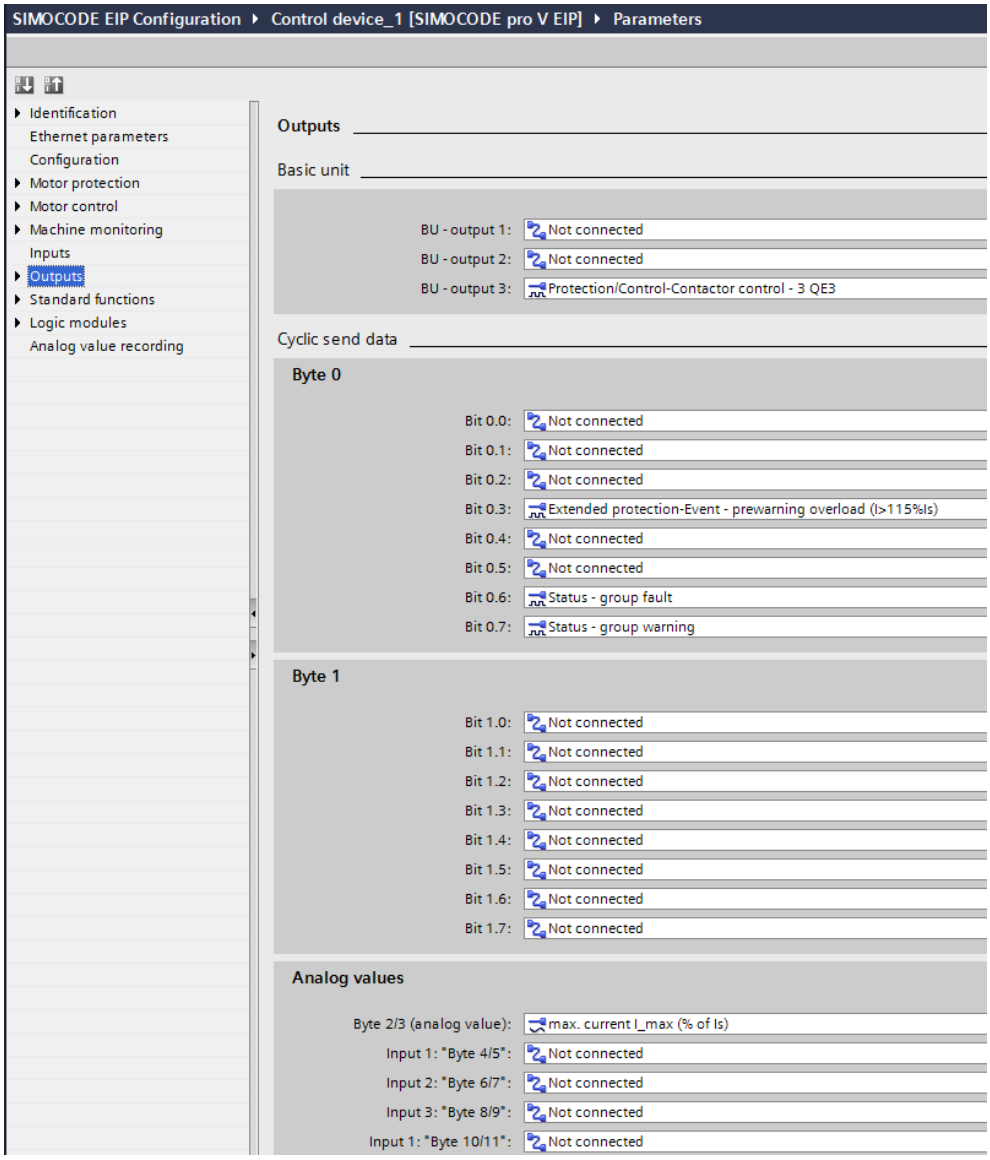
3.2 Application profiles

Each of the application profiles chosen while adding the SIMOCODE device on page 18 has default parameters that are assigned in the background.

For instance, in the case of "Overload relay", output 3 on the SIMOCODE EIP base unit is assigned as a fault contact. As long as no faults are present, the firmware turns on output 3. Outputs 1 and 2 can be freely assigned as remote outputs.

Up to 20 bytes of the data sent cyclically to the controller from SIMOCODE are defined in the "Output" area as well. This can be reviewed or changed under "Outputs > Cyclic send data". Binary signals can be selected in the first two bytes. Analog values can be selected for bytes 2 through 19.

Figure 3-2: SIMOCODE outputs



4 Appendix

4.1 Service and Support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks at:
https://support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. You send queries to Technical Support via Web form:
www.siemens.com/industry/supportrequest

Service offer

Our range of services includes, inter alia, the following:

- Product trainings
- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog:
https://support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:
https://support.industry.siemens.com/cs/ww/en/sc/2067

4.2 Links and Literature

Table 4-1: Links and Literature

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109748968
\3\	Manual Collection – SIMOCODE pro https://support.industry.siemens.com/cs/ww/en/view/109743951
\4\	Function Manual – SIMOCODE pro – Communication https://support.industry.siemens.com/cs/ww/en/view/109743960
\5\	SINAMICS G: Speed Control of a G120 with Allen-Bradley controller (Compact/ControlLogix with RSLogix 5000) via EtherNet/IP https://support.industry.siemens.com/cs/ww/en/view/82843076
\6\	SIMOCODE pro V: Prevention of Pump Blockages by Changing the Direction of Rotation https://support.industry.siemens.com/cs/ww/en/view/109478058
\7\	SIMOCODE pro V EIP: EDS file for Ethernet/IP communication https://support.industry.siemens.com/cs/ww/en/view/109741009

4.3 Change documentation

Table 4-2: Change documentation

Version	Date	Modifications
V1.0	08/2017	First version