SIEMENS

Industrial Controls

SIRIUS
PROFINET Communication Module
for SIRIUS Soft Starter 3RW44

Equipment Manual

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.

⚠ **DANGER**

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

⚠ **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.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ **WARNING**

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

Introduction

<div style="text-align: right; font-size: 2em;">1</div>

1.1 Important notes

Purpose of this manual

This manual contains the basics for using SIRIUS 3RW44 soft starters in conjunction with the PROFINET communication module. The soft starter can be optionally expanded to include a PROFIBUS or PROFINET communication module. The PROFINET communication module allows a 3RW44 soft starter to be connected to the PROFINET communication system.

The SIRIUS 3RW44 soft starter is an electronic motor controller that enables optimized starting and stopping of three-phase asynchronous motors.
This manual describes all functions of the PROFINET communication module.

Target group

This manual is intended for all users involved in

- Commissioning
- Service and maintenance
- Planning and configuring plants

Required basic knowledge

General knowledge of the following areas is needed in order to understand the manual:

- General electrical engineering
- STEP 7

Scope

This manual is valid for the PROFINET 3RW4900-0NC00 communication module for SIRIUS 3RW44 soft starters. It contains a description of the components applicable at the time of printing the manual. SIEMENS reserves the right to provide updated information about new components or new versions of components in a product information document.

Short designations and their meaning

Short designation	Meaning
3RW44	SIRIUS 3RW44 soft starter
3RW44 PN	SIRIUS 3RW44 soft starter with activated PROFINET 3RW4900-0NC00 communication module

Other publications

- Operating instructions "PROFINET Communication Module for Soft Starter 3RW44", order no.: 3ZX1012-0RW40-0NA1

- Manual "3RW44 Soft Starters", order no.: 3ZX1012-0RW44-1AB1 (http://support.automation.siemens.com/WW/view/de/21772518)

- Operating instructions "Soft Starter 3RW44", order no.: 3ZX1012-0RW44-0AA0 (http://support.automation.siemens.com/WW/view/de/21189750)

Standards and approvals

The SIRIUS 3RW44 soft starter is based on IEC/EN 60947-4-2.

Disclaimer of liability

It is the responsibility of the manufacturer to ensure that a system or machine is functioning properly as a whole. SIEMENS AG, its regional offices, and associated companies (hereinafter referred to as "SIEMENS") cannot guarantee all the properties of a complete plant or machine that has not been designed by SIEMENS.

Similarly, SIEMENS can assume no liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the SIEMENS general terms of supply are to be derived or inferred from the following description.

Up-to-the-minute information

Your regional contact for low-voltage switchgear with communications capability will be happy to help you with any queries you have regarding the soft starters. A list of contacts and the latest version of the manual are available on the Internet (http://www.siemens.com/softstarter).

1.2   Support Request

Use the Support Request online form to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

Safety information

2

2.1   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 constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the 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
https://www.siemens.com/industrialsecurity.

Safety information

2.2 Before commencing work: Isolating the equipment from the supply system and ensuring that it cannot be reconnected.

2.2 Before commencing work: Isolating the equipment from the supply system and ensuring that it cannot be reconnected.

⚠ **DANGER**

Hazardous voltage Will cause death or serious injury.

- Disconnect the system and all devices from the power supply before starting work.
- Secure against switching on again.
- Verify that the equipment is not live.
- Ground and short-circuit.
- Erect barriers around or cover adjacent live parts.

⚠ **DANGER**

Hazardous voltage Will cause death or serious injury.

Qualified Personnel.

The equipment / system may only be commissioned and operated by qualified personnel. For the purpose of the safety information in these operating instructions, a "qualified person" is someone who is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures.

2.3 Data security in automation

The topic of data security and access protection (security) is becoming more and more important in industrial environments. Increased networking of entire industrial plants, vertical integration and networking of the levels within a company, and new technologies, such as remote maintenance, are resulting in more increased requirements for protection of the industrial plant. Security is the generic term for all protection measures

- Loss of confidentiality due to unauthorized accessing of data

- Loss of integrity due to data manipulation

- Loss of availability due to destruction of data

To provide protection from manipulation in sensitive plant and production networks, it is not enough to apply data security solutions for offices to industrial applications without any adaptation.

Requirements

The special requirements of communication in an industrial environment (e.g. communication in real time) result in additional requirements for security in industrial use:

- Protection against interaction between automated cells

- Protection of network segments

- Protection from unauthorized access

- Scalability of the security functionality

- No influence on the network structure.

Threats

Threats can arise from external and internal manipulation. Loss of data security is not always caused by deliberate actions.

Internal threats arise due to:

- Technical faults

- Operating errors

- Errors in programs.

This internal hazards are compounded by external threats. The external hazards do not differ from the known threats in the office environment:

- Computer viruses and computer worms

- Trojan horses

- Unauthorized access

- Password phishing.

Password phishing means attempting to get a user to divulge access data and passwords by masquerading as a different identity in an e-mail.

Precautions

The most important precautions against manipulation and loss of data security in an industrial environment are:

- Filtering and verification of data traffic through virtual private networks (VPN). A virtual private network is used to exchange private data in a public network (e.g. the Internet). The most common VPN technology is IPsec. IPsec is a collection of protocols based on the IP protocol at the network layer.

- Segmentation into protected automation cells. The aim of this concept is to protect devices in the network through security modules. A group of protected devices forms a protected automation cell. Only security modules in the same group or the device protected by you can be interchanged.

- Authentication (identification) of the networked devices. The security modules identify themselves to each other via a secure (encrypted) channel using authentication procedures. This prevents access to a protected segment by unauthorized persons from outside.

- Encryption of the data traffic. The confidentiality of the data is ensured by encrypting the data traffic. For this purpose, every security module is given a VPN certificate which includes the encryption key.

Guidelines on information security in industrial automation

VDI guideline

The VDI/VDE Association of German Engineers "Measurement and Automation" has published with the VDI guideline "VDI/VDE 2182 Part 1, IT Security for Industrial Automation - General Model" a guideline in implementation of a security architecture in the industrial environment. The guideline is found under "VDI guidelines" on the VDI homepage: VDI guidelines (https://www.vdi.de/en/home).

PROFINET Security Guideline

The PROFIBUS & PROFINET user organization supports you with building up safety standards in your company with the PROFINET Security Guideline. These guidelines are found under downloads on the homepage of the PROFIBUS & PROFINET user organization: PI - PROFIBUS & PROFINET International Home (http://www.profibus.com).

Product description 3

The SIRIUS 3RW44 soft starter can be equipped with an optional PROFINET communication module (product version E12 or higher). With the help of the PROFINET communication module, the 3RW44 soft starter and its complete functionality can be integrated in a PROFINET environment.

An interface enables the connection of the soft starter to PROFINET as well as its operation and parameter assignment. Likewise, the "Soft Starter ES 2007" software for operator control and monitoring and parameter assignment can be connected to this interface using a PC and connection cable.

Requirements for the use of the PROFINET communication module

- You have connected the SIRIUS 3RW44 soft starter.
- You have configured an S7 station, e.g., with CPU315-2 PN/DP.
- STEP 7 (V 5.5 or higher) is fully installed on your PC or programming device.
- You have knowledge of STEP 7.
- The programming device is connected to the PROFINET IO controller.

Note

The PROFINET communication module only works with 3RW44 devices with product version "E12" and firmware version V1.11.0 or higher.

Note

For devices with product version E12 and firmware version 1.10.5, the PROFINET communication module independently performs a firmware update to version 1.11 after activation of the fieldbus interface.
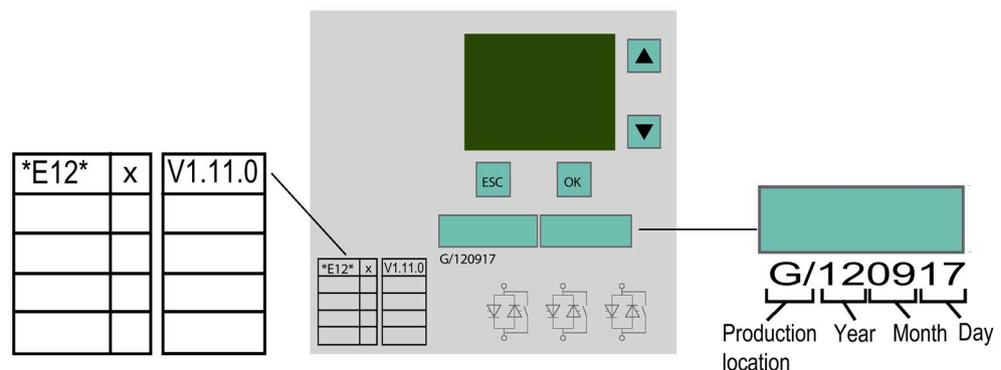
3.1 Fieldbus interfaces

3.1.1 PROFINET IO

PROFINET IO is an open transmission system with real-time functionality defined in accordance with the PROFINET standard. This standard defines a manufacturer-independent communication, automation and engineering model.

Accessories for wiring the PROFINET components are available in industrial quality.

- PROFINET discards the hierarchical PROFIBUS master/slave concept and deploys a provider/consumer principle instead. The modules of an I/O device that will be subscribed to by an IO controller are defined within the engineering phase.

- The quantity framework is extended in accordance with the options offered on PROFINET IO. Parameter limits are not exceeded during configuration.

- The transmission rate is 100 Mbps.

- The configuration interface for users is generally the same as that on PROFIBUS DP (the system is configured in STEP 7 > HW CONFIG).

Properties of PROFINET IO

- Integrated switch with 2 ports
- Supported Ethernet services: ping, arp, network diagnostics (SNMP)/MIB-2, LLDP
- Port diagnostics
- Device replacement without removable medium/programming device
- MRP (Media Redundancy Protocol)
- Supports PROFIenergy
- NTP (Network Time Protocol)

Data transfer options

The following figure shows an overview of the communication functions supported by SIRIUS 3RW44 soft starters, which are described in more detail in the following sections:

3RW44 with PROFINET communication module
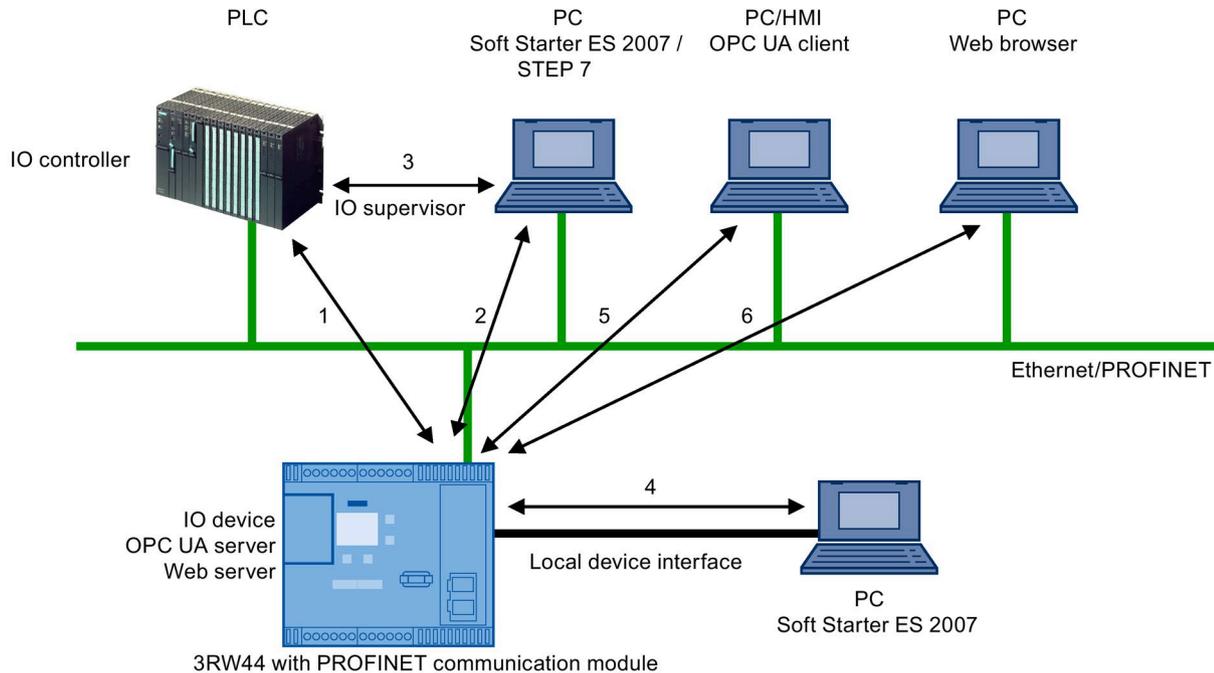
1	Communication between PLC (IO controller) and 3RW44 (IO device) via PROFINET / Ethernet
2	Communication between PC with Soft Starter ES 2007 + SP5 parameter assignment software (IO Supervisor) and 3RW44 via PROFINET
3	Communication between PC with Soft Starter ES 2007 + SP5 parameter assignment software and 3RW44 via SIMATIC S7 (3RW44 integrated in STEP 7)
4	Communication between Soft Starter ES 2007 + SP5 PC parameter assignment software and 3RW44 via the local device interface (point-to-point via RS232 or USB)
5	Communication between PC or HMI with OPC UA client and 3RW44 via Ethernet/OPC UA
6	Communication between PC with web browser and 3RW44 via TCP/IP and HTTP/HTTPS (web server)

Additional information

You can find additional information about PROFINET on the Internet (http://www.siemens.com/profinet) and in system manual "SIMATIC PROFINET System Description (http://support.automation.siemens.com/WW/view/de/19292127)".

3.2 Communication principle

The following figure shows the communication principle, in which different data are transferred depending on the operating mode:
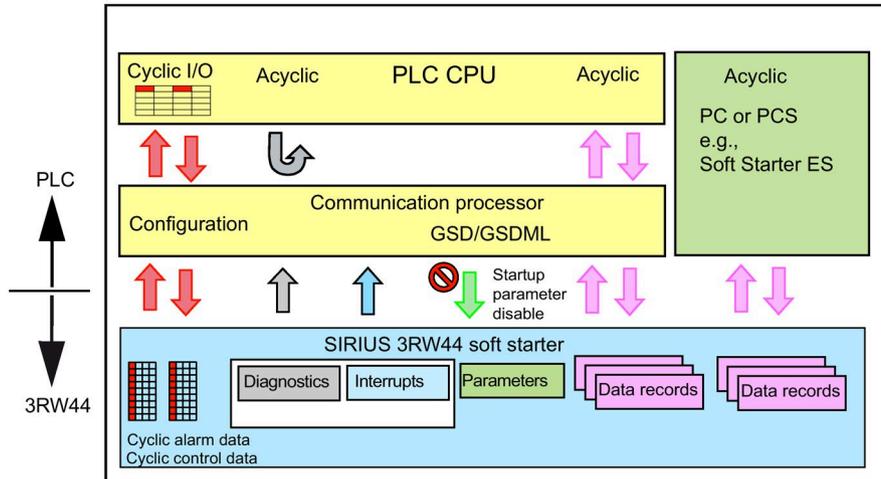
3.3 Display when PROFINET communication module is activated

There is a graphic display on the front of the device from which the functions and states of the 3RW44 can be read in plain text and with the help of symbols when control voltage is applied.

1	Shows the operator panel that currently has control priority and is thus issuing the control commands for the motor.	2	Indicates the user level setting	3	Indicates the current motor status
	Display with keys	🔒	Customer read only	⊗	No motor
	Serial interface	🔓	Customer write		Run-up
	Control inputs				Motor is running
	PLC via fieldbus (PROFIBUS, PROFINET)				Coasting down
	PC via bus (Soft Starter ES 2007 or web server or OPC UA server)				Motor ready to start
?	No control device				

3.4 Fieldbus for PROFINET menu structure

Additional menu commands when PROFINET communication module is activated

On the display of the 3RW44 soft starter, select "Settings > Fieldbus > Fieldbus interface > On" to activate the PROFINET communication module. The following menu structure is displayed:

	Setting Factory	Setting Customer
Fieldbus		
Fieldbus interface		
Off	x	
On		
Group diagnosis		
Disable	x	
Enable		
Behavior on CPU/Master Stop		
Substitute value	x	
Hold last value		
Device name		
IP address		
Subnet mask		
Router address		
MAC address		
Web server		
Off	x	
On		
User name [1]		
Old password [1]		
New password [1]		
OPC UA server		
Off	x	
On		
OPC UA server control function		
Off	x	
On		
NTP time synchronization		
Off	x	
On		
NTP server IP address [2]		
NTP display offset [2]		
Substitute value		
Motor right		
Motor left		
Slow speed		
Emergency start		
Output 1		
Output 2		
Parameter set 1		
Parameter set 2		
Parameter set 3		
Lock quickstop		
Parameters disabled CPU/Master		
Off	x	
On		

[1] only if web server is activated

[2] only if NTP time synchronization is activated

Installation / removal

<div style="text-align: right; font-size: 3em;">4</div>

> ⚠ **WARNING**
>
> **Hazardous Voltage.**
>
> Can Cause Death or Serious Injury. Turn off and lock out all power supplying this device before working on this device.

Read the information in operating instructions "PROFINET Communication Module for Soft Starter 3RW44", order no. 3ZX1012-0RW40-0NA1.

4.1 Inserting the PROFINET communication module

> **NOTICE**
>
> **Danger of material damage.**
>
> Before inserting the PROFINET communication module, disconnect the power to the 3RW44 soft starter.

Note

The PROFINET communication module only works with 3RW44 devices with product version "E12" and firmware version V1.11.0 or higher (see Product description (Page 13)).

Note

For devices with product version E12 and firmware version 1.10.5, the PROFINET communication module independently performs a firmware update to version 1.11 after activation of the fieldbus interface.

To install the PROFINET communication module, follow these steps:

Step	Description
	Slide a small screwdriver into the opening of the cover of the 3RW44 soft starter (1). Gently press down with the screwdriver (2) and remove the cover (3).
	Insert the PROFINET communication module into the device (4).
	Fasten the PROFINET communication module with the enclosed screws (5). Torque 0.8 to 1.2 Nm (7 to 10.3 lb.in).
	Insert the PROFINET connecting cable into one of the sockets of the communication module (6).
	Switch on the supply voltage. The "BUS" LED flashes yellow. The communication module has been inserted correctly, but has not yet been activated (activation, see section Commissioning (Page 29)).
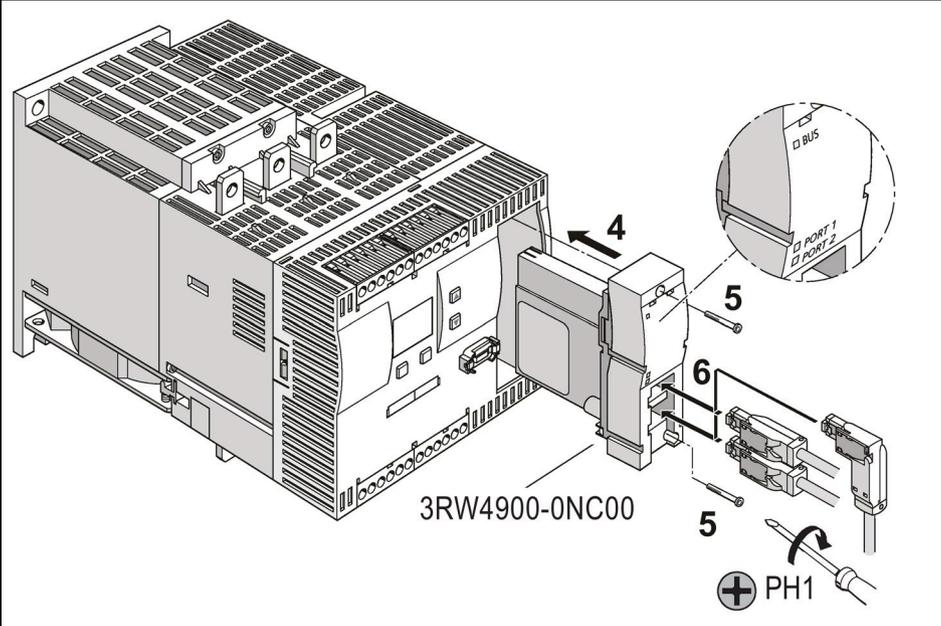
Note

Combinations of PROFINET connecting cables

The following combinations of connector designs for PROFINET connecting cables are possible:

- One straight connector
- Two straight connectors
- One angled connector
- One straight and one angled connector

4.2   Ethernet cable to RJ45 socket

The Ethernet cable is connected to the basic unit.

NOTICE
Ethernet connector
Connect using only industrial Ethernet connectors, e.g. • Siemens IE FC RJ45 PLUG 180 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 180° cable outlet, order number 6GK1901-1BB10-2AA0 or • Siemens IE FC RJ45 PLUG 90 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 90° cable outlet, order number 6GK1901-1BB20-2AA0.

4.3   Removal of the PROFINET communication module

To remove the PROFINET communication module, follow these steps:

Step	Description
	Slide a small screwdriver into the opening of the PROFINET communication module (1). Gently press to the left with the screwdriver (2) and withdraw the PROFINET connecting cable (3). Unscrew the screws on the PROFINET communication module (4) and withdraw the communication module (5).

Configuring/assigning parameters

<div align="right">

5

</div>

5.1 Configuring soft starters

Configuring refers to the configuring and the assigning of parameters of soft starters.

- Configuring: systematic arranging of individual soft starters (configuration).

- Assigning parameters: assigning parameters using the configuring software.
  You can find additional information on parameters in the section "Data formats and data records (Page 75)".

5.1.1 Configuring with a GSD file

General Station Description (GSD)

Refer to the glossary for the definition of the generic station description.

Configuring with a GSD file

You configure the soft starter using the GSD file. The soft starter is integrated into your system as an IO device by means of the GSD file.

You require a GSD file, which you can download from the Internet at:
PROFINET GSD files (http://support.automation.siemens.com/WW/view/de/38702563) >
PROFINET communication module

Following installation of the GSD file, you can find the SIRIUS Soft Starter 3RW44 PN in the HW Catalog of STEP 7 V5 under "HW Catalog > PROFINET IO > Switching Devices > Motor starter > Soft starter -> 3RW44". Insert your device variant into the PROFINET IO system.

You can find additional information on working with GSD files and on parameter assignment of the PROFINET interface in the system manual SIMATIC PROFINET System Description (http://support.automation.siemens.com/WW/view/de/19292127).

5.1.2   Assigning parameters with the "Soft Starter ES 2007" software

The "Soft Starter ES 2007 + SP5" software can be used to assign the SIRIUS 3RW44 soft starter parameters via the device interface (point-to-point connection by means of the RS232 interface cable or USB interface cable).

"Soft Starter ES 2007" is the central software for commissioning, operation, and diagnostics of SIRIUS 3RW44 soft starters.

There are two options for assigning parameters for the PROFINET communication module:

- Stand-alone program on PC or programming device with PROFINET connection (point-to-point)

- Integration with the object manager (OM) in STEP 7
  You can find detailed information about "Soft Starter ES" in the online help for the program.

You can download the "Soft Starter ES 2007" software under Test version (http://support.automation.siemens.com/WW/view/de/28323168). This is a free, 14-day test version.

5.1.3   Diagnostics package

A free diagnostics package is available for the 3RW44 soft starters. It contains HMI diagnostics masks for a touch panel. The diagnostics package is available in German and English. You can download the diagnostics package at (http://support.automation.siemens.com/WW/view/de/28557893).

5.2 Configuring the properties of 3RW44 PN as IO device

Assigning the device name and IP parameters for an IO device

PROFINET IO communication requires setting and configuring the IO device name and the IP parameters.

The device name and the IP parameters can be assigned in different ways:

- Assigning the device name using the configuration tool of the automation system
- Configuring the device name using the "Soft Starter ES 2007" software and transferring it to the device
- Assigning the device name via the display in the 3RW44 basic device

Assigning the device name using the configuration tool of the automation system

The device name is assigned during the commissioning phase by the configuration tool of the automation system (e.g., STEP 7) and transferred to the IO device via Ethernet. For the transfer, the soft starter must be connected and accessible via the Ethernet interface. The device can be accessed via LAN using the MAC address (e.g., 00-0E-8C-BD-1F-27) printed on the front of the communication module.

1. When the user performs the configuration, the device is given a technological name (e.g.: Motor-1). STEP 7 automatically assigns an IP address. This requires that "Assign IP address via IO controller" is activated.

2. The user assigns the device name to an IO device based on the MAC address and transfers the name, for example, with the "Edit Ethernet Node" function".

3. The user downloads the configuration to the IO controller

4. The IO controller assigns the IP parameters based on the device name during startup.

Configuring the device name using the "Soft Starter ES 2007" software and transferring it to the device

In this case, the device name must be configured under "Device parameters > Field bus interface > PROFINET Parameters > Station" and the "Overwrite device name in device" parameter must be activated.

Note

Transferring the device parameters

It is always possible to transfer the device parameters via the local device interface.

If the IP address has already been configured in a different way, the device parameters can be transferred via PROFINET, too.

Note

Changing the device name

Any change of the device name using the "PROFINET Parameters" dialog box of "Soft Starter ES 2007" requires a restart of the communication interface. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Transferring IP parameters

The IP parameters, consisting of IP address, subnet mask, and router can also be assigned in various ways and transferred to the IO device.

Possibilities for this are:

● The IO controller assigns the IP parameters to the IO device.

Note

Deleting IP parameters

IP parameters assigned by the IO controller are not stored retentively in the device, i.e., they are deleted when the supply voltage is switched off.

● The IP parameters are configured with the "Soft Starter ES 2007" software and transferred to the device. In this case, the "Overwrite IP parameters in device" parameter under "PROFINET Parameters > IP-Parameters" must be activated.

Note

Transferring the device parameters

It is always possible to transfer the device parameters via the local device interface.

If the PROFINET IO device name or the IP address has already been configured in a different way, the device parameters can also be transferred via PROFINET.

Note

Assigning the IP parameters

The IP parameters can be transferred to the selected device using the following functions of the "Soft Starter ES 2007" software.

- Select "Target System > Edit Ethernet Node". This function is not identical to the parameter assignment of the IP parameters using the "PROFINET Parameters" dialog box.

- Select "PROFINET Parameters > IP-Parameters". The "Overwrite IP parameters in device" parameter must be activated.

Note

Restarting the communication interface

Any change of the IP parameters using the "PROFINET Parameters" dialog box of "Soft Starter ES 2007" requires a restart of the communication interface.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

- Input of IP address, subnet mask, router address via the display of the 3RW44 (for procedure, see Parameter settings in the soft starter under Fieldbus (Page 36)).

Saving the parameters retentively

In order to save the modified parameters retentively, select "Save settings" in the menu of the 3RW44 soft starter.

Commissioning

6

6.1 Activation of the PROFINET communication module via the display

You can activate the PROFINET communication module ("Fieldbus" device function) via the display on the 3RW44 soft starter.

Note

The PROFINET communication module only works with 3RW44 devices with product version "E12" and firmware version V1.11.0 or higher.

Note

Following activation of the communication module, the default control priority automatically switches from the inputs to "SPS über Feldbus PROFINET" (PLC via PROFINET fieldbus) (automatic mode).
If an input with the "Manual operation local" function is active, the control priority does not change.

6.1.1 Activation of the fieldbus interface

1. During first commissioning of the soft starter, you must run through the Quick Start menu.
2. Press the designated button on the device.
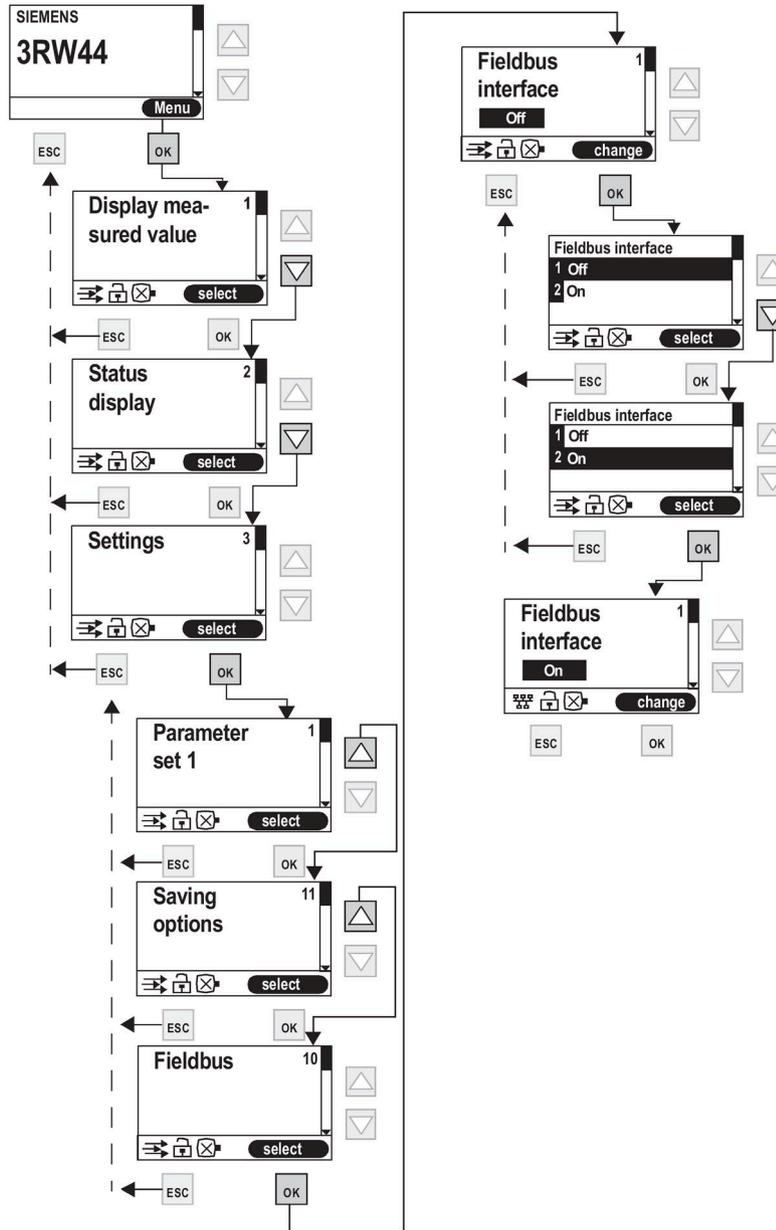
3. The "BUS" LED flashes red.
4. If the fieldbus symbol appears in the display, the PROFINET communication module has been successfully activated.

Note

If the "Parameters disabled CPU/Master" parameter is "Off" (basic factory setting), the parameters set on the soft starter are overwritten with the values stored in the GSD file or OM during bus startup. If this is not desired, the parameter must be set to "On".

6.1.2 Saving settings retentively

In order to save the settings retentively, proceed as follows:
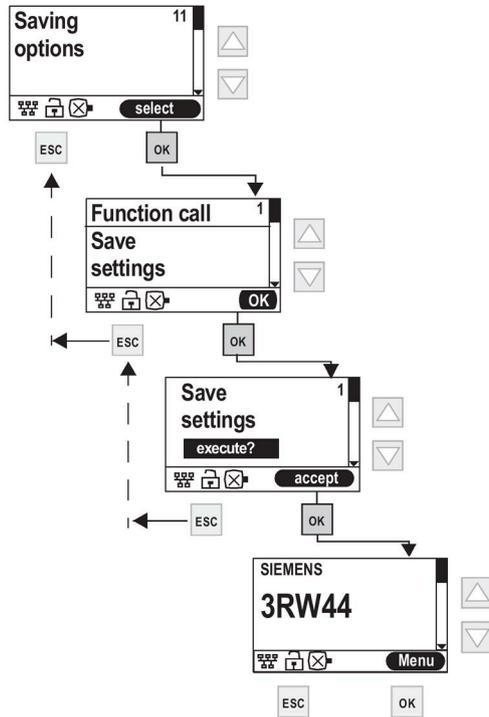
6.2 Activation of the PROFINET communication module via software

You activate the PROFINET communication module ("Fieldbus" device function) using the "Soft Starter ES 2007 + SP5" software.

Note

The PROFINET communication module only works with 3RW44 devices with product version "E12" and firmware version V1.11.0 or higher.

Note

Following activation of the communication module, the default control priority automatically switches from the inputs to "SPS über Feldbus PROFINET" (PLC via PROFINET fieldbus) (automatic mode).
If an input with the "Manual operation local" function is active, the control priority does not change.

To activate the PROFINET communication module, follow these steps:

1. Connect the 3RW44 soft starter via the interface cable to a PC on which the "Soft Starter ES 2007 + SP5" (or higher) software is installed.

2. Start the "Soft Starter ES 2007" software.

3. Select "Switching Device > Open Online" in the menu.

4. Select the "Local device interface" option in the "Open Online" dialog and select the desired COM port under "Interface".

5. Click "OK".

6. Select "Device configuration" on the left side of the window.

7. Make sure that the firmware version of the connected 3RW44 soft starter is V1.11 or higher.

8. Select the "Field bus interface" check box on the right side of the window.
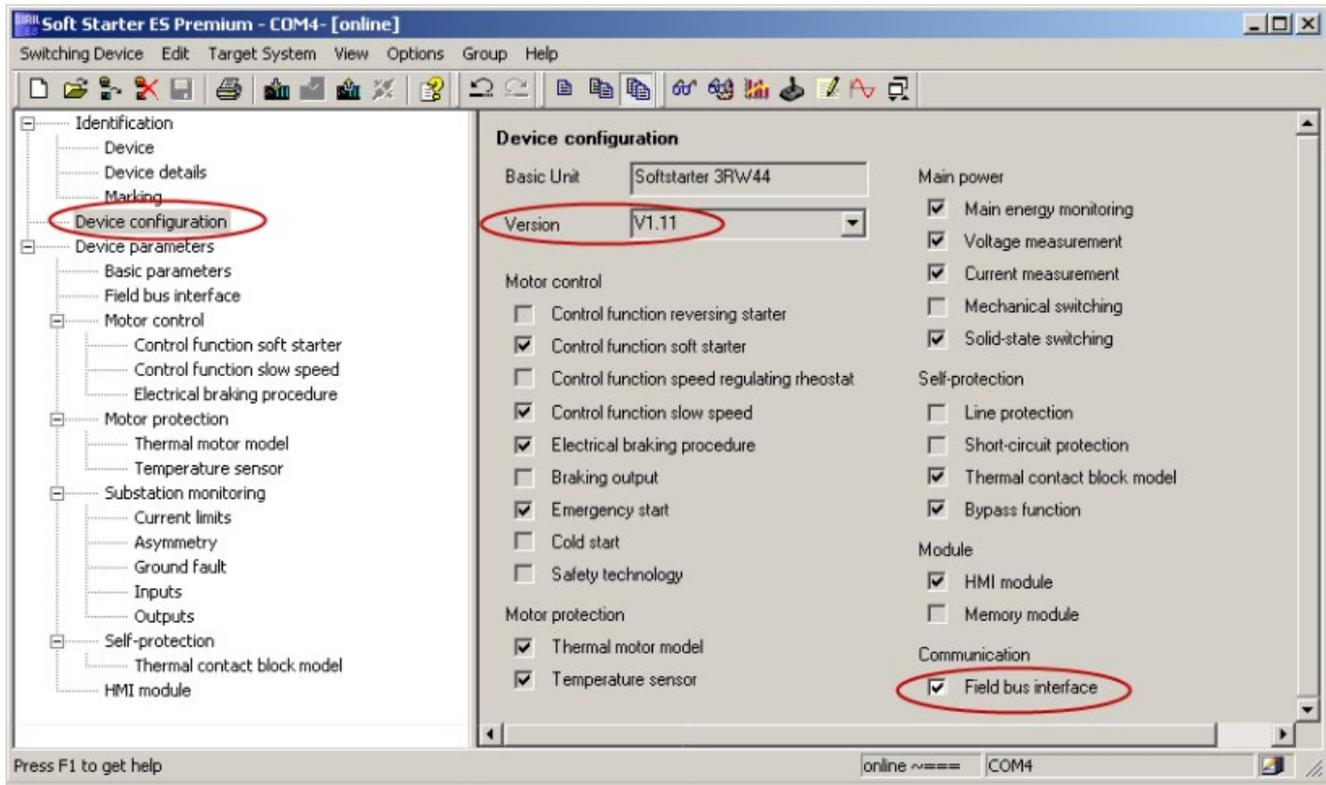
9. Select "Device parameters > Field bus interface" on the left side of the window.

10. On the right side of the window, select "PROFINET IO" as the Interface type.
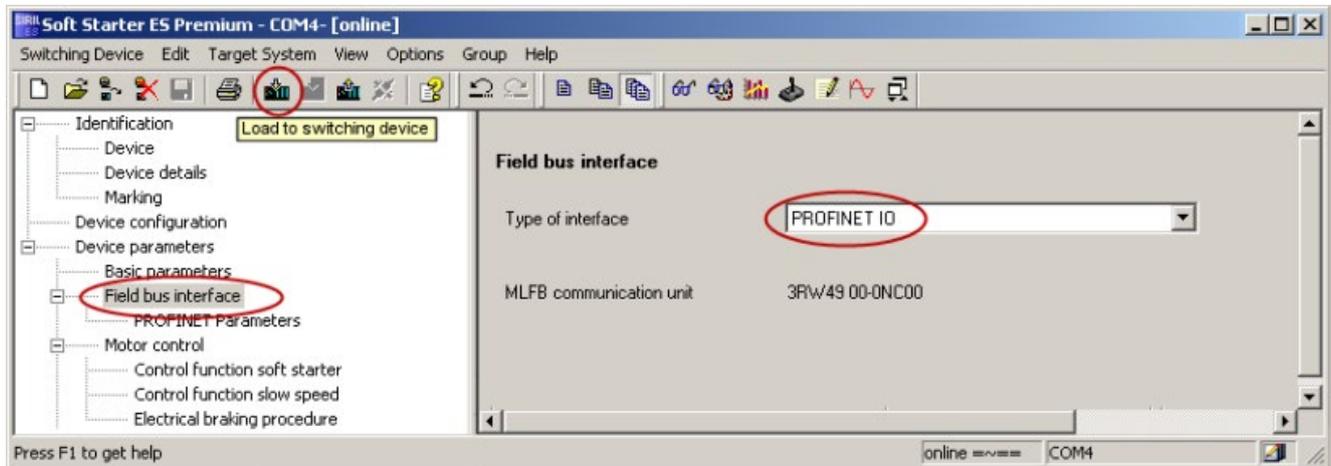
11. You can set the parameters for communication under "Device parameters > Field bus interface > PROFINET Parameters".

12. To transfer the changed parameters to the soft starter, select the "Load to Switching Device" button in the toolbar or select "Target System > Load to Switching Device > All Parameters" in the menu.

13. Acknowledge the changed PROFINET parameters with "OK".

14. Acknowledge the activation of the PROFINET communication module with "OK": The PROFINET communication module is activated.

15. If the BUS LED on the communication module flashes red and the fieldbus symbol 🖧 appears in the display, the communication module has been successfully activated.

6.3   Parameter settings in the soft starter under Fieldbus

Group diagnosis

You can use this parameter to specify whether diagnostics via the fieldbus interface is to be enabled or disabled. If the group diagnostics parameter is set to "Disable", no error messages is output.

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Group diagnosis".

3. Select "Disable" or "Enable".

Behavior on CPU/Master Stop

You use this device parameter to specify how the soft starter is to react in the event of a CPU/master stop:

- Hold last value

- Switch substitute value

Note

This is only relevant in "Automatic" mode.

---

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Behavior on CPU/Master Stop".

3. Select "Substitute value" or "Hold last value".

Device name

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Device name".

3. Press "OK" to assign a device name.

4. You can use the arrow keys to assign letters or digits.

5. Pressing "OK" advances you to the next position in the device name.

6. Press the ESC key to accept the name.

7. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

Note

Restrictions on name assignment

When the device name is entered by way of the menu, only names that conform to the naming convention may be entered. For information on PROFINET naming conventions, see PROFINET conventions (http://support.automation.siemens.com/WW/view/de/36062700). The length of the device name is limited to 20 characters when the name is entered by way of the menu.

IP address

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "IP address".

3. Press "OK" to assign an IP address.

4. You can use the arrow keys to assign digits.

5. Click "OK" to confirm each position of the IP address and to advance to the next position.

6. When you have entered the desired IP address, press the "OK" key again to accept the entered address.

7. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

Subnet mask

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Subnet mask".

3. Press "OK" to assign a name for the subnet mask.

4. You can use the arrow keys to assign digits.

5. Click "OK" to confirm each position and to advance to the next position.

6. When you have entered the desired subnet mask name, press the "OK" key again to accept the entered name.

7. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

Router address

If data must be forwarded via TCP/IP to a partner located outside the soft starter's own network, this takes place via the router.

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Router address".

3. Press "OK" to assign a router address.

4. You can use the arrow keys to assign digits.

5. Click "OK" to confirm each position and to advance to the next position.

6. When you have entered the desired router address, press the "OK" key again to accept the entered name.

7. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

MAC address

Each PROFINET device is assigned a unique device identification at the factory (MAC address).

The MAC address can be read here and serves to uniquely identify the device.

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "MAC address" in order to read it.

Web server

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Web server".

3. Select "On" or "Off".

4. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

User name

A user name is not assigned in the factory state.

You must assign a user name so that a password can be assigned later.

A user name and password is required for the web browser login in order to control the device.

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "User name".

3. Press "OK" to edit the user name.

4. You can use the arrow keys to enter a user name.

5. Click "OK" to confirm each position and to advance to the next position.

6. When you have entered the desired user name, press the "OK" key again to accept the entered name.

Old/new password

A password is not assigned in the factory state.

You must assign a user name in order to assign a password.

A user name and password is required for the web browser login in order to control the device.

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Old/new password".

3. Press "OK" to edit the password.

4. You can use the arrow keys to enter a password.

5. Click "OK" to confirm each position and to advance to the next position.

6. When you have entered the desired password, press the "OK" key again to accept the entered password.

7. For the password change, the old password also has to be entered in order for the new one to be accepted. This step can be skipped if an old password does not exist (e.g., in the factory state or when a password is deleted).
During entry, the password (both the old and new passwords) is displayed in plain text. This allows you to check it before saving.
When the password is entered via the "Soft Starter ES" software, only "*" is displayed. The new password must be entered here twice for confirmation.

OPC UA server

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "OPC UA server".

3. Select "On" or "Off".

4. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

OPC UA server control function

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "OPC UA server control function".

3. Select "On" or "Off".

4. Save the settings (see Saving settings retentively (Page 32)) and restart the device.

NTP time synchronization

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "NTP time synchronization".

3. Select "On" or "Off".

4. Save the settings (see Saving settings retentively (Page 32)).

NTP server IP address

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "NTP server IP address".

3. Press "OK" to assign an IP address.

4. You can use the arrow keys to assign digits.

5. Click "OK" to confirm each position of the IP address and to advance to the next position.

6. When you have entered the desired IP address, press the "OK" key again to accept the entered address.

NTP display offset

The offset of the NTP display is the time difference between the actual local time and the UTC time (UTC = Universal Time Coordinated) in minutes.

This can be used to indicate the actual local time. A value from -1440 min (-1 day) to 1440 min (+1 day) can be entered.

Substitute value

In the event of a bus failure, the outputs of the soft starters are controlled by a corresponding substitute process image.

Parameters disabled CPU/Master

1. Navigate in the menu of the 3RW44 to the "Fieldbus interface > On" menu command (see Activation of the fieldbus interface (Page 30))

2. Use the arrow keys to navigate to "Parameters disabled CPU/Master".

3. Press "OK".

4. Select "On" or "Off".

Note

If the "Parameters disabled CPU/Master" parameter is "Off" (basic factory setting), the parameters set on the soft starter are overwritten with the values stored in the GSD file or OM during bus startup. If this is not desired, the parameter must be set to "On".

---

5. Confirm the selection with the "OK" key.

Functions

7

7.1 PROFIenergy

PROFIenergy, a profile defined by the PROFINET user organization, lays the foundations for a vendor-neutral, universal system for flexible, short-term, and intelligent shutdown of individual consumers or whole production units.

PROFIenergy (PE) supports the following two functions:

- PE_Energy_Saving_Function

  Supports targeted shutdown of consumers during idle times.

- PE_Measured_Value_Function

  The PE_Measured_Value_Function supplies the measured values required for optimizing energy consumption.

Supported commands

The 3RW44 soft starter with PROFINET, together with the PROFIenergy data record index 0x80A0, supports the "PE_Energy_Saving_Function" and the "PE_Measured_Value_Function" for the motor current. These are designated as commands, since they trigger reactions in the soft starter.

In addition, the 3RW44 soft starter with PROFINET supplies additional service commands that provide information about the status of the soft starter, as defined in PROFIenergy. These can then be evaluated and further processed in the user program.

Command	Command ID	Meaning
Start_Pause	0x01	The soft starter switches to energy saving mode.
End_Pause	0x02	The soft starter switches back to the operating mode.
Query_Modes - list_energy_saving_modes - get_mode	0x03	Energy saving mode - Provides a list of supported energy saving modes. - Provides the parameter values that the PE_Energy_Saving_Function works with.
PEM_Status	0x04	Provides the status of the current PE mode.
PE_Identify	0x05	Provides a list of supported PROFIenergy commands/functions.
Query_Measurement - get_measurement_list - get_measurement_values	0x10	Measured values - Provides a list of supported PE_measured values. - Delivers the supported PE_measured values.

7.1.1 Energy saving function command

Command "PE_Energy_Saving_Function"

The 3RW44 soft starter distinguishes between two different data transmission modes:

PE_Mode_ID = 255	Ready to operate
PE_Mode_ID = 01	Energy saving mode

t_{off}	Time_to_Pause	Time the soft starter requires in order to change to energy saving mode. For the 3RW44 soft starter, this time is 200 ms. An assigned ramp-down time is added to this (if available and if the starter was in the ON state):
		t_{off} = 200 ms + ramp-down time
		If the soft starter was already off before the pause, energy saving mode will be switched to after only 200 ms.
t_{off_min}	Time_min_length_of_stay	Minimum time that the device spends or should spend in energy saving mode.
		For 3RW44: 0 ms
t_{on}	Time_to_operate	Time that will elapse before the starter changes back to the operating state. Since the process image is evaluated again immediately when the 3RW44 exits energy saving mode, this time is 0 ms.
t_{Pause_min}	Time_min_Pause	Time that is compared with t_{Pause} (is transferred together with the "Start_Pause" command to the soft starter); if $t_{Pause} \geq t_{Pause\_min}$, the device switches to energy saving mode.

Note

A pending fault is not acknowledged by the switchover to energy saving mode, i.e., the pending fault is saved internally and can be read. When energy saving mode is exited, the fault must be eliminated and acknowledged.

Reaction of the starter when the energy-saving function is activated:

Shutdown of the motor by suppressing (masking) of the PIO bits Motor right, Motor left, Brake. The other PIO bits (e.g., Trip Reset) remain active.

Interactions with the various operating modes

- PE is operative only in Automatic mode.

- Manual mode is not influenced by PE; it is also possible to switch to manual mode and thereby to control the motor manually.

- Both cyclic and acyclic data transmission (PII, data records, diagnostics, interrupts, etc.) to and from the soft starter are still possible.

Requirements for switchover of the starter to energy saving mode

The switchover to the "Pause" energy saving mode only takes effect when the transmitted pause time (t_{Pause}) is greater than the device-specific minimum pause time. This means that a switchover is only performed when the pause is longer than the time required by the soft starter to switch off the main energy for the motor.

An assigned ramp-down time must be added to the device-specific minimum pause time.

Each switchover to energy saving mode is recorded in the "Events" log list.
Entry: "Energy saving mode active"

7.1.2 Measured value function command

Command "PE_Measured_Value_Function"

Measured values for energy need to be supplied for efficient energy management. The PROFIenergy specification offers various measured values from which to choose, each of which is assigned a measured value ID. The 3RW44 supports the measured values "Instantaneous values of the phase current" and "Mean value of the three phase currents".

The measured values are uniquely identified by IDs. Measured value IDs 7, 8, 9, and 33 are supported:

- ID = 7: Instantaneous value of the phase current a (L1)

- ID = 8: Instantaneous value of the phase current b (L2)

- ID = 9: Instantaneous value of the phase current c (L3)

- ID = 33: Mean value of the three phase currents (a+b+c) / 3

The current values are transferred with the following tolerances:

- Accuracy Domain (unsigned8) = 0x01 → percent of full-scale reading

- Accuracy Class (unsigned8) = 0x11 → 3%

- Range (Float32) = I_{e_max} (fixed value parameter)

The result is that the measured values are transferred with an accuracy of 3% relative to the maximum configurable rated operating current I_e.

7.1.3 Function blocks for SIMATIC S7

The application description "Saving Energy with SIMATIC S7 and ET200 S" (http://support.automation.siemens.com/WW/view/en/41986454) is available on the Internet Service Portal of Siemens AG. It also contains an example program for use of the PROFIenergy functions. You can also make use of the blocks from the example to implement PROFIenergy functions in conjunction with the 3RW44 soft starter with PROFINET.

In the section "Functionality FB 815 PE_START_END" of the application description, you can find the description of the block that can be used to directly transfer the "PE_START_Pause" and "PE_END_Pause" commands to an IO device.

You can use the FB 815 "PE_START_END" function block to transfer the "START_Pause" and "END_Pause" commands directly to 3RW44 PN.

For use of other functions, in the section "Functionality FB 816 PE_CMD" you can find a universal function block that you can use to transfer other commands of the PROFIenergy profile (e.g. Query_Modes, PEM_Status, PE_Identify, Query_Measurement).

You can also find the structure of the command and response data of the FB 816 in the section "Response Data" of application description "Saving Energy with SIMATIC S7 and ET200 S."

7.2 OPC UA server

Background information on OPC UA

You can find background information on OPC UA in the application description "Programming an OPC UA .NET Client with C# for the SIMATIC NET OPC UA Server" (http://support.automation.siemens.com/WW/view/de/42014088).

7.2.1 Features of OPC UA

OPC UA offers the following features:

- Use of open and non-platform-specific protocols for network communication.
- Internet access and communication through firewalls.
- Integrated access control and security mechanisms at the protocol and application level.
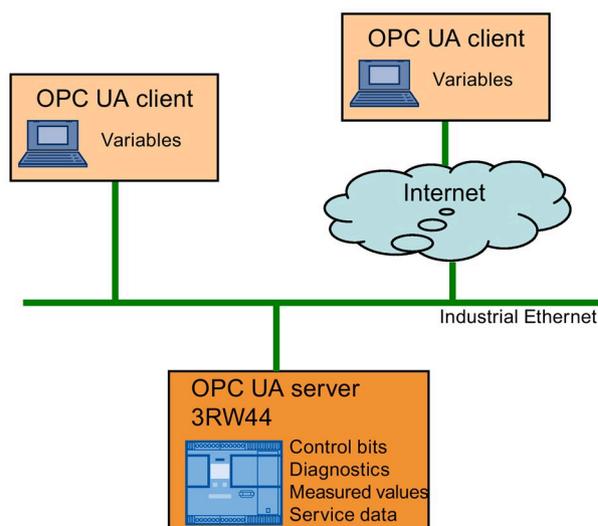
7.2.2 Reading and writing data

Writing data

Writing data means that data are transmitted **to** the soft starter.

Reading data

Reading data means that data are transmitted **from** the soft starter.

7.2.3   Activating the OPC UA server

In the default setting, the OPC UA server and the OPC UA server control function are not active.

Activating the OPC UA server via the display

To activate the OPC UA server via the display of the 3RW44, follow these steps:

1. Select "Settings > Fieldbus > OPC UA server > On" in the menu. Objects can now be read.

2. To enable execution of control functions, select "Einstellungen > Feldbus > OPC-UA-Server Steuerfunktionen > Ein" (Settings > Field bus > OPC UA Server control function > On) in the menu and save the settings (see Parameter settings in the soft starter under Fieldbus (Page 36)).

Note

Restarting the communication interface

Each change to the "OPC UA Server" parameter requires that the communication interface be restarted.

A restart of the communication interface disconnects and then reconnects all Ethernet and PROFINET connections.

Activating the OPC UA server via the"Soft Starter ES 2007" software

The OPC UA server can also be activated via the "Soft Starter ES 2007" software. For safety reasons the software must be connected via the local device interface.

1. Select "Device parameters > Field bus interface > PROFINET Parameters" in the menu.

2. In the "PROFINET Parameters" window, choose "OPC UA Server / OPC UA Server control function".

Note

Activation of the "OPC UA Server" function

You only have access to read-only variables.

Note

Activation of the "OPC UA Server control function" function

The "OPC UA Server" function must be activated. In addition, you have write-access to variables.

Activate this function only if you want to control the 3RW44 via the OPC UA Server. Ensure that the connection between the server and client is protected from unauthorized access. Use security policy "Basic128Rsa15" and message security mode "SignAndEncrypt".

Note

Restarting the communication interface

Each change to the "OPC-UA Server aktivieren" (Activate OPC UA Server) parameter requires a restart of the communication interface.

A restart of the communication interface disconnects and then reconnects all Ethernet and PROFINET connections.

7.2.4 Setting the IP parameters

To enable a connection to be established via OPC UA, the 3RW44 soft starter must have valid IP parameters.

Example of the URL of the OPC UA server in the 3RW44 PROFINET:

opc.tcp://192.168.0.2:4840, where 192.168.0.2 is the IP address of 3RW44.

The IP parameters, consisting of the IP address, Subnet mask, and Router, can be configured with the "Soft Starter ES 2007" software or via the display of 3RW44 and transferred to the device.
You can overwrite the existing IP parameters in the device using the "Soft Starter ES 2007" software if the "Overwrite IP parameters in device" parameter is activated.

7.2.5   Access to the OPC UA server

The OPC UA server integrated in SIRIUS 3RW44 soft starter PROFINET makes available the following structured objects in its address space. The client has read access and, in some cases, write access to these objects.

The following requirements must be met for write access:

● A secured connection with security policy "Basic128Rsa15" and message security mode "SignAndEncrypt" and

● "OPC UA Server control function" check box is selected

The representation of the OPC UA variables depends on the OPC UA client used. Below you can see an example representation of the variable structure:
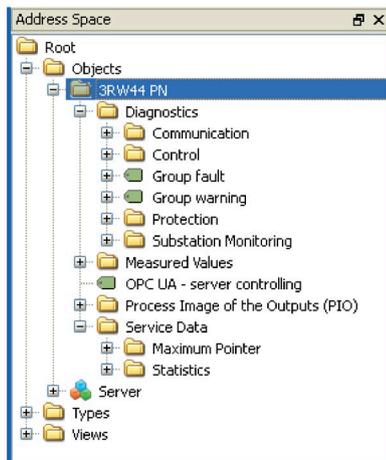
You can find a detailed description of the individual variables in section OPC UA variables (Page 105).

Read/Write

Write accesses in the "Process image of the outputs (PIO)" are limited to one OPC UA client: only the client that sets the "OPC UA - server controlling" tag
(node ID 270) to 1 without error assumes the control priority and thus write access.
If the value of the "OPC UA server controlling" tag is set to 0, the control priority and thus write access is given up.

Write access is only possible via a secure connection. The "OPC UA Server control function" function must be activated for this.

● Variable (Read) - for reading the current state of the process image

● Variable (Write) - for controlling the soft starter using OPC UA variables
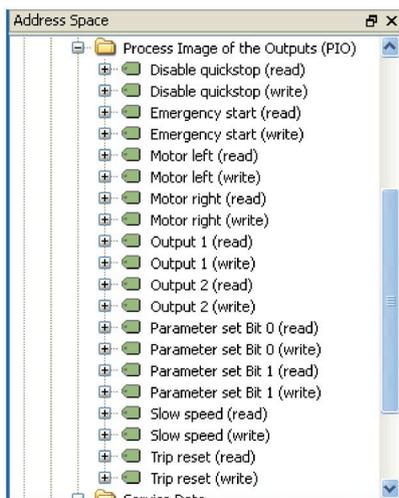
Additional specifications for OPC UA server

Maximum number of clients	2
Maximum number of subscriptions (subscribable variables)	20
Shortest update interval for subscriptions	200 ms

Note

When data are being transferred via OPC UA and a web page is called simultaneously by the web server, the transmission time via OPC UA may be prolonged considerably.

Note

OPC-UA client functionality depends on the manufacturer. The occurrence of connection failures in individual OPC UA clients cannot be excluded.

Simultaneous use of OPC UA servers and web servers is not recommended.

7.2.6 Establishing a connection to the OPC UA server

An OPC UA client can access process values in the hierarchical namespace of the OPC UA server.

To enable this, the OPC UA server and the OPC UA client authorize each other by exchanging certificates. You can additionally encrypt the data traffic.

The OPC UA server classifies every certificate of an OPC UA client as "trustworthy" by default.

Note

Configuring the connection on the client side

You can obtain information directly from the manufacturer of the software that is to access the data of the OPC UA server in the 3RW44 PN via OPC UA.

Supported OPC UA services of the OPC UA server in 3RW44 PN

3RW44 PN supports the following OPC UA services:

- SecurityPolicy:
  - None
  - Basic128Rsa15
- MessageSecurityMode:
  - None
  - Sign&Encrypt.

Explanation of security settings:

The following table shows the security functions supported by the OPC UA server, which have to be set in the connection configuration of the OPC UA client:

Security Policy	MessageSecurityMode
None [1]	None
Basic128Rsa152 [2]	SignAndEncrypt [3]

1) Exchange of certificates is deactivated
2) The data packets are exchanged unsecured between the client and server after the certificate has been verified
3) The data packets are signed and encrypted with the certificates.

> **⚠ WARNING**
>
> **Unsecured connection between the client and the server possible!**
>
> Use the setting "none" for test purposes only.
>
> During productive operation, use at least the following settings for secure communication between the client and server:
> - Security Policy: Basic128Rsa15
> - Message Security Mode: Sign.

Note

Requirement for certificate exchange in 3RW44 PN

The certificate exchange requires the presence of a valid time.

Time synchronization in the device is not required for certificate exchange since the time is already set during production.

Please note the validity period of the certificates and update the time of your PC, if necessary.

The PC time must be within the validity period of the certificate.

7.2.7   Connection monitoring

If the OPC UA connection is disconnected, all OPC UA control variables in the SIRIUS 3RW44 soft starter are deleted. A disconnection is detected after approximately 10 seconds. No fault is triggered in the 3RW44 soft starter.

7.3 Web server

7.3.1 Contents of web pages

Together with the web server, the PROFINET communication module allows you to call up information of the 3RW44 soft starter from a programming device or PC using an HTTP client.

The following web pages are available:

- Identification I&M0 (Slot 0), I&M0...3 (Slot 1)
- Diagnostics
    - Control system
    - Protection
    - Plant monitoring
    - Communication
- Measured values
- Service data
    - Statistics
    - Maximum pointer (cannot be reset)
- Log list (cannot be deleted)
- Control

Note

Number of web server connections:

Up to 5 connections are supported.

7.3.2 Activating the web server

The default setting of the web server is "not active."

Note

Restarting the communication interface

Each change to the configuration of the web server requires that the communication interface be restarted.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Activating the web server via the display

The web server can be activated via the display of the 3RW44 soft starter.

1. Select "Einstellungen > Feldbus > Webserver > Ein" (Settings > Field bus > Web server > On) in the menu.

2. Save the settings (see Parameter settings in the soft starter under Fieldbus (Page 36)) and restart the device. The web pages can now be accessed.

Activating the web server via the "Soft Starter ES 2007" software

The web server can be activated via the "Soft Starter ES 2007" software. For safety reasons the software must be connected via the local device interface.

1. Select "Device parameters > Field bus interface > PROFINET Parameters" in the menu.

2. In the "PROFINET Parameters" window, select the "Webserver" check box.

7.3.3 Setting the IP parameters

3RW44 PN must have valid IP parameters in order for a connection to be established via the web.

The IP parameters, consisting of the IP address, Subnet mask, and Router, can be configured using the display of 3RW44 or with the "Soft Starter ES 2007" software and transferred to the device.

Setting the IP parameters via the display

To set the IP parameters via the display of 3RW44, select "Einstellungen > Feldbus > IP-Adresse / Subnetzmaske / Router Adresse" (Settings > Field bus > IP address / Subnet mask / Router address" (see Parameter settings in the soft starter under Fieldbus (Page 36)).

Setting the IP parameters via the software

To set the IP parameters via the "Soft Starter ES 2007" software, select "Device parameters > Field bus interface > PROFINET Parameters".

You can overwrite the existing IP parameters in the device using the "Soft Starter ES 2007" software if the "Overwrite IP parameters in device" parameter is activated.

Note

Retaining the IP address of the web server

In order to retain the same IP address of the web server, we recommend that you not use IO controller to assign the IP address.

7.3.4   Access to the web server

For access to web pages in the 3RW44 PN, you need a web browser.

Web browser

The following web browsers are suitable for communication with 3RW44:

● Internet Explorer (recommended version as from 8.0)

● Firefox (recommended version as from 3.6)

Settings of the web browser for access to the information

Check the following settings, which are a precondition for access to the information made available via the web:

● To load diagnostics data, JavaScript must be activated in the web browser.

● The web browser must support frames.

● Cookies must be permitted.

● The web browser should be configured in such a way that whenever it accesses a page, it automatically downloads the current data from the server.

If you are using a firewall in your programming device or PC, the following port must be enabled for use of the web diagnostics. "http Port 80/TCP" or, in the case of secure connections, "https Port 443/TCP."

7.3.5   Establishing a connection to the web server

Logon to the web server

You can only use functions for controlling the soft starter after you have logged on to the web server with user name and password. Only then are the buttons with a controlling function active.

Note

Control via the web server

If the soft starter is being controlled via the web server, it is in "Manual bus - PC controlled" mode.

The log-on dialog box is only available via a secure https connection.

Logon

If the functions for controlling the soft starter are to be used as well, you must log on with user name and password. You log on in the menu of the 3RW44 under: "Settings > Fieldbus > User name / Password" (see also section Parameter settings in the soft starter under Fieldbus (Page 36)), or via the "Soft Starter ES" software.

Certificates:

Certificates are mutually exchanged in order for the web browser to access the web server via an https connection. On each change of the 3RW44 PN IP address, a unique certificate with a validity of five years is created for this purpose.

You can also install a CA certificate with a validity up to 2037 via the integrated web server as follows:

1. Click the "Download certificate" link in the header of the "Intro" start page.

2. Open or install the CA certificate.

Note

Installation of the 3RW44 CA certificate

You only have to install the 3RW44 CA certificate once for the web client in question and it then applies to all 3RW44 PN devices.

If you do not install the CA certificate, the web browser signals a certificate error when the connection is established to 3RW44 PN.

Note

The connection between the web server and web client is monitored. If an interruption lasts at least 10 s, the soft starter signals "Connection abort".

7.4 Time synchronization

Time-of-day synchronization by the NTP procedure

3RW44 PN has a non-battery-backed real-time clock that can be synchronized using NTP.

Network Time Protocol (NTP) is the implementation of a TCP/IP protocol for time synchronization in networks. The NTP procedure uses hierarchical time synchronization, that is, an external clock (e.g. SICLOCK TM or a PC in the network) is used for synchronization.

The device transmits time-of-day queries to the configured NTP server at configured time intervals. Based on the responses of the server, the time of day of the non-battery-backed clock in the 3RW44 is synchronized. This ensures that a synchronized time of day is available shortly before the supply voltage is switched on.

In the default setting, the time synchronization is not active.

Activation of time synchronization via the display

You can specify the time synchronization via the display of 3RW44.

Select "Settings > Fieldbus > NTP time synchronization".

Activation of time synchronization via the software

To activate the time synchronization using the "Soft Starter ES 2007" software, select "Device parameters > Field bus interface > PROFINET Parameters > Activate NTP synchronization".

In addition, the following settings are made (these settings can only be made using the "Soft Starter ES 2007" software):

● Cyclic update interval: Time interval in seconds at which synchronization of the time of day with the NTP server is performed. The default value is 10 seconds.

● Time shift: Time difference in minutes between UTC time (UTC = Universal Time Coordinated) and the time in the device.

Examples:

- Time slice of CET (Central European Time): +60 min

- Time shift for CST (Central Standard Time, North America): -360 min.

If an NTP server address has not been configured or a server was not found in the network, you can also set the time of day online with the help of the "Soft Starter ES 2007" software. To do this, proceed as follows:

Select the "Set time (= PC time)" command in the "Target System > Control > Additional commands" dialog.

Note

Command execution

Commands are executed immediately.

If a valid time of day is available (either synchronized using NTP or set using the "Soft Starter ES 2007" software), the entries in the error buffer/error log is additionally displayed with the time of day.

7.5 SNMP

Simple Network Management Protocol (SNMP)

SNMP is a network protocol for monitoring and controlling network elements (e.g. switches).

3RW44 PN supports the SNMP Ethernet service. MIB-2 (RFC1213) is supported.

7.6   Diagnostic functions

7.6.1   Diagnostics of the communication module via LED display

LED	LED display	Description	Measures in cases of error / error causes
BUS	Green	Device performing data exchange	
	Yellow	Device is not initialized and bus error	Send in the basic unit
	Yellow blinking	Communication module is inserted but not activated	For activation of the communication module, see section Commissioning (Page 29)
	Yellow flickering	Firmware update is running/not yet complete	Restart after aborted FW update
	Yellow/green blinking	Device is not initialized and parameter assignment error	Send in the basic unit
	Red	Bus error	Check the fieldbus interface
	Red blinking	Parameter assignment error, configuration error	Incorrect or invalid parameters received
	Red flickering	Basic factory settings are being restored	
	Off	• Bus is not connected or bus error	• Connect the bus or check the bus parameters • Check the installation of the communication module
		• CPU is in Stop	• Set CPU to RUN
PORT 1 / PORT 2	Green	Physical Ethernet connection is present	
	Green blinking	Blink test has been activated (e.g., via STEP 7)	
	Off	There is no Ethernet connection between the PROFINET interface of your PROFINET device and a communication partner (e.g., IO controller)	• Establish an Ethernet connection • The 3RW44 you are using is not PROFINET-capable

7.6.2 Diagnostics with STEP 7

Additional information regarding the data records for PROFINET IO

The structure of the diagnostic data records and examples for programming can be found in the From PROFIBUS DP to PROFINET IO programming manual. (http://support.automation.siemens.com/WW/view/en/19289930)

Options for reading diagnostics data

Automation system with I/O controller	Blocks or registers in STEP 7	Application	Reference
SIMATIC S7	e.g. in HW Config by selecting "Station" > "Open online"	Device diagnostics in form of plain text at the STEP 7 interface (in the "Quick View", "Diagnostics View", or "Module Status" windows)	"Hardware diagnostics" in the STEP 7 Online Help
	SFB 52 "RDREC"	Reading data sets from the I/O device	SFB, refer to the STEP 7 Online Help (System functions/Function blocks)
	SFB 54 "RALRM"	Receiving interrupts from the I/O device	SFB, refer to the STEP 7 Online Help (System functions/Function blocks)

7.6.2.1 Evaluation of interrupts with PROFINET IO

Triggering of interrupts

The I/O device generates interrupts as a reaction to specific error events. Interrupts are evaluated depending on the I/O controller used.

Evaluating interrupts using an IO controller

The 3RW44 soft starter with PROFINET communication module supports diagnostic interrupts.

An interrupt automatically initiates execution of the interrupt OBs in the CPU of the I/O controller (see the *System Software for S7-300/S7-400 Programming Manual*, chapter "Program design".

Information on the cause and class of the error is already available based on the OB number and start information.

You can obtain detailed information on the error event in the error OB by calling SFB 54 RALRM (read supplementary interrupt information).

Triggering of a diagnostics interrupt

When an incoming or outgoing event (e.g., a wire break) is registered, the module triggers a diagnostics interrupt Diagnostics interrupt" is set.

The CPU interrupts the user program and executes the diagnostics block OB 82. The interrupt triggering event will be logged in the start information of OB 82.

7.6.2.2 Error types

The diagnostics alarm is signaled on channel 0.

Error no.	Error type	Meaning / cause	Delete alarm bit / acknowledgement
F1	00001: Short-circuit	• Short-circuit of the temperature sensor	Alarm bit is automatically deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
F4	00100: Overload	• Overload of the temperature sensor • Overload of the thermal motor model	Alarm bit is updated continually.
F5	00101: Overtemperature	• Overload of the contact block	Alarm bit is automatically deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
F6	00110: Wire break	• Wire break of the temperature sensor	Alarm bit is updated continually.
F7	00111: High limit exceeded	• Current limit exceeded	
F8	01000: Low limit exceeded	• Current limit undershot	
F9	01001: Error	• Internal error/device error • Contact block defective	Alarm bit can be deleted when the cause of the error has been eliminated by • Switching the supply voltage On and Off • "Restart" command if possible
F16	10000: Parameter assignment error	• Incorrect parameter value	Alarm bit is always deleted when acknowledged with "Trip Reset".
F17	10001: No sensor or load voltage	• Electronics supply voltage too low • No contact block supply voltage • No main power	Alarm bit is deleted when the cause of tripping has been eliminated or automatically acknowledged.
F24	11000: Actuator tripping	• Tripping due to overload • Tripping due to zero current • Tripping due to asymmetry • Tripping due to ground fault	Alarm bit is always deleted when acknowledged with "Trip Reset". Additional acknowledgment in combination with another error.
F26	11010: External error	• Sensor supply overload • Process image error	Alarm bit is always deleted when acknowledged with "Trip Reset".

7.6.3 Diagnostics and alarms

① Warning

② Error without restart

③ Error with restart

Alarm	①	②	③	Cause / Solution
Manual bus connection abort	x			The connection to the PC was interrupted (in the case of the controller via the "Soft Starter ES 2007" software, web client, or OPC UA client). **Remedy:** Connect the PC and reassume the control priority.
No external start parameters received		x		Occurs only during operation with the PROFINET communication module or PROFIBUS DP communication module. Incorrect or impermissible parameter values have been sent by the PLC. **Remedy:** The "Soft Starter ES 2007" software can be used to read out the incorrect parameter and to change it to a permissible value in the PLC.
PIO error			x	PIO error (faulty process image of the outputs) appears in the following cases: • If "Motor right" and "Motor left" have been selected simultaneously (cause 1) or • If Bit 0 and Bit 1 have been set simultaneously via the PLC parameter set **Remedy:** • Automatically reset if "Motor right" and "Motor left" are deactivated again (in response to cause 1) or • If a valid parameter set (PS 1 - 3) is set again (in response to cause 2).

Note

For additional warnings, group errors, and device errors for the 3RW44 basic device, see 3RW44 Soft Starters Manual (http://support.automation.siemens.com/WW/view/de/21772518).

7.7　　　Firmware update of the PROFINET communication module

Note

If a PROFINET communication module is inserted into a basic device with FW Version
V1.10.5 and the fieldbus interface is activated, a FW update to V1.11.0 is performed
automatically.

After adding (compatible) functions or upgrading performance, you should update the
firmware of the 3RW44 soft starter and the PROFINET communication module to the latest
version.

You can obtain the most recent firmware versions from your Siemens representative, or
download them from the Internet. (https://support.industry.siemens.com/My/ww/en/requests)

Note

If the new firmware cause any problems, you can restore the previous firmware to the
communication module. You can also download this from the Internet.

Requirements

- Prior to the update note down the current version of your firmware. You can read the
  version number in HW Config.
- Online FW updates can be performed in STEP 7 V5.4 + SP5 or higher.
- The communication module whose firmware is to be updated must be accessible online.
- The files ("*.UPD") containing the current firmware version must be available in the file
  system on your PG/PC. A folder may contain only the files of one firmware version.

Note

Do not disconnect the communication module from the basic device

You should never disconnect the PROFINET communication module from the basic device
during the firmware update. The voltage supply to the device must not be interrupted. If the
update is interrupted, it must be restarted.

Performing a firmware update

1. Start STEP 7 (SIMATIC Manager).

2. Select the "PLC" > "Display Accessible Nodes" menu command.

3. Select the soft starter you wish to update.

4. Select the "PLC > Update Firmware" menu command.

5. In the "Update Firmware" dialog, select the path to the firmware update files (*.UPD) using the "Browse" button.

6. After you have selected a file, information on the module and minimum firmware version for which the file is suitable appears in the lower part of the "Update Firmware" dialog.

7. Click the "Run" button. STEP 7 checks whether the selected file is accepted by the communication module and, if the result is positive, then downloads the file to the communication module. If this requires changing the operating state of the communication module, you will be asked to perform these tasks in the relevant dialog boxes. The communication module then automatically updates the firmware. This process takes approximately 20 minutes.

8. Once the firmware of the communication module has performed the update, the communication module needs to be restarted. This activates the previously transferred firmware.

9. A firmware of the 3RW44 basic device is then performed automatically in the background. During this time, the "BUS" LED flickers red for approximately 20 s (old FW is being deleted) and then yellow (new FW is being written). This process takes approximately 3 minutes.

10. Following an automatic restart of the device, the firmware update is complete.

11. You can read the current firmware version via the module status of the communication module.

12. The firmware version of the basic device can be read from the device display: Status display > Firmware information

You have updated your PROFINET communication module and the 3RW44 basic device online with a new firmware version.

Note

When configuring via the object manager (OM), you can also perform the firmware update with HW Config using "PLC" > "Update Firmware".

For additional information, refer to the STEP 7 Online Help.

7.8 Factory settings

The factory settings can be restored as follows:

PROFINET (STEP 7)

1. Select "PLC > Edit Ethernet Node".

2. In the "Edit Ethernet Node" dialog, select the "Zurücksetzen" (Reset) button under "Rücksetzen der Werkseinstellungen" (Reset to factory settings).

Data record 93 "Write commands"

For additional information on data record 93, see Data record 93 - Write commands (Page 94).

Display on 3RW44 soft starter

Select "Settings > Saving options > Restore factory settings > Yes" in the menu.

The following settings are reset depending on the procedure used:

	PROFINET (STEP 7)	Data record 93 "Write commands"	Display on 3RW44 soft starter
Delete communication parameters (e.g., device name, IP address, subnet mask, router)	✓	—	✓
Delete I&M 1 - I&M 3 (e.g., installation date, installation location, plant identifier)	✓	—	✓
Deactivate fieldbus interface	—	—	✓
Reset technology parameters	—	✓	✓
Delete user name and password for web server	—	—	✓

Technical specifications

<div align="right" style="font-size:2em">8</div>

8.1   Conditions for storage and operation

Technical specifications	
Permissible ambient temperature for	
- Storage	-25 °C ... +80 °C
- Operation	0 °C ... +60 °C
Permissible relative humidity	10 ... 95 %
Permissible maximum installation altitude	5000 m
Atmospheric pressure	700 ... 1060 hPa

8.2   Standards and approvals

Standards

The following standards apply to the PROFINET communication module:

- DIN EN 60947-4-2:2007
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

Approvals

The following approvals apply to the PROFINET communication module:

- CCC
- GOST
- UL
- CSA
- EMC
- C-Tick

Dimension drawings

9

9.1 PROFINET communication module
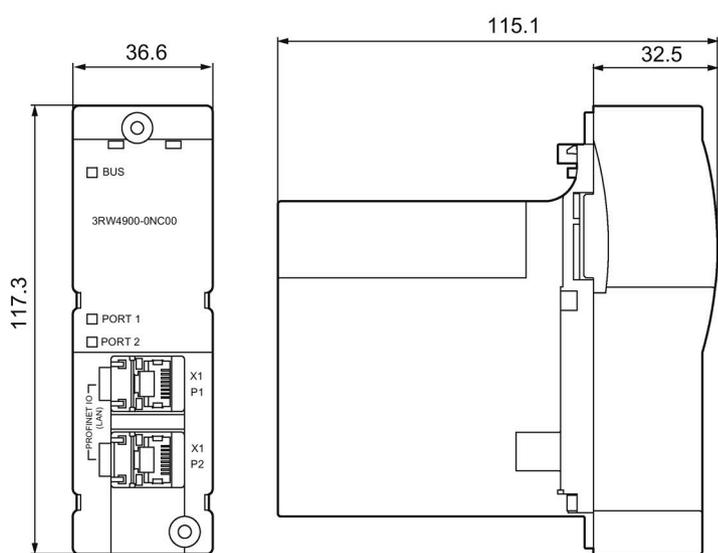
Figure 9-1   Communication Module 3RW4900-0NC00

9.2 PROFINET communication module with connectors
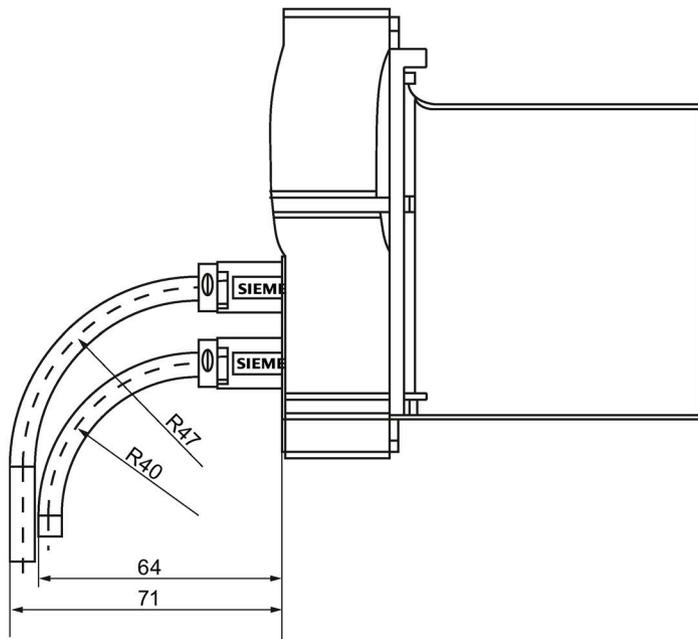
Figure 9-2   PROFINET communication module in installed/connected state with straight connectors
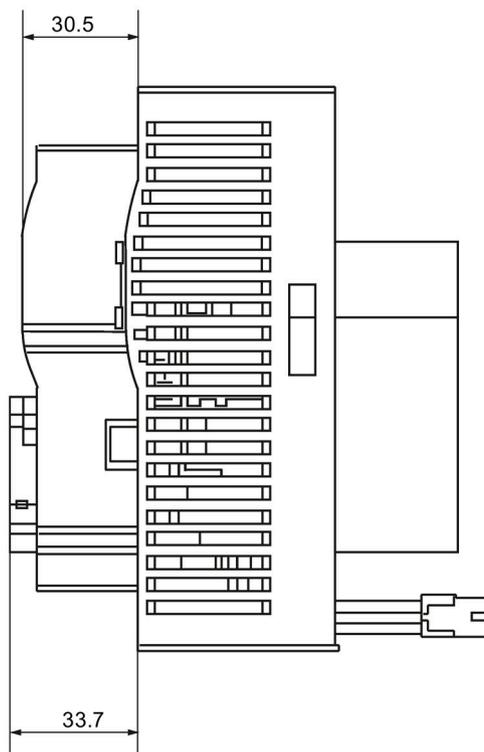
Figure 9-3   PROFINET communication module in installed/connected state with angled connectors

Circuit diagram example

10
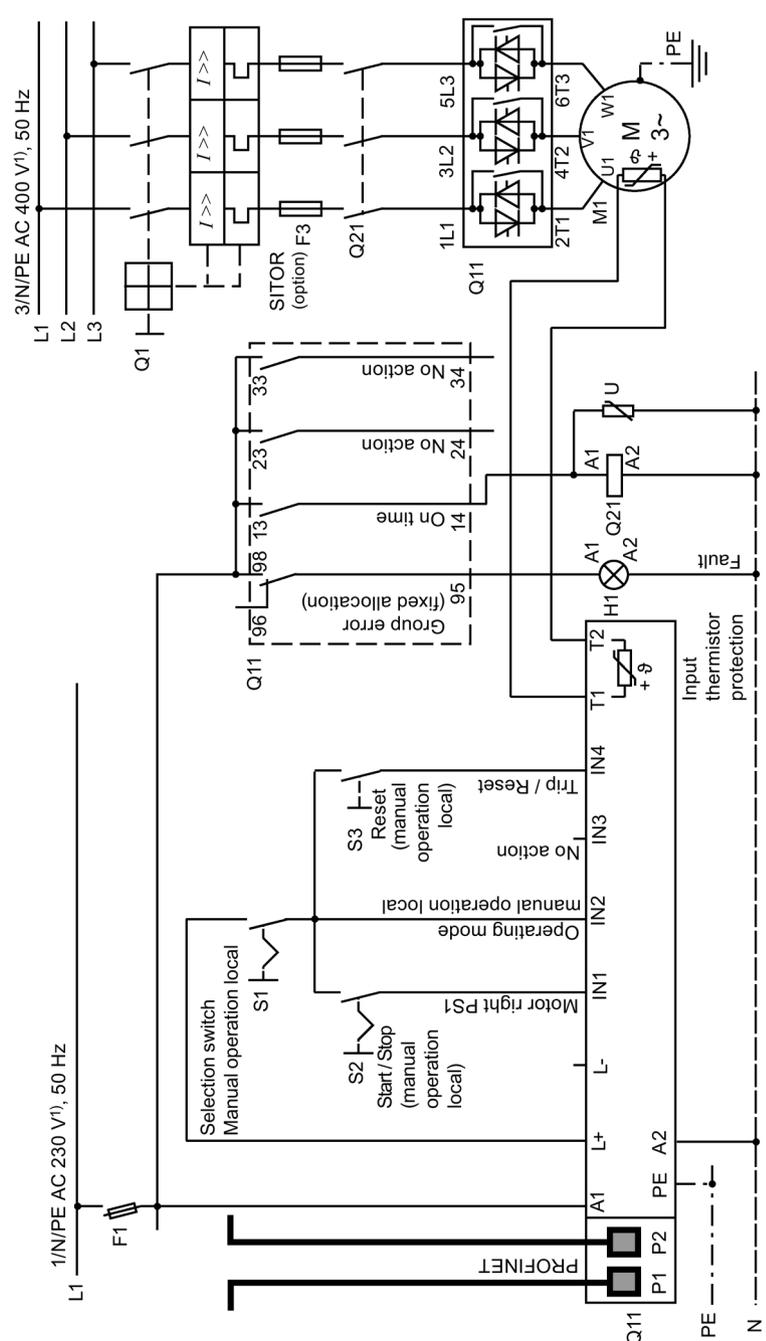
Figure 10-1   Control via PROFINET with switchover to manual operation local mode (e.g., at the control cabinet)

Appendix A

A.1 Data formats and data records

A.1.1 Process data and process images

Process image

The process image is a component of the system memory of the CPU. At the start of the cyclic program, the signal states of the inputs are transferred to the process image of the inputs. At the end of the cyclic program, the process image of the outputs is transferred to the IO device as a signal state.

For soft starters with PROFINET, the following process image is available:

- Process image with 2 bytes outputs / 2 bytes inputs (16 O/16 I)

The following table contains the the process data and process images:

		Process data	Process image: (16 O, DO 0.0 to DO 1.7) (16 I, DI 0.0 to DI 1.7)
Outputs			
		DO 0.0	Motor right
		DO 0.1	Motor left
		DO 0.2	Not assigned
		DO 0.3	Trip Reset
		DO 0.4	Emergency start
		DO 0.5	Not assigned
		DO 0.6	Slow speed
		DO 0.7	Not assigned
		DO 1.0	Output 1
		DO 1.1	Output 2
		⇐ DO 1.2	Parameter set bit 0
		⇐ DO 1.3	Parameter set bit 1
		DO 1.4	Not assigned
		DO 1.5	Not assigned
		DO 1.6	Not assigned
		DO 1.7	Lock quickstop

Parameter set 1	Parameter set 2	Parameter set 3	Process image error
PS1	PS2	PS3	
0	1	0	1
0	0	1	1

	Process data	Process image: (16 O, DO 0.0 to DO 1.7) (16 I, DI 0.0 to DI 1.7)
Inputs		
	DI 0.0	Ready (automatic)
	DI 0.1	Motor On
	DI 0.2	Group error
	DI 0.3	Group warning
	DI 0.4	Input 1
	DI 0.5	Input 2
	DI 0.6	Input 3
	DI 0.7	Input 4
	DI 1.0	Motor current $I_{act-bit0}$
	DI 1.1	Motor current $I_{act-bit1}$
	DI 1.2	Motor current $I_{act-bit2}$
	DI 1.3	Motor current $I_{act-bit3}$
	DI 1.4	Motor current $I_{act-bit4}$
	DI 1.5	Operating mode manual - local
	DI 1.6	Ramp mode

The soft starter evaluates a large amount of operating, diagnostic, and statistical data.

Control data

Data that are transferred to the soft starter, e.g., switching command Motor left, Trip Reset, etc.

Data format: Bit

Alarms

Data that are transferred from the soft starter and that indicate the current operating status, e.g., Motor left, etc.

Data format: Bit

Diagnostics

Data that are transferred from the soft starter and that indicate the current operating status, e.g., Overload fault, etc.

Data format: Bit

Current formats

Current values are coded in different current formats, namely in

6-bit current format,

8-bit current format, and

9-bit current format:
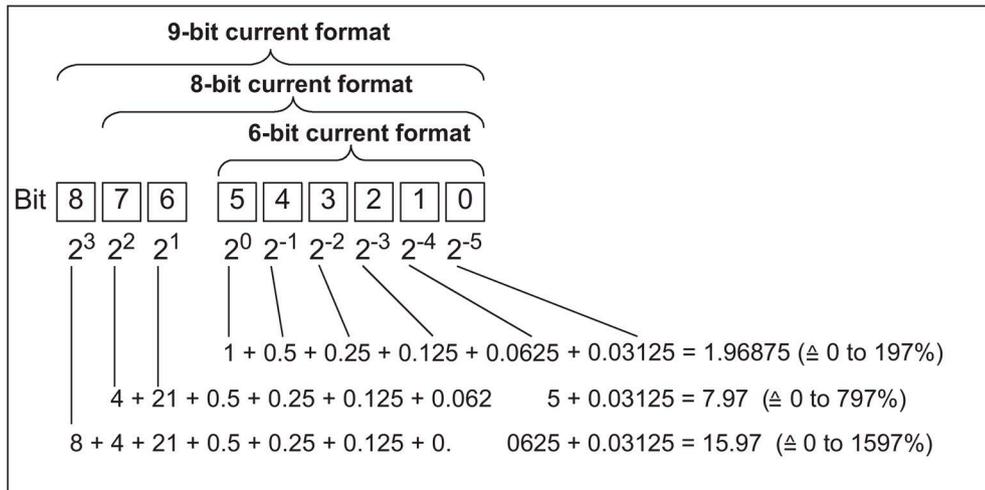
Current values are

- Motor current I_{max} (6-bit current format)

- Phase currents I_{L1max}, I_{L2max}, I_{L3max} (8-bit current format)

- Last trigger current (9-bit current format)

- Maximum tripping current (9-bit current format)

Statistics data for device service life

- Operating hours
  The soft starter records 2 operating hour values:

  – The operating hours of the motor.
    This indicates how long the motor was switched on.

  – The operating hours of the device (soft starter).
    This indicates how long the 115 V AC or 230 V AC voltage supply of the soft starter was switched on.
    Both operating hour values are recorded in data record 95 - "Read statistics". They are entered in the "Operating hours" data field at 1-second intervals.
    The operating hours are recorded in the range from 0 to 2^{32} seconds in 1-second increments.

- Number of overload trips
  The soft starter counts the number of overload trips in the range 0 to 65535.

- Number of starts motor right/left
  The soft starter counts the number of starts in the range 0 to 2^{32}
  Example: If current flows in the main circuit after the "Motor On" command, the value is incremented by 1.

- Number of starts output 1 to 4

- Motor current $I_{max.}$
  The soft starter measures the current in all 3 phases and displays the current of the highest loaded phase as a percentage [%] of the set current I_e.
  Data format: 1 byte, 8-bit current format
  Example: Set current I_e = 60 A
  Indicated motor current 110 %
  then corresponds to 60 A x 1.1 = 66 A
  All 3 phase currents are available in data record 94

- Last trigger current
  The soft starter measures the current in all 3 phases and displays the current that is flowing in the highest loaded phase when tripping occurs as a percentage [%] of the set current I_e and in amperes [A]
  Data format: 2 bytes, 9-bit current format
  Example: Set current I_e = 60 A
  Indicated motor current 455 % then corresponds to 60 A x 4.55 = 273 A

Statistical data for maximum pointers

Maximum pointers are used for preventive diagnostics:

- The maximum measured value is stored in the device.

- The higher-level PLC can retrieve the measured value at any time.

- The higher-level PLC can reset the measured value at any time.

The following data are available as a maximum pointer:

- Number of overload trips.

- Phase current I_{L1max} to I_{L3max} and I_{L1min} to I_{L3min}. Maximum and minimum phase current as a percentage [%] of set current I_e and in amperes [A]
  Data format: 1 byte each, 8-bit current format.
  Both the measured maximum and minimum phase current in bypass operation are stored per phase.

- Minimum and maximum phase-to-phase voltages U_{Lx} - U_{Ly} as RMS values in 0.1 V.
  Minimum and maximum line frequency in 0.5 Hz resolution.

Reading/writing of data records with STEP 7

You can access the data records of the soft starter from the user program.

- Writing data records:
  By calling SFB 53 "WR_REC"

- Reading data records:
  By calling SFB 52 "RD_REC"

Additional information

You can find additional information about the SFBs in:

- Reference manual
  "System Software for S7-300/400, System and Standard Functions"

- STEP 7 online help

Byte arrangements

When data longer than one byte is stored, the bytes are arranged as follows ("big endian"):

Byte arrangement			Data type
	High Byte	High Word	Double Word
Byte 1	Low Byte		
Byte 2	High Byte	Low Word	
Byte 3	Low Byte		
Byte 0	High Byte		Word
Byte 1	Low Byte		
Byte 0	Byte 0		Byte
Byte 1	Byte 1		

A.1.2 Data record 68 - Read/write process image of the outputs (PIO)

Note

Note that data record 68 is overwritten by the cyclic process image in automatic mode!

Byte	Meaning
	Header
0	Coordination (access via:) 0x20 Acyclic bus channel - Startup data record 0x30 Acyclic bus channel - ES tool ("Soft Starter ES" software) 0x40 Local device interface - ES tool ("Soft Starter ES" software)
1 - 3	Reserved = 0
	Process image of the outputs
4	Process data DO 0.0 to DO 0.7, table below
5	Process data DO 1.0 to DO 1.7, table below
6	Reserved = 0
7	Reserved = 0

Process data	Process image (16 O (outputs), DO 0.0 to DO 1.7)
DO 0.0	Motor right
DO 0.1	Motor left
DO 0.2	Not assigned (brake)
DO 0.3	Trip Reset
DO 0.4	Emergency start
DO 0.5	Not assigned (self-test)
DO 0.6	Slow speed
DO 0.7	Not assigned
DO 1.0	Output 1
DO 1.1	Output 2
DO 1.2	Parameter set bit 0
DO 1.3	Parameter set bit 1
DO 1.4	Not assigned
DO 1.5	Not assigned
DO 1.6	Not assigned
DO 1.7	Lock quickstop

> **Note**
>
> In "Automatic mode", the PLC provides the process image of the outputs. In this case, when data record 68 is read at the local device interface, the process image of the outputs is returned as it was transferred from the PLC.

A.1.3   Data record 69 - Process image of the inputs (PII)

Byte	Meaning
	Process image of the inputs
0	Process data DI 0.0 to DI 0.7, table below
1	Process data DI 1.0 to DI 1.7, table below
2	Reserved = 0
3	Reserved = 0

Process data	Process image: (16 I (inputs), DI 0.0 to DI 1.7)
DI 0.0	Ready (automatic)
DI 0.1	Motor On
DI 0.2	Group error
DI 0.3	Group warning
DI 0.4	Input 1
DI 0.5	Input 2
DI 0.6	Input 3
DI 0.7	Input 4
DI 1.0	Motor current $I_{act-bit0}$
DI 1.1	Motor current $I_{act-bit1}$
DI 1.2	Motor current $I_{act-bit2}$
DI 1.3	Motor current $I_{act-bit3}$
DI 1.4	Motor current $I_{act-bit4}$
DI 1.5	Motor current $I_{act-bit5}$
DI 1.6	Manual operation local mode
DI 1.7	Ramp mode

A.1.4   Data record 72 - Log list - Read device error

Byte	Meaning	Value range	Increment	Comment
0 ... 3	Operating hours device	$0 \dots 2^{32}$ s	1 second	Entry 1 = oldest entry
4 ... 5	Object number device error	$0 \dots \pm 32767$	1	
6 ... 9	Operating hours device	$0 \dots 2^{32}$ s	1 second	Entry 2 = second oldest entry
10 ... 11	Object number device error	$0 \dots \pm 32767$	1	
etc.				
120 ... 123	Operating hours device	$0 \dots 2^{32}$ s	1 second	Entry 21 = last, newest entry
124 ... 125	Object number device error	$0 \dots \pm 32767$	1	

This data record can accommodate 21 entries. When all locations have been written, the first entry is overwritten again.

Note

The newest entry is entered at the end of the data record. The remaining entries are moved up one entry.

The following alarms can be entered:

Object No.	Device error alarms
452	Heat sink thermistor defective
1466	Switching element 1 failed
1467	Switching element 2 failed
1468	Switching element 3 failed
1417	Bypass element defective

A.1.5 Data record 73 - Log list - Read trips

Byte	Meaning	Value range	Increment	Comment
0 ... 3	Operating hours device	0 ... 2^{32} s	1 second	Entry 1 = oldest entry
4 ... 5	Object number trips	0 ... ± 32767	1	
6 ... 9	Operating hours device	0 ... 2^{32} s	1 second	Entry 2 = second oldest entry
10 ... 11	Object number trips	0 ... ± 32767	1	
etc.				
120 ... 123	Operating hours device	0 ... 2^{32} s	1 second	Entry 21 = last, newest entry
124 ... 125	Object number trips	0 ... ± 32767	1	

This data record can accommodate 21 entries. When all locations have been written, the first entry is overwritten again.

Note

The newest entry is entered at the end of the data record. The remaining entries are moved up one entry.

The following alarms can be entered:

Object No.	Trips alarms
309	Contact block overload
317	Electronics supply voltage too low
319	No main power
324	Temperature sensor overload
325	Temperature sensor wire break
326	Temperature sensor short-circuit
327	Thermal motor model overload
334	Current limit exceeded
335	Current limit undershot
339	Motor stalled - switched off
341	Asymmetry tripping
343	Ground fault tripping
355	Process image error
365	Incorrect parameter value
(Obj. No.)	Object number of incorrect parameter
1407	Electronics supply voltage too high
1408	No load

Object No.	Trips alarms
1409	Loss of phase L1
1410	Loss of phase L2
1411	Loss of phase L3
1421	Impermissible I_e/CLASS setting
1479	Phase angle control failure
1481	System voltage too high
1482	Current measuring range exceeded

A.1.6   Data record 75 - Log list - Read events

Byte	Meaning	Value range	Increment	Comment
0 ... 3	Operating hours device	0 ... 2^{32} s	1 second	Entry 1 = oldest entry
4 ... 5	Object number events	0 ... ± 32767 *)	1	
6 ... 9	Operating hours device	0 ... 2^{32} s	1 second	Entry 2 = second oldest entry
10 ... 11	Object number events	0 ... ± 32767 *)	1	
etc.				
120 ... 123	Operating hours device	0 ... 2^{32} s	1 second	Entry 21 = last, newest entry
124 ... 125	Object number events	0 ... ± 32767 *)	1	
*) + Incoming event				
- Outgoing event				

This data record can accommodate 21 entries. When all locations have been written, the first entry is overwritten again.

Note

The newest entry is entered at the end of the data record. The remaining entries are moved up one entry.

The following alarms can be entered:

Object No.	Events alarms	Comment
Warnings		
324	Temperature sensor overload	±
325	Temperature sensor wire break	±
326	Temperature sensor short-circuit	±
327	Thermal motor model overload	±
334	Current limit exceeded	±
335	Current limit undershot	±
340	Asymmetry detected	±
342	Ground fault detected	±
Actions		
310	Emergency start active	±
357	Automatic mode	+
358	Manual bus mode	+
359	Manual operation local mode	+
360	Connection abort in manual mode	±
363	Maximum pointer reset	+
365	Incorrect parameter value	+
(Obj. No.)	Object number of incorrect parameter	
366	Parameters cannot be changed in ON state	+
(Obj. No.)	Object number of incorrect parameter	
368	Parameters disabled CPU/master active	±
369	Basic factory settings restored	+
376	FW update successful	+
1302	Log list trips deleted	+
1303	Log list events deleted	+
1422	Thermal motor model deactivated	
1520	Energy saving mode active	±
+ Incoming event		
± Incoming/outgoing event		

A.1.7 Data record 81 - Read basic setting of data record 131

Data record 81 corresponds in structure and content to data record 131. Data record 81 supplies the default values for all parameters of data record 131.

A.1.8 Data record 82 - Read basic setting of data record 132

Data record 82 corresponds in structure and content to data record 132. Data record 82 supplies the default values for all parameters of data record 132.

A.1.9   Data record 83 - Read basic setting of data record 133

Data record 83 corresponds in structure and content to data record 133. Data record 83 supplies the default values for all parameters of data record 133.

A.1.10   Data record 92 - Read device diagnostics

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
	Switching/controlling		
0^0	Ready (automatic)	-	Device is ready for operation via host (e.g., PLC), alarm bit is updated continually.
0^1	Motor right	-	Contact block 1 is switched on, alarm bit is updated continually.
0^2	Motor left	-	Contact block 2 is switched on, alarm bit is updated continually.
0^3	Contact block overload	5, 24	e.g., power semiconductor too hot, causing motor to trip. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
0^4	Contact block defective	9, 24	e.g., contactor is fusion-welded/jammed or power semiconductor has failed. Alarm bit can only be deleted by switching the supply voltage On and Off once the cause of the error has been eliminated.
0^5	Emergency start active	-	Alarm bit is deleted when emergency start is deactivated.
0^6	Group error	-	At least 1 error that generates an Error No. is set. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset, Autoreset, OFF command"
0^7	Group warning	-	At least 1 warning is pending, alarm bit is updated continually.
1^0	Reserved = 0	-	
1^1	No main power	17, 24	Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
1^2	Reserved = 0	-	
1^3	Start mode active	-	
1^4	Stop mode active	-	Alarm bit is updated continually.
1^5	Reserved = 0	-	
1^6	Electrical braking active	-	Brake output is switched on by the soft starter, alarm bit is updated continually.
1^7	Slow speed active	-	Alarm bit is updated continually.

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
	Protective function: Motor / cable / short-circuit		
2^0	Temperature sensor overload	4, 24	Overload detected, alarm bit is updated continually.
2^1	Temperature sensor wire break	6, 24	Thermistor circuit interrupted, alarm bit is updated continually.
2^2	Temperature sensor short-circuit	1, 24	Short-circuit in thermistor circuit, alarm bit is updated continually.
2^3	Thermal motor model overload	4, 24	Overload detected, alarm bit is updated continually.
2^4	Overload tripping	4, 24	Motor is tripped due to a detected overload. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset"/"Autoreset".
2^5	Idle time active	-	Alarm bit is updated continually.
2^6	Cooling time active	-	Alarm bit is updated continually.
2^7	Reserved = 0	-	
$3^{0...2}$	Reserved = 0	-	
3^3	Current limiting active	-	
$3^{4...6}$	Reserved = 0	-	
3^7	Input control	-	Device receives control commands via the inputs, alarm bit is updated continually.
4^0	Asymmetry detected	-	Asymmetry is present, alarm bit is updated continually.
4^1	Asymmetry tripping	9, 24	Tripping of the motor due to asymmetry. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
4^2	Current limit exceeded	7, 24	Limit exceeded, alarm bit is updated continually.
4^3	Current limit undershot	8, 24	Limit undershot, alarm bit is updated continually.
4^4	Current limit tripping	7, 24 or 8, 24	Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
4^5	Reserved = 0	-	
4^6	Reserved = 0	-	
4^7	Motor stalled - switched off	9, 24	Trip, stalling current detected for longer than the permitted stalling time. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
5^0	Input 1	-	States of the inputs: "1" = active, HIGH level is present "0" = inactive, LOW level is present Alarm bit is updated continually.
5^1	Input 2	-	
5^2	Input 3	-	
5^3	Input 4	-	
$5^{4...7}$	Reserved = 0	-	
6^0	Ground fault detected	-	Ground fault is present, alarm bit is updated continually.
6^1	Ground fault tripping	9, 24	Tripping of motor due to ground fault. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
6^2	Quick stop active	-	Tripping of the motor due to quick stop. Alarm bit is deleted when the cause of tripping has been eliminated and acknowledged with "Trip Reset".
6^3	Reserved = 0	-	
6^4	Trip Reset performed	-	Alarm bit is deleted by an update or by a "Trip Reset" in ready for operation status.
6^5	Trip Reset not possible	-	Tripping cause is still present. Alarm bit is deleted by an update (new "Trip Reset") or by a "Trip Reset" in ready for operation status.
6^6	Maximum pointer reset	-	Alarm bit is always deleted when acknowledged with "Trip Reset".
6^7	Electronics supply voltage too low	17, 24	Alarm bit is deleted automatically when the cause of tripping has been eliminated.
	Communication		
7^0	Bus error	-	Watchdog timer of DP interface has elapsed, alarm bit is updated continually.
7^1	CPU/master Stop	-	PLC program is no long being executed, alarm bit is updated continually.
7^2	Automatic mode	-	Automatic (PLC controlled), alarm bit is updated continually.
7^3	Manual bus mode	-	Manual mode via fieldbus (OPC controlled), alarm bit is updated continually.
7^4	Manual operation local mode	-	Manual mode via local device interface, (OPC controlled), alarm bit is updated continually.
7^5	Reserved = 0	-	
7^6	Connection abort in manual mode	-	During manual mode, the related communication connection was interrupted, alarm bit is updated continually.
7^7	Process image error	24, 26	Process image of the outputs contains an impermissible bit combination, alarm bit is deleted continually when cause of tripping has been eliminated.
	Parameters		
8^0	Parameter assignment active	-	Alarm bit is updated continually.
8^1	Incorrect parameter value	16, 24	Alarm bit is always deleted when acknowledged with "Trip Reset" or valid parameters have been received.
8^2	Parameters cannot be changed in ON state	-	Attempted parameter change while motor is running or during relevant device function, which has caused the trip. Alarm bit is always deleted when acknowledged with "Trip Reset" or valid parameters have been received.
8^3	Parameters disabled CPU/master active	-	alarm bit is updated continually, soft starter ignores parameters from the PLC.
8^4	No external start parameters received	-	
8$^{5...7}$	Reserved = 0	-	

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
	Device function		
$9^{0...2}$	Reserved = 0	-	
9^3	Basic factory settings restored	-	Alarm bit is always deleted when acknowledged with "Trip Reset".
$9^{4...5}$	Reserved = 0	-	
9^6	FW update successful	-	
9^7	Reserved = 0	-	
10	Faulty parameter number (low byte)	-	In conjunction with bytes 81 and 82, the ID No. indicates that first parameter not accepted.
11	Faulty parameter number (high byte)	-	Alarm byte is always deleted when acknowledged with "Trip Reset".
$12^{0...1}$	Reserved = 0	-	
12^2	Impermissible I$_e$/CLASS setting	-	
$12^{3...7}$	Reserved = 0	-	
13^0	Parameter set 1 active	-	
13^1	Parameter set 2 active	-	
13^2	Parameter set 3 active	-	
13^3	Reserved = 0	-	
13^4	Parameter set change impermissible	-	
$13^{5...7}$	Reserved = 0	-	
$14^{0...1}$	Reserved = 0	-	
14^2	Motor heating active	-	
14^3	DC braking active	-	
14^4	Dynamic DC braking active	-	
14^5	Motor connection type star/delta	-	
14^6	Motor connection type inside delta	-	
14^7	Motor connection type unknown	-	
15^0	No load	17, 24	
15^1	Reserved = 0	17, 24	
15^2	Loss of phase L1	17, 24	
15^3	Loss of phase L2	17, 24	
15^4	Loss of phase L3	17, 24	
15^5	Main power rotation right	-	
15^6	Main power rotation left	-	
15^7	System voltage too high	17, 24	
16	Reserved = 0	-	
17^0	Output 1 active	-	
17^1	Output 2 active	-	
17^2	Output 3 active	-	
17^3	Output 4 active	-	
$17^{4...7}$	Reserved = 0	-	
18	Reserved = 0	-	

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
	Switching/controlling		
19^0	Electronics supply voltage too high	17, 24	
19^1	Ready to start for motor ON	-	
19^2	Contact block short-circuited	-	
19^3	Bypass element defective	9, 24	
19^4	Bypass element protective tripping	4, 24	
19^5	Switching element 1 failed	-	
19^6	Switching element 2 failed	-	
19^7	Switching element 3 failed	-	
	Protective function		
20^0	Thermal motor model deactivated	-	
$20^{1...2}$	Reserved = 0	-	
20^3	Phase angle control failure	-	
$20^{4...7}$	Reserved = 0	-	
21^0	Contact block cooling time active	-	
21^1	Contact block for Start too hot	-	
21^2	Current measuring range exceeded	9, 24	
$21^{3...7}$	Reserved = 0	-	
	Communication		
22^0	Automatic mode (redundant to bit 7.2)	-	
22^1	Manual bus mode (redundant to bit 7.3)	-	
22^2	Manual bus - PC controlled	-	
22^3	Manual operation local mode (redundant to bit 7.4)	-	
22^4	Manual operation local - input controlled	-	
22^5	Manual operation local - OCM controlled	-	
22^6	Manual operation local - PC controlled	-	
22^7	Reserved = 0	-	
23	Reserved = 0	-	

Byte^{Bit}	Alarm bit	Error No.*)	Meaning/acknowledgment
	Prewarnings		
24$^{0...1}$	Reserved = 0	-	
24^2	Prewarning limit - remaining time for tripping undershot	-	
24^3	Prewarning limit - motor heating overshot	-	
24$^{4...7}$	Reserved = 0	-	
25	Reserved = 0	-	
26	Reserved = 0	-	
27	Reserved = 0	-	
28^0	FW update rejected	-	
28$^{1...7}$	Reserved = 0	-	
29	Reserved = 0	-	
30	Reserved = 0	-	
31	Reserved = 0	-	
	Energy saving function	-	
36$^{1...5}$	Reserved = 0	-	
36^6	Start_Pause command is pending	-	
36^7	Energy saving mode active	-	
37	Reserved = 0	-	

*) PROFINET error numbers

A.1.11 Data record 93 - Write commands

Structure of the command data record

Byte	Meaning	Comment
Header		
0	Coordination	0x20 Write via C1 channel (PLC)
1 ... 3	Reserved = 0	
Command		
4	Number of commands	Value range 1 ... 5
		Number of subsequent valid commands
5	Command 1	Sequential no., see table below
6	Command 2	Optional (coding, see table below)
7	Command 3	Optional (coding, see table below)
8	Command 4	Optional (coding, see table below)
9	Command 5	Optional (coding, see table below)

Code	Command	Meaning
1-byte commands		
0	Reserved = 0	No function
1	Trip Reset	Resetting and acknowledging of error messages
2	Emergency start ON	Switch on emergency start
3	Emergency start OFF	Switch off emergency start
4	Automatic mode	Transition to automatic mode (control by CPU/master)
5	Manual mode	Transition to manual mode. The soft starter switches to manual bus mode or manual operation local mode depending on the interface via which the command is received. This command can be used to obtain control priority but not to give it up.
6	Basic factory settings	Restore the basic factory settings of the parameters.
7	Reset maximum pointer	The measured values for preventive diagnostics are deleted (= 0).
9	Restart	Initiate a restart (same as after power ON), e.g., after reassignment of the station address.
10	Parameters disabled CPU/master ON	Parameter assignment by the parameter-assigning CPU or master is not possible, or its parameters are ignored.
11	Parameters disabled CPU/master OFF	Parameter assignment by the parameter-assigning CPU or master is possible.
13	Log list - Delete trips	Delete log list of recorded error causes.
14	Log list - Delete events	Delete log list of recorded alarms and specific actions.

A.1.12   Data record 94 - Read measured values

Byte[Bit]	Meaning	Value range/ [coding]	Increment	Comment
	Measured values			
0	Phase current I_{L1} (%)	0 ... 797 % / [0 ... 255]	3.125 %	8-bit current format
1	Phase current I_{L2} (%)	0 ... 797 % / [0 ... 255]	3.125 %	8-bit current format
2	Phase current I_{L3} (%)	0 ... 797 % / [0 ... 255]	3.125 %	8-bit current format
3	Reserved = 0			
4 ... 5	Remaining motor cooling time	0 ... 1 800 s / [0 ... 18 000]	0.1 s	
$6^{0...6}$	Motor heating	0 ... 200 % / [0 ... 100]	2 %	
6^{7}	Asymmetry ≥ 40%	No asymmetry [0] Asymmetry (≥ 40%) [1]		
7	Asymmetry	0 ... 100 % / [0 ...100]	1 %	
8 ...15	Reserved = 0			
16	Output frequency	0 ... 100 Hz / [0 ... 200]	0.5 Hz	
17 ... 19	Reserved = 0			
20	Line frequency	0 ... 100 Hz / [0 ... 200]	0.5 Hz	
21	Reserved = 0			
22 ... 23	Line-to-line voltage U_{L1-L2} (rms)	0 ... 1500 V / [0 ... 15000]	0.1 V	
24 ... 25	Line-to-line voltage U_{L2-L3} (rms)	0 ... 1500 V / [0 ... 15000]	0.1 V	
26 ... 27	Line-to-line voltage U_{L3-L1} (rms)	0 ... 1500 V / [0 ... 15000]	0.1 V	
28 ... 31	Phase current I_{L1} (rms)	0 ... 20000 A / [0 ... 2000000]	0.01 A	
32 ... 35	Phase current I_{L2} (rms)	0 ... 20000 A / [0 ... 2000000]	0.01 A	
36 ... 39	Phase current I_{L3} (rms)	0 ... 20000 A / [0 ... 2000000]	0.01 A	
40 ... 41	Electronics supply voltage	0 ... 1500 V / [0 ... 15000]	0.1 V	
42	Heatsink temperature	-40 ... 127 °C / [-40 ... 127]	1 °C	
43	Contact block heating	0 ... 250 °C / [0 ... 250]	1 °C	
44 ... 45	Remaining cooling time of contact block	0 ... 1800 s/ [0 ... 18000]	0.1 s	
46 ... 47	Remaining time for tripping of thermal motor model	0 ... 10000 s/ [0 ... 10000]	1 s	
48 ... 51	Output power	0 ... 2147483 W / [0 ... 21474830]	0.1 W	
52 ... 63	Reserved = 0			

A.1.13 Data record 95 - Read statistical data

Byte^{Bit}	Meaning	Value range/ [coding]	Increment	Comment
	Statistics			
0	Motor current $I_{max (\%)}$	0 ... 797 % / [0 ... 255]	3.125 %	8-bit current format
1	Reserved = 0			
2 ... 3	Last trigger current $I_{A (\%)}$			
4 ... 7	Operating hours			
8 ... 11	Number of starts motor right	0 ... 2^{32}-1 / [0 ... 2^{32}-1]	1	
12 ... 15	Number of starts motor left	0 ... 2^{32}-1 / [0 ... 2^{32}-1]	1	
16 ... 17	Number of motor overload trips	0 ... 65 535 / [0 ... 65 535]	1	
18 ... 19	Reserved = 0			
20 ... 23	Motor current $I_{max (rms)}$			
24 ... 27	Last trigger current $I_{A (rms)}$	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	
28 ... 31	Operating hours motor	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
32 ... 35	Operating hours motor current 18 ... 49.9 % x $I_{e (max)}$	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
36 ... 39	Operating hours motor current 50 ... 89.9 % x $I_{e (max)}$	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
40 ... 43	Operating hours motor current 90 ... 119.9 % x $I_{e (max)}$	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
44 ... 47	Operating hours motor current 120 ... 1000 % x $I_{e (max)}$	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
50 ... 51	Number of contact block overload trips	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
52 ... 53	Reserved = 0			
54 ... 55	Reserved = 0			
56 ... 59	Reserved = 0			
60 ... 63	Number of braking stops	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
64 ... 67	Number of starts output 1	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
68 ... 71	Number of starts output 2	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
72 ... 75	Number of starts output 3	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
76 ... 79	Number of starts output 4	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1	
80	Reserved = 0			
84	Reserved = 0			
88	Reserved = 0			
89	Reserved = 0			

A.1.14 Data record 96 - Read maximum pointer

Byte[Bit]	Meaning	Value range/ [coding]	Increment	Comment
4	Phase current $I_{L1\ min}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
5	Phase current $I_{L2\ min}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
6	Phase current $I_{L3\ min}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
7	Reserved = 0			In bypass operation
8	Phase current $I_{L1\ max}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
9	Phase current $I_{L2\ max}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
10	Phase current $I_{L3\ max}$ (%)	0 ... 797 % / [0 ... 255]	3,125 %	In bypass operation
11	Reserved = 0			
12 ... 13	Maximum tripping current $I_{A\ max}$ (%)	0 ... 1000 % / [0 ... 320]	3,125 %	
14 ... 15	Number of motor overload trips	0 ... 65 535 / [0 ... 65 535]	1	
16 ... 19	Maximum tripping current $I_{A\ max}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	
20 ... 23	Phase current $I_{L1\ min}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
24 ... 27	Phase current $I_{L2\ min}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
28 ... 31	Phase current $I_{L3\ min}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
32 ... 35	Phase current $I_{L1\ max}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
36 ... 39	Phase current $I_{L2\ max}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
40 ... 43	Phase current $I_{L3\ max}$ (rms)	0 ... 20 000 A / [0 ... 2 000 000]	0.01 A	In bypass operation
44 ... 45	Line-to-line voltage $U_{L1 - L2min}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	Reset to 0 in the event of phase failure or switch-off of main voltage.
46 ... 47	Line-to-line voltage $U_{L2 - L3min}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
48 ... 49	Line-to-line voltage $U_{L3 - L1min}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
50 ... 51	Line-to-line voltage $U_{L1 - L2max}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
52 ... 53	Line-to-line voltage $U_{L2 - L3max}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
54 ... 55	Line-to-line voltage $U_{L3 - L1max}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
56 ... 57	Electronics supply voltage $U_{NS\ min}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	Reset to zero at "Power on"
58 ... 59	Electronics supply voltage $U_{NS\ max}$ (rms)	0 ... 1500 V / [0 ... 15 000]	0.1 V	
60	Maximum cooling temperature	1 ... -40 °C / [-40 ... 127]	1 °C	
61	Maximum contact black heating	0 ... 250 % / [0 ... 250]	1 %	
62	Minimum line frequency	0 ... 100 Hz / [0 ... 200]	0.5 Hz	For line or phase loss
63	Maximum line frequency	0 ... 100 Hz / [0 ... 200]	0.5 Hz	
64 ... 67	Operating hours - motor current = 18 ... 49.9 % x I_e	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
68 ... 71	Operating hours - motor current = 50 ... 89.9 % x I_e	0 ... 2^{32}-1 s [0 ... 2^{32}-1]	1 s	
72 ... 75	Operating hours - motor current = 90 ... 119.9 % x I_e	0 ... 2^{32}-1 s [0 ... 2^{32}-1]	1 s	
76 ... 79	Operating hours - motor current = 120 ... 1000 % x I_e		1 s	
80 ... 83	Operating hours device	0 ... 2^{32}-1 s / [0 ... 2^{32}-1]	1 s	
84 ... 85	Reserved = 0			

A.1.15 Data records 131, 141, 151 - Technology parameter 2: Read/write record 1, 2, 3

Byte^{Bit}	Value	Comment
Header		
0	Coordination	0x20 Write via C1 channel (PLC)
1 ... 3	Reserved = 0	

Object No.	Byte^{Bit}	Meaning	Only in data record 131	Value range/ [coding]	Factor
120	4 ... 7	Device functions_2	X		
1	8 ... 11	Device functions_1	X		
130	12	Rated operating current I$_e$		0 ... 2 000 A [0 ... 200 000]	0.01 A
3	16^0	Load type	X	3-phase [0]	
4	16^1	Protection against voltage failure	X	• No [0] • Yes [1]	
	16$^{2...7}$	Reserved = 0			
136	17	Prewarning limit motor heat build-up	X	0 ... 95 % [0 ... 19]	5 %
5	18$^{0...2}$	Response to thermal motor model overload	X	• Tripping without restart [0] • Tripping with restart [1] • Warning [2]	
	18$^{3...7}$	Reserved = 0			
6	19$^{0...4}$	Tripping class	X	• CLASS 5 (10a) [3] • CLASS 10 [0] • CLASS 15 [4] • CLASS 20 [1] • CLASS 30 [2] • CLASS OFF [15]	
	19$^{5...7}$	Reserved = 0			
7	20	Pre-charge time	X	60 ... 1 800 s [2 ... 60]	30 s
8	21	Idle time	X	0 ... 255 s [0 ... 255]	1 s
137	22 ... 23	Prewarning limit value tripping reserve	X	0 ... 500 s [0 ... 500]	1 s
10	24$^{0...1}$	Response to temperature sensor overload	X	• Tripping without restart [0] • Tripping with restart [1] • Warning [2]	
	24$^{2...3}$	Reserved = 0			
9	24$^{4...6}$	Temperature sensor	X	• Deactivated [0] • Thermo click [1] • PTC-type A [2]	

Object No.	Byte^{Bit}	Meaning	Only in data record 131	Value range/ [coding]	Factor
12	24^7	Temperature sensor monitoring	X	• No [0] • Yes [1]	
	25 ... 26	Reserved = 0			
15	28	Minimum current limit		18.75 ... 100 % [6 ... 32]	3.125 %
16	29	Maximum current limit		50 ... 150 % [16 ... 48]	3.125 %
	30 ... 31	Reserved = 0			
	32$^{0...5}$	Reserved = 0			
14	32^6	Response to current limit value violation	X	• Warning [0] • Tripping [1]	
	32^7	Reserved = 0			
	33$^{0...1}$	Reserved = 0			
140	33^2	Response to overload - contact block	X	• Tripping without restart [0] • Tripping with restart [1]	
	33$^{4...7}$	Reserved = 0			
21	34$^{0...2}$	Asymmetry limit	X	30 ... 60 % [3 ... 6]	10 %
	34$^{3...5}$	Reserved = 0			
20	34^6	Response to asymmetry	X	• Warning [0] • Tripping [1]	
22	34^7	Response to ground fault	X	• Warning [0] • Tripping [1]	
	35 ... 44	Reserved = 0			
47	45	Braking torque		20 ... 100 % [4 ... 20]	5 %
	46 ... 47	Reserved = 0			
40	48	Start voltage		20 ... 100 % [4 ... 20]	5 %
	49	Reserved = 0			
42	50	Current limiting value		• 3RW442/3/4: 125 ... 550 % [40 ... 176] • 3RW445: 125 ... 500 % [40 ... 160] • 3RW446: 125 ... 450 % [40 ... 144]	
167	51$^{0...3}$	Starting mode		• Direct on line [0] • Voltage ramp [1] • Torque control [2] • Motor heating [3] • Voltage ramp + current limiting [5] • Torque control + current limiting [6]	

Object No.	Byte[Bit]	Meaning	Only in data record 131	Value range/ [coding]	Factor
168	51[4...7]	Stopping mode		• Coasting down [0] • Torque control [2] • Pump stop [3] • DC braking [4] • Combined braking [5]	
35	52 ... 53	Substitute value	X	The "Substitute value" parameter is only relevant if the "Response to CPU/Master STOP" parameter has been parameterized to "Switch substitute value". • Motor CW 52 [0] • Motor CCW (only if 52 [6] active) 52 [1] • Trip Reset 52 [3] • Emergency start 52 [4] • Creep speed 52 [6] • Output 1 53 [0] • Output 2 53 [1] • Parameter set bit 0 53 [2] • Parameter set bit 1 53 [3]	
	54 ... 55	Reserved = 0			
	56[0...5]	Reserved = 0			
36	56[6]	Group diagnosis	X	• Disable [0] • Enable [1]	
34	56[7]	Behavior on CPU/Master Stop	X	• Switch substitute value [0] • Hold last value [1]	
	57 ... 75	Reserved = 0			
26	76	Input 1 action	X	• No action (default) [0] • Manual operation local mode [6] • Emergency start [7] • Slow speed [10] • Quick stop [11] • Trip Reset [12] • Motor right with PS1 [16] • Motor left with PS1 [17] • Motor right with PS2 [18] • Motor left with PS2 [19] • Motor right with PS3 [20] • Motor left with PS3 [21]	

Object No.	Byte^Bit	Meaning	Only in data record 131	Value range/ [coding]	Factor
28	7⁷	Input 2 - (see Input 1 action)	X		
30	7⁸	Input 3 - (see Input 1 action)	X		
32	7⁹	Input 4 - (see Input 1 action)	X		
	80 ... 95	Reserved = 0			
163	96	Output 1 action	X	• No action (default) [0] • Control source PIO DO 1.0 output 1 [1] • Control source PIO DO 1.1 output 2 [2] • Control source input 1 [6] • Control source input 2 [7] • Control source input 3 [8] • Control source input 4 [9] • Run-up [10] • Operation/bypass [11] • Coasting down [12] • On time motor [13] • Control command motor-on [14] • DC brake contactor [16] • Device ON [18] • Group warning [31] • Group error [32] • Bus error [33] • Device error [34] • Ready to start for motor ON [38]	
164	97	Output 2 action (see Output 1 action)	X		
165	98	Output 3 action (see Output 1 action)	X		
166	99	Output 4 action			
	100 ... 111	Reserved = 0			
116	112	Breakaway time		0 ... 2 s [0 ... 200]	0.01 s
117	113	Breakaway voltage		40 ... 100 % [8 ... 20]	5 %
169	114 ... 115	Maximum starting time		0 ... 1 000 s [0 ... 10 000]	0.1 s [1]
170	116 ... 117	Starting time		0 ... 360 s [0 ... 3 600]	0.1 s [1]
171	118 ... 119	Stopping time		0 ... 360 s [0 ... 3 600]	0.1 s [1]
172	120	Start torque		10 ... 100 % [2 ... 20]	5 %
118	121	Limiting torque		20 ... 200 % [4 ... 40]	5 %

Object No.	Byte^{Bit}	Meaning	Only in data record 131	Value range/ [coding]	Factor
173	122	Stopping torque		10 ... 100 % [2 ... 20]	5 %
	123	Reserved = 0			
	124	Reserved = 0			
119	125	Motor thermal capacity		1 ... 100 % [1 ... 100]	1 %
	126 ... 129	Reserved = 0			
178	130	Dynamic braking torque		20 ... 100 % [4 ... 20]	5 %
43	131	Slow speed factor right		3 ... 21 [3 ... 21]	1
198	132	Slow speed factor left		3 ... 21 [3 ... 21]	1
44	133	Slow speed torque right		20 ... 100 % [4 ... 20]	5 %
199	134	Slow speed torque left		20 ... 100 % [4 ... 20]	5 %
	135 ... 137	Reserved = 0			

1) This parameter is evaluated in the soft starter without the digits after the decimal point.

Dependencies

- Maximum current limit > Minimum current limit
- DC braking can only be selected if an output has the "DC braking contactor" function assigned.
- Maximum starting time ≥ Starting time
- Limiting torque > Start torque

A.1.16 Data records 132, 142, 152 - Technology parameter 3: Read/write record 1, 2, 3

Byte^{Bit}	Value	Comment
Header		
0	Coordination	0x20 Write via C1 channel (PLC)
1 ... 3	Reserved = 0	

Object No.	Byte^{Bit}	Meaning	Value range [coding]	Factor
	4 ... 9	Reserved = 0		
104	10 ... 11	Rated operating speed	500 ... 3 600 rpm [500 ... 3 600]	1 rpm
	12 ... 18	Reserved = 0		
113	19 ... 20	Rated operating torque	0 ... 65 535 Nm [0 ... 65 535]	1 Nm
	21 ... 63	Reserved = 0		

A.1.17 Data record 133 - Technology parameter 4: OCM module

Byte^{Bit}	Value	Comment
Header		
0	Coordination	0x20 Write via C1 channel (PLC)
1 ... 3	Reserved = 0	

Object No.	Byte^{Bit}	Meaning	Value range [coding]	Factor
	4	Reserved = 0		
179	8$^{0...3}$	Language	• English [0] • German [1] • French [2] • Spanish [3] • Italian [4] • Portuguese [5] • Dutch [7] • Greek [8] • Turkish [9] • Russian [10] • Chinese [11]	
181	8$^{4...7}$	Brightness lighting	• Lighting on [0] • Off with time delay [4] • Off [5]	
180	9	Contrast display	0 ... 100 % [0 ... 20]	5 %
182	10$^{0...3}$	Response of LEDs to fault	• Unchanged [0] • On (1) • Blinking [2] • Flickering [3]	
183	10$^{4...7}$	Response of LEDs to warning	• Unchanged [0] • On (1) • Blinking [2] • Flickering [3]	
	11	Reserved = 0		
184	12	Response time keys	10 ... 100 % [2 ... 20]	5 %
185	13	Auto repeat speed	10 ... 100 % [2 ... 20]	5 %
186	14	Auto repeat time	10 ... 250 ms [2 ... 20]	5 ms
187	15	OCM keys activity monitoring time	0 ... 1800 s [0 ... 60]	30 s
	16 ... 19	Reserved = 0		

A.1.18   Data record 165 - Read/write comment

You can save any text containing up to 121 characters (max. 121 bytes) in the soft starter, e.g., for system documentation.

Byte^Bit	Communication parameters	Value range [coding]
Header		
0	Coordination	0x20 Write via C1 channel (PLC)
1	Reserved 1	
2 ... 3	Reserved 2	
Comment		
4 ... 124	Comment data	

A.1.19   OPC UA variables

Node ID

The variables can be accessed as follows:

ns=http://siemens.com/automation/simocode/3rw44pn;i=Node ID of the relevant variable.

Example:

You want to access the RMS motor current in phase L1. You search for the Node ID of tag of variable "Phase current I_{L1} (rms)" in the following table: Node ID=173

Node ID	Coding	Meaning
Diagnostics		
20	Bool	Group fault
21	Bool	Group warning
Diagnostics - Control		
25	Bool	Ready (automatic)
26	Bool	Ready for motor ON
27	Bool	Motor right
28	Bool	Motor left
29	Bool	Starting active
30	Bool	Coast-down active
31	Bool	Current limiting active
32	Bool	Slow speed active
33	Bool	Electronics supply voltage too high
34	Bool	Electronics supply voltage too low
35	Bool	No main power

Node ID	Coding	Meaning
36	Bool	Contact block defective
37	Bool	Contact block short-circuited
38	Bool	Switching element 1 failed
39	Bool	Switching element 2 failed
40	Bool	Switching element 3 failed
41	Bool	Supply voltage too high
42	Bool	Phase failure L1
43	Bool	Phase failure L2
44	Bool	Phase failure L3
45	Bool	Rotation direction of line frequency right
46	Bool	Rotation direction of line frequency left
47	Bool	No load
48	Bool	Motor connection type unknown
49	Bool	Motor connection type star/delta
50	Bool	Motor connection type inside delta
51	Bool	Motor heating active
52	Bool	Phase angle control failure
53	Bool	Electrical braking active
54	Bool	DC braking active
55	Bool	Dynamic braking active
56	Bool	Emergency start active
Diagnostics - Protection		
65	Bool	Overload tripping
66	Bool	Prewarning limit - remaining time for tripping undershot
67	Bool	Prewarning limit - motor heating overshot
68	Bool	Thermal motor model overload
69	Bool	Idle time active
70	Bool	Cooling time active
71	Bool	Impermissible I_e/CLASS setting
72	Bool	Thermal motor model deactivated
73	Bool	Temperature sensor overload
74	Bool	Temperature sensor wire break
75	Bool	Temperature sensor short-circuit
76	Bool	Contact block overload
77	Bool	Contact block too hot for start
78	Bool	Contact block cooling time active
79	Bool	Bypass element protective tripping
80	Bool	Bypass element defective

Node ID	Coding	Meaning
Diagnostics – Substation Monitoring		
90	Bool	Input 1
91	Bool	Input 2
92	Bool	Input 3
93	Bool	Input 4
94	Bool	Input control
95	Bool	Quick stop active
96	Bool	Output 1 active
97	Bool	Output 2 active
98	Bool	Output 3 active
99	Bool	Output 4 active
100	Bool	I_e upper limit value violation
101	Bool	I_e lower limit value violation
102	Bool	I_e limit value tripping
103	Bool	Tripping due to motor blocking
104	Bool	Asymmetry detected
105	Bool	Asymmetry tripping
106	Bool	Ground fault detected
107	Bool	Ground fault tripping
108	Bool	Current measuring range overshot
Diagnostics - Communication		
120	Bool	Process image error
121	Bool	Automatic mode
122	Bool	Manual mode bus
123	Bool	Manual mode bus - PC controls
124	Bool	Manual mode local
125	Bool	Manual mode local - Input controls
126	Bool	Manual mode local - HMI controls
127	Bool	Manual mode local - PC controls
128	Bool	Connection abort in manual mode
129	Bool	Trip reset successful
130	Bool	Trip reset unsuccessful
131	Bool	Maximum pointer deleted
132	Bool	Parameter set 1 active
133	Bool	Parameter set 2 active
134	Bool	Parameter set 3 active
135	Bool	Parameter set change impermissible
136	Bool	Parameter assignment active
137	Bool	Factory settings restored
138	Bool	Bus error
139	Bool	CPU/master STOP
140	Bool	No external startup parameters received

Node ID	Coding	Meaning
141	Bool	Parameters disabled CPU/master active
142	Bool	Invalid parameter value
143	Bool	Parameters cannot be changed in ON state
144	Bool	NTP-time set
145	Bool	NTP-time synchronized
146	Unsigned Word	Incorrect parameter number
147	Bool	FW update successful
148	Bool	FW update denied
149	Bool	Command Start_Pause active
150	Bool	Energy saving mode active
Measured Values		
160	Unsigned Byte	Phase current I_{L1} (%)
161	Unsigned Byte	Phase current I_{L2} (%)
162	Unsigned Byte	Phase current I_{L3} (%)
164	Unsigned Word	Remaining motor cooling time
165	Unsigned Byte	Motor heating
166	Bool	Asymmetry $\geq$ 40%
167	Unsigned Byte	Asymmetry
168	Unsigned Byte	Output frequency
169	Unsigned Byte	Line frequency
170	Unsigned Word	Line-to-line voltage U_{L1-L2} (rms)
171	Unsigned Word	Line-to-line voltage U_{L2-L3} (rms)
172	Unsigned Word	Line-to-line voltage U_{L3-L1} (rms)
173	Signed DWord	Phase current I_{L1} (rms)
174	Signed DWord	Phase current I_{L2} (rms)
175	Signed DWord	Phase current I_{L3} (rms)
176	Unsigned Word	Electronics supply voltage
177	Signed Byte	Heat sink temperature
178	Unsigned Byte	Contact block heating
179	Unsigned Word	Remaining contact block cooling time
180	Unsigned Word	Remaining time for tripping for thermal motor model
181	Signed DWord	Output power
Service Data - Statistics		
200	Unsigned Byte	Motor current I_{max} (%)
203	Unsigned Word	Last tripping current I_A (%)
204	Unsigned DWord	Operating hours - device
205	Unsigned DWord	Number of starts motor right
206	Unsigned DWord	Number of starts motor left
207	Unsigned Word	Number of motor overload trips
208	Signed DWord	Motor current I_{max} (rms)
209	Signed DWord	Last tripping current I_A (rms)
210	Unsigned DWord	Operating hours - motor
211	Unsigned DWord	Operating hours - motor current = 18 ... 49.9 % x $I_{e\,max}$

Node ID	Coding	Meaning
212	Unsigned DWord	Operating hours - motor current = 50 ... 89.9 % x $I_{e\,max}$
213	Unsigned DWord	Operating hours - motor current = 90 ... 119.9 % x $I_{e\,max}$
214	Unsigned DWord	Operating hours - motor current = 120 ... 1000 % x $I_{e\,max}$
216	Unsigned Word	Number of contact block overload trips
220	Unsigned DWord	Number of stops with electrical brake
221	Unsigned DWord	Number of starts - output 1
222	Unsigned DWord	Number of starts - output 2
223	Unsigned DWord	Number of starts - output 3
224	Unsigned DWord	Number of starts - output 4
Service Data – Maximum Pointer		
230	Unsigned Byte	Phase current $I_{L1\,min}$ (%)
231	Unsigned Byte	Phase current $I_{L2\,min}$ (%)
232	Unsigned Byte	Phase current $I_{L3\,min}$ (%)
233	Unsigned Byte	Phase current $I_{L1\,max}$ (%)
234	Unsigned Byte	Phase current $I_{L2\,max}$ (%)
235	Unsigned Byte	Phase current $I_{L3\,max}$ (%)
236	Unsigned Word	Maximum tripping current $I_{A\,max}$ (%)
237	Unsigned Word	Number of motor overload trips
238	Signed DWord	Maximum tripping current $I_{A\,max}$ (rms)
239	Signed DWord	Phase current $I_{L1\,min}$ (rms)
240	Signed DWord	Phase current $I_{L2\,min}$ (rms)
241	Signed DWord	Phase current $I_{L3\,min}$ (rms)
242	Signed DWord	Phase current $I_{L1\,max}$ (rms)
243	Signed DWord	Phase current $I_{L2\,max}$ (rms)
244	Signed DWord	Phase current $I_{L3\,max}$ (rms)
245	Unsigned Word	Line-to-line voltage $U_{L1-L2\,min}$ (rms)
246	Unsigned Word	Line-to-line voltage $U_{L2-L3\,min}$ (rms)
247	Unsigned Word	Line-to-line voltage $U_{L3-L1\,min}$ (rms)
248	Unsigned Word	Line-to-line voltage $U_{L1-L2\,max}$ (rms)
249	Unsigned Word	Line-to-line voltage $U_{L2-L3\,max}$ (rms)
250	Unsigned Word	Line-to-line voltage $U_{L3-L1\,max}$ (rms)
251	Unsigned Word	Electronics supply voltage $U_{NS\,min}$ (rms)
252	Unsigned Word	Electronics supply voltage $U_{NS\,max}$ (rms)
253	Signed Byte	Maximum heat sink temperature
254	Unsigned Byte	Maximum contact block heating
255	Unsigned Byte	Line frequency min
256	Unsigned Byte	Line frequency max
257	Unsigned DWord	Operating hours - motor current = 18 ... 49.9 % x I_e
258	Unsigned DWord	Operating hours - motor current = 50 ... 89.9 % x I_e
259	Unsigned DWord	Operating hours - motor current = 90 ... 119.9 % x I_e
260	Unsigned DWord	Operating hours - motor current = 120 ... 1000 % x I_e
261	Unsigned DWord	Operating hours - device

Node ID	Coding	Meaning
Process image of the outputs (PIO)		
270	Bool	OPC UA - server controlling
274	Bool	Motor right (write)
275	Bool	Motor left (write)
276	Bool	Trip reset (write)
277	Bool	Emergency start (write)
278	Bool	Slow speed (write)
279	Bool	Output 1 (write)
280	Bool	Output 2 (write)
281	Bool	Parameter set Bit 0 (write)
282	Bool	Parameter set Bit 1 (write)
283	Bool	Disable quick stop (write)
290	Bool	Motor right (read)
291	Bool	Motor left (read)
292	Bool	Trip reset (read)
293	Bool	Emergency start (read)
294	Bool	Slow speed (read)
295	Bool	Output 1 (read)
296	Bool	Output 2 (read)
297	Bool	Parameter set Bit 0 (read)
298	Bool	Parameter set Bit 1 (read)
299	Bool	Disable quick stop (read)

A.2 List of abbreviations

Abbreviation	Meaning
OCM	Operator control and monitoring station
BUS	Binary Unit System
	System for transferring data between multiple nodes
CA	Certificate Authority
	Certificate authority
CCC	China Compulsory Certification.
	The CCC certificate is the compulsory Chinese certificate for various product groups, especially electronic products and products in the automobile industry.
COM	Component Object Model
	Technology for creating software components independently of the programming language
CPU	Central Processing Unit
	Central processing unit
CSA	Canadian Standards Association
	Provider of product testing and certification services in North America
CST	Central Standard Time
C-Tick	Mark of conformity with Australian EMC standards
DCOM	Distributed Component Object Model
	Extension of the existing COM interface definition, or Network OLE
DI	Digital Input
	Digital input
DIN	German Institute for Standardization
	The "Deutsche Institut für Normung" is the German institution that is responsible for standards development and that represents German interests in European and global standards organizations.
DO	Digital Output
	Digital output
DP	Distributed I/O
	Linking of distributed control system electronics for a machine to a central CPU via a bus system
EMC	Electromagnetic compatibility
EN	Europäische Norm (European standard)
Error no.	Error number
FW	Firmware
GOST	Certification for Russia
GSD	General Station Description
HMI	Human Machine Interface
	Human-machine interface
HTTP	Hypertext Transfer Protocol
	Hypertext Transfer Protocol
IEC	International Electrotechnical Commission
	International Electrotechnical Commission

Abbreviation	Meaning
IO controller	Controller used as component of PROFIBUS IO
IP	Internet Protocol
IPsec	Internet Protocol Security
IRTtop	Isochronous Real-Time Communication
LED	Light emitting diode
LLDP	Link Layer Discovery Protocol
	Vendor-neutral Layer 2 protocol
MAC address	Media Access Control address
CET	Central European Time
MRP	Media Redundancy Protocol
NTP	Network Time Protocol
	Protocol for time synchronization between computers
OB	Organization block
OLE	Object Linking and Embedding
	Object Linking and Embedding
OM	Object Manager
OPC	OLE for Process Control
OPC UA	OPC Unified Architecture
PIO	Process image of the outputs
PII	Process image of the inputs
PC	Personal computer
PE	PROFIenergy
PG	Programming device
PCS	Process Control System
PN	PROFINET
PNO	PROFINET user organization
PS	Parameter set
RS232	Standardized computer interface
SF	Group error
SFB	System function block
SFC	Sequential Function Chart
SNMP	Simple Network Management Protocol
SP	Service Pack
PLC	Programmable logic controller
TCP/IP	Transmission Control Protocol / Internet Protocol
UL	Underwriters Laboratories Inc.
	U.S. organization for certifying electrotechnical products.
USB	Universal Serial Bus
VDE	Association for Electrical, Electronic and Information Technologies (Germany)
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
VPN	Virtual private network

Glossary

Device name

Before an IO device can be addressed by an IO controller, it must have a device name since its IP address is a fixed address assigned to the device name.
This approach has been chosen for PROFINET because names are easier to manage than complex IP addresses.
The assignment of a device name to a specific IO device is comparable to the setting of the PROFIBUS address for a DP slave.
An IO device does not have a device name in the factory state. A device name must first be assigned to an IO device before it can be addressed by the IO controller, for example, for transmitting configuration data (including the IP address) during startup or for exchanging user data in cyclic operation.

Fieldbus

Industrial communication system that connects a large number of field devices such as probes (sensors), final controlling elements, and drives (actuators) to a control device.

GSD file

The properties of a PROFINET device are described in a GSD (General Station Description) file that contains all the information required
for configuration. Similar to PROFIBUS, you can integrate a PROFINET device in an automation system using a GSD file.
In the case of PROFINET IO, the GSD file is in XML format. The structure of the GSD file conforms to ISO 15734, the worldwide standard for device descriptions.

GSDML

The GSDML language is defined by the GSDML scheme. A GSDML scheme contains validity rules that allow you to check the syntax of a GSD file, for example. Manufacturers of IO devices can obtain GSDML schemes (in the form of scheme files) from PROFIBUS International.

I&M data

Identification and maintenance data.
Information stored in a module that supports you when checking the plant configuration, locating hardware changes in a plant , or performing troubleshooting for the plant. I&M data enable modules to be uniquely identified online.

IP address

In order for a PROFINET device to be addressed as an Industrial Ethernet node, it must also have an IP address that is unique within the network. The IP address consists of 4 decimal numbers, each ranging from 0 to 255, separated by dots.
The IP address is composed of

- the address of the (sub)network and

- the address of the node (generally called the host or network node)

MAC address

Each PROFINET device is assigned a globally unique device identification at the factory. This 6-byte device identification is the MAC address.
The MAC address is divided into:

- 3 bytes for the manufacturer identifier and

- 3 bytes for the device identifier (sequential number).

The MAC address can generally be read on the device from the front, e.g.:
08-00-06-6B-80-C0.

Media redundancy

The PROFINET communication module supports media redundancy according to the Media Redundancy Protocol (MRP). This function is configured using the configuration tool of the automation system, e.g., HW Config with STEP 7.

The Media Redundancy Protocol (MRP) enables redundant PROFINET communication using a ring topology without additional Ethernet switches.

Network Time Protocol

Implementation of a TCP/IP protocol for time synchronization in networks.
The NTP procedure uses hierarchical time synchronization, that is, an external clock (such as SICLOCK TM or a PC in the network) is used for synchronization.

OCM

Operator control and monitoring
OCM components enable process data to be visualized and systems to be operated.

OPC

OLE for Process Control - industrial standard that defines vendor-neutral access to industrial communication networks on the basis of OLE.

OPC (OLE for Process Control) refers to a standard interface for communication in automation engineering. With OPC, you can access OLE (Object Linking and Embedding). OLE is a component model of Microsoft. Components are the software objects or applications that make their functionality available to other applications.

Communication via the OPC interface is based on COM/DCOM. In this case, the object is the process image.

The OPC interface was developed as an industrial standard by leading companies in the automation industry with support from Microsoft Corporation. Previously, applications that access process data were restricted to the access mechanisms of the communication networks of one manufacturer. Now, the standardized OPC interface provides a uniform method of accessing the communication networks of any vendor.

OPC UA client

An OPC UA client is a user program that accesses process data via the OPC UA interface. Access to the process data is made possible by the OPC UA server.

OPC UA server

The OPC server provides the OPC client with a wide range of functions with which it can communicate via industrial networks.

OPC Unified Architecture (UA)

OPC Unified Architecture (UA) is the next generation technology of the OPC Foundation for secure and reliable data transfer and defines access to industrial communication networks.

PII/PIO

Process input image/process output image

PROFIBUS

PROFIBUS stands for "process fieldbus". PROFIBUS is a manufacturer-independent standard to network the field devices (e.g. PLCs, actuators, final controlling elements and sensors). PROFIBUS is compatible with protocols such as DP (decentralized peripherals), FMS (fieldbus message specification) and PA (process automation).

PROFIenergy

Profile for energy management in production plants.
PROFIenergy uses the PROFINET communication protocol. It controls the power consumption of automation equipment used in production via a PROFINET network.

PROFINET

PROFINET (Process Field Network) is the open Industrial Ethernet standard of Profibus & Profinet International (PI) for automation.
Within the framework of Totally Integrated Automation (TIA), PROFINET is a consistent continuation of:

- PROFIBUS DP, the established fieldbus

- Industrial Ethernet, the communication bus for the cell level

Experiences from both systems have been and are being integrated in PROFINET.

PROFINET IO controller

Device via which the connected IO devices are addressed. This means: the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

PROFINET IO device

Distributed field device assigned to one of the IO controllers.

S7 slave

An S7 slave is a slave that is fully integrated in STEP 7. It is integrated via the OM Soft Starter ES.
It supports the S7 model (diagnostic interrupts).

Simple Network Management Protocol (SNMP)

Network protocol for monitoring and controlling network elements (e.g., switches).

Soft Starter ES 2007

Soft Starter ES 2007 is the central software for commissioning, operation, and diagnostics of the SIRIUS 3RW44 High Feature Soft Starter series.

Step 7

The basic STEP 7 software is the standard tool for the SIMATIC S7, SIMATIC C7 and SIMATIC WinAC automation systems.

Index

R

Read, 51
Removal, 21
RJ45 socket, 21
Router address, 38

S

Security settings, 52
SIMATIC S7, 62
Simple Network Management Protocol, 60
SNMP, 60
Standards, 69
STEP 7, 13, 14, 23
Subnet mask, 38
Substitute value, 41

T

Target group, 7
Test version, 24
Time synchronization
    Network Time Protocol (NTP), 59
Torque, 20
Transmission rate, 14
Type of interface, 35

U

Update, 13, 19
User name, 39

V

VDI guideline, 12
Version, 34

W

Web browser, 57
    Settings, 57
Web pages
    Control, 54
    Diagnostics, 54
    Identification, 54
    Log list, 54
    Measured values, 54
    Service data, 54

Web server, 38, 54
    Activating, 55
    Contents, 54
    Logon, 58
Write, 51
Write access, 51