SIEMENS

SINAMICS

OALINK Open Application Link

Communication between two Control Units via DRIVE-CLiQ

Function Manual

Edition 08/2016

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Function Manual

Valid for	
Technology Extension	**Firmware version**
OALINK	**1.3**
Control Unit	
SINAMICS CU320-2	**from 4.6 HF5**
SINAMICS CUD	**from 1.4 HF2 (DCM) from 1.1 (DCP)**

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Legal information

Warning notice system

This Manual contains information which you must observe to ensure your own personal safety as well as to avoid material damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to equipment damage have no safety alert symbol. Depending on the hazard level, warnings are indicated in a descending order as follows:

⚠ **DANGER**
indicates that death or serious injury **will** result if proper precautions are not taken.

⚠ **WARNING**
indicates that death or serious injury **could** 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 level of danger is simultaneously applicable, the warning notice for the highest level is 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 only be operated by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, 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 are only permitted to be used for the applications listed in the catalog and in the associated technical documentation. If third-party products and components are used, then they must be recommended or approved by Siemens. These products can only function correctly and safely if they are transported, stored, set up, mounted, installed, commissioned, operated and maintained correctly. The permissible ambient conditions must be adhered to. Notices in the relevant documentation must be observed.

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All names identified with ® are registered trademarks of Siemens AG. Any other names used 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 checked the contents of this publication for consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. The information given in this document is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent editions.

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Preface

Information about the SINAMICS documentation

The SINAMICS documentation is organized in two parts:

- General documentation/catalogs
- Manufacturer/service documentation

This documentation is part of the Technical Customer Documentation for SINAMICS.

In the interests of clarity, this documentation does not contain all the detailed information for all product types and cannot take into account every possible aspect of installation, operation or maintenance.

The contents of this documentation are not part of an earlier or existing agreement, a promise, or a legal agreement, nor do they change this. All obligations on the part of Siemens can be found in the respective sales contract, which also contains the complete and sole warranty provisions. These contractual warranty provisions are neither extended nor curbed as a result of the statements made in this documentation.

Target group

This documentation addresses commissioning engineers and service personnel who use SINAMICS.

Objective

This manual contains information about all parameters, function diagrams, faults, and warnings required to commission and service the system.

This manual should be used in addition to the other manuals and tools provided for the product.

Search tools

The following guides are provided to help you locate information in this manual:

1. Table of contents for the complete manual (Page 7)
2. List of abbreviations (Page 86)
3. Index (Page 95)

Technical Support

Country-specific telephone numbers for technical support are provided at the following Internet address:

http://www.siemens.com/automation/service&support

SINAMICS

Information about SINAMICS can be found on the Internet at the following address:
http://www.siemens.com/sinamics

Table of contents

Fundamental safety instructions

1

Content

1.1 General safety instructions

⚠ WARNING

Risk of death if the safety instructions and remaining risks are not carefully observed

If the safety instructions and residual risks are not carefully observed in the associated hardware documentation, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- When assessing the risk, take into account residual risks.

⚠ WARNING

Danger to life or malfunctions of the machine as a result of incorrect or changed parameter assignment

Machines can malfunction as a result of incorrect or changed parameter assignment, which in turn can lead to injuries or death.

- Protect the parameterization (parameter assignments) against unauthorized access.
- Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY-STOP or EMERGENCY-OFF).

1.2 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, devices, and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

To ensure that Siemens products and solutions are operated securely, suitable preventive measures (e.g. cell protection concept) and each component must be integrated into a state-of-the-art holistic industrial security concept. Any third-party products that may be in use must also be taken into account. You will find more information about industrial security at:

http://www.siemens.com/industrialsecurity

To receive information about product updates on a regular basis, register for our product newsletter. You will find more information at:

http://support.automation.siemens.com

⚠ WARNING

Danger due to unsafe operating states caused by software manipulation

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

- Update your software regularly.

  You can find information and newsletters on this subject at:

  http://support.automation.siemens.com
- Integrate the automation and drive components into a holistic, state-of-the-art industrial security concept for the plant or machine.

  For more information, visit:

  http://www.siemens.com/industrialsecurity
- Make sure that you include all installed products into the holistic industrial security concept.

⚠ WARNING

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

Storing files onto exchangeable storage media amounts to an increased risk of infection, e.g. with viruses and malware. As a result of incorrect parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software by taking suitable protection measures, e.g. virus scanners.

Field of application, characteristics

2

Field of application

The OALINK (Open Application Link) Technology Extension enables bidirectional communication between two Control Units based on DRIVE-CLiQ. It must be available and parameterized on both Control Units. A maximum of two OALINK communications can be used simultaneously per Control Unit. Each OALINK communication is a point-to-point connection and can transfer maximum 120 words (maximum 240 bytes).

The Control Units are **not** synchronized via DRIVE-CLiQ. If synchronization is required, then this must be externally realized via an isochronous PROFIBUS/PROFINET.

The data to be transferred can be interconnected via BICO technology.

For example, for the following applications:

- Technology extension for the SINAMICS S120 (CU320-2 as replacement for the SIMATIC T400 technology module or the SIMATIC FM 458 application module for simple applications).
- Technology extension for the SINAMICS DCM (CU320-2 as replacement for the SIMATIC T400 technology module).
- Load distribution of physically coupled drives (master/slave drive).
- Couplings between SINAMICS DCM and SINAMICS S120.
- Couplings between SINAMICS DCP and SINAMICS S120.

Characteristics

- Connection topology
  - Bidirectional point-to-point connection between two DRIVE-CLiQ sockets.
  - No bus functionality available. It is therefore not possible to replace a fieldbus (PROFIBUS, PROFINET) with the OALINK.
  - Simultaneous operation of two OALINK communications on one Control Unit.
  - DRIVE-CLiQ socket can be parameterized for one OALINK communication.
- Net data
  - The data to be transferred can be interconnected via BICO technology.
  - Four binector-connector converters for binary send data for free use.
  - Four connector-binector converters for binary receive data for free use.
- Data transfer
  - Cyclic data transfer.
  - Sampling time can be parameterized for each OALINK communication.

Differences to SINAMICS Link

Table 2-1 Properties of the OALINK Technology Extension compared to SINAMICS Link

Feature	OALINK	SINAMICS Link
Supported Control Units	• CU320-2 DP • CU320-2 PN • Advanced CUD	• CU320-2 DP • CU320-2 PN • Advanced CUD (can only be used with PROFIBUS)
Required additional hardware	None	Communication Board Ethernet 20 (CBE20)
Connection via	DRIVE-CLiQ cable between two Control Units (without 24 V wires)	PROFINET cable between two CBE20s
Communication	Bidirectional communication via DRIVE-CLiQ	PROFINET communication
Maximum number of data to be transferred	120 words	16 words (16 or 64 nodes) Starting from firmware Version 4.8, optional: • 24 words (12 nodes) • 32 words (8 nodes)
Sampling time / transmission time	≥ 1000 µs	≥ 500 µs
Maximum number of nodes (Control Units)	3 (recommended)	64 for transmission time ≥ 1000 µs 16 for transmission time = 500 µs
Synchronization of the nodes	None Only possible externally via isochronous PROFIBUS/PROFINET	Automatic
Licensing	Only required for CU320-2 DP/PN, see "Licensing" (Page 47)	None required

Note

References: /FH1/ SINAMICS S120 Function Manual, Drive Functions
Chapter "Communication via SINAMICS Link"

References: SINAMICS DCM Control Module Operating Instructions
Chapter "Communication via SINAMICS Link"

Additional information on OALINK

The OALINK Technology Extension is described in detail in Chapter"Function description and commissioning" (Page 23).

Installation and activation

3

Contents

3.1 Installing a Technology Extension using STARTER

Note

The subsequent description in this chapter refers to the fictitious Technology Extension "ABC_OA".

The procedure described in this chapter can be correspondingly applied to any real Technology Extension.

This description to install and commission an Technology Extension is also applicable for engineering software with integrated STARTER (e.g. SIMOTION SCOUT).

3.1.1 General

Terms

- Technology Extension (TEC)

  Software component, which is installed as an additional technology package and which expands the functionality of the SINAMICS drive system.

  A Technology Extension is also known as OA-application (OA, Open Architecture).

- OA support package (OASP)

  By installing an OA support package (OASP), the STARTER commissioning tool is expanded by the corresponding Technology Extension.

  An OA support package is only required if the associated Technology Extension is used. Generally, it can be sourced through your local Siemens office.

Devices

This description is applicable for devices that require a memory card (e.g. S120, automation systems with SINAMICS Integrated).

Requirements

1. The STARTER commissioning tool as of Version V4.2 must be installed.
2. The file for the OA support package "oasp_abc_oa_v1_2_oaif04402300.zip" must be located in a known directory.

   The file name for the OA support package comprises the following elements:

   – oasp = OA support package

   – abc_oa = name of the Technology Extension

   – v1_2 = version of the Technology Extension

   – oaif04402300 = OA-interface version (OA-interface version)

     Version of the SINAMICS firmware from which this Technology Extension can be used (04402300 = V4.4).

Note

The following description assumes that control and the drive have been commissioned.

3.1.2 Installing theOA support package in STARTER

In the following, the Technology Extension is installed in STARTER as technology package.

Requirements

1. The STARTER commissioning tool has been opened.
2. No project is open.

Procedure

Proceed as follows:

1. Select the menu **Tools >Installation libraries and technology packages …**.

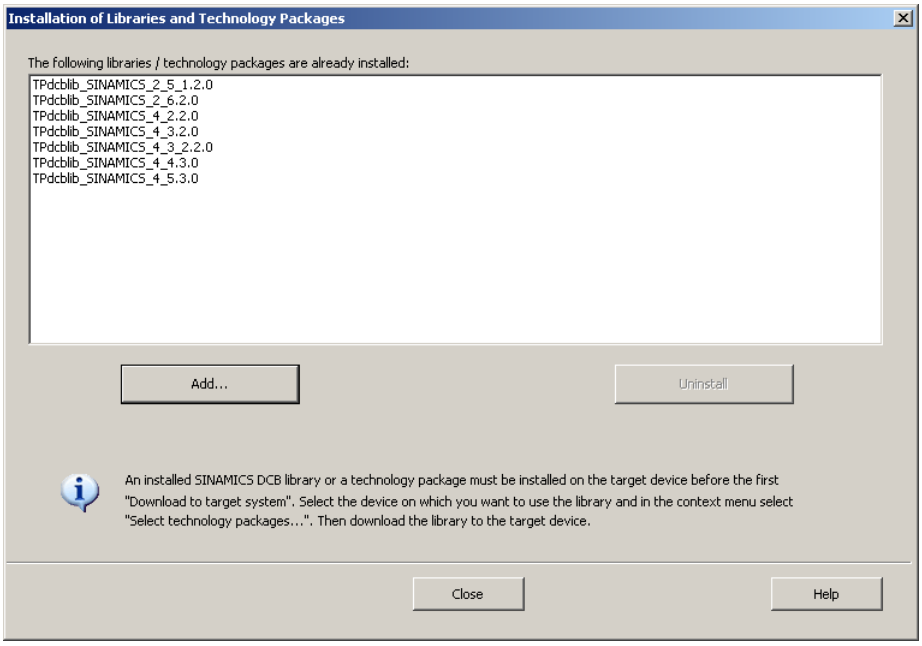


Fig. 3-1 Select OA support package (technology package) and install

2. Press the **Add …** button.
3. Open file "oasp_abc_oa_v1_2_oaif04402300.zip".

   The technology package belonging to the Technology Extension ABC is added.
4. Press the **Close** button.

3.1.3 Downloading the technology package

In the following, the Technology Extension ABC_OA is loaded into the device via STARTER.

Requirements

1. A project matching the device is open.
2. The STARTER commissioning tool is in the online mode.

Procedure

Proceed as follows:

1. Select the drive device in the project navigator.
2. In the shortcut menu (right mouse key), call the**Select technology packages ….**.

   The "Select technology packages" window opens.
3. For the technology package "ABC_OA", set the action "Load to target device"

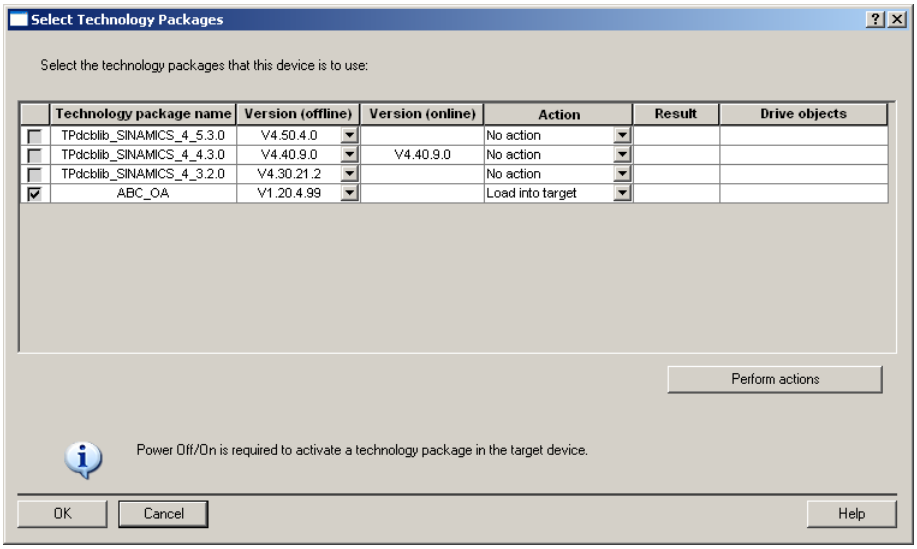


Fig. 3-2 Select Technology packages

4. Click the **Execute actions** button.

   After successfully performing the action, the "OK" result field is displayed.
5. Then perform a power on (switch off/on) for the target device.

Additional information on the "Select technology package" dialog

- For a technology package, the "Version (online)" column will only be filled after you have executed "Load into target device."
- The version data between the columns "Version (offline)" and "Version (online)" can differ. When you download the technology package, the version in the target device is always overwritten.

3.1.4 Activating the Technology Extension in the drive object

In the following, the Technology Extension is assigned to a drive object.

Requirements

1. A project matching the device is open.
2. The corresponding drive axes are created in the project.
3. The STARTER commissioning tool is in the offline mode.

Procedure

Proceed as follows:

1. In the project navigator, select the drive object for which the functionality is required (e.g. SERVO_03).
2. Select the shortcut menu **Properties** (right mouse key)
3. Select the **Technology packages** tab.
4. Activate the checkbox for "ABC_OA" (set the check mark).

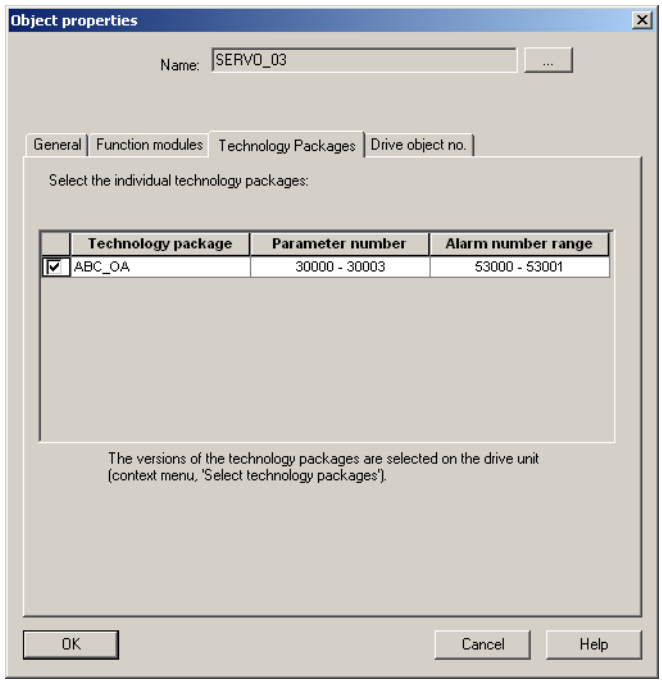


Fig. 3-3 Object properties

5. Press the **OK** button.

6. Checking the expert list of the drive object

   The additional parameters of the installed Technology Extension must now be visible in the expert list of the corresponding drive object.

	Param...	Data	Parameter text	Offline value SERVO_03	Unit	Modifiable to	Access level	Minimum	Maximum
	All	A	All	All	All	All	All	All	All
1092	p9850		SI SGE changeover tolerance time (Motor Mo...	500000.00	µs	Commissioni...	3	0	2E+006
1093	p9851		SI STO/SBC/SS1 debounce time (Motor Module)	0.00	µs	Commissioni...	3	0	100000
1094	p9852		SI Safe Stop 1 delay time (Motor Module)	0.00	ms	Commissioni...	3	0	300000
1095	p9858		SI transition time STOP F to STOP A (Control ...	0.00	µs	Commissioni...	3	0	3E+007
1096	⊞r9870[0]		SI version drive-integrated safety function (M...	4			3		
1097	⊞r9871		SI common functions (Motor Module	1FFFFH			3		
1098	⊞r9872		CO/BO: SI status list (Motor Module)	0H			2		
1099	r9880		SI monitoring clock cycle (Motor Module)	4.00	ms		3		
1100	⊞r9881[0]		SI Motion Sensor Module Node Identifier seco...	30H			3		
1101	⊞r9890[0]		SI version (Sensor Module), Safety Version (...	0			3		
1102	⊞r9894[0]		SI crosswise comparison list (Motor Module)	1			3		
1103	r9895		SI diagnostics STOP F (Motor Module)	0			2		
1104	p9897		SI Motion pulse suppression failsafe delay ti...	0.00	µs	Commissioni...	3	0	800000
1105	r9898		SI actual checksum SI parameters (Motor Mod...	88DBF4C5H			3		
1106	p9899		SI reference checksum SI parameters (Motor	0H		Commissioni	3	0H	FFFFFFFFH
1107	p30000		MINIFOO Meldungen steuern	[0] Meldungen zurückse...		Operation	1		
1108	p30001		CI: MINIFOO P-Regler Eingang Signalquelle	0		Operation	1		
1109	r30002		CO: MINIFOO P-Regler Ausgangssignal	0.00			1		
1110	p30003		MINIFOO P-Regler Verstärkungsfaktor	1.00		Operation	1	0	1000

Fig. 3-4 Expert list

7. Download the project

   To activate the Technology Extension, for the drive object, a project download is required (establish the ONLINE mode, download the project).

3.1.5 Commissioning the Technology Extension

By setting the corresponding additional parameters, the Technology Extension ABC_OA can be commissioned using the STARTER commissioning tool via the expert list.

Parameters p30000 … p30003 are available for ABC_OA.

Commissioning OALINK

For the OALINK Technology Extension, parameters starting at p31770 are available, see "List of parameters" (Page 51).

Commissioning is described in detail in Chapter "Function description and commissioning" (Page 23).

3.2 Uninstalling a Technology Extension using STARTER

Uninstalling a Technology Extension via STARTER is performed in the inverse sequence to that of installation.

1. Deactivating the Technology Extension in the drive object, see "Activating the Technology Extension in the drive object" (Page 20).
2. Delete the technology package, belonging to the Technology Extension, in the drive unit, see "Downloading the technology package" (Page 19).
   – Deactivate the technology package in the OFFLINE mode.
   – For the technology package in the ONLINE mode, select the "Delete" action and press the **Execute actions** button.
3. Uninstalling the Technology Extension in STARTER, see "Installing theOA support package in STARTER" (Page 18).

Function description and commissioning

4

Contents

This chapter describes the method of operation and the commissioning of the OALINK Technology Extension. It complements the following chapters:

- "Field of application, characteristics" (Page 13)
- "Installation and activation" (Page 15)

4.1 OALINK method of operation

The OALINK Technology Extension enables bidirectional communication between the following Control Units based on DRIVE-CLiQ:

- CU320-2 from firmware version 4.6 HF5 (V04.60.21.13)

  Control Unit for SINAMICS G130, G150, S120, S150, GH150, GM150, GL150, SL150, SM120 CM.

- Advanced CUD

  Control Unit for SINAMICS DCM, DCP

  – SINAMICS DCM from firmware version 1.4 HF2 (V01.40.09.02)

  – SINAMICS DCP from firmware version 1.1 (V01.10.07.00)

4.1.1 Commissioning

The following description of the functionality also describes the normal sequence for commissioning the OALINK.

The "Examples of OALINK" (Page 35) also serve as a guide for the commissioning.

The installed OALINK Technology Extension is also transferred with the "Load to file system". This can be used for a series commissioning.

Requirements

The following requirements must be satisfied in order to commission the OALINK Technology Extension:

1. The OALINK Technology Extension is installed as technology package in STARTER, see "Installing theOA support package in STARTER" (Page 18).
2. The OALINK Technology Extension has been loaded to the two Control Units that communicate with each other via OALINK, see "Downloading the technology package" (Page 19).
3. The OALINK Technology Extension has been assigned to the Control Unit drive object on both Control Units, see "Activating the Technology Extension in the drive object" (Page 20).

Licensing may be required depending on the Control Unit, see "Licensing" (Page 47).

Establishing the DRIVE-CLiQ wiring

In the offline mode, proceed as follows:

1. Select a free DRIVE-CLiQ socket on the two Control Units that are to be connected.

   Generally, socket X102 or X103 is used for the CU320-2 because X100 and X101 are usually used for the connection of other DRIVE-CLiQ components (e.g. Motor Modules). Socket X101 is generally used for the CUD.

2. On both Control Units, assign the DRIVE-CLiQ socket used for the OALINK communication.

   A DRIVE-CLiQ socket is assigned to the OALINK communication via parameter p31770[0…1].

3. Download the project.

4. Directly connect the two DRIVE-CLiQ sockets with a DRIVE-CLiQ cable (without 24 V wires).

   The maximum permissible cable lengths must be observed!

   The DRIVE-CLiQ wiring between the two Control Units must not be routed via a DRIVE-CLiQ Hub Module!

Point 3 is omitted in the online mode.

The relevant DRIVE-CLiQ socket is marked with a "u" (up to V4.3) or "In use" (as of V4.4) in the topology of the STARTER commissioning tool.

Note

The following conditions must be fulfilled before the DRIVE-CLiQ wiring between the Control Units is established:

1. The Technology Extension must be installed and activated on both Control Units.
2. Parameter p31770[0…1] to activate a DRIVE-CLiQ socket must be set on both Control Units and be active.

If this sequence is not maintained, the Control Units do not power up, and fault F01357 is displayed.

Configuration

The configuration of the OALINK is shown in the following function diagrams:

- "7320 – OALINK overview" (Page 72)
- "7321 – OALINK configuration" (Page 73)

The settings required for the configuration are as follows:

1. Set the sampling time for the OALINK communication.

   The permissible sampling times are listed in detail in the description of p31771[0…1], see "List of parameters" (Page 51). The minimum sampling time is 1 ms.

   The sampling time for the OALINK communication should be an integer multiple of the sampling time for the subordinate control.

   If not parameterized correctly, the closest valid value is set automatically.

   Note

   The same sampling time should be set for the Control Units involved in the OALINK communication. This is not checked by the software.

2. Set the number of data words to be transferred

   The OALINK Technology Extension enables the cyclic data transfer of the following data:

   – Data of the Integer16 type (1 word)

   – Data of the Integer32 type (2 words)

   – Data of the FloatingPoint32 type (2 words)

   The maximum number of words that can be transferred can be set in p31778/p31780 or p31779/p31781 (maximum 120 words).

   Note

   The following applies for the number of receive words:

   - The same number of words for sending must be set on the other Control Unit involved in the OALINK communication.

   The following applies for the number of send words:

   - The same number of words for receiving must be set on the other Control Unit involved in the OALINK communication.

   For example:

   Parameter p31778 (OALINK1 receive words maximum number) of Control Unit 1
   and
   parameter p31780 (OALINK1 send words maximum number) of Control Unit 2
   must be set the same.

Note

After changing the value, the expert list of the STARTER commissioning tool is updated as follows:

- Offline mode

  Immediately after the change.

- Online mode

  After executing function "Load project to PG".

3. Parameterize the BICO interconnections

   The BICO interconnections provided by OALINK can be seen in the following function diagrams:

   – "7322 – OALINK receive data interconnection" (Page 74)

   – "7323 – OALINK send data interconnection" (Page 75)

   The BICO interconnections must be established for the respective application.

4.1.2 Data transfer

Update of the connector inputs/outputs of OALINK

At the start of the sampling time, the data received last is provided at the OALINK connector outputs (r31790, r31791, r31792 or r31796, r31797, r31798). During the sampling time, this data remains unchanged and is taken over by the connected connector inputs.

At the end of the sampling time, the OALINK connector inputs (p31793, p31794, p31795 or p31799, p31800, p31801) take over the actual data from the connected connector outputs as the data to be sent.

The data exchange is then performed via DRIVE-CLiQ.

The following figure shows the schematic sequence of the data transfer between two synchronized Control Units. It refers to "Example 2 – Control Unit for technology" (Page 38) and shows the data transfer between the CU for technology and the CU for AC-drives.

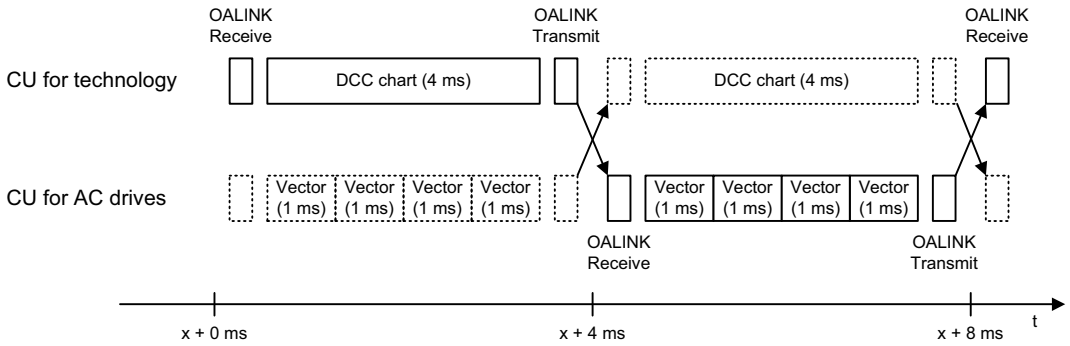


Fig. 4-1 Schematic sequence of the data transfer for synchronized Control Units

The following has to be observed for the sampling times on the two Control Units that are involved in the OALINK communication:

- The sampling times of the controls, which send and receive data via OALINK, should have an integer multiple relationship to one another.

  The following applies to the control sampling times in the example:

  – On the CU for technology:

    On drive object CU_S, the sampling time for DCC p21000[0] * r21002. With p21000[0] = 1 and r21002 = 4 ms, a sampling time of 4 ms is obtained.

  – On the CU for AC-drives:

    On the VECTOR drive object, the sampling time for the setpoint channel p0115[3] = 1 ms.

- The sampling time for the OALINK communication complies with the slowest Control Unit (the CU for technology in the example). It should be set the same for both Control Units.

Synchronization

The sampling times and system clock cycles of the two Control Units involved are **not** synchronized by the OALINK technology extension.

The synchronization of the Control Units involved is only possible using a higher-level control and isochronous PROFIBUS/PROFINET.

A distinction is made between the following:

- The sampling times and system clock cycles of the Control Units involved are synchronized **and** the sampling times are set the same.

  See "Synchronized operation" (Page 29).

- The sampling times and system clock cycles of the Control Units involved are **not**synchronized or the sampling times are set differently.

  See "Non-synchronized operation" (Page 30).

Synchronized operation

Synchronized operation is involved if the following two conditions are satisfied:

1. The system clock cycles and sampling times of the Control Units involved are synchronized using a higher-level control and isochronous PROFIBUS/PROFINET.
2. The sampling times are set the same.

As shown in Section "Update of the connector inputs/outputs of OALINK" (Page 28), the following applies when receiving or sending data:

- A Control Unit receives data from the other Control Unit at the beginning of the sampling time.
- A Control Unit sends data to the other Control Unit at the end of the sampling time.

Due to the synchronization, the sampling times of the Control Units involved start and end at the same instant in time. This is the reason that one Control Unit always receives the data that the other Control Unit sent in the previous sampling time. This is shown in Fig. "Schematic sequence of the data transfer for synchronized Control Units" (Page 28).

The setting of parameter p31773[0] (OALINK1) or p31773[1] (OALINK2) is of no significance. This parameter controls whether data is received again when access collisions occur. It can also be set to a value of 0, as no access collisions occur.

If no other errors occur during data transfer, the following binector outputs for the status display continually have a 0-signal:

- r31786.3 (OALINK1) or r31787.3 (OALINK2): Receive data being repeated
- r31786.4 (OALINK1) or r31787.4 (OALINK2): Consistency error identified
- r31786.5 (OALINK1) or r31787.5 (OALINK2): Data package lost

See also "Data transfer errors" (Page 32).

Non-synchronized operation

Non-synchronized operation is involved if one of the two conditions is satisfied:

- The sampling times and system clock cycles of the Control Units involved are **not** synchronized.
- The sampling times are set differently.

For OALINK communication with an Advanced CUD, the Control Units involved cannot be synchronized, as isochronous PROFIBUS/PROFINET operation is not possible at the Advanced CUD.

In non-synchronized operation, two factors influence data reception:

- The clocks of the Control Units diverge as a result of production tolerances of the clock cycle generators. The sampling times of the Control Units shift with respect to one another, although the same values are set.

  As a consequence, the following occur at periodic intervals:

  – The instants in time within the particular sampling time, when the two Control Units send or receive data, shift past one another.

  – Therefore, the receiving Control Unit identifies access collisions; as a consequence, data packages are received twice or are skipped.

- Within a sampling time, the instants in time where data are sent or received are not precisely defined. Especially the instant in time that data is sent fluctuates within a sampling time. This instant in time depends on the CPU utilization level of the Control Unit, as data is sent at the end of the sampling time, after all other processes have been executed.

  The following occurs as a result of these fluctuations:

  – As described above, the instants in time when the two Control Units send or receive data, shift past one another. However, this periodic process is discontinuous. The sequence (timing) for sending and receiving is undefined over several sampling times.

  – As a consequence, the receiving Control Unit identifies the access collisions, described above, over several sampling times. As a result of these access collisions, some data packages are received twice, while others are skipped.

These access collisions are indicated at binector outputs r31786.3…5 (OALINK1) or r31787.3…5 (OALINK2), see "Status displays for non-synchronized operation" (Page 31).

Status displays for non-synchronized operation

The status displays depend on how the receiving Control Unit responds to access collisions. In parameter p31773[0] (OALINK1) or p31773[1] (OALINK2), it is defined whether "receive data" is repeated when access collisions occur. Possible settings are:

- **Repeat data receive** (p31773[0, 1] = 1:

  This is the recommended setting (factory setting).

  In this case, when access collisions are identified, "data receive" is repeated so that no consistency errors occur.

  The repeat operation (receive data being repeated) is indicated as follows:

  – OALINK1: Binector output r31786.3 = 1

    In conjunction with this, binector output r31786.5 = 1 is set, if it was identified that a data package was lost.

    Binector output r31786.4 (consistency error identified) continually has a 0-signal.

  – OALINK2: Binector output r31787.3 = 1

    In conjunction with this, binector output r31787.5 = 1 is set, if it was identified that a data package was lost.

    Binector output r31787.4 (consistency error identified) continually has a 0-signal.

  Note

  Even if the signal in r31786.5 or r31787.5 is active over several sampling times, a maximum of one data package is lost.

- **Do not repeat data receive** (p31773[0, 1] = 0:

  With access collisions, data receive is **not** repeated. Instead, a consistency error is identified and indicated as follows:

  – OALINK1: Binector output r31786.4 = 1

    The number of consistency errors that occurred is indicated in r31783[0].

  – OALINK2: Binector output r31787.4 = 1

    The number of consistency errors that occurred is indicated in r31783[1].

  Under certain circumstances, these consistency errors are indicated over several sampling times.

  However, the OALINK Technology Extension always ensures that all BICO parameters have valid values.

For non-synchronized operation, we urgently recommend that p31773[0, 1] is kept at a value of 1 (factory setting) so that when necessary, data receive can be repeated.

Data transfer errors

In addition to the consistency errors for non-synchronized Control Units – or different system clock cycles and sampling times – additional data transfer errors can occur. They are caused, for example, by EMC-problems or poor or dirty plug connections. They are displayed at binector outputs r31786 (OALINK1) or r31787 (OALINK2).

- Consistency error identified: Bit 4 = 1

  See also: "Status displays for non-synchronized operation" (Page 31).

  The number of consistency errors that occurred is indicated in r31783[0, 1].

- Lost data package detected: Bit 5 = 1

  See also: "Status displays for non-synchronized operation" (Page 31).

  This bit is set as long as the DRIVE-CLiQ connection is interrupted.

- Checksum error detected: Bit 6 = 1

  At the same time, alarm A53482 with fault cause 2 is triggered.

  The number of checksum errors that occurred is indicated in r31785[0, 1].

- DRIVE-CLiQ connection interrupted: Bit 8 = 0

  This bit is only influenced after a system-related delay time (typically longer than 100 ms).

  At the same time, alarm A53480 with fault cause 2 is triggered.

A received data package is considered to be valid, if bit 4 = bit 5 = bit 6 = 0. As soon as one of these bits assumes a value of 1, the timer starts to run, which is reset when a valid data package is received.

If, within the tolerance time (p31772[0] or p31772[1]), no valid data package was received, bit 7 is set to = 0 (tolerance time communication problem exceeded).

Bit 2 (data being transfered) is formed by AND'ing bit 7 and bit 8.

Bit 1 (wait for data transfer) has the inverted signal of bit 2.

The user can now individually respond to these data transfer errors. For instance, he interconnects the binector inputs of the basic system for external faults (p2106, p2107, p2108) or external alarms (p2112, p2116, p2117) with the following binector outputs:

- OALINK1: r31786.2 or r31786.7
- OALINK2: r31787.2 or r31787.7

4.1.3 Binector-connector converters and connector-binector converters

Binector-connector converters (send words)

A total of 4 binector-connector converters are available for the two OALINK communications. Individual binary signals can be combined into a send word at a connector output via these converters for further interconnection.

An overview of the individual converters is shown in the following function diagrams:

- "7320 – OALINK overview" (Page 72)
- "7324 – OALINK binector-connector converter" (Page 76)

The interconnection of connector input p31793[0…n] (OALINK1) or p31799[0…n] (OALINK2) with connector output r31807[0…3] (converter 1 … 4) results in the following:

- Assignment to OALINK1 or OALINK2.
- Activation of the corresponding binector-connector converter.
- Calculation with the sampling time of the assigned OALINK communication.

Each individual signal can be inverted before output via the connector output. The converted signals are available in the appropriate connector output for further interconnection.

The following parameters are available for the binector-connector converters:

Table 4-1 Parameters for binector-connector converters

Converter	Signal source	Inversion	Result
1	CI: p31802[0…15]	p31806[0].0…15	CO: r31807[0]
2	CI: p31803[0…15]	p31806[1].0…15	CO: r31807[1]
3	CI: p31804[0…15]	p31806[2].0…15	CO: r31807[2]
4	CI: p31805[0…15]	p31806[3].0…15	CO: r31807[3]

Example:

Converter 2 is to be used to convert binary signals and to send them with send word 1 via OALINK1.

CI: p31793[0] = r31807[1]

Binector-connector converter 2 is assigned to OALINK1, activated and calculated with the sampling time of OALINK1 (p31771[0]). The result is available in connector output r31807[1] for further interconnection.

Connector-binector converters (receive words)

A total of four connector-binector converters are available for the two OALINK communications. Receive words can be separated bit-by-bit via these converters for further interconnection.

An overview of the individual converters is shown in the following function diagrams:

- "7320 – OALINK overview" (Page 72)
- "7325 – OALINK connector-binector converter" (Page 77)

The interconnection of connector input p31808[0…3] (converter 1 … 4) with connector output r31790[0…n] (OALINK1) or r31796[0…n] (OALINK2) results in the following:

- Assignment to OALINK1 or OALINK2.
- Activation of the corresponding connector-binector converter.
- Calculation with the sampling time of the assigned OALINK communication.

Each individual signal can be inverted before output via the binector output. The converted signals are available in the appropriate binector output for further bit-by-bit interconnection.

The following parameters are available for the connector-binector converters:

Table 4-2 Parameters for connector-binector converters

Converter	Signal source	Inversion	Result
1	CI: p31808[0]	p31809[0].0…15	BO: r31810.0…15
2	CI: p31808[1]	p31809[1].0…15	BO: r31811.0…15
3	CI: p31808[2]	p31809[2].0…15	BO: r31812.0…15
4	CI: p31808[3]	p31809[3].0…15	BO: r31813.0…15

Example:

Converter 3 is to be used to receive receive word 1 via OALINK2 and to convert it.

p31808[2] = r31796[0]

Connector-binector converter 3 is assigned to OALINK2, activated and calculated with the sampling time of OALINK2 (p31771[1]). The result is available in the binector outputs r31812.0…15 for further interconnection.

4.2 Examples of OALINK

4.2.1 Example 1 – master/slave drive

A conveyor belt is driven by two SINAMICS G150 drives. The master drive passed on the speed setpoint, torque setpoint and control word 1 to the slave drive. It receives the status word of the slave drive as feedback message. The master drive can only start to turn when the slave drive signals "Drive ready".

The specification of the setpoints can be performed via an extensive DCC on the master drive.

DRIVE-CLiQ topology

The following figure shows such an arrangement:

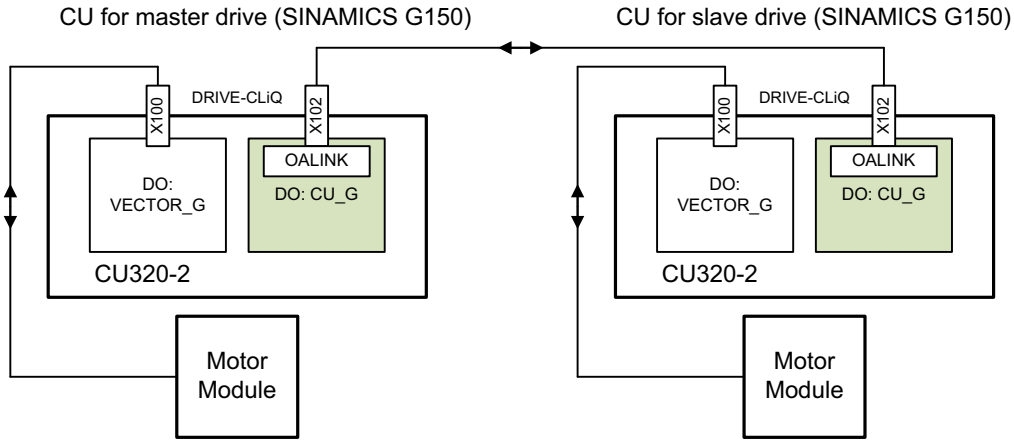


Fig. 4-2 Example 1 – DRIVE-CLiQ topology

Installing the Technology Extension

The following requirements must be satisfied in order to commission the OALINK Technology Extension:

1. The Technology Extension is installed as technology package in STARTER, see "Installing theOA support package in STARTER" (Page 18).
2. It has been loaded to the two Control Units that communicate with each other via OALINK, see "Downloading the technology package" (Page 19).
3. It has been assigned to the Control Unit drive object on both Control Units, see "Activating the Technology Extension in the drive object" (Page 20).
4. The DRIVE-CLiQ wiring has been established between both Control Units, see "Establishing the DRIVE-CLiQ wiring" (Page 25).

Licensing is required for the CU320-2 Control Units, see "Licensing" (Page 47).

Commissioning the Technology Extension

Table 4-3 Example 1 – configuration of the OALINK technology extension

	Parameters	Value	
		Control Unit for master drive (SINAMICS G150, CU320-2)	**Control Unit for slave drive (SINAMICS G150, CU320-2)**
1	p0009 Device commissioning parameter filter	= 3 Drive basic configuration	= 3 Drive basic configuration
2	p31770[0] OALINK activation, OALINK1	= 2 DRIVE-CLiQ socket X102	= 2 DRIVE-CLiQ socket X102
3	p31771[0] OALINK sampling time, OALINK1	= 2 ms	= 2 ms As for p31771[0] on Control Unit for master drive
4	p31778 OALINK1 receive words maximum number	= 1 1 * Integer16 (word)	= 5 As for p31780 on Control Unit for master drive
5	p31780 OALINK1 send words maximum number	= 5 1 * Integer16 (word), 2 * FloatingPoint32 (doubleword)	= 1 As for p31778 on Control Unit for master drive
6	Parameterization of the BICO interconnections See Table "Example 1 – list of the BICO interconnections" (Page 37)		
7	p0009 Device commissioning parameter filter	= 0 Ready	= 0 Ready

The maximum number of send words or receive words is calculated as follows:

- Number of send words (p31780) =
  = number of connector inputs used with Integer16 +
  + 2 * number of connector inputs used with Integer32 or FloatingPoint32
- Number of receive words (p31778) =
  = number of connector outputs used with Integer16 +
  + 2 * number of connector outputs used with Integer32 or FloatingPoint32

Table 4-4 Data type of the BICO parameters

	Integer16	Integer32	FloatingPoint32
Connector inputs	p31793	p31794	p31795
Connector outputs	r31790	r31791	r31792

The required BICO interconnections are shown graphically and in tabular form in the following:

- Fig. "Example 1 – display of the BICO interconnections" (Page 37)
- Table "Example 1 – list of the BICO interconnections" (Page 37)

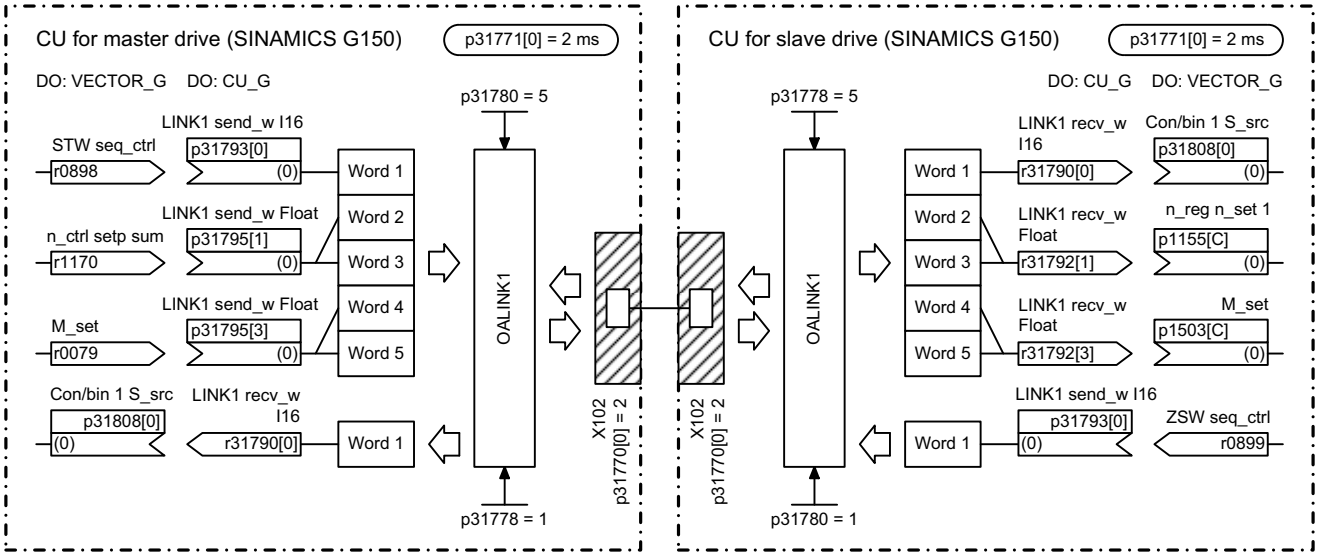


Fig. 4-3 Example 1 – display of the BICO interconnections

Table 4-5 Example 1 – list of the BICO interconnections

Signal sink (connector/binector input)		Signal sink (connector/binector output)	
BICO interconnections on Control Unit for master drive (SINAMICS G150, CU320-2)			
CI: p31793[0] DO: CU_G	OALINK1 send words integer16 Send word 1	CO: r0898 DO: VECTOR_G	Control word, sequence control
CI: p31795[1] DO: CU_G	OALINK1 send words FloatingPoint32 Send word 2, 3	CO: r1170 DO: VECTOR_G	Speed controller setpoint sum
CI: p31795[3] DO: CU_G	OALINK1 send words FloatingPoint32 Send word 4, 5	CO: r0079 DO: VECTOR_G	Torque setpoint
CI: p31808[0] DO: CU_G	OALINK con/bin converter signal source Converter 1	CO: r31790[0] DO: CU_G	OALINK1 receive words Integer16 Receive word 1
BI: p0852[C] DO: VECTOR_G	Enable operation / disable operation	BO: r31810.7 DO: CU_G	OALINK con/bin converter 1 result Bit 7: Drive ready
BICO interconnections on Control Unit for slave drive (SINAMICS G150, CU320-2)			
CI: p31808[0] DO: CU_G	OALINK con/bin converter signal source Converter 1	CO: r31790[0] DO: CU_G	OALINK1 receive words Integer16 Receive word 1
CI: p1155[C] DO: VECTOR_G	Speed controller, speed setpoint 1	CO: r31792[1] DO: CU_G	OALINK1 receive words FloatingPoint32 Receive word 2, 3
CI: p1503[C] DO: VECTOR_G	Torque setpoint	CO: r31792[3] DO: CU_G	OALINK1 receive words FloatingPoint32 Receive word 4, 5
CI: p31793[0] DO: CU_G	OALINK1 send words Integer16 Send word 1	CO: r0899 DO: VECTOR_G	Status word, sequence control
Binector inputs according to function diagram [2501], see: /LH2/ SINAMICS G130/G150 List Manual DO: VECTOR_G		BO: r31810.0…15 DO: CU_G	OALINK con/bin converter 1 result

Note

All parameters of the OALINK technology extension, not listed in the tables, above should be kept with the factory setting.

NOTICE
Incomplete parameterization in the example
Further parameters must be set for the successful operation of a master/slave drive. They are not shown in this manual.

4.2.2 Example 2 – Control Unit for technology

In some cases, the computing capacity of a Control Unit that controls the drives is not sufficient for additional computation-intensive processes (e.g. extensive DCC).

As a remedy, the computation-intensive processes can be performed on a separate Control Unit for technology. The Control Unit for technology exchanges the required data with the Control Unit for the drives via OALINK.

In this example, a SINAMICS S120 with CU320-2 Control Unit is used as the Control Unit for technology. An extensive DCC with technological function runs on this Control Unit, which supplies the setpoints and control signals to the following Control Units:

- Control Unit for AC drives:

  SINAMICS S120 with CU320-2 Control Unit and two Motor Modules

- Control Unit for DC drive:

  SINAMICS DCM with Advanced CUD Control Unit

The DCC receives actual values and status signals from these Control Units.

DRIVE-CLiQ topology

There are four DRIVE-CLiQ sockets (X100 … X103) for the CU320-2 Control Unit. The Advanced CUD Control Unit has two DRIVE-CLiQ sockets (X100, X101).

The following figure shows such an arrangement:

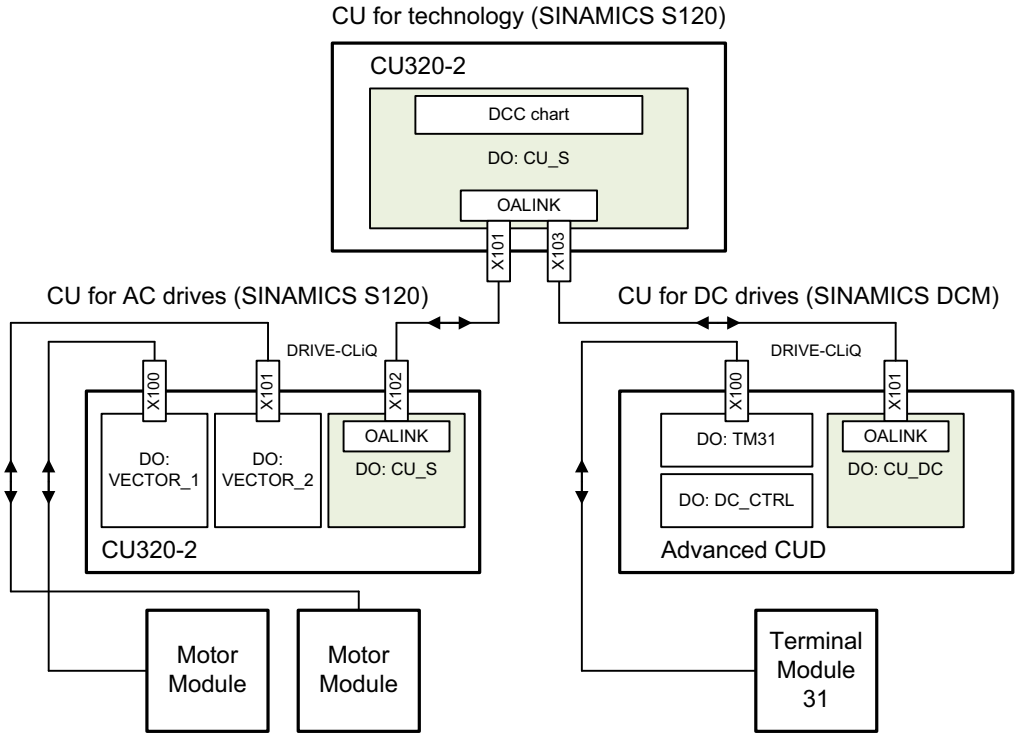


Fig. 4-4 Example 2 – DRIVE-CLiQ topology

Installing the Technology Extension

The following requirements must be satisfied in order to commission the OALINK Technology Extension:

1. The Technology Extension is installed as technology package in STARTER, see "Installing theOA support package in STARTER" (Page 18).
2. It has been loaded to the two Control Units that communicate with each other via OALINK, see "Downloading the technology package" (Page 19).
3. It has been assigned to the Control Unit drive object on both Control Units, see "Activating the Technology Extension in the drive object" (Page 20).
4. The DRIVE-CLiQ wiring has been established between both Control Units, see "Establishing the DRIVE-CLiQ wiring" (Page 25).

Licensing is only required for the CU320-2 Control Units, see "Licensing" (Page 47).

Commissioning the Technology Extension

Table 4-6 Example 2 – configuration of the OALINK technology extension

	Parameters	Value		
		Control Unit for technology (SINAMICS S120, CU320-2)	**Control Unit for AC drives (SINAMICS 120, CU320-2)**	**Control Unit for DC drive (SINAMICS DCM, Advanced CUD)**
1	p0009 Device commissioning parameter filter	= 3 Drive basic configuration	= 3 Drive basic configuration	= 3 Drive basic configuration
2	p31770[0] OALINK activation, OALINK1	= 1 DRIVE-CLiQ socket X101	= 2 DRIVE-CLiQ socket X102	= 1 DRIVE-CLiQ socket X101
3	p31770[1] OALINK activation, OALINK2	= 3 DRIVE-CLiQ socket X103	– Factory setting 999 OALINK2 deactivated	– Factory setting 999 OALINK2 deactivated
4	p31771[0] OALINK sampling time, OALINK1	= 4 ms	= 4 ms As for p31771[0] on Control Unit for technology	= 4 ms As for p31771[1] on Control Unit for technology
5	p31771[1] OALINK sampling time, OALINK2	= 4 ms	– Factory setting 8 ms	– Factory setting 8 ms
6	p31778 OALINK1 receive words maximum number	= 8 2 * Integer16 (word), 3 * FloatingPoint32 (doubleword)	= 6 As for p31780 on Control Unit for technology	= 3 As for p31781 on Control Unit for technology
7	p31779 OALINK2 receive words maximum number	= 3 1 * Integer16 (word), 1 * FloatingPoint32 (doubleword)	– Factory setting 0	– Factory setting 0
8	p31780 OALINK1 send words maximum number	= 6 2 * Integer16 (word), 2 * FloatingPoint32 (doubleword)	= 8 As for p31778 on Control Unit for technology	= 3 As for p31779 on Control Unit for technology
9	p31781 OALINK2 send words maximum number	= 3 1 * Integer16 (word), 1 * FloatingPoint32 (doubleword)	– Factory setting 0	– Factory setting 0
10	Parameterization of the BICO interconnections See Table "Example 2 – list of the BICO interconnections" (Page 43)			
11	p0009 Device commissioning parameter filter	= 0 Ready	= 0 Ready	= 0 Ready

The maximum number of send words or receive words is calculated as follows:

- Number of send words =
  = number of connector inputs used with Integer16 +
  + 2 * number of connector inputs used with Integer32 or FloatingPoint32
- Number of receive words =
  = number of connector outputs used with Integer16 +
  + 2 * number of connector outputs used with Integer32 or FloatingPoint32

Table 4-7 Data type of BICO parameters

	Integer16	**Integer32**	**FloatingPoint32**
Connector inputs	p31793, p31799	p31794, p31800	p31795, p31801
Connector outputs	r31790, r31796	r31791, r31797	r31792, r31798

The required BICO interconnections are shown graphically and in tabular form in the following:

- Fig. "Example 2 – display of the BICO interconnections" (Page 42)
- Table "Example 2 – list of the BICO interconnections" (Page 43)

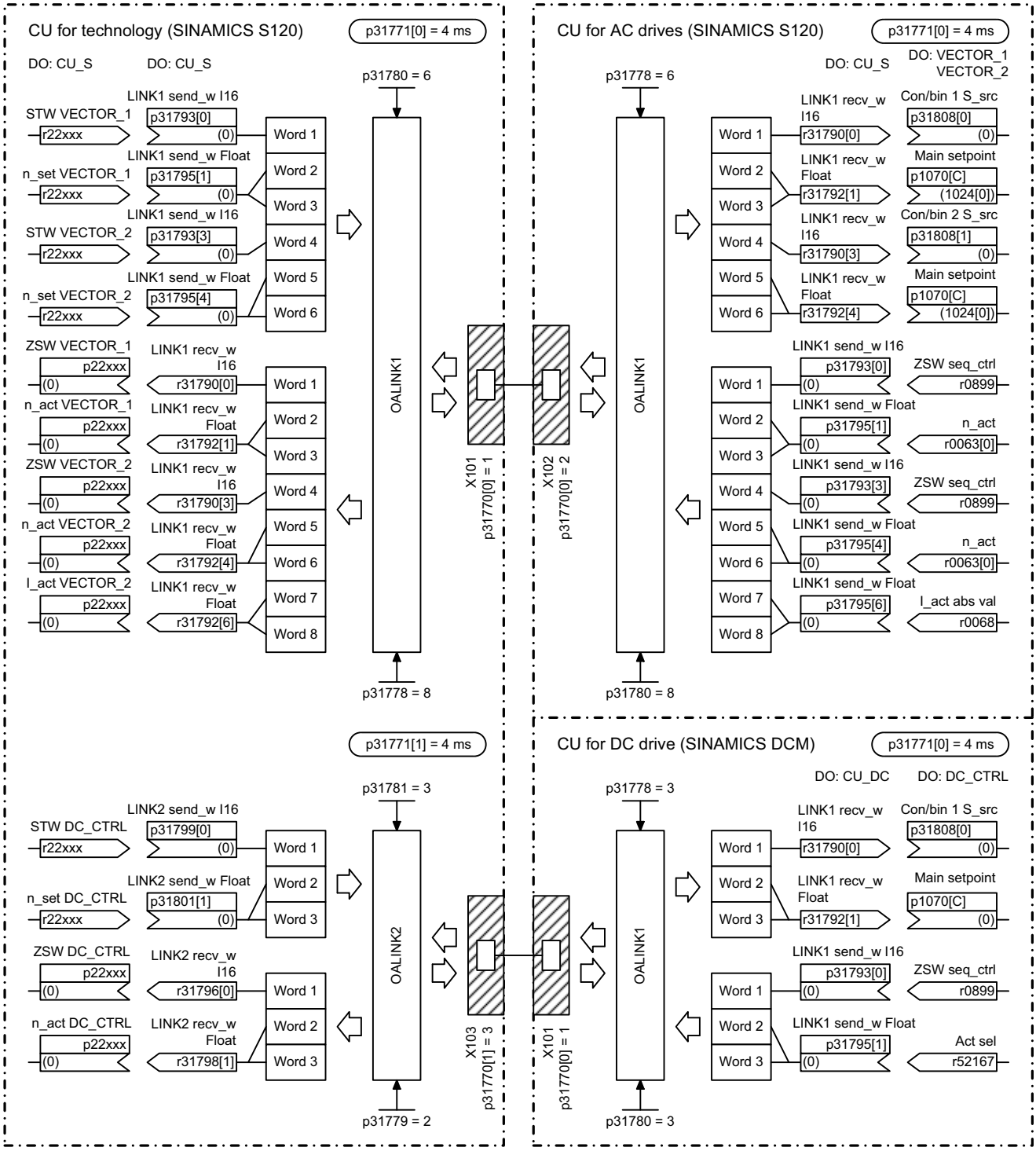


Fig. 4-5 Example 2 – display of the BICO interconnections

Table 4-8 Example 2 – list of the BICO interconnections

Signal sink (connector/binector input)		Signal sink (connector/binector output)	
BICO interconnections on Control Unit for technology (SINAMICS S120, CU320-2)			
CI: p31793[0] DO: CU_S	OALINK1 send words Integer16 Send word 1	CO: r22xxx DO: CU_S	Control word for VECTOR_1
CI: p31795[1] DO: CU_S	OALINK1 send words FloatingPoint32 Send word 2, 3	CO: r22xxx DO: CU_S	Speed setpoint for VECTOR_1
CI: p31793[3] DO: CU_S	OALINK1 send words Integer16 Send word 4	CO: r22xxx DO: CU_S	Control word for VECTOR_2
CI: p31795[4] DO: CU_S	OALINK1 send words FloatingPoint32 Send word 5, 6	CO: r22xxx DO: CU_S	Speed setpoint for VECTOR_2
CI: p22xxx DO: CU_S	Status word from VECTOR_1	CO: r31790[0] DO: CU_S	OALINK1 receive words Integer16 Receive word 1
CI: p22xxx DO: CU_S	Actual speed value from VECTOR_1	CO: r31792[1] DO: CU_S	OALINK1 receive words FloatingPoint32 Receive word 2, 3
CI: p22xxx DO: CU_S	Status word from VECTOR_2	CO: r31790[3] DO: CU_S	OALINK1 receive words Integer16 Receive word 4
CI: p22xxx DO: CU_S	Actual speed value from VECTOR_2	CO: r31792[4] DO: CU_S	OALINK1 receive words FloatingPoint32 Receive word 5, 6
CI: p22xxx DO: CU_S	Actual current value from VECTOR_2	CO: r31792[6] DO: CU_S	OALINK1 receive words FloatingPoint32 Receive word 7, 8
CI: p31799[0] DO: CU_S	OALINK2 send words Integer16 Send word 1	CO: r22xxx DO: CU_S	Control word for DC_CTRL
CI: p317801[1] DO: CU_S	OALINK2 send words FloatingPoint32 Send word 2, 3	CO: r22xxx DO: CU_S	Speed setpoint for DC_CTRL
CI: p22xxx DO: CU_S	Status word from DC_CTRL	CO: r31796[0] DO: CU_S	OALINK2 receive words Integer16 Receive word 1
CI: p22xxx DO: CU_S	Actual speed value from DC_CTRL	CO: r31798[1] DO: CU_S	OALINK2 receive words FloatingPoint32 Receive word 2, 3
BICO interconnections on Control Unit for AC drives (SINAMICS S120, CU320-2)			
CI: p31808[0] DO: CU_S	OALINK con/bin converter signal source Converter 1	CO: r31790[0] DO: CU_S	OALINK1 receive words Integer16 Receive word 1
CI: p1070[C] DO: VECTOR_1	Main setpoint	CO: r31792[1] DO: CU_S	OALINK1 receive words FloatingPoint32 Receive word 2, 3
CI: p31808[1] DO: CU_S	OALINK con/bin converter signal source Converter 2	CO: r31790[3] DO: CU_S	OALINK1 receive words Integer16 Receive word 4
CI: p1070[C] DO: VECTOR_2	Main setpoint	CO: r31792[4] DO: CU_S	OALINK1 receive words FloatingPoint32 Receive word 5, 6
CI: p31793[0] DO: CU_S	OALINK1 send words Integer16 Send word 1	CO: r0899 DO: VECTOR_1	Status word, sequence control

Table 4-8 Example 2 – list of the BICO interconnections, continued

Signal sink (connector/binector input)		Signal sink (connector/binector output)	
CI: p31795[1] DO: CU_S	OALINK1 send words FloatingPoint32 Send word 2, 3	CO: r0063[0] DO: VECTOR_1	Speed actual value
CI: p31793[3] DO: CU_S	OALINK1 send words Integer16 Send word 4	CO: r0899 DO: VECTOR_2	Status word, sequence control
CI: p31795[4] DO: CU_S	OALINK1 send words FloatingPoint32 Send word 5, 6	CO: r0063[0] DO: VECTOR_2	Speed actual value
CI: p31795[6] DO: CU_S	OALINK1 send words FloatingPoint32 Send word 7, 8	CO: 0068[0] DO: VECTOR_2	Absolute current actual value
Binector inputs according to function diagram [2501], see: /LH1/ SINAMICS S120/S150 List Manual DO: VECTOR_1		BO: r31810.0…15 DO: CU_S	OALINK con/bin converter 1 result
Binector inputs according to function diagram [2501], see: /LH1/ SINAMICS S120/S150 List Manual DO: VECTOR_2		BO: r31811.0…15 DO: CU_S	OALINK con/bin converter 2 result
BICO interconnections on Control Unit for DC drive (SINAMICS DCM, Advanced CUD)			
CI: p31808[0] DO: CU_DC	OALINK con/bin converter signal source Converter 1	CO: r31790[0] DO: CU_DC	OALINK1 receive words Integer16 Receive word 1
CI: p1070[C] DO: DC_CTRL	Main setpoint	CO: r31792[1] DO: CU_DC	OALINK1 receive words FloatingPoint32 Receive word 2, 3
CI: p31793[0] DO: CU_DC	OALINK1 send words Integer16 Send word 1	CO: r0899 DO: DC_CTRL	Status word, sequence control
CI: p31795[1] DO: CU_DC	OALINK1 send words FloatingPoint32 Send word 2, 3	CO: r52167 DO: DC_CTRL	Speed controller actual value selection
Binector inputs according to function diagram [2501], see: /LH8/ SINAMICS DCM List Manual DO: DC_CTRL		BO: r31810.0…15 DO: CU_DC	OALINK con/bin converter 1 result

Note

All parameters of the OALINK technology extension, not listed in the tables, above should be kept with the factory setting.

NOTICE

Incomplete parameterization in the example

Further parameters must be set for the successful operation of drive system. They are not shown in this manual.

4.3 Function diagrams

Note

This manual only contains function diagrams for OALINK Technology Extension, see Chapter "Function diagrams" (Page 71).

The function diagrams for SINAMICS are contained in the relevant product-specific Lists Manuals, for example:

References: /LH1/	SINAMICS S120/S150 List Manual Chapter "Function diagrams"
References: /LH8/	SINAMICS DCM List Manual Chapter "Function diagrams"
References: /LH12/	SINAMICS SM120 CM List Manual Chapter "Function diagrams"

4.4 Sampling times and number of controllable drives

The OALINK Technology Extension requires additional computation time and increases the system utilization accordingly. This can reduce the maximum number of drive axes that can be controlled.

Note

Information on the system sampling times and the number of drives that can be controlled is provided in the following reference:

References: /FH1/ SINAMICS S120 Function Manual Drive Functions
Chapter "System sampling times and number of drives that can be controlled"

The remaining computation time (see r9976) can be used for OALINK and other options (e.g. DCC).

Examples of additional computation time utilization

The following table contains measured values for the additional computation time utilization for the CU320-2 and Advanced CUD Control Units:

- For different sampling times.
- For a different number of receive words (each with four converters).
- For a different number of send words (each with four converters).

Table 4-9 OALINK computation time utilization (examples)

Example	OALINK sampling time (p31771[0…1])	Number of receive words (p31778, p31779) or send words (p31780, p31781)	Additional computation time utilization (r9976[1])	
			CU320-2	Advanced CUD
1	16 ms	20 receive words [a]	Approx. 0.1 %	Approx. 0.35%
		20 send words [b]	Approx. 0.2 %	Approx. 0.55%
		Total	Approx. 0.3 %	Approx. 0.9 %
2	1 ms	20 receive words [a]	Approx. 1.9 %	Approx. 5.3 %
		20 send words [b]	Approx. 2.9 %	Approx. 8.5 %
		Total	Approx. 4.8 %	Approx. 13.8 %
3	1 ms	40 receive words [a]	Approx. 2.6 %	Approx. 7.3 %
		40 send words [b]	Approx. 3.5 %	Approx. 10.6 %
		Total	Approx. 6.1 %	Approx. 17.9 %

a. 4 connector-binector converters are activated.

b. 4 binector-connector converters are activated.

The values may differ slightly depending on the already existing system utilization.

4.5 Licensing

A license key is required for the OALINK Technology Extension depending on the Control Unit:

- A license key is required when installing on the CU320-2 Control Unit (CU_G, CU_MV, CU_S drive objects).
- No license key is required when installing on the Advanced CUD Control Unit. This applies to the following products:
  - SINAMICS DCM, drive object CU_DC
  - SINAMICS DCP, drive object CU_DCP

You can generate the appropriate license key using the WEB License Manager. To do this, you require the Certificate of License (CoL).

The article number (MLFB) for the Certificate of License (CoL) is as follows:

6SL3077-0AA01-0AB0

Note

Information and the procedure required for licensing is provided in the following reference:

References: /FH1/ SINAMICS S120 Function Manual Drive Functions
Chapter "Licensing"

4.6 SINAMICS Safety Integrated

The functions implemented with a Technology Extension are not part of the SINAMICS Safety Integrated functions, nor do they influence the SINAMICS Safety Integrated functions.

Note

Information on SINAMICS Safety Integrated is provided in the following reference:

References: /FHS/ SINAMICS S120 Safety Integrated Function Manual

Parameters

5

Content

5.1 Overview of parameters

Note

An overview of the parameters, especially the explanation of the parameter list is contained in the product-specific List Manuals, for example:

References: /LH1/	SINAMICS S120/S150 List Manual Chapter "Overview of parameters"
References: /LH8/	SINAMICS DCM List Manual Chapter "Overview of parameters"
References: /LH12/	SINAMICS SM120 CM List Manual Chapter "Overview of parameters"

Drive objects

The OALINK Technology Extension is released for the following drive objects:

- CU_DC

  Advanced CUD Control Unit for SINAMICS DCM.
- CU_DCP

  Advanced CUD Control Unit for SINAMICS DCP.
- CU_G

  CU320-2 Control Unit for SINAMICS G130/G150.
- CU_MV

  CU320-2 Control Unit for SINAMICS medium-voltage converters.
- CU_S

  CU320-2 Control Unit for SINAMICS S120/S150.

5.2 List of parameters

Note

This chapter only includes the parameters for the OALINK Technology Extension.

The product-dependent parameters available for SINAMICS should be taken from the online help for the particular control or commissioning tool or, for example, from the following reference:

References: /LH1/ SINAMICS S120/S150 List Manual
Chapter "List of parameters"

References: /LH8/ SINAMICS DCM List Manual
Chapter "List of parameters"

References: /LH12/ SINAMICS SM120 CM List Manual
Chapter "List of parameters"

Product: Oalink, Version: 1300300, Language: eng
Objects: CU_DC, CU_DCP, CU_G, CU_MV, CU_S

p31770[0...1] OALINK activation / Activation

CU_S, CU_G, CU_DC, CU_MV

Can be changed: C1(3)	**Calculated:** -	**Access level:** 3
Data type: Integer16	**Dyn. index:** -	**Func. diagram:** 7320, 7321
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
0	999	999

Description: Setting of the DRIVE-CLiQ socket to be used for the OALINK communication.

Via the Technology Extension OALINK, bidirectional communication is established between two Control Units based on DRIVE-CLiQ. The Technology Extension must be installed and parameterized on both Control Units. A maximum of two OALINK communications can be used for each Control Unit. Each OALINK communication is a point-to-point connection, and can transfer a maximum of 120 words (maximum of 240 bytes).

In this case, the Control Units are not synchronized via DRIVE-CLiQ. If synchronization is required, this must be realized externally via PROFIBUS/PROFINET in the isochronous mode.

The data to be transferred can be interconnected using BICO technology.

Value:
0: OALINK communication via DRIVE-CLiQ socket X100
1: OALINK communication via DRIVE-CLiQ socket X101
2: OALINK communication via DRIVE-CLiQ socket X102
3: OALINK communication via DRIVE-CLiQ socket X103
999: OALINK communication deactivated

Recommendation: In the offline mode, the following procedure is recommended to activate the DRIVE-CLiQ socket:

1. Select DRIVE-CLiQ sockets that are not assigned.
2. Appropriately set this parameter on the two Control Units involved.
3. Download the project.
4. Establish the DRIVE-CLiQ wiring

Note:

Point 3 is omitted in the online mode.

Index: [0] = OALINK1
[1] = OALINK2

Dependency: Refer to: p31771, p31773, p31778, p31779, p31780, p31781

Refer to: A53480, A53481

Note: OALINK: Open Application Link

A change is only possible in the commissioning mode (p0009 = 3).

The number of available DRIVE-CLiQ sockets depends on the Control Unit being used.

p31771[0...1] OALINK sampling time / Sampling time

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** C1(3)	**Calculated:** -	**Access level:** 3
	Data type: FloatingPoint32	**Dyn. index:** -	**Func. diagram:** 7320, 7321, 7322, 7323, 7324, 7325
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	1.00000 [ms]	768.00000 [ms]	8.00000 [ms]

Description: Sets the sampling time for particular OALINK communication.

Recommendation: The same sampling times should be set at both Control Units that participate in OALINK communication. Data packages can be lost if the sampling times are not set the same (r31786.5 = 1 or 31787.5 = 1).

The sampling times are not checked by the software.

The tolerance time should also be checked when changing the sampling time (p31772).

Index: [0] = OALINK1
[1] = OALINK2

Dependency: The sampling time for OALINK communication depends on the sampling time of the lower-level (subordinate) closed-loop control. It makes sense to set a multiple integer of the sampling time of the lower-level closed-loop control.

Refer to: p31770, p31772, p31773, p31778, p31779, p31780, p31781

Refer to: A53481

Note: The following values can be set:

- sampling time < 8 ms:

Any floating point values can be set.

- sampling time >= 8 ms:

The following values are possible:

8, 16, 24, 32, 40, 48, 64, 80, 96, 128, 160, 192, 256, 320, 384, 512, 640, 768 ms

When entering a different value, internally the next valid value is automatically active.

p31772[0...1] OALINK communication problems signals tolerance time / Problem sig t_tol

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: FloatingPoint32	**Dyn. index:** -	**Func. diagram:** 7320, 7321
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	1.00 [ms]	340.28235E36 [ms]	80.00 [ms]

Description: Sets the tolerance time to signal a problem for the relevant OALINK communication.

The timer is started after a data package error or interruption in the data transfer has been identified.

If a valid data package was not received within this tolerance time, then binector output r31786.7 is set = 1 (OALINK1) or r31787.7 is set = 1 (OALINK2).

The timer is reset when a valid data package is received.

A data package is considered to have an error if one of the following conditions occurs:

- consistency error was detected (r31786.4 or r31787.4).
- lost data package was detected (r31786.5 or r31787.5).
- checksum error was detected (r31786.6 or r31787.6).
- DRIVE-CLiQ wiring interrupted (A53480 with fault cause 2, r31786.8 = 0 or r31787.8 = 0).

Index: [0] = OALINK1
[1] = OALINK2

Dependency: The selected tolerance time should be a multiple integer of OALINK sampling time (p31771[0...1]). Otherwise, internally the next higher integer multiple becomes automatically effective.

Refer to: p31771

p31773[0...1] OALINK repeat receive mode / Repeat_recv mode

CU_S, CU_G, CU_DC, CU_MV

Can be changed: C1(3)	**Calculated:** -	**Access level:** 3
Data type: Integer16	**Dyn. index:** -	**Func. diagram:** 7320, 7321
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
0	1	1

Description: Sets the mode for repeating the reception of data for OALINK communication.

A consistency check is made each time data is received.

Inconsistencies can occur under the following conditions:

- the repeat receive function is deactivated, and the clock cycles of the Control Units participating in the OALINK communication are not synchronized to a higher-level clock cycle.
- there are connection problems that result in telegram failures (e.g. EMC problems, poor or dirty plug connections, ...).

Value:
0: Do not repeat data receive
1: Repeat data receive

Index:
[0] = OALINK1
[1] = OALINK2

Dependency: Refer to: p31770, p31771, r31783, r31786, r31787

Note: If value = 0:

If data inconsistency is identified (r31786.4 = 1 or r31787.4 = 1) data receive is not repeated. The previous data remain valid.

The repeat receive function should only be deactivated if the two following conditions are not fulfilled:

1. The two Control Units participating in the OALINK communication are synchronized to a higher-level clock cycle.
2. The OALINK sampling times of the Control Units involved are set the same (p31771).

If value = 1:

Data receive is repeated if data inconsistency is detected.

p31778 OALINK1 receive words maximum number / LINK1 recv_w qty

CU_S, CU_G, CU_DC, CU_MV

Can be changed: C1(3)	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321, 7322
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
0	120	0

Description: Sets the maximum number of receive words for communication via OALINK1.

Dependency: For active communication via OALINK1, it is absolutely necessary that p31778 is set > 0 or p31780 is set > 0.

Parameters r31790, r31791 and r31792 are only displayed in the expert list of the STARTER commissioning tool, if p31778 > 0.

The expert list is updated as follows after changing the value:

- offline mode: immediately after the change.
- online mode: after executing function "Load project to PG" using the STARTER commissioning tool.

Refer to: r31784, r31790, r31791, r31792

Refer to: A53481, A53482

Note: For the other Control Unit, which is participating in this OALINK communication, the same number of words to be sent must be set.

The number refers to words with a length of 16 bits.

p31779 OALINK2 receive words maximum number / LINK2 recv_w qty

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** C1(3)	**Calculated:** -	**Access level:** 3
	Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321, 7322
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	0	120	0

Description: Sets the maximum number of receive words for communication via OALINK2.

Dependency: For active communication via OALINK2, it is absolutely necessary that p31779 is set > 0 or p31781 is set > 0.

Parameters r31796, r31797 and r31798 are only displayed in the expert list of the STARTER commissioning tool, if p31779 > 0.

The expert list is updated as follows after changing the value:

- offline mode: immediately after the change.
- online mode: after executing function "Load project to PG" using the STARTER commissioning tool.

Refer to: r31784, r31796, r31797, r31798

Refer to: A53481, A53482

Note: For the other Control Unit, which is participating in this OALINK communication, the same number of words to be sent must be set.

The number refers to words with a length of 16 bits.

p31780 OALINK1 send words maximum number / LINK1 send_w qty

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** C1(3)	**Calculated:** -	**Access level:** 3
	Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	0	120	0

Description: Sets the maximum number of send words for communication via OALINK1.

Dependency: For active communication via OALINK1, it is absolutely necessary that p31778 is set > 0 or p31780 is set > 0.

Parameters p31793, p31794 and p31795 are only displayed in the expert list of the STARTER commissioning tool, if p31780 > 0.

The expert list is updated as follows after changing the value:

- offline mode: immediately after the change.
- online mode: after executing function "Load project to PG" using the STARTER commissioning tool.

Refer to: p31793, p31794, p31795

Refer to: A53481

Note: For the other Control Unit, which is participating in this OALINK communication, the same number of words to be received must be set.

The number refers to words with a length of 16 bits.

p31781 OALINK2 send words maximum number / LINK2 send_w qty

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** C1(3)	**Calculated:** -	**Access level:** 3
	Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	0	120	0

Description: Sets the maximum number of send words for communication via OALINK2.

Dependency: For active communication via OALINK2, it is absolutely necessary that p31779 is set > 0 or p31781 is set > 0.
Parameters p31799, p31800 and p31801 are only displayed in the expert list of the STARTER commissioning tool, if p31781 > 0.
The expert list is updated as follows after changing the value:
- offline mode: immediately after the change.
- online mode: after executing function "Load project to PG" using the STARTER commissioning tool.
Refer to: p31799, p31800, p31801
Refer to: A53481

Note: For the other Control Unit, which is participating in this OALINK communication, the same number of words to be received must be set.
The number refers to words with a length of 16 bits.

r31782[0...1] OALINK status (V1.1) / Status (V1.1)

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 4
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** -
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the status of the OALINK communication.
This status parameter r31782[0...1] should no longer be used from OALINK firmware version 1.2 and higher.

Recommendation: Instead of r31782[0], use parameter r31786.
Instead of r31782[1], use parameter r31787.

Index: [0] = OALINK1
[1] = OALINK2

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Configuration mode active	Yes	No	-
01	Wait for data transfer	Yes	No	-
02	Data being transferred	Yes	No	-
03	Receive data being repeated	Yes	No	-
04	Consistency error identified	Yes	No	-
05	Data package lost	Yes	No	-
06	Checksum error detected	Yes	No	-
07	Tolerance time communication problem	OK	Exceeded	-
08	DRIVE-CLiQ connection status	OK	Interrupted	-

Dependency: Refer to: r31786, r31787
Refer to: A53480, A53482

Note: The display is identical to parameter r31786 or r31787.
For bit 00:
The configuration mode is active as long as the parameters required for an OALINK communication have still not been completely set.
OALINK1: p31770[0], p31771[0], p31778, p31780
OALINK2: p31770[1], p31771[1], p31779, p31781
For bit 01:
This bit is the inverted signal to bit 2.
For bit 02:
This bit has a 0 signal if one of the following conditions is satisfied:
- the configuration mode is active (bit 0 = 1).
- the tolerance time for communication problems was exceeded (bit 7 = 0).
- the DRIVE-CLiQ connection was interrupted (bit 8 = 0).
For bit 03:
- this bit has a 1 signal if p31773[0...1] = 1 and data receive was repeated.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.

For bit 04:
- this bit has a 1 signal if p31773[0...1] = 0 and consistency errors were detected.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.
The number of consistency errors is displayed in r31783[0...1].
For bit 05:
- this bit has a 1 signal as long as the DRIVE-CLiQ connection is interrupted.
- this bit can have a 1 signal if the sampling times are not set the same or in non-synchronized operation.
- this bit can occur in conjunction with bit 3.
For bit 06:
The number of checksum errors is displayed in r31785[0...1] (A53482 with fault cause 2).
For bit 07:
This bit has a 0 signal if, within the set tolerance time (p31772[0...1]), a valid data package was not received.
The following applies to valid data packages: bit 4 = bit 5 = bit 6 = 0.
This status bit is automatically reset as soon as a valid data package is received.
For bit 08:
This bit has a 0 signal if the DRIVE-CLiQ connection is interrupted (A53480 with fault cause 2).
Possible causes:
- the DRIVE-CLiQ cable is not inserted.
- the other Control Unit is switched off.
This bit is only influenced after a system-related delay time (this is typically greater than 100 ms).

r31783[0...1] OALINK data inconsistencies number / Inconsistency qty

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned32	**Dyn. index:** -	**Func. diagram:** 7320, 7321
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the number of data inconsistencies that have occurred (r31786.4 = 1 or r31787.4 = 1).

Index: [0] = OALINK1
[1] = OALINK2

Note: Data inconsistencies can especially occur for the following reasons:
- the clock cycles of the Control Units participating in the OALINK communication are not synchronized to a higher-level clock cycle.
- there are connection problems that result in telegram failures (e.g. EMC problems, poor or dirty plug connections, ...).

r31784[0...1] OALINK receive words number / Recv_w qty

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the number of received data words of the particular OALINK communication.

Index: [0] = OALINK1
[1] = OALINK2

Dependency: Refer to: A53482

Note: Contrary to the adjustable parameters p31778 or p31779, the number of actually received data words is displayed in r31784.

r31785[0...1] OALINK checksum errors number / CRC error qty

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** -	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32	**Dyn. index:** -	**Func. diagram:** 7320, 7321
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Displays the number of checksum errors that have occurred (r31786.6 = 1 or r31787.6 = 1).

Index: [0] = OALINK1
[1] = OALINK2

Dependency: Refer to: A53482

Note: Checksum errors (CRC errors) can occur for connection problems that result in telegram failures (e.g. EMC problems, poor or dirty plug connections, ...).

r31786.0...8 CO/BO: OALINK1 status / LINK1 status

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** -	**Calculated:** -	**Access level:** 3
	Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Display and BICO output for the status of the communication via OALINK1.
This status display makes the receiving Control Unit available.

Recommendation: Status displays bit 2 or bit 7 can be used to respond to receive problems, e.g. via BICO interconnection to external faults/alarms (p2106, p2107, p2108, p2112, p2116, p2117).
Use this parameter instead of r31782[0].

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Configuration mode active	Yes	No	-
01	Wait for data transfer	Yes	No	-
02	Data being transferred	Yes	No	-
03	Receive data being repeated	Yes	No	-
04	Consistency error identified	Yes	No	-
05	Data package lost	Yes	No	-
06	Checksum error detected	Yes	No	-
07	Tolerance time communication problem	OK	Exceeded	-
08	DRIVE-CLiQ connection status	OK	Interrupted	-

Dependency: Refer to: A53480, A53482

Note: For bit 00:
The configuration mode is active as long as the parameters p31770[0], p31771[0], p31778, p31780, required for communication via OALINK1, have not been completely set.
For bit 01:
This bit is the inverted signal to bit 2.
For bit 02:
This bit has a 0 signal if one of the following conditions is satisfied:
- the configuration mode is active (bit 0 = 1).
- the tolerance time for communication problems was exceeded (bit 7 = 0).
- the DRIVE-CLiQ connection was interrupted (bit 8 = 0).
For bit 03:
- this bit has a 1 signal if p31773[0] = 1 and data receive was repeated.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.

For bit 04:
- this bit has a 1 signal if p31773[0] = 0 and consistency errors were detected.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.
The number of consistency errors is displayed in r31783[0].
For bit 05:
- this bit has a 1 signal as long as the DRIVE-CLiQ connection is interrupted.
- this bit can have a 1 signal if the sampling times are not set the same or in non-synchronized operation.
- this bit can occur in conjunction with bit 3.
For bit 06:
The number of checksum errors is displayed in r31785[0] (A53482 with fault cause 2).
For bit 07:
This bit has a 0 signal if, within the set tolerance time (p31772[0]), a valid data package was not received.
The following applies to valid data packages: bit 4 = bit 5 = bit 6 = 0.
This status bit is automatically reset as soon as a valid data package is received.
For bit 08:
This bit has a 0 signal if the DRIVE-CLiQ connection is interrupted (A53480 with fault cause 2).
Possible causes:
- the DRIVE-CLiQ cable is not inserted.
- the other Control Unit is switched off.
This bit is only influenced after a system-related delay time (this is typically greater than 100 ms).

r31787.0...8 CO/BO: OALINK2 status / LINK2 status

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7321
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and BICO output for the status of the communication via OALINK2.
This status display makes the receiving Control Unit available.

Recommendation: Status displays bit 2 or bit 7 can be used to respond to receive problems, e.g. via BICO interconnection to external faults/alarms (p2106, p2107, p2108, p2112, p2116, p2117).
Use this parameter instead of r31782[1].

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Configuration mode active	Yes	No	-
01	Wait for data transfer	Yes	No	-
02	Data being transferred	Yes	No	-
03	Receive data being repeated	Yes	No	-
04	Consistency error identified	Yes	No	-
05	Data package lost	Yes	No	-
06	Checksum error detected	Yes	No	-
07	Tolerance time communication problem	OK	Exceeded	-
08	DRIVE-CLiQ connection status	OK	Interrupted	-

Dependency: Refer to: A53480, A53482

Note: For bit 00:
The configuration mode is active as long as the parameters p31770[1], p31771[1], p31779, p31781, required for communication via OALINK1, have not been completely set.
For bit 01:
This bit is the inverted signal to bit 2.

For bit 02:
This bit has a 0 signal if one of the following conditions is satisfied:
- the configuration mode is active (bit 0 = 1).
- the tolerance time for communication problems was exceeded (bit 7 = 0).
- the DRIVE-CLiQ connection was interrupted (bit 8 = 0).
For bit 03:
- this bit has a 1 signal if p31773[1] = 1 and data receive was repeated.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.
For bit 04:
- this bit has a 1 signal if p31773[1] = 0 and consistency errors were detected.
- this bit continuously has a 0 signal if, for the participating Control Units, the following conditions are fulfilled:
1. The system clock cycles and sampling times are synchronized to a higher-level PROFIBUS/PROFINET clock cycle.
2. The sampling times p31771 of the Control Units participating in the communication are set the same.
The number of consistency errors is displayed in r31783[1].
For bit 05:
- this bit has a 1 signal as long as the DRIVE-CLiQ connection is interrupted.
- this bit can have a 1 signal if the sampling times are not set the same or in non-synchronized operation.
- this bit can occur in conjunction with bit 3.
For bit 06:
The number of checksum errors is displayed in r31785[1] (A53482 with fault cause 2).
For bit 07:
This bit has a 0 signal if, within the set tolerance time (p31772[1]) a valid data package was not received.
The following applies to valid data packages: bit 4 = bit 5 = bit 6 = 0.
This status bit is automatically reset as soon as a valid data package is received.
For bit 08:
This bit has a 0 signal if the DRIVE-CLiQ connection is interrupted (A53480 with fault cause 2).
Possible causes:
- the DRIVE-CLiQ cable is not inserted.
- the other Control Unit is switched off.
This bit is only influenced after a system-related delay time (this is typically greater than 100 ms).

r31790[0...n] CO: OALINK1 receive words integer16 / LINK1 recv_w I16

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Integer16	**Dyn. index:** p31778	**Func. diagram:** 7320, 7322
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and connector output for the receive words for communication via OALINK1.
A receive word is interpreted as integer number, data type integer16.

Recommendation: Use connector outputs r31792 to interconnect with connector inputs, data type Unsigned32/FloatingPoint32.

Dependency: The maximum number of receive words is set using p31778.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31778 > 0).
Refer to: p31778, r31791, r31792

Note: A word can be broken down into individual signals via a connector-binector converter (p31808 ... p31813).

r31791[0...n] CO: OALINK1 receive words integer32 / LINK1 recv_w I32

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Integer32	**Dyn. index:** p31778	**Func. diagram:** 7320, 7322
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and connector output for the receive words for communication via OALINK1.
Two adjacent receive words (double word) are interpreted as an integer number, data type integer32.

Recommendation: Use connector outputs r31792 to interconnect with connector inputs, data type Unsigned32/FloatingPoint32.

Dependency: The maximum number of receive words is set using p31778.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31778 > 0).
Refer to: p31778, r31790, r31792

r31792[0...n] CO: OALINK1 receive words floating point32 / LINK1 recv_w float

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: FloatingPoint32	**Dyn. index:** p31778	**Func. diagram:** 7320, 7322
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** PERCENT	**Expert list:** 1
Min	**Max**	**Factory setting**
- [%]	- [%]	- [%]

Description: Display and connector output for the receive words for communication via OALINK1.
Two adjacent receive words (double word) are interpreted as a floating point number, data type floating point32.

Dependency: The maximum number of receive words is set using p31778.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31778 > 0).
Refer to: p31778, r31790, r31791

Note: The values are automatically limited to a valid value range according to IEEE 754.

p31793[0...n] CI: OALINK1 send words integer16 / LINK1 send_w I16

CU_S, CU_G, CU_DC, CU_MV

Can be changed: T	**Calculated:** -	**Access level:** 3
Data type: Unsigned32 / Integer16	**Dyn. index:** p31780	**Func. diagram:** 7320, 7323
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0

Description: Sets the signal source for the send words for communication via OALINK1.
The value to be sent is interpreted as integer number, data type integer16 and is transferred in a send word.

Recommendation: Interconnect signals with data type FloatingPoint32 with connector inputs p31795.

Dependency: The maximum number of send words is set using p31780.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31780 > 0).
Refer to: p31780, p31794, p31795

Note: Individual signals can be combined to form a word using a binector-connector converter (p31802 ... p31807).
It is only permissible that a send word is supplied from a single signal source (p31793, p31794, p31795). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31793, p31794 and p31795 should be checked.

p31794[0...n] CI: OALINK1 send words integer32 / LINK1 send_w I32

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / Integer32	**Dyn. index:** p31780	**Func. diagram:** 7320, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal source for the send words for communication via OALINK1.
The value to be sent is interpreted as integer number, data type integer32, and is transferred in two adjacent send words (double word).

Recommendation: Interconnect signals with data type FloatingPoint32 with connector inputs p31795.

Dependency: The maximum number of send words is set using p31780.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31780 > 0).
Refer to: p31780, p31793, p31795

Note: It is only permissible that a send word is supplied from a single signal source (p31793, p31794, p31795). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31793, p31794 and p31795 should be checked.

p31795[0...n] CI: OALINK1 send words floating point32 / LINK1 send_w float

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / FloatingPoint32	**Dyn. index:** p31780	**Func. diagram:** 7320, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** PERCENT	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal source for the send words for communication via OALINK1.
The value to be sent is interpreted as floating point number, data type floating point32, and is transferred in two adjacent send words (double word).

Dependency: The maximum number of send words is set using p31780.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31780 > 0).
Refer to: p31780, p31793, p31794

Note: It is only permissible that a send word is supplied from a single signal source (p31793, p31794, p31795). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31793, p31794 and p31795 should be checked.

r31796[0...n] CO: OALINK2 receive words integer16 / LINK2 recv_w I16

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** -	**Calculated:** -	**Access level:** 3
	Data type: Integer16	**Dyn. index:** p31779	**Func. diagram:** 7320, 7322
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Display and connector output for the receive words for communication via OALINK2.
A receive word is interpreted as integer number, data type integer16.

Recommendation: Use connector outputs r31798 to interconnect with connector inputs, data type Unsigned32/FloatingPoint32.

Dependency: The maximum number of receive words is set using p31779.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31779 > 0).
Refer to: p31779, r31797, r31798

Note: A word can be broken down into individual signals via a connector-binector converter (p31808 ... p31813).

r31797[0...n] CO: OALINK2 receive words integer32 / LINK2 recv_w I32

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** -	**Calculated:** -	**Access level:** 3
	Data type: Integer32	**Dyn. index:** p31779	**Func. diagram:** 7320, 7322
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Display and connector output for the receive words for communication via OALINK2.
Two adjacent receive words (double word) are interpreted as an integer number, data type integer32.

Recommendation: Use connector outputs r31798 to interconnect with connector inputs, data type Unsigned32/FloatingPoint32.

Dependency: The maximum number of receive words is set using p31779.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31779 > 0).
Refer to: p31779, r31796, r31798

r31798[0...n] CO: OALINK2 receive words floating point32 / LINK2 recv_w float

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** -	**Calculated:** -	**Access level:** 3
	Data type: FloatingPoint32	**Dyn. index:** p31779	**Func. diagram:** 7320, 7322
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** PERCENT	**Expert list:** 1
	Min	**Max**	**Factory setting**
	- [%]	- [%]	- [%]

Description: Display and connector output for the receive words for communication via OALINK2.
Two adjacent receive words (double word) are interpreted as a floating point number, data type floating point32.

Dependency: The maximum number of receive words is set using p31779.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of receive words has been set to greater than 0 (p31779 > 0).
Refer to: p31779, r31796, r31797

Note: The values are automatically limited to a valid value range according to IEEE 754.

p31799[0...n] CI: OALINK2 send words integer16 / LINK2 send_w I16

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / Integer16	**Dyn. index:** p31781	**Func. diagram:** 7320, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal source for the send words for communication via OALINK2.
The value to be sent is interpreted as integer number, data type integer16 and is transferred in a send word.

Recommendation: Interconnect signals with data type FloatingPoint32 with connector inputs p31801.

Dependency: The maximum number of send words is set using p31781.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31781 > 0).
Refer to: p31781, p31800, p31801

Note: Individual signals can be combined to form a word using a binector-connector converter (p31802 ... p31807).
It is only permissible that a send word is supplied from a single signal source (p31799, p31800, p31801). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31799, p31800 and p31801 should be checked.

p31800[0...n] CI: OALINK2 send words integer32 / LINK2 send_w I32

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / Integer32	**Dyn. index:** p31781	**Func. diagram:** 7320, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** 4000H	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal source for the send words for communication via OALINK2.
The value to be sent is interpreted as integer number, data type integer32, and is transferred in two adjacent send words (double word).

Recommendation: Interconnect signals with data type FloatingPoint32 with connector inputs p31801.

Dependency: The maximum number of send words is set using p31781.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31781 > 0).
Refer to: p31781, p31799, p31801

Note: It is only permissible that a send word is supplied from a single signal source (p31799, p31800, p31801). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31799, p31800 and p31801 should be checked.

p31801[0...n] CI: OALINK2 send words floating point32 / LINK2 send_w float

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / FloatingPoint32	**Dyn. index:** p31781	**Func. diagram:** 7320, 7323
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** PERCENT	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal source for the send words for communication via OALINK2.
The value to be sent is interpreted as floating point number, data type floating point32, and is transferred in two adjacent send words (double word).

Dependency: The maximum number of send words is set using p31781.
This parameter is only displayed in the expert list of the STARTER commissioning tool if the number of send words has been set to greater than 0 (p31781 > 0).
Refer to: p31781, p31799, p31800

Note: It is only permissible that a send word is supplied from a single signal source (p31799, p31800, p31801). Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool. Parameters p31799, p31800 and p31801 should be checked.

p31802[0...15] BI: OALINK bin/con converter 1 signal source / Bin/con 1 S_src

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** U, T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / Binary	**Dyn. index:** -	**Func. diagram:** 7320, 7324
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal sources for binector-connector converter 1.
The individual signals are combined at a connector output for further interconnection (CO: r31807[0]).

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8

[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: Binector-connector converter 1 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31793 or p31799 with connector output r31807[0] results in the following:
- assignment to OALINK1 or OALINK2.
- activates binector-connector converter 1.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31806, r31807

Note: Each individual signal can be inverted (p31806[0].0...15).

p31803[0...15] BI: OALINK bin/con converter 2 signal source / Bin/con 2 s_src

CU_S, CU_G, CU_DC, CU_MV

Can be changed: U, T	**Calculated:** -	**Access level:** 3
Data type: Unsigned32 / Binary	**Dyn. index:** -	**Func. diagram:** 7324
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0

Description: Sets the signal sources for binector-connector converter 2.
The individual signals are combined at a connector output for further interconnection (CO: r31807[1]).

Index: [0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: Binector-connector converter 2 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31793 or p31799 with connector output r31807[1] results in the following:
- assignment to OALINK1 or OALINK2.
- activates binector-connector converter 2.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31806, r31807

Note: Each individual signal can be inverted (p31806[1].0...15).

p31804[0...15] BI: OALINK bin/con converter 3 signal source / Bin/con 3 s_src

CU_S, CU_G, CU_DC, CU_MV

Can be changed: U, T	**Calculated:** -	**Access level:** 3
Data type: Unsigned32 / Binary	**Dyn. index:** -	**Func. diagram:** 7324
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0

Description: Sets the signal sources for binector-connector converter 3.

The individual signals are combined at a connector output for further interconnection (CO: r31807[2]).

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: Binector-connector converter 3 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31793 or p31799 with connector output r31807[2] results in the following:
- assignment to OALINK1 or OALINK2.
- activates binector-connector converter 3.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31806, r31807

Note: Each individual signal can be inverted (p31806[2].0...15).

p31805[0...15] BI: OALINK bin/con converter 4 signal source / Bin/con 4 s_src

CU_S, CU_G, CU_DC, CU_MV	**Can be changed:** U, T	**Calculated:** -	**Access level:** 3
	Data type: Unsigned32 / Binary	**Dyn. index:** -	**Func. diagram:** 7324
	P-Group: -	**Unit group:** -	**Unit selection:** -
	Not for motor type: -	**Scaling:** -	**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0

Description: Sets the signal sources for binector-connector converter 4.
The individual signals are combined at a connector output for further interconnection (CO: r31807[3]).

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: Binector-connector converter 4 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31793 or p31799 with connector output r31807[3] results in the following:
- assignment to OALINK1 or OALINK2.
- activates binector-connector converter 4.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31806, r31807

Note: Each individual signal can be inverted (p31806[3].0...15).

p31806[0...3] OALINK bin/con converter invert signal / Bin/con sig inv

CU_S, CU_G, CU_DC, CU_MV

Can be changed: U, T | **Calculated:** - | **Access level:** 3
Data type: Unsigned16 | **Dyn. index:** - | **Func. diagram:** 7324
P-Group: - | **Unit group:** - | **Unit selection:** -
Not for motor type: - | **Scaling:** - | **Expert list:** 1

Min	Max	Factory setting
-	-	0000 0000 0000 0000 bin

Description: Setting to invert the individual signals for the binector-connector converter.

Index:
[0] = Converter 1
[1] = Converter 2
[2] = Converter 3
[3] = Converter 4

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	Inverted	Not inverted	-
01	Bit 1	Inverted	Not inverted	-
02	Bit 2	Inverted	Not inverted	-
03	Bit 3	Inverted	Not inverted	-
04	Bit 4	Inverted	Not inverted	-
05	Bit 5	Inverted	Not inverted	-
06	Bit 6	Inverted	Not inverted	-
07	Bit 7	Inverted	Not inverted	-
08	Bit 8	Inverted	Not inverted	-
09	Bit 9	Inverted	Not inverted	-
10	Bit 10	Inverted	Not inverted	-
11	Bit 11	Inverted	Not inverted	-
12	Bit 12	Inverted	Not inverted	-
13	Bit 13	Inverted	Not inverted	-
14	Bit 14	Inverted	Not inverted	-
15	Bit 15	Inverted	Not inverted	-

Dependency: Refer to: p31802, p31803, p31804, p31805, r31807

r31807[0...3] CO: OALINK bin/con converter result / Bin/con result

CU_S, CU_G, CU_DC, CU_MV

Can be changed: - | **Calculated:** - | **Access level:** 3
Data type: Unsigned16 | **Dyn. index:** - | **Func. diagram:** 7320, 7324
P-Group: - | **Unit group:** - | **Unit selection:** -
Not for motor type: - | **Scaling:** - | **Expert list:** 1

Min	Max	Factory setting
-	-	-

Description: Display and connector output for the result of the binector-connector converter.
Using a BICO interconnection with one of the connector inputs p31793 or p31799 the result of the binector-connector converter can be used as send word for a OALINK communication.

Index:
[0] = Converter 1
[1] = Converter 2
[2] = Converter 3
[3] = Converter 4

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-

12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: Binector-connector converters 1 ... 4 can be freely used for OALINK1 or OALINK2 and are only calculated for the corresponding interconnection.
Interconnecting connector input p31793 or p31799 with connector output r31807 results in the following:
- assignment to OALINK1 or OALINK2.
- activates the appropriate binector-connector converter.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31802, p31803, p31804, p31805, p31806

p31808[0...3] CI: OALINK con/bin converter signal source / Con/bin S_src

CU_S, CU_G, CU_DC, CU_MV

Can be changed: U, T	**Calculated:** -	**Access level:** 3
Data type: Unsigned32 / Integer16	**Dyn. index:** -	**Func. diagram:** 7320, 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0

Description: Sets the signal source for the connector-binector converter.
A 16-bit receive word can be selected as signal source (CO: r31790, r31796).
The converted signals are available in the following binector output for further bit-by-bit interconnection:
Converter 1: binector output r31810.0...15
Converter 2: binector output r31811.0...15
Converter 3: binector output r31812.0...15
Converter 4: binector output r31813.0...15

Index: [0] = Converter 1
[1] = Converter 2
[2] = Converter 3
[3] = Converter 4

Dependency: Connector-binector converters 1 ... 4 can be freely used for OALINK1 or OALINK2 and are only calculated for the corresponding interconnection.
Interconnecting connector input p31808 with connector output r31790 or r31796 results in the following:
- assignment to OALINK1 or OALINK2.
- activates the appropriate connector-binector converter.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31809, r31810, r31811, r31812, r31813

Note: A connector-binector converter is only calculated for interconnection with connector output r31790 or r31796 (data type, integer16), and is simultaneously assigned to OALINK1 or OALINK2.
It is only permissible to establish the interconnection with one of the connector outputs specified above. Otherwise, the project will not be completely downloaded when using the STARTER commissioning tool.

p31809[0...3] OALINK con/bin converter invert signal / Con/bin inv sig

CU_S, CU_G, CU_DC, CU_MV

Can be changed: U, T	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0000 0000 0000 0000 bin

Description: Setting to invert the individual signals for the connector-binector converter.

Index: [0] = Converter 1
[1] = Converter 2
[2] = Converter 3
[3] = Converter 4

Bit field:	Bit	Signal name	1 signal	0 signal	FP
	00	Bit 0	Inverted	Not inverted	-
	01	Bit 1	Inverted	Not inverted	-
	02	Bit 2	Inverted	Not inverted	-
	03	Bit 3	Inverted	Not inverted	-
	04	Bit 4	Inverted	Not inverted	-
	05	Bit 5	Inverted	Not inverted	-
	06	Bit 6	Inverted	Not inverted	-
	07	Bit 7	Inverted	Not inverted	-
	08	Bit 8	Inverted	Not inverted	-
	09	Bit 9	Inverted	Not inverted	-
	10	Bit 10	Inverted	Not inverted	-
	11	Bit 11	Inverted	Not inverted	-
	12	Bit 12	Inverted	Not inverted	-
	13	Bit 13	Inverted	Not inverted	-
	14	Bit 14	Inverted	Not inverted	-
	15	Bit 15	Inverted	Not inverted	-

Dependency: Refer to: p31808, r31810, r31811, r31812, r31813

r31810.0...15 BO: OALINK con/bin converter 1 result / Con/bin 1 result

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7320, 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and binector outputs for the result of connector-binector converter 1.

The 16-bit word interconnected using connector input p31808[0] is available for further bit-by-bit interconnection (BO: r31810.0...15).

Bit field:	Bit	Signal name	1 signal	0 signal	FP
	00	Bit 0	ON	OFF	-
	01	Bit 1	ON	OFF	-
	02	Bit 2	ON	OFF	-
	03	Bit 3	ON	OFF	-
	04	Bit 4	ON	OFF	-
	05	Bit 5	ON	OFF	-
	06	Bit 6	ON	OFF	-
	07	Bit 7	ON	OFF	-
	08	Bit 8	ON	OFF	-
	09	Bit 9	ON	OFF	-
	10	Bit 10	ON	OFF	-
	11	Bit 11	ON	OFF	-
	12	Bit 12	ON	OFF	-
	13	Bit 13	ON	OFF	-
	14	Bit 14	ON	OFF	-
	15	Bit 15	ON	OFF	-

Dependency: Connector-binector converter 1 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.

Interconnecting connector input p31808[0] with connector output r31790 or r31796 results in the following:

- assignment to OALINK1 or OALINK2.
- activates connector-binector converter 1.
- calculation with the sampling time of the associated OALINK communication.

Refer to: p31808, p31809

Note: Each individual signal can be inverted (p31809[0].0...15).

r31811.0...15 BO: OALINK con/bin converter 2 result / Con/bin 2 result

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and binector outputs for the result of connector-binector converter 2.

The 16-bit word interconnected using connector input p31808[1] is available for further bit-by-bit interconnection (BO: r31811.0...15).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: Connector-binector converter 2 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.

Interconnecting connector input p31808[1] with connector output r31790 or r31796 results in the following:

- assignment to OALINK1 or OALINK2.
- activates connector-binector converter 2.
- calculation with the sampling time of the associated OALINK communication.

Refer to: p31808, p31809

Note: Each individual signal can be inverted (p31809[1].0...15).

r31812.0...15 BO: OALINK con/bin converter 3 result / Con/bin 3 result

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and binector outputs for the result of connector-binector converter 3.

The 16-bit word interconnected using connector input p31808[2] is available for further bit-by-bit interconnection (BO: r31812.0...15).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-

10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: Connector-binector converter 3 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31808[2] with connector output r31790 or r31796 results in the following:
- assignment to OALINK1 or OALINK2.
- activates connector-binector converter 3.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31808, p31809

Note: Each individual signal can be inverted (p31809[2].0...15).

r31813.0...15 BO: OALINK con/bin converter 4 result / Con/bin 4 result

CU_S, CU_G, CU_DC, CU_MV

Can be changed: -	**Calculated:** -	**Access level:** 3
Data type: Unsigned16	**Dyn. index:** -	**Func. diagram:** 7325
P-Group: -	**Unit group:** -	**Unit selection:** -
Not for motor type: -	**Scaling:** -	**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display and binector outputs for the result of connector-binector converter 4.
The 16-bit word interconnected using connector input p31808[3] is available for further bit-by-bit interconnection (BO: r31813.0...15).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: Connector-binector converter 4 can be freely used for OALINK1 or OALINK2 and is only calculated for the corresponding interconnection.
Interconnecting connector input p31808[3] with connector output r31790 or r31796 results in the following:
- assignment to OALINK1 or OALINK2.
- activates connector-binector converter 4.
- calculation with the sampling time of the associated OALINK communication.
Refer to: p31808, p31809

Note: Each individual signal can be inverted (p31809[3].0...15).

Function diagrams

6

Content

Note

This chapter only includes the function diagrams for the OALINK Technology Extension.

The function diagrams for SINAMICS are contained in the relevant product-specific Lists Manuals, for example:

References: /LH1/	SINAMICS S120/S150 List Manual Chapter "Function diagrams"
References: /LH8/	SINAMICS DCM List Manual Chapter "Function diagrams"
References: /LH12/	SINAMICS SM120 CM List Manual Chapter "Function diagrams"

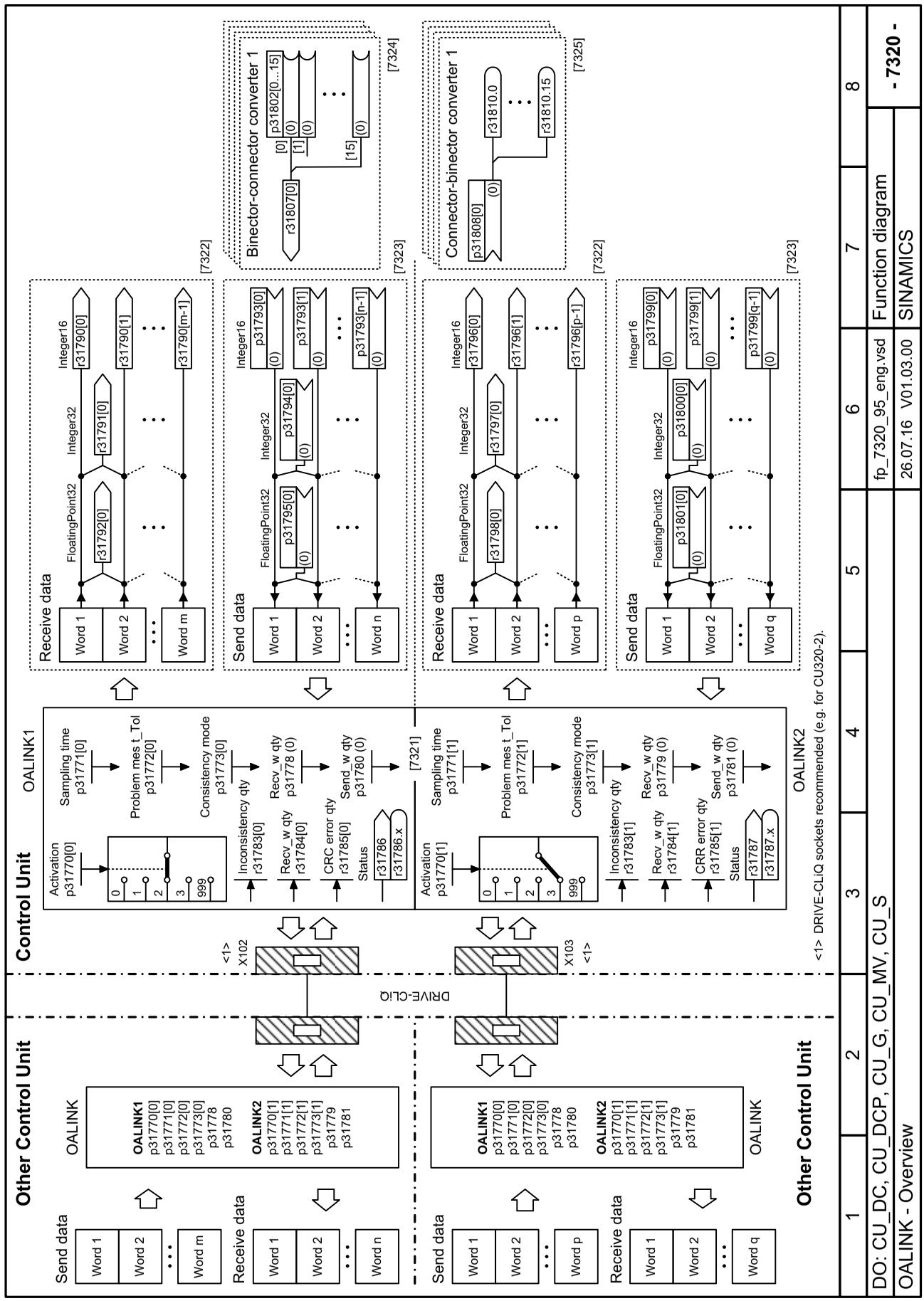
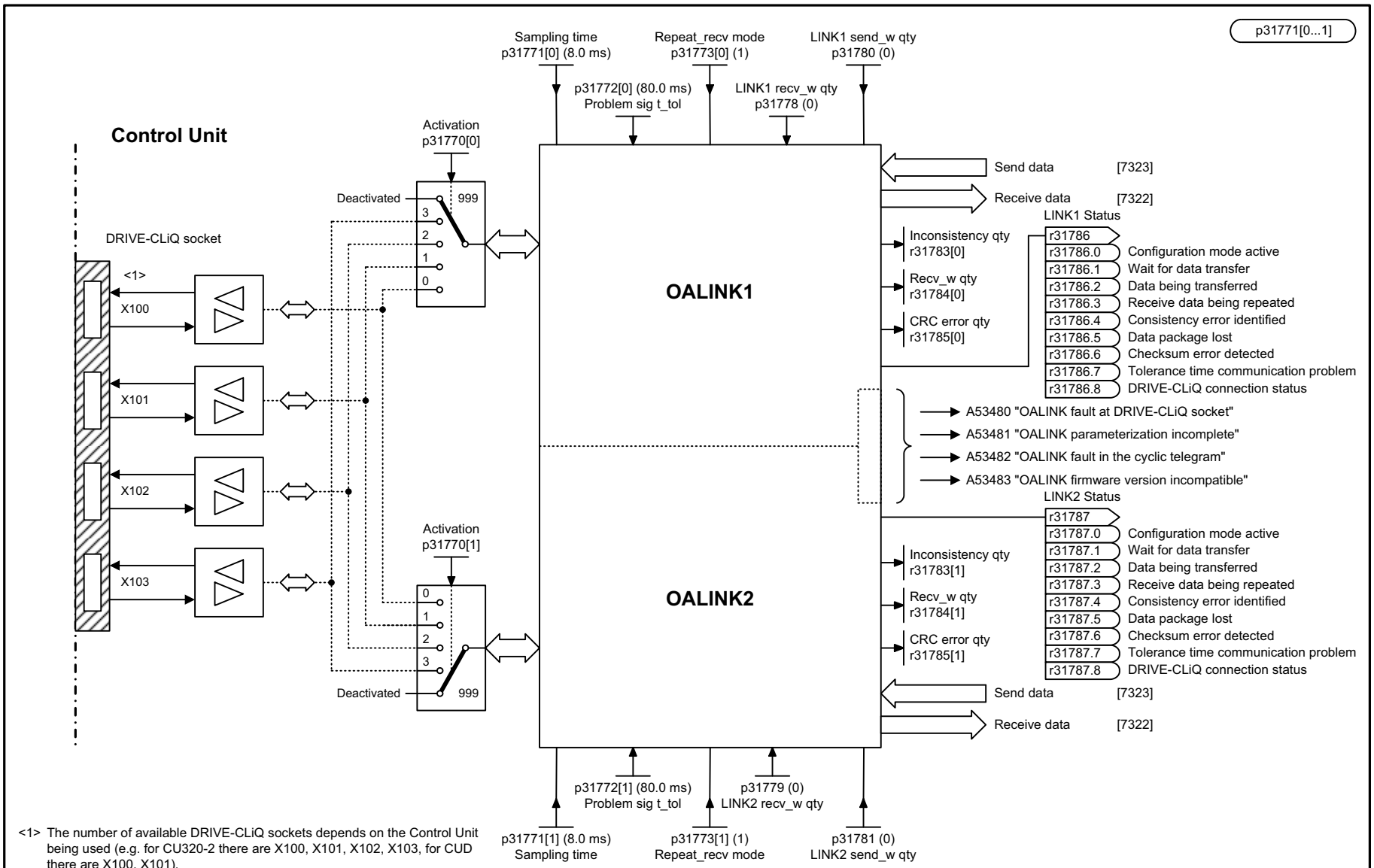


Fig. 6-1 7320 – OALINK overview

Fig. 6-2 7321 – OALINK configuration



<1> The number of available DRIVE-CLiQ sockets depends on the Control Unit being used (e.g. for CU320-2 there are X100, X101, X102, X103, for CUD there are X100, X101).

1	2	3	4	5	6	7	8
DO: CU_DC, CU_DCP, CU_G, CU_MV, CU_S					fp_7321_95_eng.vsd	Function diagram	- 7321 -
OALINK - Configuration					26.07.16 V01.03.00	SINAMICS	

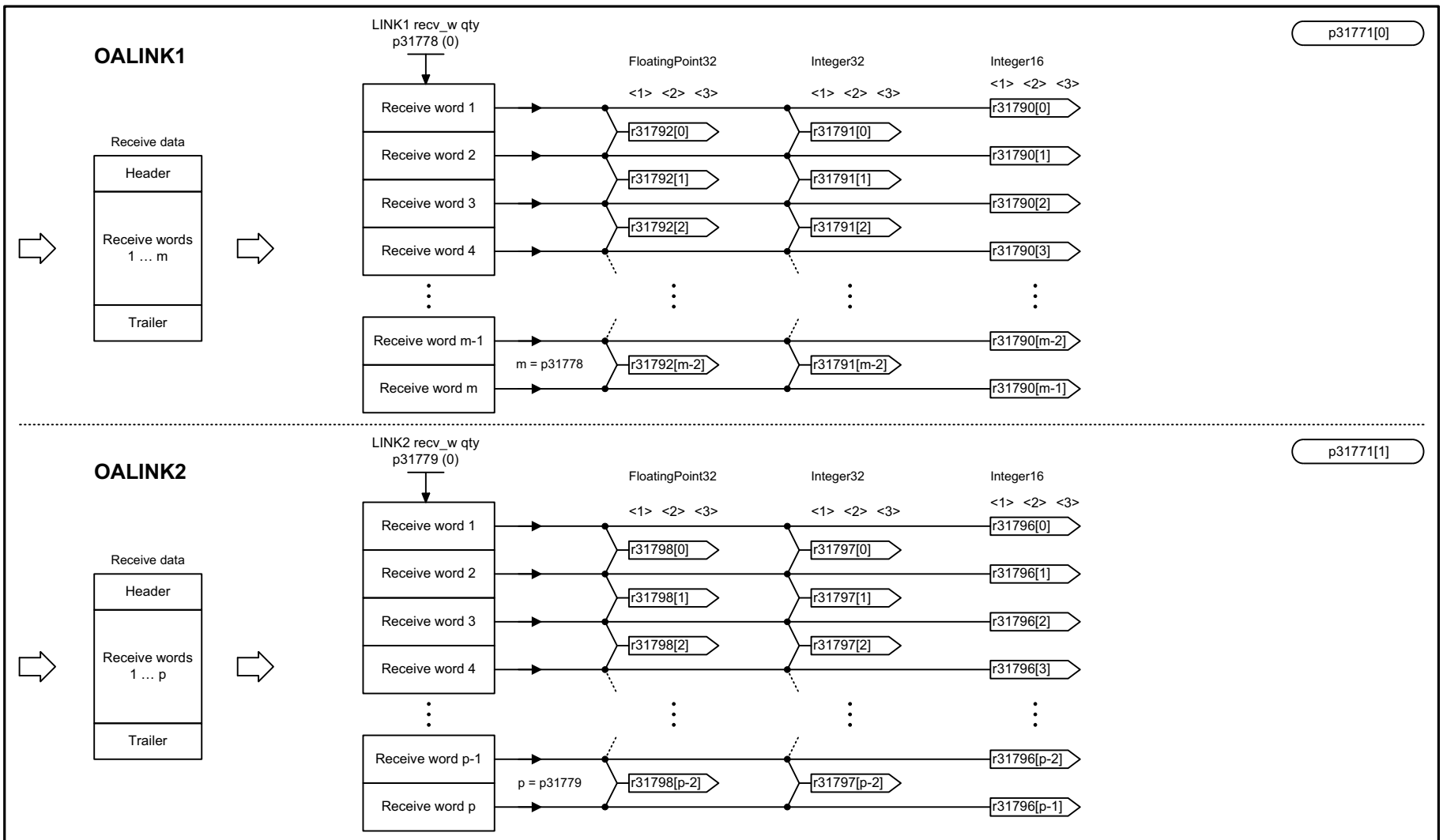


Fig. 6-3 7322 – OALINK receive data interconnection

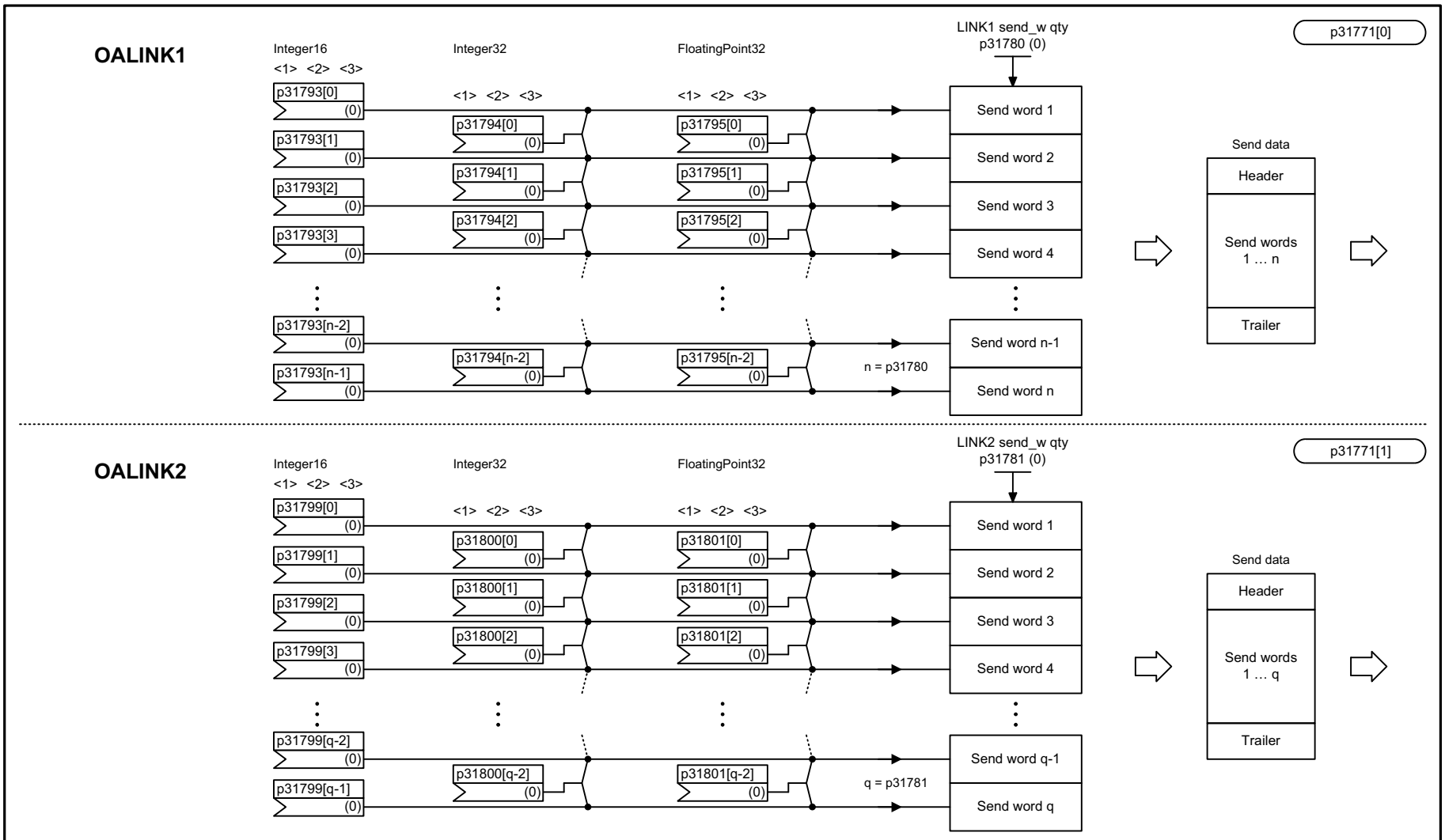
<1> Only a single connector output which belongs to a receive word x may be connected:
OALINK1: r31790[x-1], r31791[x-2], r31791[x-1], r31792[x-2], r31792[x-1]
OALINK2: r31796[x-1], r31797[x-2], r31797[x-1], r31798[x-2], r31798[x-1]

<2> These parameters are only displayed in the expert list of the STARTER commissioning tool if the number of receive words is set to a value greater than 0 (p31778 > 0, p31779 > 0).

<3> When connecting, the values received are interpreted in relation to the reference value (p200x) of the interconnected connector input. The following applies to the data type Integer16/32: 100 % = 4000 hex resp. 4000 0000 hex.

1	2	3	4	5	6	7	8
DO: CU_DC, CU_DCP, CU_G, CU_MV, CU_S					fp_7322_95_eng.vsd	Function diagram	- 7322 -
OALINK - Receive data interconnection					26.07.16 V01.03.00	SINAMICS	

Fig. 6-4 7323 – OALINK send data interconnection



<1> The send word x may only be supplied by one of the following connector inputs:
OALINK1: p31793[x-1], p31794[x-2], p31794[x-1], p31795[x-2], p31795[x-1]
OALINK2: p31799[x-1], p31800[x-2], p31800[x-1], p31801[x-2], p31801[x-1]

<2> These parameters are only displayed in the expert list of the STARTER commissioning tool if the number of send words is set to a value greater than 0 (p31780 > 0, p31781 > 0).

<3> Physical values are transferred in relation to the reference value (p200x) of the interconnected connector output. The following applies to the data type Integer16/32: 100 % = 4000 hex resp. 4000 0000 hex.

1	2	3	4	5	6	7	8
DO: CU_DC, CU_DCP, CU_G, CU_MV, CU_S					fp_7323_95_eng.vsd	Function diagram	- 7323 -
OALINK - Send data interconnection					26.07.16 V01.03.00	SINAMICS	

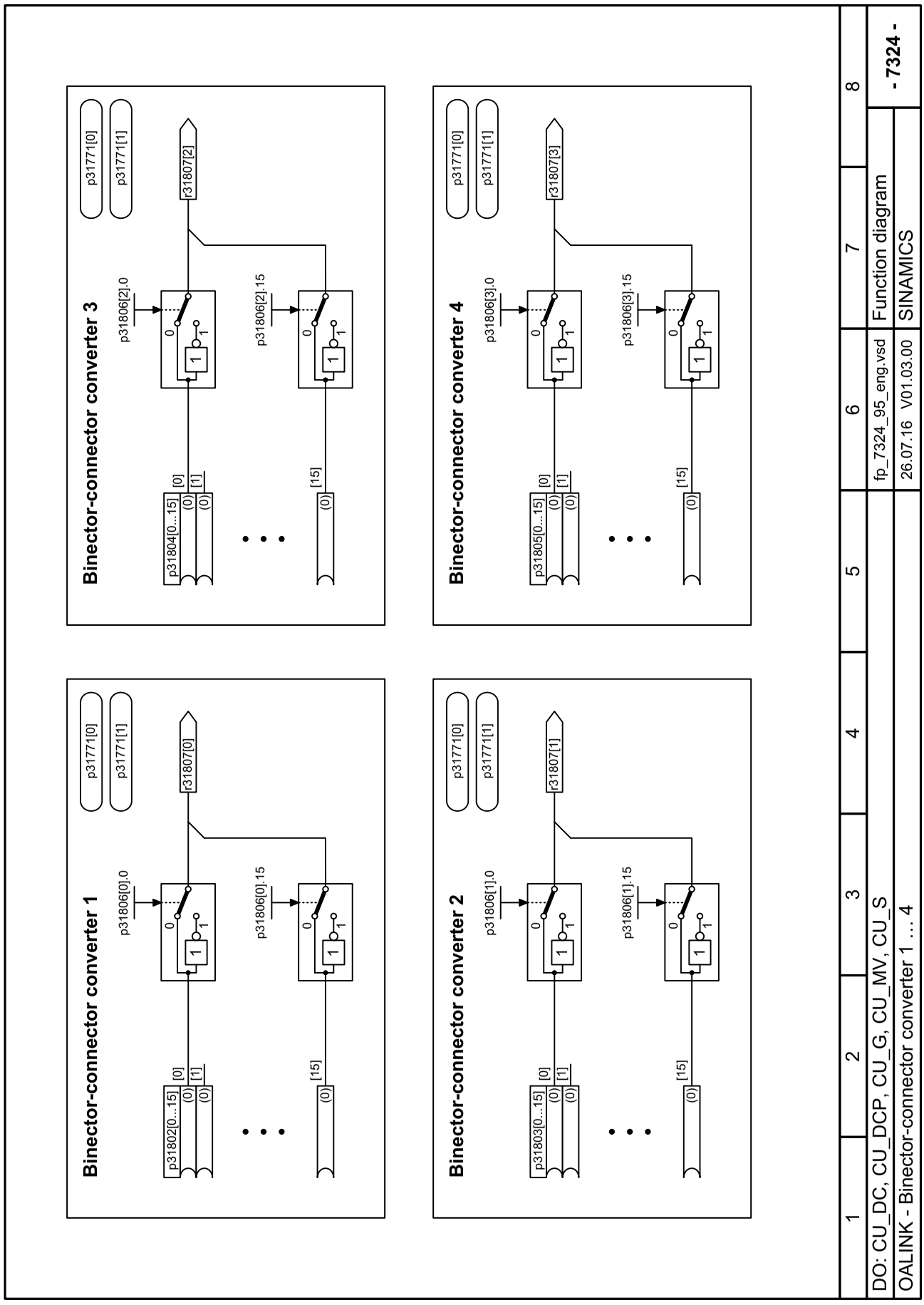


Fig. 6-5 7324 – OALINK binector-connector converter

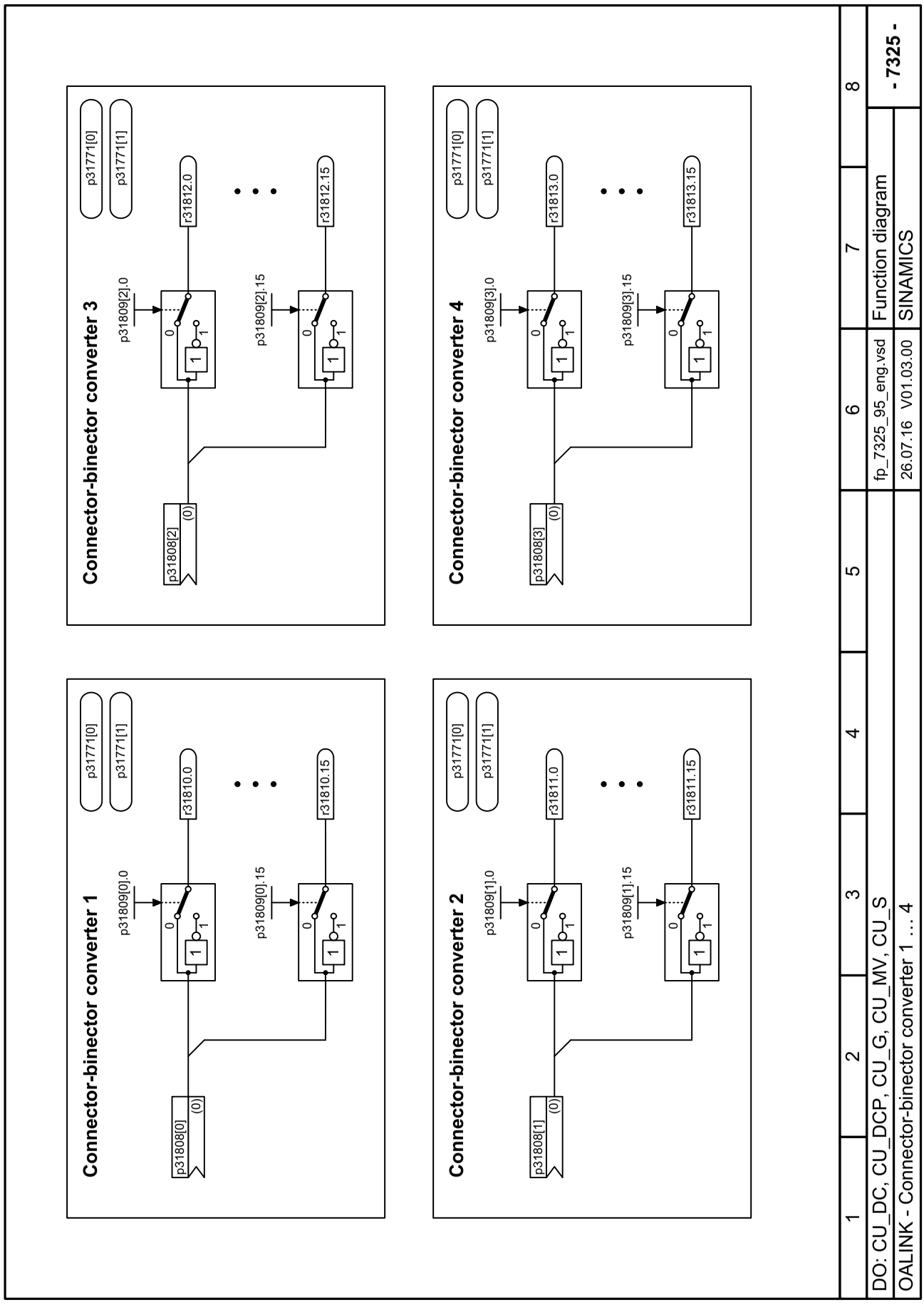


Fig. 6-6 7325 – OALINK connector-binector converter

Faults and alarms

7

Content

7.1 Overview of faults and alarms

Note

An overview of the faults and alarms, especially the explanation of the faults and alarms list is contained in the product-specific List Manuals, for example:

References: /LH1/	SINAMICS S120/S150 List Manual Chapter "Overview of faults and alarms"
References: /LH8/	SINAMICS DCM List Manual Chapter "Overview of faults and alarms"
References: /LH12/	SINAMICS SM120 CM List Manual Chapter "Overview of faults and alarms"

All objects

"All objects" in the following list refers to all drive objects for which the OALINK Technology Extension has been released.

This comprises the following drive objects:

- CU_DC

  Advanced CUD Control Unit for SINAMICS DCM.
- CU_DCP

  Advanced CUD Control Unit for SINAMICS DCP.
- CU_G

  CU320-2 Control Unit for SINAMICS G130/G150.
- CU_MV

  CU320-2 Control Unit for SINAMICS medium-voltage converters.
- CU_S

  CU320-2 Control Unit for SINAMICS S120/S150.

7.2 List of faults and alarms

Note

This chapter only includes the messages for the OALINK Technology Extension.

Information on further messages that are output (faults, alarms) should be taken from the online help for the particular control or commissioning tool or, for example, from the following references:

References: /LH1/	SINAMICS S120/S150 List Manual Chapter "List of faults and alarms"
References: /LH8/	SINAMICS DCM List Manual Chapter "List of faults and alarms"
References: /LH12/	SINAMICS SM120 CM List Manual Chapter "List of faults and alarms"

Product: Oalink, Version: 1300300, Language: eng
Objects: CU_DC, CU_DCP, CU_G, CU_MV, CU_S

A53480 OALINK fault at DRIVE-CLiQ socket

Message value: X10%1, fault cause %2

Drive object: All objects

Component: Control Unit (CU) **Propagation:** LOCAL

Reaction: NONE

Acknowledge: NONE

Cause: Using p31770, at the DRIVE-CLiQ socket OALINK communication was configured, however no supported DRIVE-CLiQ component was detected at the socket.
Fault cause:
1 (= 01 hex):
Connected DRIVE-CLiQ component is not supported (e.g. Terminal Module).
2 (= 02 hex):
DRIVE-CLiQ component not found.
Note regarding the alarm value:
The individual information is coded as follows in the alarm value (r2124):
yyxx hex: yy = fault cause, xx = DRIVE-CLiQ socket X1xx
Note:
For several configuration errors, the alarm with error cause is only displayed once.
See also: p31770 (OALINK activation)

Remedy: - check the DRIVE-CLiQ wiring for the specified DRIVE-CLiQ socket, and if required, establish a connection to a supported Control Unit.
- check the configuration of the OALINK communication OALINK1 or OALINK2 (p31770[0...1]).
Note:
OALINK: Open Application Link

A53481 OALINK parameterization incomplete

Message value: OALINK%1, fault cause %2

Drive object: All objects

Component: Control Unit (CU) **Propagation:** LOCAL

Reaction: NONE

Acknowledge: NONE

Cause: Using p31770, at a DRIVE-CLiQ socket, OALINK communication was activated, however the additional configuration for this communication has not been completed.

Fault cause:

1 (= 01 hex):

Sampling time has been set too low (p31771[0, 1]).

2 (= 02 hex):

Number of receive words and send words has not been set (p31778, p31780 or p31779, p31781).

Note regarding the alarm value:

The individual information is coded as follows in the alarm value (r2124):

yyxx hex: yy = fault cause, xx = OALINK communication

See also: p31770 (OALINK activation), p31771 (OALINK sampling time), p31778 (OALINK1 receive words maximum number), p31779 (OALINK2 receive words maximum number), p31780 (OALINK1 send words maximum number), p31781 (OALINK2 send words maximum number)

Remedy: For fault cause = 1:

Correctly set the sampling time for this OALINK communication (p31771[0...1] >= 1 ms).

For fault cause = 2:

Set the number of receive words or send words greater than 0.

OALINK1: p31778, p31780

OALINK2: p31779, p31781

Note:

OALINK: Open Application Link

A53482 OALINK fault in the cyclic telegram

Message value: OALINK%1, fault cause %2

Drive object: All objects

Component: Control Unit (CU) **Propagation:** LOCAL

Reaction: NONE

Acknowledge: NONE

Cause: A fault has occurred during the cyclic OA LINK communication.

Fault cause:

1 (= 01 hex):

Version of the Technology Extension does not match on the two Control Units.

2 (= 02 hex):

Checksum error (CRC error).

3 (= 03 hex):

Number of data words, send side and receive side, parameterized differently.

Note regarding the alarm value:

The individual information is coded as follows in the alarm value (r2124):

yyxx hex: yy = fault cause, xx = OALINK communication

Note:

If receive problems are involved, this alarm will not result in the drive being switched off. It is recommended that status bit r31786.2/7 or r31787.2/7 is used to switch off the drive, e.g. via BICO interconnection to the external fault/alarm (p2106, p2107, p2108, p2112, p2116, p2117).

See also: p31778 (OALINK1 receive words maximum number), p31779 (OALINK2 receive words maximum number), r31784 (OALINK receive words number)

Remedy: For fault cause = 1:
Update the Technology Extension, so that an identical version is used on both sides.
For fault cause = 2:
Check the DRIVE-CLiQ connection for pollution/damage.
For fault cause = 3:
The number of receive words on the receiver side (p31778 or p31779) must match the number of send words of the communication partner.
Note:
The number of actually received words is displayed in r31784[0...1].
OALINK: Open Application Link

A53483 OALINK firmware version incompatible

Message value: %1
Drive object: All objects
Component: Control Unit (CU) **Propagation:** LOCAL
Reaction: NONE
Acknowledge: NONE
Cause: When powering up, the Technology Extension OALINK detected that an incompatible firmware version of the basic SINAMICS system is installed.
As a minimum, firmware version 4.6 HF5 (V04.60.21.13) must be installed.
Alarm value (r2124, interpret decimal):
Firmware version of the installed basic system (see r0018).
Note:
If the message is present, it is not permissible that the parameters are saved in a non-volatile fashion.
Remedy: - deactivate the Technology Extension OALINK.
- if required, update the firmware version of the basic SINAMICS system to a compatible version, as a minimum, version 4.6 HF5 (V04.60.21.13).
Note:
OALINK: Open Application Link

Appendix

A

Contents

A.1 List of abbreviations

Note

The following list of abbreviations includes all abbreviations and their meanings used in the entire SINAMICS family of drives.

Abbreviation	Source of abbreviation	Significance
A		
A…	Alarm	Warning
AC	Alternating Current	Alternating current
ADC	Analog Digital Converter	Analog-Digital converter
AI	Analog Input	Analog input
AIM	Active Interface Module	Active Interface Module
ALM	Active Line Module	Active Line Module
AO	Analog Output	Analog output
AOP	Advanced Operator Panel	Advanced Operator Panel
APC	Advanced Positioning Control	Advanced Positioning Control
AR	Automatic Restart	Automatic restart
ASC	Armature Short Circuit	Armature short-circuit
ASCII	American Standard Code for Information Interchange	American coding standard for the exchange of information
AS-i	AS-Interface (Actuator Sensor Interface)	AS-interface (open bus system in automation technology)
ASM	Asynchronmotor	Induction motor
B		
BB	Betriebsbedingung	Operation condition
BERO	-	Contactless proximity switch
BI	Binector Input	Binector input
BIA	Berufsgenossenschaftliches Institut für Arbeitssicherheit	BG-Institute for Occupational Safety and Health
BICO	Binector Connector Technology	Binector connector technology
BLM	Basic Line Module	Basic Line Module
BO	Binector Output	Binector output
BOP	Basic Operator Panel	Basic operator panel
C		
C	Capacitance	Capacitance
C…	-	Safety message
CAN	Controller Area Network	Serial bus system
CBC	Communication Board CAN	Communication Board CAN
CBE	Communication Board Ethernet	PROFINET communication module (Ethernet)
CD	Compact Disc	Compact disk
CDS	Command Data Set	Command data set
CF Card	CompactFlash Card	CompactFlash card
CI	Connector Input	Connector input

Abbreviation	Source of abbreviation	Significance
CLC	Clearance Control	Clearance control
CNC	Computerized Numerical Control	Computer-supported numerical control
CO	Connector Output	Connector output
CO/BO	Connector Output / Binector Output	Connector Output / Binector Output
COB ID	CAN Object-Identification	CAN Object-Identification
CoL	Certificate of License	Certificate of License
COM	Common contact of a changeover relay	Center contact of a changeover contact
COMM	Commissioning	Startup
CP	Communication Processor	Communications processor
CPU	Central Processing Unit	Central processing unit
CRC	Cyclic Redundancy Check	Cyclic redundancy check
CSM	Control Supply Module	Control Supply Module
CU	Control Unit	Control Unit
CUA	Control Unit Adapter	Control Unit Adapter
CUD	Control Unit DC	Control Unit DC
D		
DAC	Digital Analog Converter	Digital analog converter
DC	Direct Current	DC current
DCB	Drive Control Block	Drive Control Block
DCBRK	DC Brake	DC braking
DCC	Drive Control Chart	Drive Control Chart
DCN	Direct Current Negative	Direct current negative
DCP	Direct Current Positive	Direct current positive
DDC	Dynamic Drive Control	Dynamic Drive Control
DDS	Drive Data Set	Drive Data Set
DI	Digital Input	Digital input
DI/DO	Digital Input / Digital Output	Digital input/output, bidirectional
DMC	DRIVE-CLiQ Hub Module Cabinet	DRIVE-CLiQ Hub Module Cabinet
DME	DRIVE-CLiQ Hub Module External	DRIVE-CLiQ Hub Module External
DMM	Double Motor Module	Double Motor Module
DO	Digital Output	Digital output
DO	Drive Object	Drive object
DP	Decentralized Peripherals	Distributed I/O
DPRAM	Dual-Port Random Access Memory	Dual-Port Random Access Memory
DQ	DRIVE-CLiQ	DRIVE-CLiQ
DRAM	Dynamic Random Access Memory	Dynamic Random Access Memory
DRIVE-CLiQ	Drive Component Link with IQ	Drive Component Link with IQ
DSC	Dynamic Servo Control	Dynamic Servo Control
DTC	Digital Time Clock	Timer
E		
EASC	External Armature Short-Circuit	External armature short-circuit
EDS	Encoder Data Set	Encoder data set

Abbreviation	Source of abbreviation	Significance
EEPROM	Electrically Erasable Programmable Read-Only Memory	Electrically Erasable Programmable Read-Only-Memory
EGB	Elektrostatisch gefährdete Baugruppen	Electrostatic sensitive devices
ELCB	Earth Leakage Circuit-Breaker	Residual current operated circuit breaker
ELP	Earth Leakage Protection	Ground-fault monitoring
EMC	Electromagnetic Compatibility	Electromagnetic compatibility
EMF	Electromotive Force	Electromotive force
EMK	Elektromotorische Kraft	Electromotive force
EMV	Elektromagnetische Verträglichkeit	Electromagnetic compatibility
EN	Europäische Norm	European Standard
EnDat	Encoder-Data-Interface	Encoder interface
EP	Enable Pulses	Pulse enable
EPOS	Einfachpositionierer	Basic positioner
ES	Engineering System	Engineering system
ESB	Ersatzschaltbild	Equivalent circuit diagram
ESD	Electrostatically Sensitive Devices	Electrostatic sensitive devices
ESM	Essential Service Mode	Essential service mode
ESR	Extended Stop and Retract	Extended stop and retract
F		
F…	Fault	Fault
FAQ	Frequently Asked Questions	Frequently Asked Questions
FBLOCKS	Free Blocks	Free function blocks
FCC	Function control chart	Function control chart
FCC	Flux Current Control	Flux current control
FD	Function Diagram	Function diagram
F-DI	Fail-safe Digital Input	Failsafe digital input
F-DO	Fail-safe Digital Output	Fail-safe digital output
FEPROM	Flash-EPROM	Non-volatile write and read memory
FG	Function Generator	Function Generator
FI	-	Fault current
FOC	Fiber-Optic Cable	Fiber-optic cable
FP	Funktionsplan	Function diagram
FPGA	Field Programmable Gate Array	Field Programmable Gate Array
FW	Firmware	Firmware
G		
GB	Gigabyte	Gigabyte
GC	Global Control	Global control telegram (broadcast telegram)
GND	Ground	Reference potential for all signal and operating voltages, usually defined as 0 V (also referred to as M)
GSD	Gerätestammdatei	Generic Station Description: Describes the features of a PROFIBUS slave
GSV	Gate Supply Voltage	Gate supply voltage
GUID	Globally Unique Identifier	Globally Unique Identifier

Abbreviation	Source of abbreviation	Significance
H		
HF	High Frequency	High frequency
HFD	Hochfrequenzdrossel	Radio frequency reactor
HLA	Hydraulic Linear Actuator	Hydraulic linear actuator
HLG	Hochlaufgeber	Ramp-function Generator
HM	Hydraulic Module	Hydraulic Module
HMI	Human Machine Interface	Human Machine Interface
HTL	High-Threshold Logic	Logic with high interference threshold
HW	Hardware	Hardware
I		
i. V.	In Vorbereitung	Under development: This property is currently not available
I/O	Input/Output	Input/output
I2C	Inter-Integrated Circuit	Internal serial data bus
IASC	Internal Armature Short-Circuit	Internal armature short-circuit
IBN	Inbetriebnahme	Startup
ID	Identifier	Identification
IE	Industrial Ethernet	Industrial Ethernet
IEC	International Electrotechnical Commission	International Electrotechnical Commission
IF	Interface	Interface
IGBT	Insulated Gate Bipolar Transistor	Insulated gate bipolar transistor
IGCT	Integrated Gate-Controlled Thyristor	Semiconductor power switch with integrated control electrode
IL	Impulslöschung	Pulse suppression
IP	Internet Protocol	Internet protocol
IPO	Interpolator	Interpolator
IT	Isolé Terre	Non-grounded three-phase line supply
IVP	Internal Voltage Protection	Internal voltage protection
J		
JOG	Jogging	Jogging
K		
KDV	Kreuzweiser Datenvergleich	Data cross-check
KHP	Know-How Protection	Know-how protection
KIP	Kinetische Pufferung	Kinetic buffering
Kp	-	Proportional gain
KTY84	-	Temperature sensor
L		
L	-	Symbol for inductance
LED	Light Emitting Diode	Light emitting diode
LIN	Linearmotor	Linear motor
LR	Lageregler	Position controller
LSB	Least Significant Bit	Least Significant Bit
LSC	Line-side converter	Line-side converter

Abbreviation	Source of abbreviation	Significance
LSS	Line-Side Switch	Line-side switch
LU	Length Unit	Length unit
LWL	Lichtwellenleiter	Fiber-optic cable
M		
M	-	Symbol for torque
M	Masse	Reference potential for all signal and operating voltages, usually defined as 0 V (also referred to as GND)
MB	Megabyte	Megabyte
MCC	Motion Control Chart	Motion Control Chart
MDI	Manual Data Input	Manual data input
MDS	Motor Data Set	Motor data set
MLFB	Maschinenlesbare Fabrikatebezeichnung	Machine-readable product code
MM	Motor Module	Motor Module
MMC	Man-Machine Communication	Man-machine communication
MMC	Micro Memory Card	Micro memory card
MSB	Most Significant Bit	Most significant bit
MSC	Motor Side Converter	Motor-side converter
MSCY_C1	Master Slave Cycle Class 1	Cyclic communication between master (class 1) and slave
MSC	Motorstromrichter	Motor-side converter
MT	Messtaster	Probe
N		
N. C.	Not Connected	Not connected
N…	No Report	No report or internal message
NAMUR	Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie	Standardization association for measurement and control in chemical industries
NC	Normally Closed (contact)	NC contacts
NC	Numerical Control	Numerical control
NEMA	National Electrical Manufacturers Association	Standardization association in USA (United States of America)
NM	Nullmarke	Zero mark
NO	Normally Open (contact)	NO contacts
NSR	Netzstromrichter	Line-side converter
NVRAM	Non-Volatile Random Access Memory	Non-volatile read/write memory
O		
OA	Open Architecture	Software component which provides additional functions for the SINAMICS drive system
OAIF	Open Architecture Interface	Version of the SINAMICS firmware as of which the OA-application can be used
OASP	Open Architecture Support Package	Expands the STARTER commissioning tool by the corresponding OA-application
OC	Operating Condition	Operation condition
OEM	Original Equipment Manufacturer	Original equipment manufacturer

Abbreviation	Source of abbreviation	Significance
OLP	Optical Link Plug	Bus connector for fiber-optic cable
OMI	Option Module Interface	Option Module Interface
P		
p…	-	Adjustable parameters
P1	Processor 1	CPU 1
P2	Processor 2	CPU 2
PB	PROFIBUS	PROFIBUS
PcCtrl	PC Control	Master control
PD	PROFIdrive	PROFIdrive
PDC	Precision Drive Control	Precision Drive Control
PDS	Power Unit Data Set	Power unit data set
PE	Protective Earth	Protective ground
PELV	Protective Extra-Low Voltage	Safety extra-low voltage
PFH	Probability of dangerous failure per hour	Probability of dangerous failure per hour
PG	Programmiergerät	Programming device
PI	Proportional integral	Proportional integral
PID	Proportional integral differential	Proportional integral differential
PLC	Programmable Logic Controller	Programmable logic controller
PLL	Phase-locked loop	Phase-locked loop
PM	Power Module	Power Module
PMSM	Permanent-Magnet Synchronous Motor	Permanent-magnet synchronous motor
PN	PROFINET	PROFINET
PNO	PROFIBUS Nutzerorganisation	PROFIBUS user organization
PPI	Point-to-Point Interface	Point-to-point interface
PRBS	Pseudo Random Binary Signal	White noise
PROFIBUS	Process Field Bus	Serial data bus
PS	Power Supply	Power supply
PSA	Power Stack Adapter	Power Stack Adapter
PT1000	-	Temperature sensor
PTC	Positive Temperature Coefficient	Positive temperature coefficient
PTP	Point-To-Point	Point-to-point
PWM	Pulse Width Modulation	Pulse width modulation
PZD	Prozessdaten	Process data
Q		
R		
r…	-	Display parameters (read only)
RAM	Random Access Memory	Speicher zum Lesen und Schreiben
RCCB	Residual Current Circuit Breaker	Residual current operated circuit breaker
RCD	Residual Current Device	Residual current operated circuit breaker
RCM	Residual Current Monitor	Residual current monitor
REL	Reluctance motor textile	Reluctance motor textile
RESM	Reluctance Synchronous Motor	Synchronous reluctance motor
RFG	Ramp-Function Generator	Ramp-function Generator

Abbreviation	Source of abbreviation	Significance
RJ45	Registered Jack 45	Term for an 8-pin socket system for data transmission with shielded or non-shielded multi-wire copper cables
RKA	Rückkühlanlage	Cooling unit
RLM	Renewable Line Module	Renewable Line Module
RO	Read Only	Read only
ROM	Read-Only Memory	Read-only memory
RPDO	Receive Process Data Object	Receive Process Data Object
RS232	Recommended Standard 232	Interface standard for a cable-connected serial data transmission between a sender and receiver (also known as EIA232)
RS485	Recommended Standard 485	Interface standard for a cable-connected differential, parallel, and/or serial bus system (data transmission between a number of senders and receivers, also known as EIA485)
RTC	Real-Time Clock	Real-time clock
RZA	Raumzeigerapproximation	Space-vector approximation
S		
S1	-	Continuous operation
S3	-	Intermittent duty
SAM	Safe Acceleration Monitor	Safe acceleration monitoring
SBC	Safe Brake Control	Safe brake control
SBH	Sicherer Betriebshalt	Safe operating stop
SBR	Safe Brake Ramp	Safe brake ramp monitoring
SBT	Safe Brake Test	Safe brake test
SCA	Safe Cam	Safe cam
SCC	Safety Control Channel	Safety Control Channel
SD Card	SecureDigital Card	Secure digital memory card
SDC	Standard Drive Control	Standard Drive Control
SDI	Safe Direction	Safe motion direction
SE	Sicherer Software-Endschalter	Safe software limit switch
SESM	Separately Excited Synchronous Motor	Separately excited synchronous motor
SG	Sicher reduzierte Geschwindigkeit	Safely-limited speed
SGA	Sicherheitsgerichteter Ausgang	Safety-related output
SGE	Sicherheitsgerichteter Eingang	Safety-related input
SH	Sicherer Halt	Safe stop
SI	Safety Integrated	Safety Integrated
SIC	Safety Info Channel	Safety Info Channel
SIL	Safety Integrity Level	Safety Integrity Level
SITOP	-	Siemens power supply system
SLM	Smart Line Module	Smart Line Module
SLP	Safely Limited Position	Safely Limited Position
SLS	Safely-Limited Speed	Safely-limited speed
SLVC	Sensorless Vector Control	Sensorless vector control

Abbreviation	Source of abbreviation	Significance
SM	Sensor Module	Sensor Module
SMC	Sensor Module Cabinet	Sensor Module Cabinet
SME	Sensor Module External	Sensor Module External
SMI	SINAMICS Sensor Module Integrated	SINAMICS Sensor Module Integrated
SMM	Single Motor Module	Single Motor Module
SN	Sicherer Software-Nocken	Safe software cam
SOS	Safe Operating Stop	Safe operating stop
SP	Service Pack	Service pack
SP	Safe Position	Safe position
SPC	Setpoint Channel	Setpoint channel
SPI	Serial Peripheral Interface	Serial peripheral interface
SPS	Speicherprogrammierbare Steuerung	Programmable logic controller
SS1	Safe Stop 1	Safe Stop 1 (monitored for time and ramp)
SS1E	Safe Stop 1 External	Safe Stop 1 with external stop
SS2	Safe Stop 2	Safe Stop 2
SS2E	Safe Stop 2 External	Safe Stop 2 with external stop
SSI	Synchronous Serial Interface	Synchronous serial interface
SSM	Safe Speed Monitor	Safe feedback from speed monitor
SSP	SINAMICS support package	SINAMICS support package
STO	Safe Torque Off	Safe torque off
STW	Steuerwort	Control word
T		
TB	Terminal Board	Terminal Board
TEC	Technology Extension	Software component which is installed as an additional technology package and which expands the functionality of SINAMICS (previously OA-application)
TIA	Totally Integrated Automation	Totally Integrated Automation
TM	Terminal Module	Terminal Module
TN	Terre Neutre	Grounded three-phase line supply
Tn	-	Integral time
TPDO	Transmit Process Data Object	Transmit Process Data Object
TT	Terre Terre	Grounded three-phase line supply
TTL	Transistor-Transistor Logic	Transistor-Transistor-Logik
Tv	-	Rate time
U		
UL	Underwriters Laboratories Inc.	Underwriters Laboratories Inc.
UPS	Uninterruptible Power Supply	Uninterruptible power supply
USV	Unterbrechungsfreie Stromversorgung	Uninterruptible power supply
UTC	Universal Time Coordinated	Universal time coordinated
V		
VC	Vector Control	Vector control
Vdc	-	DC-link voltage

Abbreviation	Source of abbreviation	Significance
VdcN	-	Partial DC-link voltage negative
VdcP	-	Partial DC-link voltage positive
VDE	Verband Deutscher Elektrotechniker	Verband Deutscher Elektrotechniker [Association of German Electrical Engineers]
VDI	Verein Deutscher Ingenieure	Verein Deutscher Ingenieure [Association of German Engineers]
VPM	Voltage Protection Module	Voltage Protection Module
Vpp	Volt peak to peak	Volt peak to peak
VSM	Voltage Sensing Module	Voltage Sensing Module
W		
WEA	Wiedereinschaltautomatik	Automatic restart
WZM	Werkzeugmaschine	Machine tool
X		
XML	Extensible Markup Language	Extensible markup language (standard language for Web publishing and document management)
Y		
Z		
ZK	Zwischenkreis	DC link
ZM	Zero Mark	Zero mark
ZSW	Zustandswort	Status Word

Index

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