LXM32M

PROFINET Module

User Guide

Original instructions

0198441114106.03
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PROFI® INDUSTRIAL ETHERNET NET

www.se.com

Schneider Electric™

Legal Information

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Qualification of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by modifying the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used.

The qualified person must be able to detect possible hazards that may arise from parameterization, modifying parameter values and generally from mechanical, electrical, or electronic equipment.

The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

Intended Use

The products described or affected by this document are, along with software, accessories and options, servo-drive systems for three-phase servo motors.

The products are intended for industrial use according to the instructions, directions, examples, and safety information contained in the present user guide and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.

Prior to using the products, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety-related measures must be implemented.

Since the products are used as components in an overall machine or process, you must ensure the safety of persons by means of the design of this overall machine or process.

Operate the products only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted as described herein is prohibited and may result in unanticipated hazards.

About the Book

Document Scope

The information provided in this user guide supplements the user guide of the servo drive LXM32M.

The functions described in this user guide are only intended for use with the associated product. You must read and understand the appropriate user guide of the drive.

Validity Note

This user guide applies to the module PROFINET for the servo drive LXM32M, module identification PNT (VW3M3308).

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to www.se.com/ww/en/work/support/green-premium/.

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of documentation	Reference number
LXM32M - PROFINET Module - User Guide (this user guide)	0198441114106 (eng) 0198441114107 (fre) 0198441114105 (ger)
Lexium 32M - Servo Drive - User Guide	0198441113767 (eng) 0198441113768 (fre) 0198441113766 (ger) 0198441113770 (spa) 0198441113769 (ita) 0198441113771 (chi)

Product Related Information

⚠WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS 7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems” or their equivalent governing your particular location.

For reasons of Internet security, for those devices that have a native Ethernet connection, TCP/IP forwarding is disabled by default. Therefore, you must manually enable TCP/IP forwarding. However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

⚠WARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT NETWORK INTRUSION

- Observe and respect any and all pertinent national, regional and local cybersecurity and/or personal data laws and regulations when enabling TCP/IP forwarding on an industrial network.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Consult the Schneider Electric Cybersecurity Best Practices for additional information.

Use the latest firmware version. Visit https://www.se.com or contact your Schneider Electric representative for information on firmware updates that may involve Ethernet connections.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Introduction

Fieldbus Devices on the PROFINET Network

General

PROFINET is an Ethernet-based fieldbus which allows you to network products from different manufacturers without the need for special interface adaptation.

Different products with a PROFINET interface can be operated in the same fieldbus segment. PROFINET provides a common basis for interchanging commands and data between the network devices.

Functions

The following functions can be performed via the fieldbus:

- Reading and writing parameters
- Reading and writing inputs and outputs
- Diagnostics and monitoring functions

Networking the Product

The product is networked via an RJ45 interface and operates as an IO device on the PROFINET network.

Data is exchanged according to the producer-consumer model.

Basics

The information contained in this chapter provides a general overview of the various protocols of the fieldbus as it applies to the equipment in the present document. It is not intended as a thorough treatment of the subject, nor is it a sufficient basis to design and deploy a fieldbus network in any given application.

The following information is intended to be consulted in an as needed, as is basis. Only appropriately trained persons who are familiar with and have the education and training necessary to understand the contents of this information, as well as all other pertinent product documentation, are authorized to work on and with this equipment.

Conformance Classes

PROFINET is a communication protocol based on Industrial Ethernet.

Depending on the application area, PROFINET functionality is subdivided into 3 classes:

- Conformance class A (CC-A)
- Conformance class B (CC-B)
- Conformance class C (CC-C)

Conformance Class A (CC-A)

Conformance class A provides basic functions for cyclic real-time communication and acyclic TCP/IP communication. Typical applications include building automation.

Conformance Class B (CC-B)

Conformance class B adds network diagnostics, SNMP and topology information to conformance class A. Typical applications include process automation.

Conformance Class C (CC-C)

Conformance class C adds bandwidth reservation and synchronization to conformance class B. Typical applications include positioning systems.

Supported Conformance Class

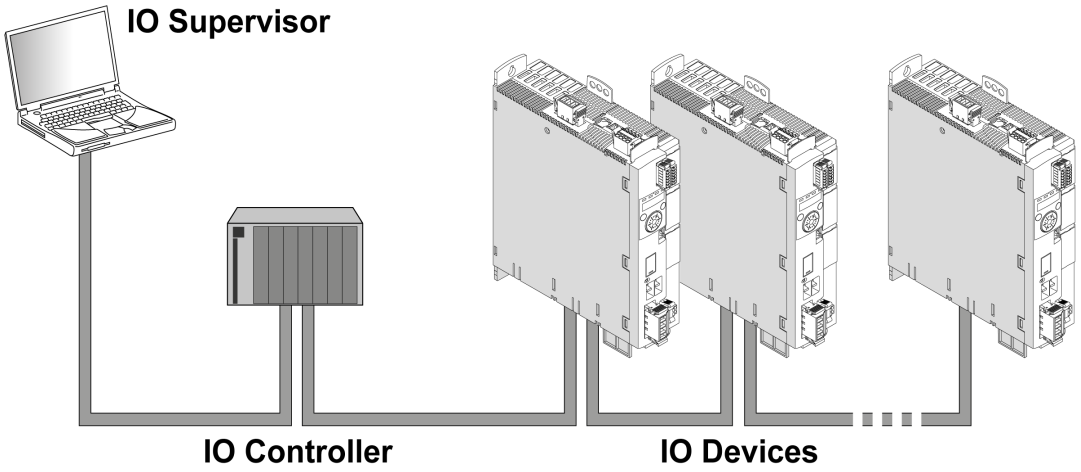
The drive LXM32M with the module PROFINET supports conformance class B (CC-B).

Network Topology

A PROFINET network consists of the following components:

- PROFINET IO supervisor
  (corresponds to the definition of a PROFIBUS master class 2)
- One or several PROFINET IO controllers
  (corresponds to the definition of a PROFIBUS master class 1)
- One or several PROFINET IO devices
  (corresponds to the definition of a PROFIBUS slave)

The PROFINET network uses CAT5e Ethernet cable.



IO Supervisor

The IO supervisor allows for commissioning and network diagnostics. Examples of IO supervisors:

- PCs
- HMIs
- Programming devices

IO Controller

The IO controller sends the output data to the IO device and receives the input data from the IO device. Examples of IO controllers:

- Automation devices, for example, logic controllers

IO Devices

The IO device receives commands form the IO controller and sends status information to the IO controller. Examples of IO devices:

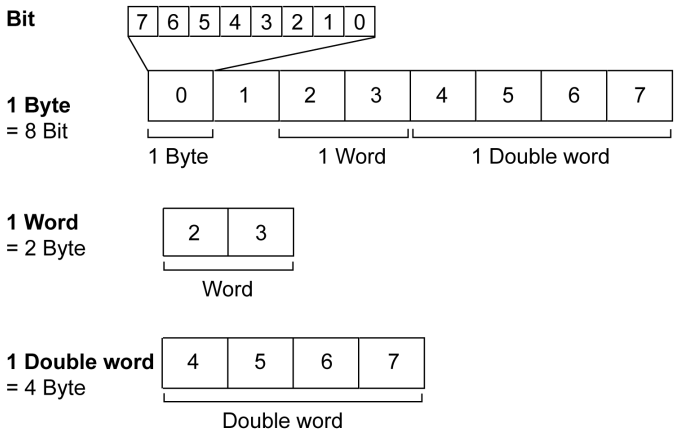
- Input/output modules
- Drive systems
- Sensors and actuators

Data Structure

Overview

Byte, word and double word values are shown in hexadecimal notation. Hexadecimal values are indicated as such by means of an "h" behind the numerical value, for example, "31_h". Decimal values have no special identification. Note the different counting format of bits (right to left) and bytes (left to right).

General data structure from bit to double word



Used Byte Sequence: Big Endian Format

The bytes are transmitted in Big Endian format.

Cyclic Communication - Overview

Input Data and Output Data

With the output data, the IO controller sends a command to the IO device, for example, in order to start an operating mode, trigger a function, perform a movement or request status information. The IO device executes the command and acknowledges it with a confirmation.

The exchange of data follows a fixed pattern:

- Output data to the IO device: The IO controller places a command in the output data memory. From there, it is transmitted to the IO device and executed.
- Input data from IO device: The IO device acknowledges the command in the input data. If the command was successfully executed, the IO controller receives an acknowledgement without an error message.

The IO controller cannot send a new command unless it has received acknowledgement concerning the ongoing command. Acknowledgement information and error messages are included in the transmitted data in bit-coded form.

The IO controller receives up-to-date input data from the IO device during each cycle. The input data contains acknowledgement information concerning a transmitted command and status information.

The data of the cyclic communication comprise 2 parts:

- Process data channel
- Parameter channel (optional)

The selection of the drive profile determines whether or not the parameter channel is to be used.

Process Data Channel

The process data channel is used for realtime data exchange, for example the actual position or the actual velocity. Transmission is fast because the data is sent without additional administration data and data transmission acknowledgement from the recipient is not required.

The IO controller can control the operating states of the IO device via the process data channel, for example:

- Enabling and disabling the power stage
- Starting and terminating operating modes
- Starting and terminating movements
- Triggering a "Quick Stop" / resetting a "Quick Stop"
- Resetting an error message

Changing operating states and activating operating modes must be done separately. An operating mode can only be started if the operating state of the drive is **6** Operation Enabled.

Parameter Channel

The IO controller can request a parameter value from the IO device or change a parameter value via the parameter channel. Each parameter can be uniquely addressed via the index and subindex.

Drive Profile

The product supports the following drive profiles:

- Profile 104: "Drive Profile Lexium 1" (vendor-specific)
- Profile 105: "Drive Profile Lexium 2" (vendor-specific)

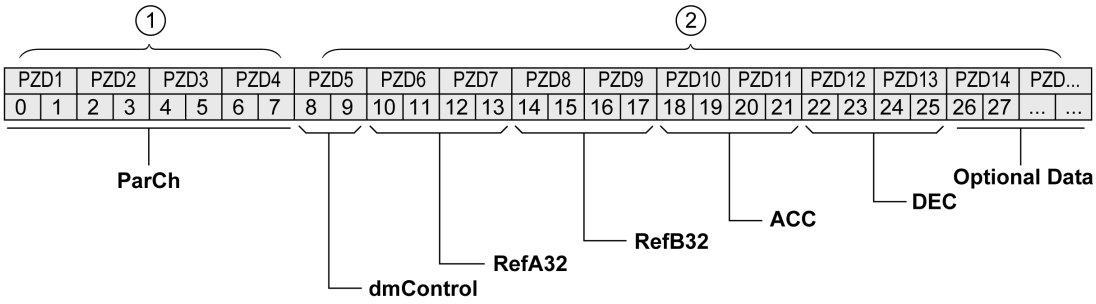
Profile 104 "Drive Profile Lexium 1"	**Profil 105: "Drive Profile Lexium 2"**
Profile with 26 bytes	Profile with 10 bytes
Advanced functionality	Core functionality
With parameter channel (8 bytes)	Without parameter channel

Cyclic Communication - Structure of the Output Data

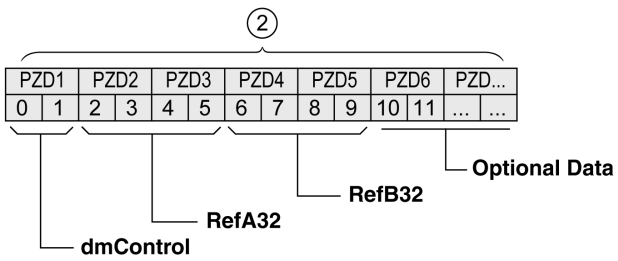
Overview

The output data is used to transmit requests from the IO controller to the IO device.

Output data "Drive Profile Lexium 1", profile 104



Output data "Drive Profile Lexium 2", profile 105



1 Parameter channel

2 Process data channel

Parameter Channel “ParCh”

Parameters can be read or written via "ParCh", see Cyclic Communication - Parameter Channel, page 18.

Word “dmControl”

The word "dmControl" is used to set the operating state and the operating mode.

See Changing the Operating State via Fieldbus, page 35 and Starting and Changing an Operating Mode, page 37 for a detailed description of the bits.

Double Words “RefA32” and “RefB32”

The two double words "RefA32" and "RefB32" are used to set two values for the operating mode. The meaning depends on the operating mode; it is described in the sections on the individual operating modes.

Double Words “ACC” and “DEC”

The two double words "ACC" and "DEC" are used to set the values for the acceleration ramp and the deceleration ramp. The acceleration ramp corresponds to the parameter *RAMP_v_acc*, the deceleration ramp corresponds to the parameter *RAMP_v_dec*.

Bytes “Optional Data”

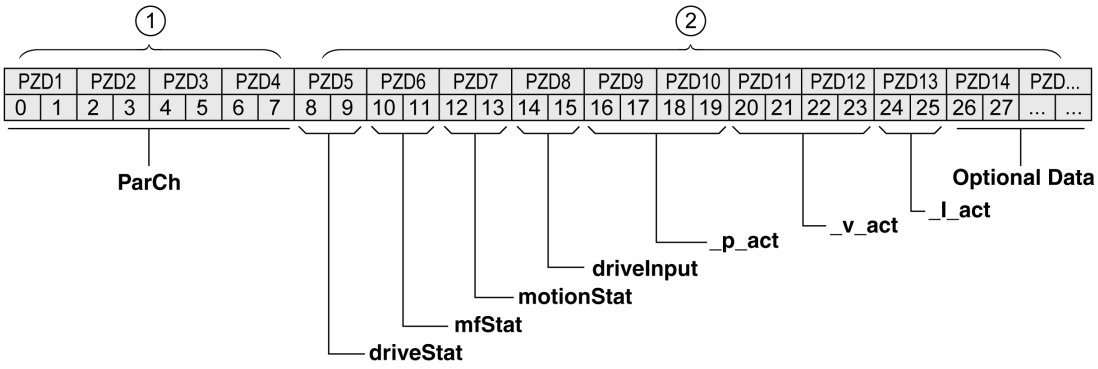
"Optional Data" is used to append additional parameters to the profile that can be selected by the user (mapping). See Settings with the Configuration Tool STEP7 - V13 (TIA Portal), page 32 for additional information on mapping.

Cyclic Communication - Structure of the Input Data

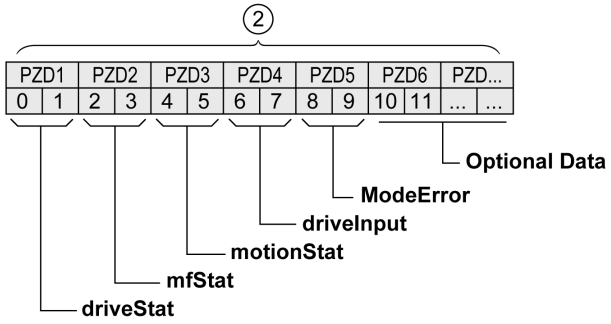
Overview

The input data is used to transmit information from the IO device to the IO controller.

Input data "Drive Profile Lexium 1", profile 104



Input data "Drive Profile Lexium 2", profile 105



1 Parameter channel

2 Process data channel

Parameter Channel “ParCh”

Parameters can be read or written via "ParCh", see Cyclic Communication - Parameter Channel, page 18.

Word “driveStat”

The current operating state is indicated with the "driveStat" word.

For a detailed description of the bits, see Indication of the Operating State via Fieldbus, page 35.

Word “mfStat”

The word "mfStat" is used to indicate the current operating mode.

For a detailed description of the bits, see Indicating an Operating Mode, page 36.

Word “motionStat”

The word "motionStat" is used to provide information on the motor and profile generator.

Bit	Meaning
1	Positive limit switch triggered(1)
2	Negative limit switch triggered(1)
3 ... 5	Reserved
6	MOTZ: Motor at a standstill

Bit	Meaning
7	MOTP: Motor movement in positive direction
8	MOTN: Motor movement in negative direction
9	Setting via parameter DS402intLim
10	Setting via parameter DPL_intLim
11	TAR0: Profile generator at standstill
12	DEC: Profile generator decelerates
13	ACC: Profile generator accelerates
14	CNST: Profile generator moves at constant velocity
15	Reserved

(1)	With firmware version ≥V01.14

Word “driveInput”

The word "driveInput" is used to indicate the status of the digital signal inputs.

Bit	Signal	Factory setting
0	*DI0*	Signal input function Freely Available
1	*DI1*	Signal input function Reference Switch (REF)
2	*DI2*	Signal input function Positive Limit Switch (LIMP)
3	*DI3*	Signal input function Negative Limit Switch (LIMN)
4	*DI4*	Signal input function Freely Available
5	*DI5*	Signal input function Freely Available
6 ... 7	-	Reserved
8	*DI11* (module IOM1)	Signal input function Freely Available
9	*DI12* (module IOM1)	Signal input function Freely Available
10	*DI13* (module IOM1)	Signal input function Freely Available
11	*DI14* (module IOM1)	Signal input function Freely Available
12 ... 15	-	Reserved

Double Word “_p_act”

The double word "_p_act" indicates the actual position. The value corresponds to the parameter *_p_act*.

Double Word “_v_act”

The double word "_v_act" can be parameterized. You can select the parameter *_v_act* (actual velocity) or the parameter *_n_act* (actual speed of rotation), see Mapping for “_v_act”, page 33.

Word “_I_act”

The word "_I_act" is used to provide information on the total motor current. The value corresponds to the parameter *_I_act*.

Word “ModeError”

The word "ModeError" is used to provide the vendor-specific error code that caused the ModeError to be set. The ModeError bit relates to MT-dependent parameters. The value corresponds to the parameter *_ModeError*.

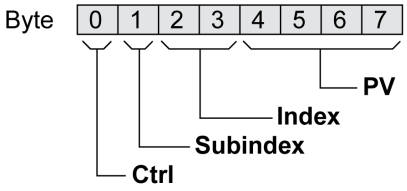
Bytes “Optional Data”

"Optional Data" is used to append additional parameters to the profile that can be selected by the user (mapping). See Settings with the Engineering Software TIA Portal, page 32 for additional information on mapping.

Cyclic Communication - Parameter Channel

Overview

The IO controller can request a parameter value from the IO device or change a parameter value via the parameter channel. Each parameter can be uniquely addressed via the index and subindex.



Byte “Ctrl”

Byte "Ctrl" contains the request to read or write a parameter.

The output data contains the information whether a parameter is to be read or written. The input data contains the information whether the read request or the write request were successful.

Output data:

Ctrl	Function
00_h	No request
10_h	Read request
20_h	Write request (word)
30_h	Write request (double word)

Input data:

Ctrl	Function
00_h	Request not yet completed
10_h	Read request or write request successfully completed (word)
20_h	Read request or write request successfully completed (double word)
70_h	Error message

Only one request can be processed at a time. The IO device provides the response until the IO controller sends a new request. If a response includes parameter values, the IO device responds with the current value in the case of a repetition.

Read requests are only executed by the IO device if the value changes from 00_h to 10_h. Write requests requests are only executed by the IO device if the value changes from 00_h to 20_h or to 30_h.

Byte “Subindex”

The byte "Subindex" must be set to the value 00_h.

Word “Index”

The word "Index" contains the parameter address.

Double Word “PV”

The double word "PV" contains the parameter value.

In the case of a read request, the value in the output data has no significance. The input data contains the parameter value.

In the case of a write request, the output data contains the value to be written to the parameter. The input data contains the parameter value.

If a read request or a write request were not successful, the double word "PV" contains the error number of the error.

Example: Reading a Parameter

In the example, the program number of the product is read from the parameter *_prgNoDEV*. The parameter *_prgNoDEV* has the parameter address 258 (01_h 02_h).

The parameter value read has the decimal value 91200 which corresponds to 01_h 64_h 40_h.

Output data:

Ctrl	Subindex	Index	PV
10_h	00_h	01_h 02_h	00_h 00_h 00_h 00_h

Input data:

Ctrl	Subindex	Index	PV
20_h	00_h	01_h 02_h	00_h 01_h 64_h 40_h

Example: Writing of an Invalid Parameter

In this example, the value of a non-existent parameter is to be changed. The parameter has the parameter address 101 (00_h 65_h). The value of the parameters is to be changed to 222 (DE_h).

Before the IO device can accept a new request, the value 00_h must first be transmitted in byte "Ctrl".

Since the IO device cannot address the parameter, a synchronous error message is transmitted with the input data. Byte "Ctrl" is set to 70_h. Double word "PV" is set to the error number (error number 1101_h: Parameter does not exist).

Output data:

Ctrl	Subindex	Index	PV
30_h	00_h	00_h 65_h	00_h 00_h 00_h DE_h

Input data:

Ctrl	Subindex	Index	PV
70_h	00_h	00_h 65_h	00_h 00_h 11_h 01_h

Cyclic Communication - Handshake via the "Mode Toggle" Bit

Mode Toggle

The "Drive Profile Lexium" uses synchronous communication. In the case of synchronous communication, the IO controller waits for a response from the IO device prior to new actions.

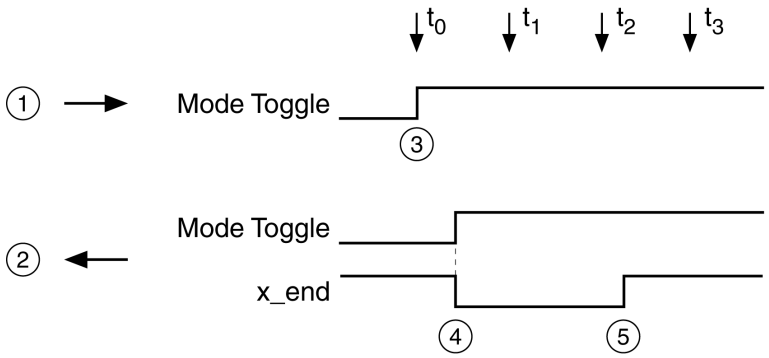
Synchronous communication is controlled by means of the appropriate bits in the output data and the input data:

- Output data: In the word "dmControl" by means of the bit "Mode Toggle"
- Input data: In the byte "mfStat" by means of the bit "ModeError" and the bit "Mode Toggle"

The bit "Mode Toggle" is effective with a rising edge and a falling edge.

Example 1: Positioning

The IO controller starts a movement at point in time t_0. At points in time t_1, t_2 ..., the IO controller verifies the responses from the IO device. It waits for the end of the movement. The end of the movement is detected when bit "x_end" =1.



1 Output data

2 Input data

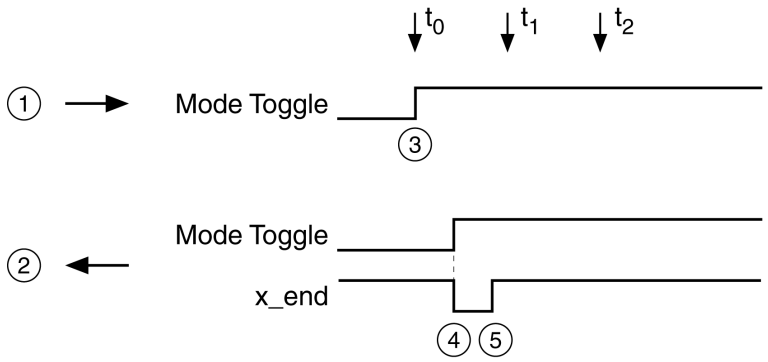
3 IO controller starts movement: Bit "Mode Toggle" = 1.

4 IO device reports "Movement running": Bit "Mode Toggle" = 1, bit "x_end" = 0.

5 IO device reports "Movement terminated": Bit "x_end" = 1.

Example 2: Short-Distance Movement

The IO controller starts a short-distance movement at point in time t_0. The duration is shorter than the request cycle of the IO controller. At point in time t_1 the movement is terminated. Bit "x_end" does not allow the IO controller to detect whether the movement is already terminated or has not yet been started. However, it can identify the current state with the "Mode Toggle" bit.



1 Output data

2 Input data

3 IO controller starts movement: Bit "Mode Toggle" = 1.

4 IO device reports "Movement running": Bit "Mode Toggle" = 1 and bit "x_end" = 0.

5 IO device reports "Movement terminated": Bit "x_end" = 1.

Acyclic Communication - Overview

Overview

In addition to cyclic communication, the IO controller and the IO device can also communicate acyclically. This includes, for example, station-specific, module-specific and channel-specific diagnostics, as well as various alarm types for diagnostics.

Acyclic communication enables the change of parameters during operation, but it is slower than the cyclic communication. Additionally, an acyclic communication is used for error messages via "Diagnostics Alarm", page 47.

Acyclic Communication - Parameter Channel

The IO device supports acyclic data exchange with an IO controller and an IO supervisor.

Structure of acyclic communication:

- IO controller sends WRITE Request with data (read parameter or write parameter).
- IO device confirms write request with WRITE Response.
- IO controller sends READ Request.
- IO device confirms read request with READ Response. Depending on the request, several READ Request / READ Response cycles without data transmission may be required before the IO device can provide the data with a READ Response.

Acyclic Communication: Elements

The following items are defined for acyclic communication:

	Data type	Value
REQUEST REFERENCE	Unsigned 8	00_h: Reserved 01_h ... FF_h
REQUEST ID	Unsigned 8	01_h: Request Parameter

	Data type	Value
		02_h: Change Parameter
RESPONSE ID	Unsigned 8	Response (+) 00_h: Reserved 01_h: Request Parameter (+) 02_h: Change Parameter (+) Response (-) 81_h: Request Parameter (-) 82_h: Change Parameter (-)
AXIS	Unsigned 8	01_h
NO. OF PARAMETERS	Unsigned 8	01_h ...17_h: 1 ... 23 DWORD (240 data bytes)
ATTRIBUTE	Unsigned 8	00_h: Reserved 01_h: Value
NO. OF ELEMENTS	Unsigned 8	00_h: Special Function 01_h ... EA_h: Quantity 1 ... 234
PARAMETER NUMBER	Unsigned 16	00_h: Reserved 0001_h ... $FFFF_h$: Parameter Index
SUBINDEX	Unsigned 16	0000_h (Drive Profile Lexium)
FORMAT	Unsigned 8	42_h: WORD 43_h: DWORD 44_h: ERROR
NO. OF VALUES	Unsigned 8	00_h ... EA_h: Quantity 0 ... 234
ERROR NUMBER	Unsigned 16	0000_h ... 0064_h Error codes

Acyclic Communication - Example: Reading a Parameter (with Configuration Tool STEP 7)

Sending WRITE Request

Administration data:

WRITE Request		Description
Index	47	Index (Drive Profile Lexium: 47)
Length	10	10 bytes payload

Payload data:

Byte	Name	Value	Description
0	REQUEST REFERENCE	01_h	Reference number for parameter request
1	REQUEST ID	01_h	Request Parameter
2	AXIS	01_h	Axis 1
3	NO. OF PARAMETERS	01_h	1 parameter is transmitted
4	ATTRIBUTE	10_h	Parameter value (access)
5	NO. OF ELEMENTS	00_h	Access to direct value (>0: sub-elements)

Byte	Name	Value	Description
6, 7	PARAMETER NUMBER	0104_h	Firmware version (1.2)
8, 9	SUBINDEX	0000_h	Subindex: In drive profile Lexium 0

Sending READ Request

Administration data:

READ Request		Description
Index	47	Index (Drive Profile Lexium: 47)
Length	10	10 bytes receive buffer

Receiving READ Response

Administration data:

READ Response		Description
Index	47	Index (Drive Profile Lexium: 47)
Length	8	8 bytes payload

Payload data:

Byte	Name	Value	Description
0	RESPONSE REFERENCE	01_h	Mirrored reference number of parameter request
1	RESPONSE ID	01_h	Positive response for requested parameter
2	AXIS	01_h	Mirrored axis number (axis 1)
3	NO. OF PARAMETERS	01_h	1 parameter is transmitted.
4	FORMAT	42_h	Parameter format (WORD)
5	NO. OF VALUES	01_h	Access to 1 value
6, 7	VALUE	$xxxx_h$	Value of the parameter

Installation

Installation of the Module

Mechanical Installation

Electrostatic discharge (ESD) may permanently damage the module either immediately or over time.

NOTICE

EQUIPMENT DAMAGE DUE TO ESD

- Use suitable ESD measures (for example, ESD gloves) when handling the module.
- Do not touch internal components.

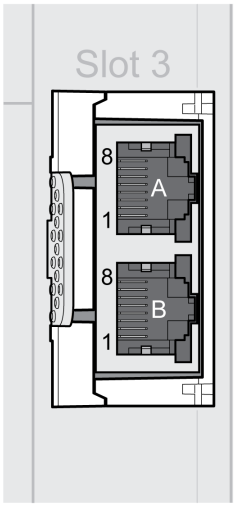
Failure to follow these instructions can result in equipment damage.

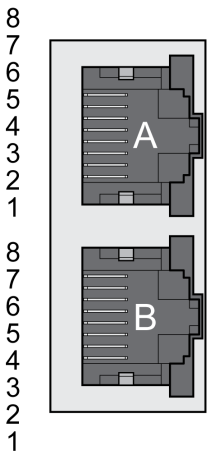
Install the module according to the instructions in the user guide of the drive.

Cable Specifications

Category:	Cat 5e
Connection:	RJ45
Shield:	Required, both ends grounded
Twisted Pair:	Required (no crossover cable)
Cable composition:	8 * 0.25 mm^2 (8 * AWG 22)
Maximum cable length:	100 m

Pin Assignment





Pin	Signal	Meaning
1	*Tx+*	Ethernet transmit signal +
2	*Tx-*	Ethernet transmit signal -
3	*Rx+*	Ethernet receive signal +
4	-	-
5	-	-

Pin	Signal	Meaning
6	*Rx*-	Ethernet receive signal -
7	-	-
8	-	-

Commissioning

Preparation

Description

This chapter describes how to commission the product.

The product is unable to detect an interruption of the network link if connection monitoring is not active.

⚠WARNING

LOSS OF CONTROL

- Ensure that connection monitoring is enabled.
- Set the shortest, practical monitoring time cycles to detect communication interruptions as quickly as possible.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only start the system if there are no persons or obstructions in the zone of operation.
- Do not write values to reserved parameters.
- Do not write values to parameters unless you fully understand the function.
- Run initial tests without coupled loads.
- Verify correct word order for fieldbus communication.
- Do not establish a fieldbus connection unless you have fully understood the communication principles.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Required Components

The following is required for commissioning:

- Commissioning software “Lexium32 DTM Library”

  https://www.se.com/ww/en/download/document/Lexium_DTM_Library/
- Fieldbus converter for the commissioning software for connection via the commissioning interface
- GSD file

  https://www.se.com/ww/en/download/document/LXM32 Profinet GSD File/
- PROFINET IO controller
- Lexium 32M Drive User Guide and this user guide, LXM32M PROFINET Module User Guide

GSD File

The properties of an IO device are described in a GSD file (General Station Description). The GSD file is provided by the manufacturer of the product and must be read using the configuration tool of the IO controller.

The GSD file contains information on the operation of the IO device on the PROFINET network.

- Manufacturer information
- Profile class (IO device)
- Device identification
- Time intervals
- Settings of inputs and outputs

Setting the IP Address

Overview

The IP address of the device can be set by means of the following methods:

- DCP (Discovery Configuration Protocol)
- Manual setting

Factory Setting

The factory setting for the IP address is **DCP**.

This setting does not have to be changed if the configuration tool of the IO controller is used.

Manual Setting

If a connection is to be established without the configuration tool of the IO controller, the IP address can also be set manually.

The IP address can be set manually via the HMI or the commissioning software Lexium DTM Library.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

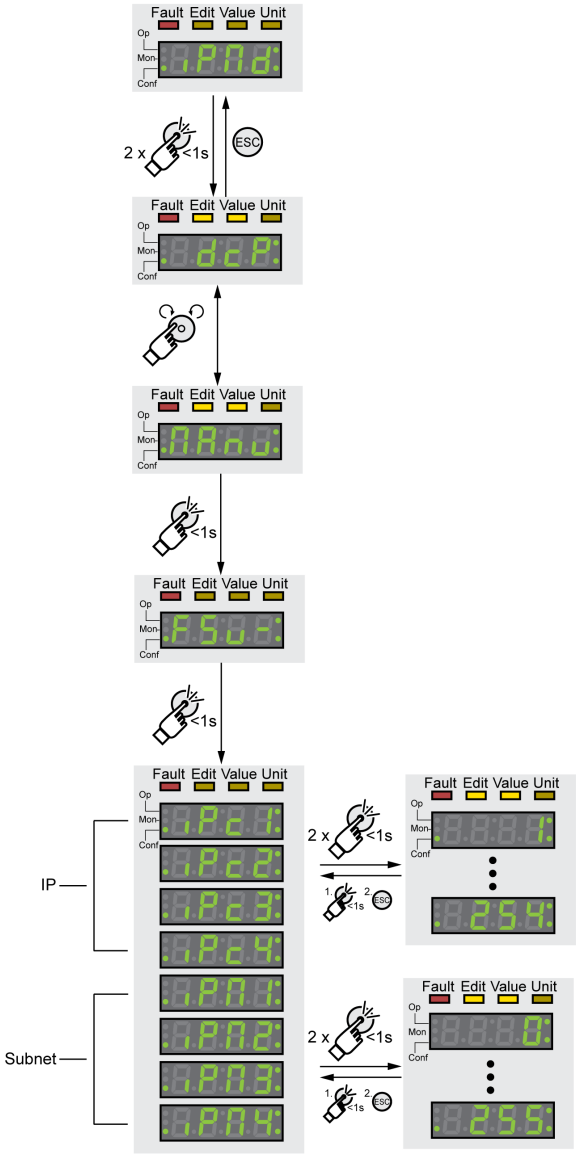
- Verify that the devices have unique IP addresses.
- Verify that you use the correct IP address to address the intended device.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Even if the setting for IP address is set to **Manual**, the IP address can be overwritten by the configuration tool of the IO controller.

Manual Setting via HMI

HMI menu: CONF -> CON - -> IPAD



Manual Setting via Commissioning Software

The method of obtaining the IP address can be set via the parameter *PntIpMode*.

Set the parameter to the value “Manual” to set the IP address manually.

Parameter name **HMI menu** **HMI name**	**Description**	**Unit** **Minimum value** **Factory setting** **Maximum value**	**Data type** **R/W** **Persistent** **Expert**	**Parameter address via fieldbus**
PntIpMode CONF → CON- IPMD	Method of obtaining IP address. **0 / Manual /** MANU: Manual **3 / DCP /** dcP: DCP	- 0 3 3	UINT16 R/W per. -	CANopen 3048:2$_h$ Modbus 18436 Profibus 18436 CIP 172.1.2 ModbusTCP 18436 EtherCAT 3048:2$_h$ PROFINET 18436

The parameters *PntIPAddress1* ... *PntIPAddress4* let you set the IP address.

Parameter name **HMI menu** **HMI name**	**Description**	**Unit** **Minimum value** **Factory setting** **Maximum value**	**Data type** **R/W** **Persistent** **Expert**	**Parameter address via fieldbus**
PntIPAddress1 CONF → COM - IPC 1	IP address, byte 1. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:7$_h$ Modbus 18446 Profibus 18446 CIP 172.1.7 ModbusTCP 18446 EtherCAT 3048:7$_h$ PROFINET 18446
PntIPAddress2 CONF → COM - IPC 2	IP address, byte 2. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:8$_h$ Modbus 18448 Profibus 18448 CIP 172.1.8 ModbusTCP 18448 EtherCAT 3048:8$_h$ PROFINET 18448
PntIPAddress3 CONF → COM - IPC 3	IP address, byte 3. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:9$_h$ Modbus 18450 Profibus 18450 CIP 172.1.9 ModbusTCP 18450 EtherCAT 3048:9$_h$ PROFINET 18450
PntIPAddress4 CONF → COM - IPC 4	IP address, byte 4. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:A$_h$ Modbus 18452 Profibus 18452 CIP 172.1.10 ModbusTCP 18452 EtherCAT 3048:A$_h$ PROFINET 18452

The parameters *PntIPmask1* ... *PntIPmask4* let you set the subnet mask.

Parameter name HMI menu HMI name	Description	Unit Minimum value Factory setting Maximum value	Data type R/W Persistent Expert	Parameter address via fieldbus
PntIPmask1 CONF → COM- IPM1	IP address subnet mask, byte 1. Modified settings become active the next time the product is powered on.	- 0 255 255	UINT16 R/W per. -	CANopen 3048:B_h Modbus 18454 Profibus 18454 CIP 172.1.11 ModbusTCP 18454 EtherCAT 3048:B_h PROFINET 18454
PntIPmask2 CONF → COM- IPM2	IP address subnet mask, byte 2. Modified settings become active the next time the product is powered on.	- 0 255 255	UINT16 R/W per. -	CANopen 3048:C_h Modbus 18456 Profibus 18456 CIP 172.1.12 ModbusTCP 18456 EtherCAT 3048:C_h PROFINET 18456
PntIPmask3 CONF → COM- IPM3	IP address subnet mask, byte 3. Modified settings become active the next time the product is powered on.	- 0 255 255	UINT16 R/W per. -	CANopen 3048:D_h Modbus 18458 Profibus 18458 CIP 172.1.13 ModbusTCP 18458 EtherCAT 3048:D_h PROFINET 18458
PntIPmask4 CONF → COM- IPM4	IP address subnet mask, byte 4. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:E_h Modbus 18460 Profibus 18460 CIP 172.1.14 ModbusTCP 18460 EtherCAT 3048:E_h PROFINET 18460

The parameters *PntIPgate1* ... *PntIPgate4* let you set the gateway.

Parameter name HMI menu HMI name	Description	Unit Minimum value Factory setting Maximum value	Data type R/W Persistent Expert	Parameter address via fieldbus
PntIPgate1 CONF → COM - IPG 1	IP address gateway, byte 1. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:F_h Modbus 18462 Profibus 18462 CIP 172.1.15 ModbusTCP 18462 EtherCAT 3048:F_h PROFINET 18462
PntIPgate2 CONF → COM - IPG2	IP address gateway, byte 2. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:10_h Modbus 18464 Profibus 18464 CIP 172.1.16 ModbusTCP 18464 EtherCAT 3048:10_h PROFINET 18464
PntIPgate3 CONF → COM - IPG3	IP address gateway, byte 3. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:11_h Modbus 18466 Profibus 18466 CIP 172.1.17 ModbusTCP 18466 EtherCAT 3048:11_h PROFINET 18466
PntIPgate4 CONF → COM - IPG4	IP address gateway, byte 4. Modified settings become active the next time the product is powered on.	- 0 0 255	UINT16 R/W per. -	CANopen 3048:12_h Modbus 18468 Profibus 18468 CIP 172.1.18 ModbusTCP 18468 EtherCAT 3048:12_h PROFINET 18468

Setting the Device Name

Overview

The device name consists of two parts:

- Device name text
- Device name extension (5 additional numbers appended with a “-”)

Example: UserDefinedName-12345

Each device must have a unique device name on the network.

Factory Setting

The device name is empty (no device name text is set and the device name extension is set to 0).

Setting the Device Name Text

The device name text can be set via a PROFINET commissioning software or via the configuration tool of the IO controller.

If no user-defined device name text is set, but if a device name extension is set, then the device name text is set automatically to **lxm32m**.

Setting the Device Name Extension

The value set via the device name extension is appended to the device name text with a “-”. The additional number is appended either to the user-defined device name text or to the automatic device name text.

The additional number is stored as a 5 digit value with leading zeros. Example for value 12: “-00012”.

The device name extension can be set via the parameter *DevNameExtAddr*.

If the parameter is set to the value 0, the device name extension is empty instead of “-00000”.

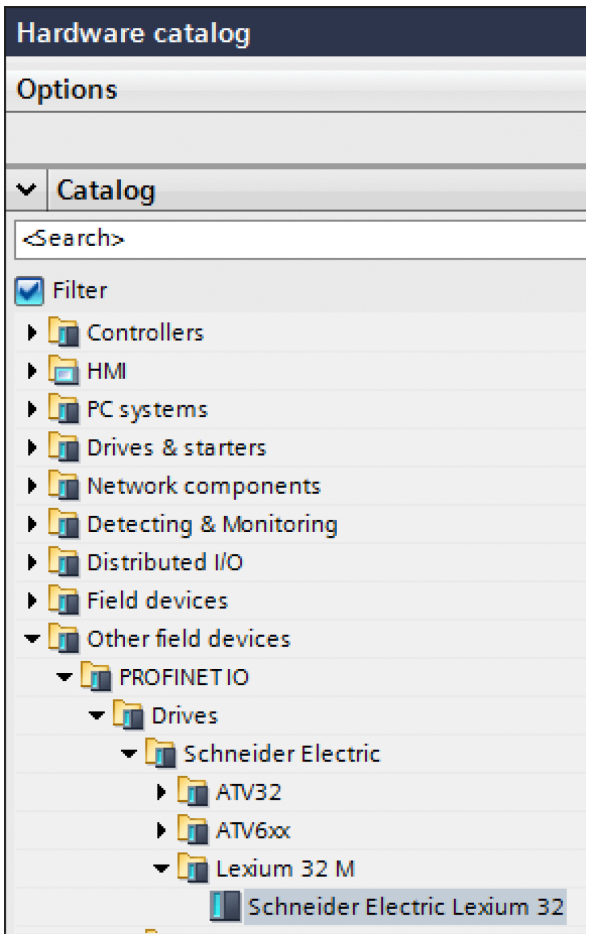
Parameter name **HMI menu** **HMI name**	**Description**	**Unit** **Minimum value** **Factory setting** **Maximum value**	**Data type** **R/W** **Persistent** **Expert**	**Parameter address via fieldbus**
DevNameExtAddr CONF → CON- dnEA	Value for device name extension. Modified settings become active the next time the product is powered on.	- 0 0 65535	UINT16 R/W per. -	CANopen 303E:11$_h$ Modbus 15906 Profibus 15906 CIP 162.1.17 ModbusTCP 15906 EtherCAT 303E:11$_h$ PROFINET 15906

Settings with the Engineering Software TIA Portal

GSD File

The GSD file must be read with the configuration tool of the IO controller. The device is then known to the network.

In the Hardware catalog, select the device "Schneider Electric Lexium 32" from the list.



Selecting the Drive Profile

The configuration tool of the IO controller lets you select the drive profile to be used.

In the Device overview, select the required drive profile ("Drive Profile Lexium 1" or "Drive Profile Lexium 2") in slot 1. See Cyclic Communication - Overview, page 13 for additional information on the drive profiles.

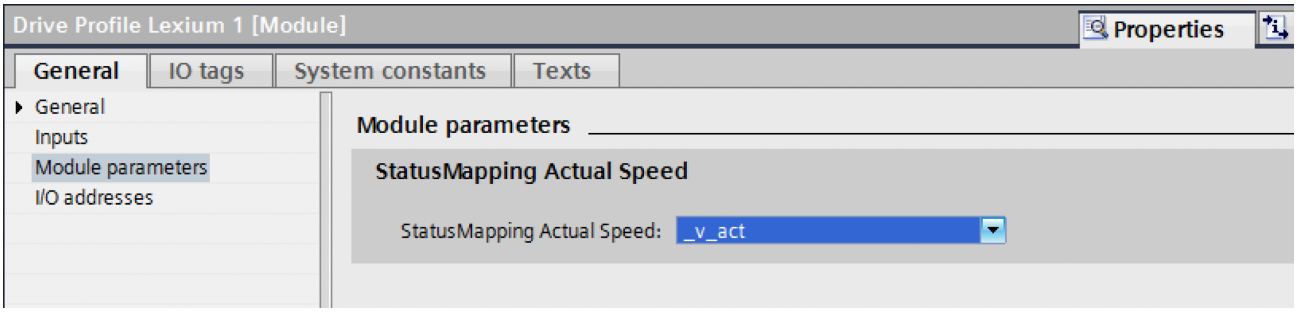
Device overview

...	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware	Comment
	LXM32M	0	0	2042*		Schneider Electric Lexium 32	LXM32Mxxxxxx		
	X1	0	0 X1	2041*		schneider-dev			
	Drive Profile Lexium 1	0	1	256...281	256...281	Drive Profile Lexium 1			
		0	2						
		0	3						
		0	4						
		0	5						
		0	6						
		0	7						
		0	8						
		0	9						

Mapping for "_v_act"

In the drive profile "Drive Profile Lexium 1", the double word "_v_act" can be parameterized. In the properties of the drive profile "Drive Profile Lexium 1", you

can select the parameter *_v_act* (actual velocity) or *_n_act* (actual speed of rotation).

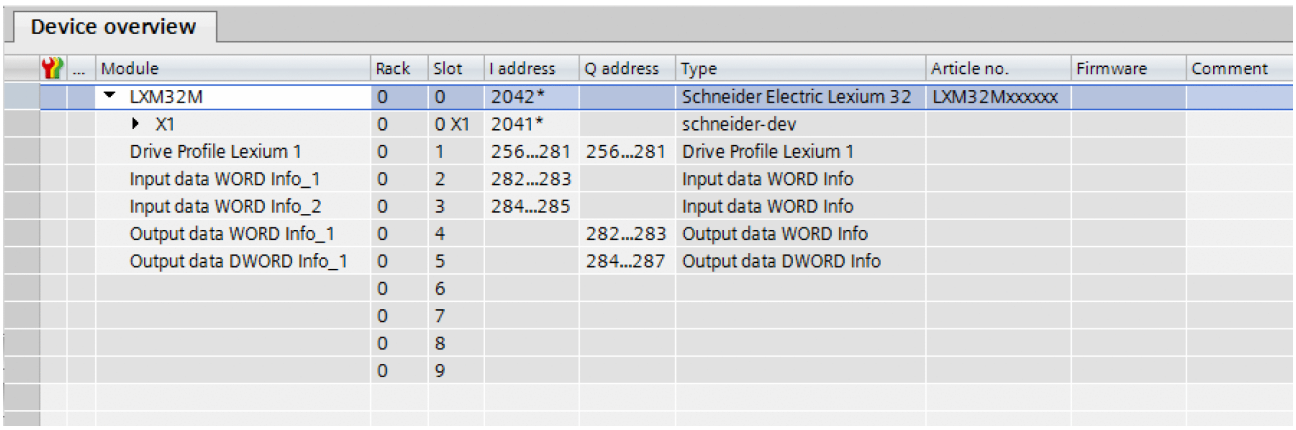


Additional Parameters in "Optional Data"

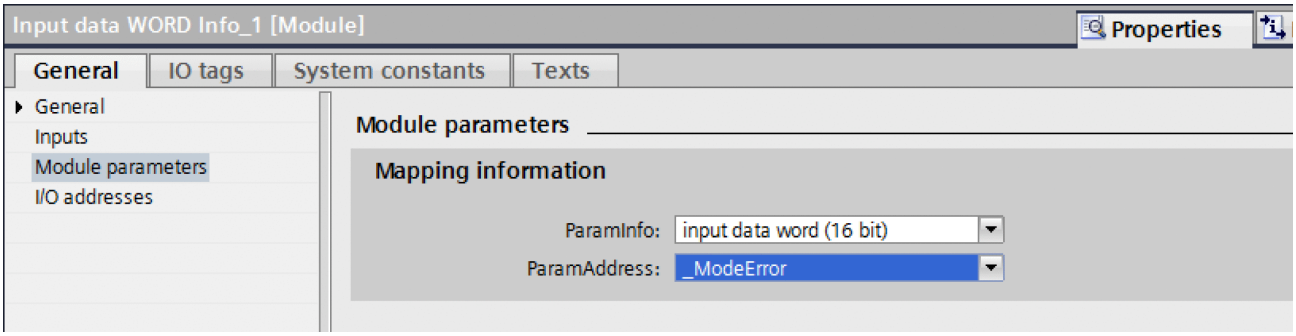
The configuration tool of the IO controller lets you set the additional parameters to be transmitted in the output data and the input data in the range "Optional Data".

There are up to 8 slots in which 8 additional parameters can be set. The total length of the data frame of the output data and the input data must not exceed 40 bytes.

Set the required additional parameters in slots 2 ... 9 in the Device overview.



...	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware	Comment
	LXM32M	0	0	2042*		Schneider Electric Lexium 32	LXM32Mxxxxxx		
	X1	0	0 X1	2041*		schneider-dev			
	Drive Profile Lexium 1	0	1	256...281	256...281	Drive Profile Lexium 1			
	Input data WORD Info_1	0	2	282...283		Input data WORD Info			
	Input data WORD Info_2	0	3	284...285		Input data WORD Info			
	Output data WORD Info_1	0	4		282...283	Output data WORD Info			
	Output data DWORD Info_1	0	5		284...287	Output data DWORD Info			
		0	6						
		0	7						
		0	8						
		0	9						

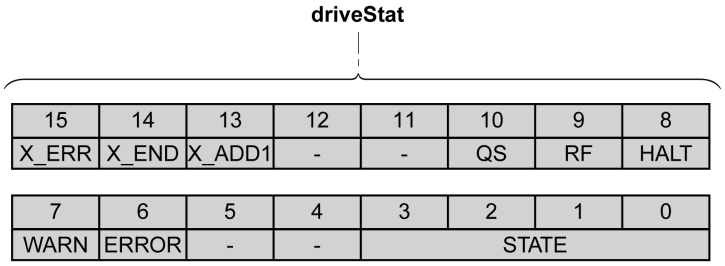


Operating States and Operating Modes

Operating States

Indication of the Operating State via Fieldbus

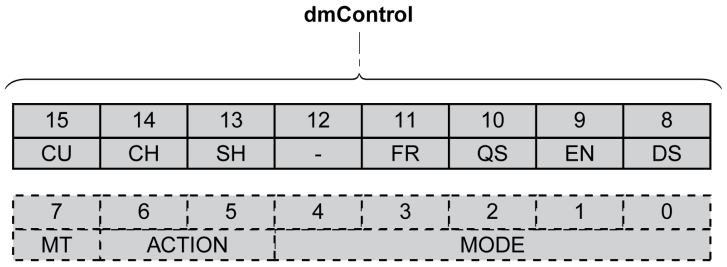
The operating state is indicated with the word "driveStat".



bit	Name	Meaning
0 ... 3	STATE	Operating state (binary coded) **1** Start **2** Not Ready To Switch On **3** Switch On Disabled **4** Ready To Switch On **5** Switched On **6** Operation Enabled **7** Quick Stop Active **8** Fault Reaction Active **9** Fault
4 ... 5	-	Reserved
6	ERROR	Error detected (error classes 1 ... 3)
7	WARN	Error detected (error class 0)
8	HALT	"Halt" is active
9	RF	Homing valid
10	QS	"Quick Stop" is active
11 ... 12	-	Reserved
13	X_ADD1	Operating mode-specific information
14	X_END	Operating mode terminated
15	X_ERR	Operating mode terminated with error

Changing the Operating State via Fieldbus

Bits 8 ... 15 of the word "dmControl" are used to set the operating state.



Bit	Name	Meaning	Operating state
8	DS	Disabling the power stage	**6** Operation Enabled -> **4** Ready To Switch On
9	EN	Enabling the power stage	**4** Ready To Switch On -> **6** Operation Enabled
10	QS	Perform "Quick Stop"	**6** Operation Enabled -> **7** Quick Stop Active
11	FR	Perform "Fault Reset"	**7** Quick Stop Active -> **6** Operation Enabled **9** Fault -> **4** Ready To Switch On
12	-	Reserved	Reserved
13	SH	Execute "Halt"	**6** Operation Enabled
14	CH	Clear "Halt"	**6** Operation Enabled
15	CU	Resume operating mode interrupted by "Halt"	**6** Operation Enabled

In the case of an access, the bits respond to a 0->1 change to trigger the corresponding function.

If a request for changing the operating state is not successful, this request is ignored. There is no error response.

If the bits 8 ... 15 are set to 0, the power stage will be disabled.

Ambivalent bit combinations are treated in accordance with the following priority list (highest priority bit 8, lowest priority bit 14 and bit 15):

- Bit 8 (disable power stage) prior to bit 9 (enable power stage)
- Bit 10 ("Quick Stop") prior to bit 11 ("Fault Reset")
- Bit 13 (execute "Halt") prior to bit 14 (clear "Halt") and bit 15 (resume operating mode interrupted by "Halt")

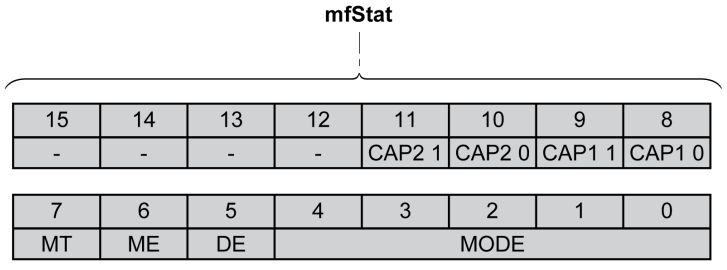
In the case of an error of error class 2 or error class 3, a "Fault Reset" can only be performed when bit 9 (enable power stage) is no longer set.

Operating Modes

Indicating an Operating Mode

Indicating an Operating Mode

The word “mfStat” is used to indicate the set operating mode.

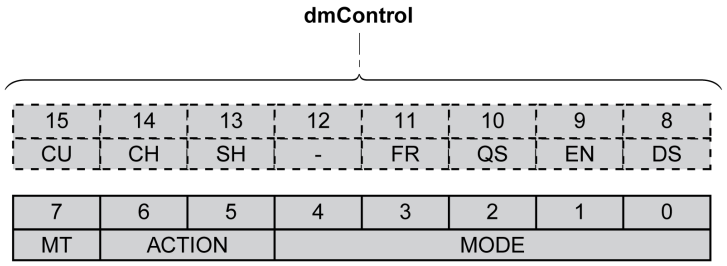


bit	Name	Description
0 ... 4	MODE	Indicates the set operating mode Value 01_h: Profile Position Value 03_h: Profile Velocity Value 04_h: Profile Torque Value 06_h: Homing Value $1D_h$: Motion Sequence Value $1E_h$: Electronic Gear Value $1F_h$: Jog
5	DE	The bit “DE” (Data Error) relates to parameters that are independent of the bit “MT” (Mode Toggle). The bit “DE” (Data Error) is set if a data value in the process data channel is invalid.
6	ME	The bit “ME” (Mode Error) relates to parameters that are dependent on the bit “MT” (Mode Toggle). The bit “ME” (Mode Error) is set if a request (for example, starting an operating mode) was rejected.
7	MT	Bit “MT” (Mode Toggle)
8 ... 9	CAP1	Bit 0 and bit 1 of parameter *_Cap1Count*
10 ... 11	CAP2	Bit 0 and bit 1 of parameter *_Cap2Count*
12 ... 15	-	Reserved

Starting and Changing an Operating Mode

Starting and Changing an Operating Mode

Bits 0 ... 7 in the word “dmControl” are used to set the operating mode.



bit	Name	Description
0 ... 4	MODE	Operating Mode Value 01_h: Profile Position Value 03_h: Profile Velocity Value 04_h: Profile Torque Value 06_h: Homing Value $1D_h$: Motion Sequence Value $1E_h$: Electronic Gear Value $1F_h$: Jog
5 ... 6	AC-TION	Operating mode-dependent
7	MT	Bit “MT” (Mode Toggle)

Via the following values the operating mode can be activated or target values can be changed:

- Target values, depending on required operating mode
- Operating mode in “dmControl”, bits 0 ... 4 (MODE).
- Action for this operating mode in bit 5 and bit 6 (ACTION)
- Toggle bit 7 (MT)

The following sections describe the possible operating modes, functions and the corresponding target values.

Overview of Operating Modes

Operating Mode	**dmControl** **Bits 0 ... 6** **MODE+ACTION**	**RefA32**	**RefB32**
JOG	$1F_h$	Value 0: No movement Value 1: Slow movement in positive direction Value 2: Slow movement in negative direction Value 5: Fast movement in positive direction Value 6: Fast movement in negative direction	-
Electronic Gear: Position synchronization without compensation movement	$1E_h$	As *GEARdenom*	As *GEARnum*
Electronic Gear: Position synchronization with compensation movement	$3E_h$	As *GEARdenom*	As *GEARnum*
Electronic Gear: Velocity synchronization	$5E_h$	As *GEARdenom*	As *GEARnum*
Profile Torque: Via analog input	04_h	-	-
Profile Torque: Via parameter	24_h	As *PTtq_target*	As *RAMP_tq_slope*
Profile Torque: Via PTI interface	44_h	-	-
Profile Velocity: Via analog input	03_h	-	-
Profile Velocity: Via parameter	23_h	As *PVv_target*	-
Profile Position: Absolute	01_h	As *PPv_target*	As *PPp_target*
Profile Position: Relative with reference to the currently set target position	21_h	As *PPv_target*	As *PPp_target*
Profile Position: Relative with reference to the motor position	41_h	As *PPv_target*	As *PPp_target*
Homing: Position setting	06_h	-	As *HMp_setP*
Homing: Reference Movement	26_h	As *HMmethod*	-
Motion Sequence: Start sequence	$1D_h$	Data set number	Value 1: Use data set number
Motion Sequence: Start individual data set	$3D_h$	Data set number	-

Operating Mode Jog

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
$1F_h$	Value 0: No movement Value 1: Slow movement in positive direction Value 2: Slow movement in negative direction Value 5: Fast movement in positive direction Value 6: Fast movement in negative direction	-

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	Reserved
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Value 0 RefA
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Electronic Gear

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Position synchronization without compensation movement	$1E_h$	As *GEARdenom*	As *GEARnum*
Position synchronization with compensation movement	$3E_h$	As *GEARdenom*	As *GEARnum*
Velocity synchronization	$5E_h$	As *GEARdenom*	As *GEARnum*

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	1: Reference velocity reached(1)
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

(1)	Only with method Velocity synchronization and with active velocity window.

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Profile Torque

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Via analog input	04_h	-	-
Via parameter	24_h	As *PTtq_target*	As *RAMP_tq_slope*
Via PTI interface	44_h	-	-

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	0: Target torque not reached 1: Target torque reached
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Profile Velocity

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Via analog input	03_h	-	-
Via parameter	23_h	As *PVv_target*	-

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	0: Target velocity not reached 1: Target velocity reached
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Profile Position

Starting the operating mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Absolute	01_h	As *PPv_target*	As *PPp_target*
Relative with reference to the currently set target position	21_h	As *PPv_target*	As *PPp_target*
Relative with reference to the current motor position	41_h	As *PPv_target*	As *PPp_target*

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	0: Target position not reached 1: Target position reached
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Target position reached
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Homing

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Position setting	06_h	-	As *HMp_setP*
Reference movement	26_h	As *HMmethod*	-

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	Reserved
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Homing successful
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Operating Mode Motion Sequence

Starting the Operating Mode

The operating mode is set and started in the process data channel with the output data.

Method	dmControl Bits 0 ... 6 MODE+ACTION	RefA32	RefB32
Start sequence	$1D_h$	Data set number	Value 1: Use data set number
Start individual data set	$3D_h$	Data set number	-

Status Information

The word "driveStat" provides information on the operating mode.

bit	Name	Meaning
13	X_ADD1	1: End of a sequence
14	X_END	0: Operating mode started 1: Operating mode terminated
15	X_ERR	0: No error detected 1: Error detected

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Individual data set terminated
- Individual data set of a sequence terminated (waiting for transition condition to be fulfilled)
- Sequence terminated
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

Diagnostics and Troubleshooting

Fieldbus Communication Error Diagnostics

Verifying Connections

A properly operating fieldbus is essential for evaluating status and error messages.

If the product cannot be addressed via the fieldbus, first verify the connections.

Verify the following connections:

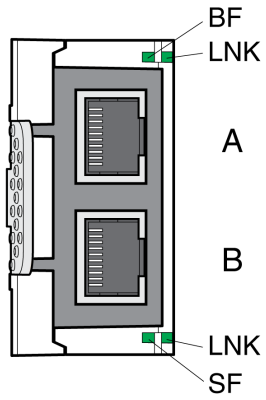
- System power supply
- Supply connections
- Fieldbus cables and wiring
- Fieldbus connection

Fieldbus Function Test

If the connections are correct, verify that you can address the product on the fieldbus.

Fieldbus Status LEDs

The fieldbus status LEDs represent the status of the fieldbus.



LED **LNK**

2.4 s	**Meaning**
	No link
	Link, 100 MBit, no activity
	Link, 100 MBit, activity
	Link, 10 MBit, no activity
	Link, 10 MBit, activity

LED **SF**

2.4 s	Meaning
	Device is powered off
	Internal error detected
	Ready for operation
	IO controller in state "Stop", communication interrupted or invalid configuration
	Startup test (after successful initialization)
	No communication with IO controller (waiting for IO controller)
	Device detection (DCP), synchronized flashing with LED **BF**

LED **BF**

2.4 s	Meaning
	No IP address or the device is powered off
	Startup test (after successful initialization)
	General communication error detected
	IP address valid
	Double IP address detected
	Device detection (DCP), synchronized flashing with LED **SF**

Error Messages

Overview

Error messages generated during operation on network are received by the IO controller via the fieldbus.

The following error messages are possible:

- Synchronous errors
- Asynchronous errors

Error Message in Parameter Channel

If a command cannot be processed in the parameter channel, the IO controller receives a synchronous error message from the IO device.

In the case of a synchronous error message, the input data contains the following information:

Ctrl	Subindex	Index	PV
70_h	00_h	Contains the address of the parameter	Contains the error number

Error Message in Process Data Channel

If a command cannot be processed in the process data channel, bit 6 (ModeError, ME) in the word "mfStat" is set in the input data.

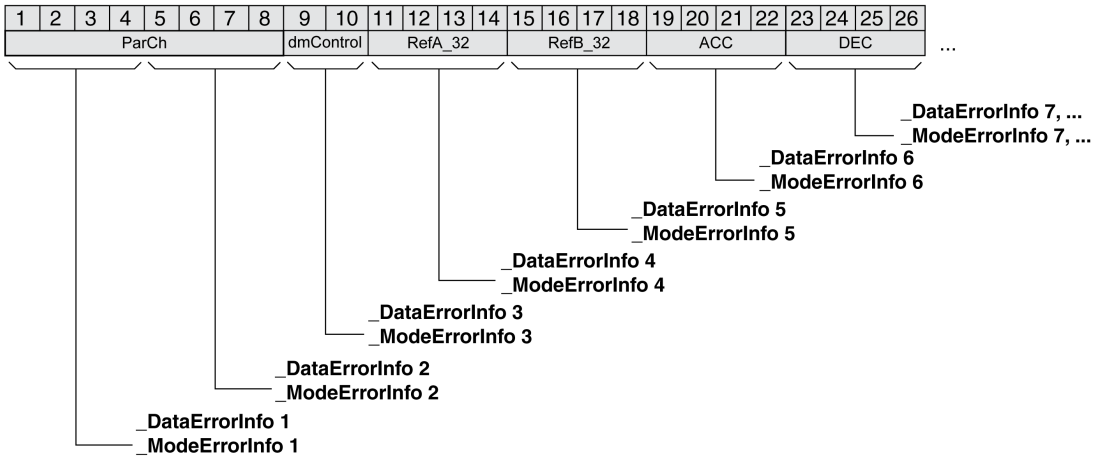
Data such as position and velocity is transmitted via the process data channel. If the data is not accepted (for example, if the value is outside of the permissible range), bit 5 (DataError, DE) is set in the input data in the word "mfStat".

Bit	Name	Description
5	DE	The DataError bit relates to parameters that are independent of "Mode Toggle" (MT). It is set if a data value in the process data channel is invalid.
6	ME	The ModeError bit relates to parameters that are dependent on "Mode Toggle" (MT). It is set if a request from a IO controller (starting an operating mode) was rejected.

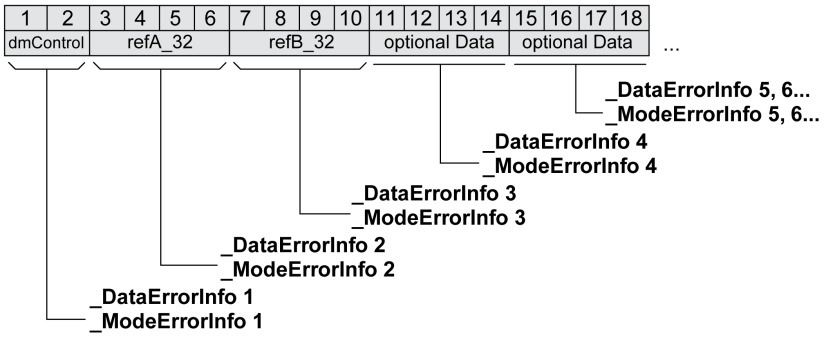
If DE or ME are set, this does not interrupt the ongoing movement. To determine the cause of the error, the IO controller can read the error number from the parameters *_DataError, 6966:00* and *_ModeError, 6962:00*.

In order to identify the parameter that has caused the DE bit or the ME bit to be set, the position of the parameter can be read from the parameters *_DataErrorInfo, 6970:00* and *_ModeErrorInfo, 6968:00*.

Overview for “Drive Profile Lexium 1”



Overview for “Drive Profile Lexium 2”



The error message is reset when the next valid data frame is transmitted.

Asynchronous Errors

Asynchronous errors are triggered by internal monitoring functions (for example, temperature) or by external monitoring functions (for example, limit switch).

Asynchronous errors are indicated in the following way:

- Transition to operating state **7** Quick Stop Active or to operating state **9** Fault (see "driveStat", bits 0 ... 3)
- Setting of:
  - "driveStat" bit 6 (error of error classes 1 ... 4)
  - "driveStat" bit 7 (error of error class 0)
  - "driveStat", bit 15 (operating mode terminated with detected error).

The error bits have the following meaning:

- Bit 6

  Error of error classes 1 ... 4

  The cause is contained in parameter *_LastError* in a bit-coded way.
- Bit 7

  Error of error class 0

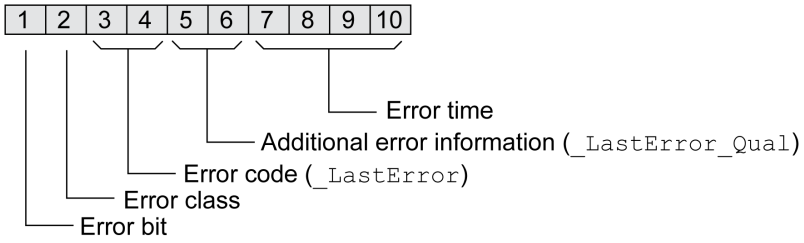
  The error information is contained in parameter *_LastWarning* in a bit-coded way.
- Bit 15

  Indicates whether the operating mode was terminated by an error.

Error Message via "Diagnostics Alarm"

If an error of error classes 1 ... 4 is detected, the IO device sends a "Diagnostics Alarm" to the IO controller.

Error message via "Diagnostics Alarm"



Glossary

B

Big Endian format:

Big-endian means that the most significant byte of a word is stored at the smallest memory address and the least significant byte is stored at the largest.

D

DE:

DataError-Bit. The DataError bit relates to parameters that are independent of "Mode Toggle" (MT). It is set if a data value in the process data channel is invalid.

Direction of movement:

In the case of a rotary motors, direction of movement is defined in accordance with IEC 61800-7-204: Positive direction is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.

DOM:

Date **o**f **m**anufacturing: The nameplate of the product shows the date of manufacture in the format DD.MM.YY or in the format DD.MM.YYYY. For example:

31.12.19 corresponds to December 31, 2019

31.12.2019 corresponds to December 31, 2019

E

EMC:

Electromagnetic compatibility

Error class:

Classification of errors into groups. The different error classes allow for specific responses to errors, for example by severity.

Error:

Discrepancy between a detected (computed, measured or signaled) value or condition and the specified or theoretically correct value or condition.

F

Factory settings:

Settings when the product is shipped.

Fault Reset:

Function used to exit the operating state Fault. Before the function is used, the cause of the detected error must be removed.

Fault:

Fault is an operating state. If the monitoring functions detect an error, a transition to this operating state is triggered, depending on the error class. A "Fault Reset" or a power cycle are required to exit this operating state. Prior to this, the cause of the detected error must be removed. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

G

GSD file:

A file that is provided by the vendor and contains specific information on the product.

L

Limit switch:

Switches that signal overtravel of the permissible movement range.

Little Endian format:

Little-endian means that the least significant byte of a word is stored at the smallest memory address and the most significant byte is stored at the largest.

M

ME:

ModeError-Bit. The ModeError bit relates to parameters that are dependent on "Mode Toggle" (MT). It is set if a request (for example, starting an operating mode) was rejected.

MT:

Mode Toggle, toggling a bit from 0 -> 1 or 1 -> 0

Q

Quick Stop:

The function can be used for fast deceleration of a movement as a response to a detected error or via a command.

T

Toggle:

See MT, Mode Toggle

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I

O

P

Q

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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