Inverter

9400

E94AYAE

SM301 safety module_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Software manual EN

13303780

Lenze

Overview of technical documentation for Servo Drives 9400

Project planning, selection & ordering

- ☐ Hardware manual 9400
- 🖹 Catalogue / electronic catalogue (DSC - Drive Solution Catalogue)

Mounting & wiring

- 🖹 MA 9400 StateLine/HighLine/PLC
- 🖹 MA for the communication module
- 🖹 MA for the extension module
- 🖹 MA for the safety module
- 🖹 MA for the accessories
- 🖹 MA - remote maintenance components

Parameter setting

- 🖹 BA keypad
- ☐ SW - Lenze software »Engineer«
- ☐ SW - controller (9400 StateLine/HighLine/PLC)
- ☐ SW - regenerative power supply module
- ☐ KHB for the communication module
- ☐ SW - extension module
- ☐ **SW - safety module** ← **This documentation**
- ☐ SW - Lenze technology application
- ☐ SW - function library 9400

Configuring & programming

- ☐ SW - Lenze software »Engineer«
- ☐ SW - Lenze software »PLC Designer«
- ☐ SW - controller (9400 HighLine/PLC)
- ☐ KHB for the communication module
- ☐ SW - extension module
- ☐ **SW - safety module** ← **This documentation**
- ☐ SW - Lenze technology application
- ☐ SW - function library 9400

Drive commissioning

- 🖹 Commissioning guidelines
- ☐ SW - controller (9400 StateLine/HighLine/PLC)
- ☐ Remote maintenance manual

Networking

- ☐ KHB for the communication medium used

Legend:

- 🖹 Printed documentation
- ☐ Online documentation (PDF/Engineer online help)

Abbreviations used:

BA	Operating Instructions
KHB	Communication manual
MA	Mounting instructions
SW	Software manual

Contents

Contents

1 About this documentation

This documentation contains information on how to parameterise & configure the SM301 safety module.

Note!

This documentation supplements the manual for the safety module and the documentation for the controller.

The manual for the safety module contains safety instructions which must be observed!

Target group

This documentation addresses to persons who want to parameterise, configure, and diagnose an SM301 safety module attached to the Servo Drives 9400 using the L-force »Engineer« engineering software.

Information regarding the validity

The information in this documentation applies to:

Safety module	Type designation	From hardware version	From software version
SM301	E94AYAE	VA	1.00

This safety module can be used together with the following standard devices:

Product series	Type designation	From hardware version	From software version
Servo Drives 9400	E94AxxExxxx	VA	1.49

- The use of the safety module in version 1.3 with parameter set version 1.3 and support of the 2-encoder concept requires standard devices of the 9400 product series from nameplate inscription:

Product series	Type designation	From hardware version	From software version
Servo Drives 9400	E94AxHExxxx	VA	07.xx
Servo Drives 9400	E94AxPExxxx	2A	02.xx

- The use of the safety module in version 1.4 with parameter set version 1.4 and support of the resolver as motor encoder requires standard devices of the 9400 product series from nameplate inscription:

Product series	Type designation	From hardware version	From software version
Servo Drives 9400	E94AxHExxxx	VA	08.xx
Servo Drives 9400	E94AxPExxxx	2A	02.xx

Tip!

Information and tools regarding the Lenze products can be found in the Internet:

http://www.Lenze.com → Download

1.1 Document history

Version			Description
2.3	11/2013	TD05	Supplements and conversion to new layout
2.2	10/2011	TD05	Supplements
2.1	09/2010	TD05	Extended by new functions for SM301 V1.4
2.0	09/2009	TD05	New edition due to reorganisation of the company Extended by new functions for SM301 V1.3
1.3	10/2007	TD05	Extended by new functions for SM301 V1.2
1.2	04/2007	TD05	Extended by new functions for SM301 V1.1
1.1	10/2006	TD05	Error corrections
1.0	09/2006	TD05	First edition for SM301 V1.0

1.2 Conventions used

This documentation uses the following conventions to distinguish between different types of information:

Type of information	Writing	Examples/notes
Spelling of numbers		
Decimal separator	Point	The decimal point is always used. Example: 1234.56
Text		
Version information	Blue text colour	All information that applies to from a certain software version of the drive onwards are marked accordingly in this documentation. Example: This function extension is available from software version V3.0!
Program name	» «	The Lenze PC software »Engineer«...
Window	*italics*	The *Message* window ... / The *Options* dialog box...
Variable names		By setting *bEnable* to TRUE...
Control element	**bold**	The **OK** button... / The **Copy** command... / The **Properties** tab... / The **Name** input field...
Sequence of menu commands		If the execution of a function requires several commands, the individual commands are separated by an arrow: Select **File→Open** to...
Shortcut	**<bold>**	Press **<F1>** to open the online help.
		If a command requires a combination of keys, a "+" is placed between the key symbols: Use **<Shift>+<ESC>** to...
Hyperlink	Underlined	Optically highlighted reference to another topic. It is activated with a mouse-click in this online documentation.
Icons		
Page reference	(📖 6)	Optically highlighted reference to another page. In this online documentation activated via mouse-click.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning	
Engineering tools	Software solutions for easy engineering in all project stages	
		»EASY Navigator« – provides a good guide to the user • All convenient Lenze engineering tools at a glance • Tools can be selected quickly • The clear structure simplifies the engineering process from the start
		»Engineer« – multi-device engineering • For all products in our L-force portfolio • Practical user interface • Graphic interfaces make it easy to navigate • Can be applied in every phase of a project (project planning, commissioning, production) • Parameter setting and configuration
Code	"Container" for one or several parameters used for controller parameter setting or monitoring.	
Subcode	If a code contains several parameters, they are stored in "subcodes". In the documentation, the slash "/" is used as a separator between the code and the subcode (e.g. "C00118/3").	
Function block	A function block (FB) can be compared with an integrated circuit that contains a specific control logic and delivers one or several values when being executed. • An instance (reproduction, copy) of the function block is always inserted in the circuit. • It is also possible to insert several instances of a function block in a circuit. • Each instance has an unequivocal identifier (the instance name) and a processing number which defines the position at which the function block is calculated during the task cycle.	
System block	System blocks provide interfaces to basic functions and hardware of the controller in the function block editor of the »Engineer« (e.g. to the digital inputs). • System blocks cannot be instanced in contrast to function blocks.	

1.4 Definition of the notes used

The following signal words and symbols are used in this documentation to indicate dangers and important information:

Safety instructions

Layout of the safety instructions:

Danger!

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph	Signal word	Meaning
	Danger!	**Danger of personal injury through dangerous electrical voltage** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	Danger!	**Danger of personal injury through a general source of danger** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
STOP	**Stop!**	**Danger of property damage** Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph	Signal word	Meaning
	Note!	Important note to ensure trouble-free operation
	Tip!	Useful tip for easy handling
		Reference to another document

2 Introduction

Drive-based safety with L-force | 9400

The controllers of the L-force | 9400 range can be equipped with a safety module. The functional range of the safety module types varies in order to optimally implement different applications.

"Integrated safety technology" stands for user-related safety functions that are applicable to the protection of persons working with machines and the machine protection.

The motion functions are still executed by the controller. The safety module monitors the safe compliance with the limit values and provides the safe inputs and outputs. When the limit values are exceeded, the safety module starts the control functions in accordance with EN 60204-1 directly in the controller.

The safety functions are suitable for applications in accordance with IEC 61508 up to SIL 3 and meet, depending on the module, the requirements of EN ISO 13849-1 up to control category 4 and Performance Level (PL) "e".

2.1 Terms and abbreviations used in drive-based safety

Abbreviation	Meaning
9400	Lenze servo controller
EC_STO	Error class stop 0
EC_SS1	Error class stop 1
EC_SS2	Error class stop 2
EC_FS	Error class fail-safe
Cat.	Category in accordance with EN 954-1
OSSD	Output Signal Switching Device, tested signal output
PS	PROFIsafe
PWM	Pulse width modulation
SD-In	Safe input ("Safe Digital Input")
SD-Out	Safe output ("Safe Digital Output")
SIL	Safety Integrity Level in accordance with IEC 61508
SM	Safety module
Optocoupler supply	Supply of optocouplers to control the power drivers
PELV	Protective Extra Low Voltage
SELV	Safety Extra Low Voltage
OFF state	Signal state of the sensors when they are activated or respond.
ON state	Signal state of the sensors in normal operation
PM	P/N switched signal paths
PP	P/P switched signal paths
GSD	File with device-specific data for establishing PROFIBUS communication
GSDML	File with device-specific data for establishing PROFINET communication.
AIS	Restart acknowledgement ("Acknowledge In Stop")
AIE	Error acknowledgement ("Acknowledge In Error")

Abbreviation	Safety function
SDI	Safe direction
SLI	Safely limited increment
SLS	Safely limited speed
SOS	Safe operating stop
SS1	Safe stop 1
SS2	Safe stop 2
SSM	Safe speed monitor
STO	Safe torque off • Formerly: safe standstill
SMS	Safe maximum speed
SSE	Safe stop emergency
ES	Enable switch
OMS	Operation mode selector